

Probability Board

DCS # 1A20.10 Status Active

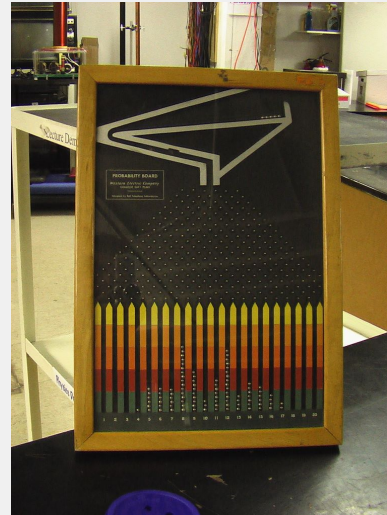
Area 1 Mechanics Location 14

Topic 1A Measurement Rating good but lacks zest

Concept 1A20 Error and Accuracy Demo # 096

Checked Yes Related Demos

Date Checked 2/14/2020



Brief Description As the metal balls fall from the top, they will collect in a series of columns at the bottom in a bell curve distribution.

Keywords probability, gaussian, thermodynamics, statistics, distribution, bell curve

Equipment Needed none

Detail Tip board upside down to collect the metal balls in the track above. Balls can be held in top track by pushing in the pin located on the back of the board. Let balls fall and see the distribution.

References

Other Uses

Suggestions for Improvement

PASCO ROLLING TRACK CARS

DCS #	1C10.25	Status	Active
Area	1 Mechanics	Location	35
Topic	1C Motion in One Dimension	Rating	□□□□ good but lacks zest
Concept	1C10 Velocity	Demo #	060
Checked	Yes	Related Demos	058, 059, 061, 242
Date Checked	2/14/2020		



Brief Description

1. Great for any size class room
2. Very close to perfect elastic and inelastic collision conditions
3. Set up should be done before hand to get familiarized with the equipment
4. Could easily be used to cover multiple days of 1 and 2 dimensional

Keywords

Pasco, air track, glider, cart, velocity, motion, inertia, momentum, collision, conservation, energy, dynamic, friction, Newton, first law, second law, third law, fan cart,

Equipment Needed

In Box:

1. Pasco Dynamics Carts, Fan Accessory, and Various Accessories

Additional Equipment:

2. Pasco Dynamics Track

Detail

These carts can be used to demonstrate several motion concepts. Three (3) of the carts have a magnetic bumper on one side and a spring loaded piston on the other side. The fourth cart has magnetic bumpers on both ends. The magnets make for very effective inelastic collisions while the track itself is relatively frictionless. The track can be used with the Demo Computer to monitor position versus time graphs during class on the LCD projectors. Instruction Sheets for the Collision Cart and Fan Accessory are included in the box. Refer to the Instruction Manual and Experiment Guide for the PASCO PASCar with Mass, located on the Physics Demo Room Computer. **IMPORTANT: BE SURE TO GRAB THE TRACK!!! (NOT IN PICTURE)**

References

Other Uses

Suggestions for Improvement

Also need batteries for fan.

TIMED GRAVITY BALLS

DCS # 1C20.20 Status Active

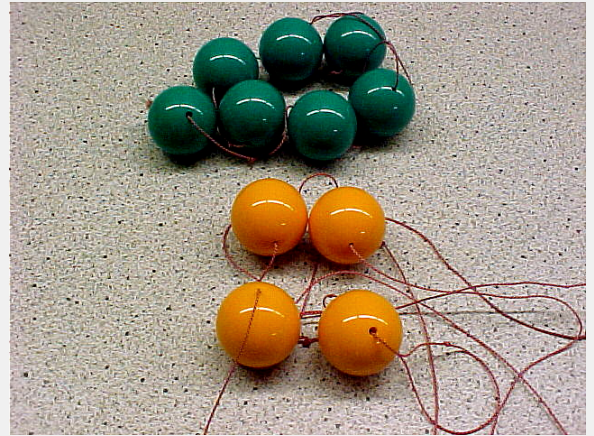
Area 1 Mechanics Location 17

Topic 1C Motion in One Dimension Rating good but lacks zest

Concept 1C20 Uniform Acceleration Demo # 124

Checked Yes

Date Checked 9/4/2019



Related Demos

Brief Description 1. Drop two long strings with balls - one with equal distance intervals (green) and the other with equal time intervals (yellow).
2. Students listen to the sound of the balls hitting the floor and compare the time intervals of the "hits" between the two sets of balls.

Detail You can drop balls on wooden board to amplify the sound.

Drawback: length of equal time is long so a ladder is needed.

Keywords timed gravity balls, equal time, distance, drop, interval, acceleration, uniform,

Equipment Needed

1. String with green wooden balls, where the balls are placed with equal distance between balls (in the box)
2. String with yellow balls, where there are different distances between balls (in the box)
3. Ladder

References Sutton (M-84); University of Maryland Physics Lecture-Demonstration Facility (C2-06); PIRA 500.

Other Uses

Suggestions for Improvement

HIGH ROAD AND LOW ROAD

DCS # 1D15.20 Status Active

Area 1 Mechanics Location 31

Topic 1D Motion in Two Dimensions Rating good and engaging

Concept 1D15 Velocity, Position, and Demo # 161

Checked Yes

Date Checked 2/14/2020



Related Demos

Brief Description Race two metal balls (located on side) down each track simultaneously and see which ball wins. Remember the Brachistochrone?

Keywords high, low, road, motion, two dimensions, 2D, velocity, position, acceleration, conservation, energy, ramp, ball,

Equipment Needed Two tracks mounted in to a wooden frame - one road with incline goes straight down, the other one is with the same incline but including a valley; Two Metal Balls.

Detail The conversion of potential to kinetic energy determines the speed of the balls on each of the tracks.

References American Journal of Physics (AJP 51(1),132); University of Maryland Physics Lecture-Demonstration Facility (C2-11).

Other Uses

Suggestions for Improvement

CENTER OF MASS WAND

DCS # 1D40.11 Status Active

Area 1 Mechanics

Location 29

Topic 1D Motion in Two Dimensions

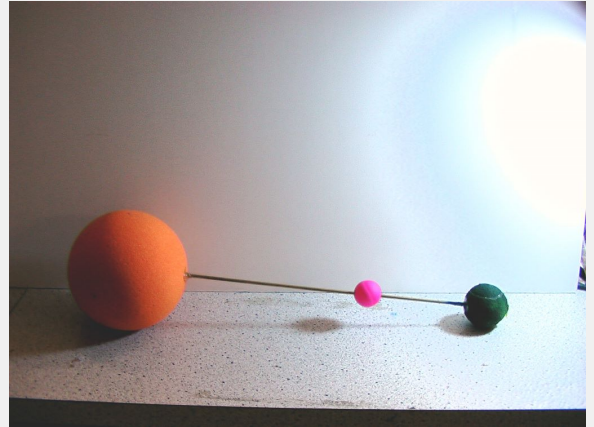
Rating old but effective

Concept 1D40 Motion of the Center of Mass

Demo # 144

Checked Yes

Related Demos



Date Checked 9/6/2019

Brief Description The wand has one ball on either end. The pink ball marks the center of mass. You can throw the wand in the air and watch the peripheral balls rotate around the pink ball. You can also rotate the wand in your hand about the pink ball.

Keywords center of gravity, juggling, center of mass, motion, parabolic curve, two dimensions, 2D

Equipment Needed

Detail

References Meiners (14-2.3).

Other Uses

Suggestions for Improvement

CENTRIPETAL FORCE APPARATUS

DCS # 1D50.20 Status Active

Area 1 Mechanics Location 17

Topic 1D Motion in Two Dimensions Rating good but lacks zest

Concept 1D50 Central Forces Demo # 129

Checked Yes

Date Checked 2/14/2020



Related Demos

Brief Description Hold the metal cylinder and rotate the rubber stopper over your head. The speed of rotation depends on the string length. So, you can adjust the length during the ball rotation by moving weight up and down.

Keywords centripetal, force, centrifugal, central, rotation, circular, motion, speed, velocity, length, speed,

Equipment Needed

Mass; string, cylinder, and loop apparatus (in box)

Detail This can work with varying weights, but the stopper is 100g, so weights in the 200-500g range work well.

References American Journal of Physics (AJP 29(3), 212), Freier & Anderson (Mm-2), Sutton (M-138).

Other Uses

Suggestions for Improvement

WHEEL OF EYES

DCS # 1D50.50 Status Active

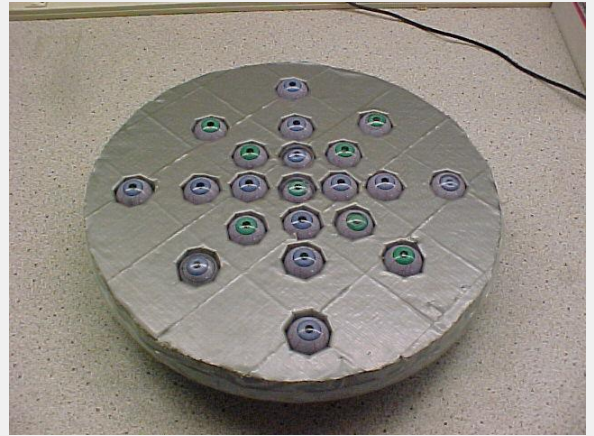
Area 1 Mechanics Location 8

Topic 1D Motion in Two Dimensions Rating old difficult to observe

Concept 1D50 Central Forces Demo # 356

Checked Yes

Date Checked 2/14/2020



Brief Description Eyes look towards the center of the disk as it rotates

Keywords central, force, wheel, eyes, centripetal, centrifugal, circular, motion, density, fluids, rotation,

Equipment Needed

Detail -Not very visible
-Explanation is simple
-On an individual basis it demonstrates rotational dynamics well

The buoyancy balls are eye's that always float up. When the disk is spun, all the eyes look towards the center as the water pushes it's way toward the outside. The further from the center the eyes are, the greater the deflection.

References

Other Uses

Suggestions for Improvement

SPINNING GLASS OF WATER

DCS # 1D50.45 Status Active

Area 1 Mechanics Location 17

Topic 1D Motion in Two Dimensions Rating good but difficult

Concept 1D50 Central Forces Demo # 126

Checked Yes Related Demos 125

Date Checked 9/6/2019



Brief Description This is the classic cup on a plate being swung upside down. good for intro classes to describe the differences between centripetal and centrifugal forces.

Keywords spinning, water, centripetal, centrifugal, force, circular, motion, central, deformation, momentum, waiter tray

Equipment Needed Plate and cup (in box); food coloring (optional); water (optional)

Detail Adding food coloring to the water can improve visibility for larger classes (though it can be a bigger problem if it spills).

Will probably spill water

References

Other Uses

Suggestions for Improvement

Large Waiter's Tray

DCS # 1D50.45 Status Active

Area 1 Mechanics Location 29

Topic 1D Motion in Two Dimensions Rating good and engaging

Concept 1D50 Central Forces Demo # 125

Checked Yes Related Demos 126

Date Checked 2/14/2020



Brief Description A good way to demonstrate centripetal force. Fill glasses with water, place on plate suspended by the ropes. Slowly begin to swing tray holding the glasses. Swing higher and higher then make a full circle. The glasses will continue to hold water as they are upsidedown.

Keywords centripetal force, inertia, mechanics, Newton's first law, centripetal

Equipment Needed Tray and glasses (included); water; food coloring (optional)

Detail With a little practice, the demonstrator can reliably swing the glass in dizzying circles and even overhead. The simple pendulum shows that the net force acting on the glass is always directed nearly radially, pinning the glass to the tray

Using food coloring can improve visibility (but is also more problematic if it spills).

References

Other Uses

Suggestions for Improvement

CENTRIPETAL FORCE FLOAT #2

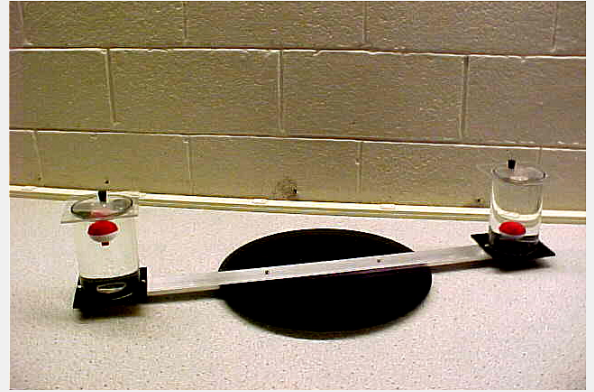
DCS # 1D52.30 Status Active

Area 1 Mechanics Location 8

Topic 1D Motion in Two Dimensions Rating good and engaging

Concept 1D52 Deformation by Central Forces Demo # 341

Checked Yes



Related Demos

Date Checked 9/6/2019

Brief Description Spin this apparatus and fishing bobbers, normally remain vertical, will behave differently.

Keywords centripetal, force, centrifugal, central, centrifuge, spinning, deformation, circular motion, density, float, accelerometer, rotation,

Equipment Needed Rotating platform with two jars of water - one jar has a light fishing bobber, suspended from the bottom; the other one - with a heavy bobber, suspended from the top.

Detail Make sure you have enough space to rotate this apparatus.
HANDLE WITH CARE!

References University of Maryland Physics Lecture-Demonstration Facility (D1-43); The Physics Teacher (TPT2(4),176); Meiners (8-3.2).

Other Uses

Suggestions for Improvement

CIRCULAR MOTION RING BOARD

DCS # 1D55.10 Status Active

Area 1 Mechanics Location 18

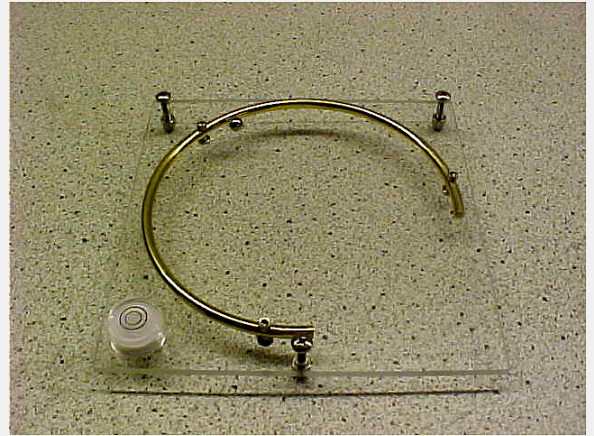
Topic 1D Motion in Two Dimensions Rating old but effective

Concept 1D55 Centrifugal Escape Demo # 141

Checked Yes

Related Demos

Date Checked 9/6/2019



Brief Description A ball is rolled around the inside of a large open metal hoop. Show the students where the ball will go, when it reaches the opening.

Keywords centripetal, force, centrifugal, central, centrifuge, spinning, circular motion, tangential, velocity,

Equipment Needed

Clear board with metal ring and level on it, metal ball.

Detail You can adjust screws so clear board is leveled.
Good for use with overhead projector and camera.

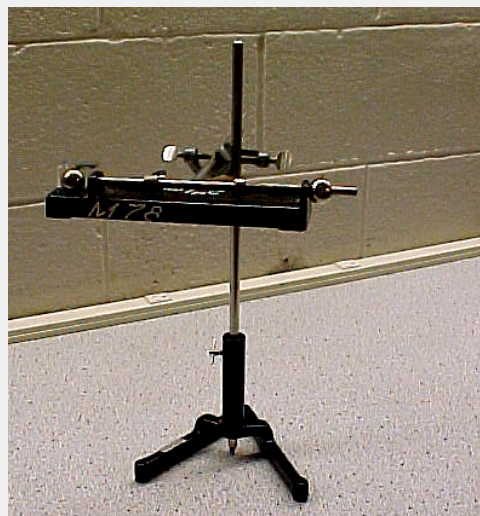
References University of Minnesota Handbook (1A12.01).

Other Uses

Suggestions for Improvement

SIMULTANEOUS BALL LAUNCH AND DROP #1

DCS #	1D60.20	Status	Active
Area	1 Mechanics	Location	18
Topic	1D Motion in Two Dimensions	Rating	□□□□ good but launches a long way
Concept	1D60 Projectile Motion	Demo #	136
Checked	Yes	Related Demos	158
Date Checked	9/6/2019		



Brief Description Place two metal balls on this launching apparatus. The system simultaneously release two balls - dropping one and launching the other horizontally. They strike the floor at the same time.

Keywords projectile, motion, two dimensions, 2D, parabolic, trajectory, monkey and hunter, Newton, second, law, simultaneous, fall, drop, gravity, range,

Equipment Needed Launching apparatus; Lab stand with clamps; Two metal balls.

Detail use wooden stand provided. Metal stand DNE

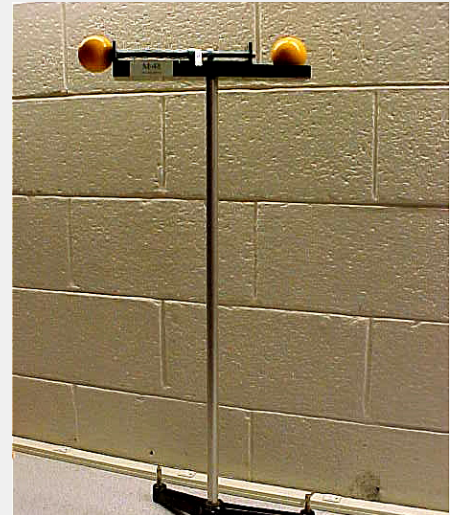
References Central Scientific Company (CENCO'99,80), Freier & Anderson (Mb-14), Sutton (M-91), Hilton (M-13b).

Other Uses

Suggestions for Improvement

SIMULTANEOUS BALL LAUNCH AND DROP #2

DCS #	1D60.20	Status	Active
Area	1 Mechanics	Location	28
Topic	1D Motion in Two Dimensions	Rating	□□□□ good and engaging
Concept	1D60 Projectile Motion	Demo #	158
Checked	Yes	Related Demos	136
Date Checked	9/6/2019		



Brief Description A spring loaded device drops one ball and projects the other horizontally. Two yellow wooden balls simultaneously dropped and projected horizontally hit the floor together. The size of the apparatus lets see the demonstration well even from the distance.

Keywords projectile, motion, two dimensions, 2D, parabolic, trajectory, monkey and hunter, Newton, second, law, simultaneous, fall, drop, gravity, range,

Equipment Needed

Detail Be careful, horizontally flying ball can hurt.

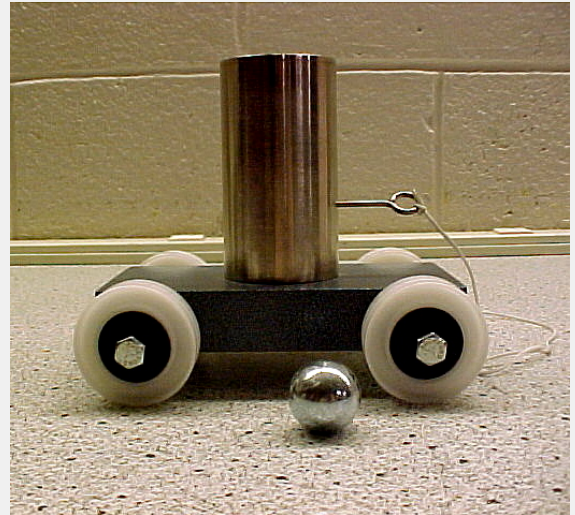
References Freier & Anderson (Mb-14); Sutton (M-91); Hilton (M-13b); Central Scientific Company (CENCO'99,80).

Other Uses

Suggestions for Improvement

HOWITZER AND TUNNEL

DCS #	1D60.10	Status	Active
Area	1 Mechanics	Location	20
Topic	1D Motion in Two Dimensions	Rating	□□□□ good but inconsistent
Concept	1D60 Projectile Motion	Demo #	135
Checked	Yes	Related Demos	059
Date Checked	2/14/2020		



Brief Description The car is set horizontally in motion. the pin is pulled, and the ball flies up and lands back in the cylinder, even though the car has continued its horizontal path. So, two objects can have the same horizontal component of motion that is undisturbed by one object's vertical

Keywords howitzer and tunnel, ballistic, car, projectile, motion, two dimensions, 2D,

Equipment Needed Car with a central cylinder and a spring-loaded launcher that will shoot an included ball vertically in the air when a locking pin is pulled; Metal ball.

Detail There are two positions that the pin can be locked into to vary the vertical launch.

BALLISTIC ACCESSORY CART
WORKS BETTER (Demo 059)

References Central Scientific Company (CENCO'99,79); Sutton (M-99); Hilton (M-6b).

Other Uses

Suggestions for Improvement Does not work consistently with included marble

SHORT RANGE PROJECTILE LAUNCHER

DCS # 1D60.40 Status Active

Area 1 Mechanics Location 18

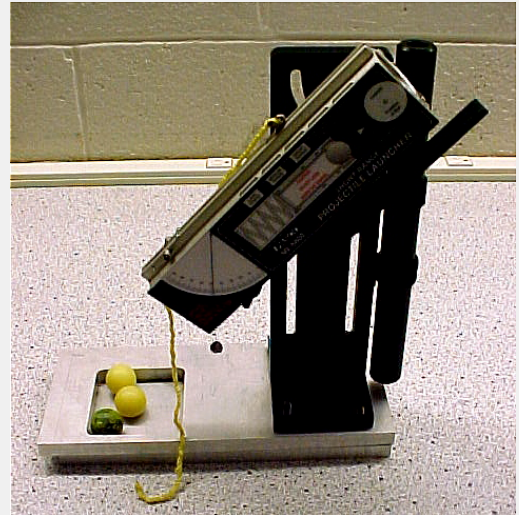
Topic 1D Motion in Two Dimensions Rating good and engaging

Concept 1D60 Projectile Motion Demo # 156

Checked Yes

Date Checked 9/9/2019

Related Demos



Brief Description Set the spring gun to the desired angle, put the rubber balls into launcher and pull the yellow string. Watch the balls motion.

Keywords ball, launcher, projectile, motion, two dimensions, 2D, parabolic, trajectory, short range,

Equipment Needed Projectile launcher with adjustable angle of the inclined tube-gun; Rubber balls; distance string.

Detail A string is included to approximately show the distance traveled by various launch angles. Note that 3 different launch powers are possible. The black balls in the box work best because they do not bounce once they land.

References

Other Uses

Suggestions for Improvement

MONKEY AND HUNTER #2

DCS # 1D60.30 Status Active see details

Area 1 Mechanics

Location 28

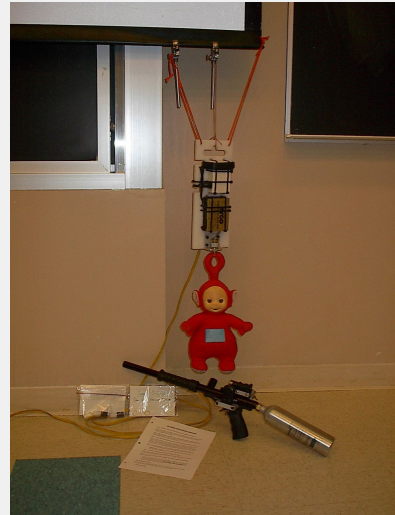
Topic 1D Motion in Two Dimensions Rating good and engaging

Concept 1D60 Projectile Motion Demo # 149

Checked Yes

Related Demos

Date Checked 9/9/2019



Brief Description

1. Visible to a large class.
2. Clearly shows that all objects fall vertically at the same rate, regardless of size or horizontal speed.
3. Set-up should be done before class to familiarize yourself with the equipment and to practice the Demo

Keywords projectile motion, two dimensions (2D), parabolic trajectory, monkey and hunter, Newton's Second Law, simultaneous, fall, drop, gravity, range, collision

Equipment Needed

- In the Box:
1. Po (Tellytubby)
 2. Paintball Gun w/ CO2 canister
 3. Remote Control Magnet Assembly
 4. Pellets
 5. Instructions
 6. Photos of set-up

Detail

1. It is recommended that the Remote Control Magnet Assembly be attached to the right side of the Auditorium's Main Screen with Holder Clamps (see Instructions & Photos).
2. The paintball gun trigger is modified to set off the remote magnet from which the tellytubby hangs. This insures the tellytubby begins falling at the exact moment (same time as) the pellet is fired (be sure to pull the trigger forcefully).
3. There is also a laser sight on the paintball gun to show the class where the gun is being aimed.
4. Detailed Instructions &

- Additional Equipment:
1. Holder Clamps (2)

References

Other Uses Detailed Instructions and Photos included in the box.

Suggestions for Improvement

PASCO Ballistic Cart Accessory

DCS # 1D60.10 Status Active

Area 1 Mechanics Location 35

Topic 1D Motion in Two Dimensions Rating good and engaging

Concept 1D60 Projectile Motion Demo # 059

Checked Yes Related Demos 060, 058, 061

Date Checked 2/14/2020



Brief Description Mounted on a dynamics cart moving at constant velocity, the Ballistic Cart Accessory launches a ball vertically, continues down the track, and then catches the ball as it falls -- every time. It offers an exciting introductory demonstration to projectile motion.

Keywords projectile motion, parabolic, velocity, constant acceleration, ballistic

Equipment Needed Ballistic Cart Accessory, Dynamics Cart and track
One 9V battery

Detail Instruction manual in box

THIS DEMO IS BETTER THAN HOWITZER & TUNNEL.

Take some time before using to make sure the aim is set correctly so the ball drops consistently.

References

Other Uses

Suggestions for Improvement

BIG BLACK METAL DOORSTOP AS A HANDSHIELD

DCS # 1F10. Status Active

Area 1 Mechanics Location Shelf 57

Topic 1F Newton's First Law Rating good and engaging

Concept 1F10 Measuring Inertia Demo # 358

Checked Yes



Related Demos

Date Checked 9/9/2019

Brief Description One side of the doorstop is lowered onto your fingers (**gently!**) and then you hit the hammer on top of the doorstop. An excellent demonstration of inertia, and a sure way to get students' attention.

Keywords inertia

Equipment Needed

- 1.) The Big Black Metal Doorstop (on the floor near the dry erase board).
- 2.) A hammer (available on the pegboard with the tools)

Detail **Be careful: the doorstop is very heavy and would easily damage fingers if dropped on them.**

The large mass of the doorstep (high inertia) prevents the force of the hammer blows from damaging your hand.

References

Thanks go to Professor Leisure for suggesting this demo.

You may want to practice once before class so you know your tolerance, and how hard you want to hit (you can still feel the hammer blows slightly)

Other Uses

Doorstop

The drama can be heightened by not explaining the physics first.

Suggestions for Improvement

NEWTON'S FIRST LAW GEL

DCS # 1F20.40 Status Active

Area 1 Mechanics Location 17

Topic 1F Newton's First Law Rating old but effective

Concept 1F20 Inertia of Rest Demo # 127

Checked Yes

Related Demos



Date Checked 9/9/2019

Brief Description Very easy demonstration of Newton's First Law.

Keywords Newton, first, law, gel, inertia, rest, fluid, dynamics of fluids (2C), viscosity,

Not especially visible to a large class.

Equipment Needed Bottle of Green Gel

Takes only a minute or two of lecture time.

Detail Demonstrates how to *really* get the ketchup out of the bottle. Turn it over and whack the bottom (which is now on top). This is the usual way people try to get the ketchup out, but by the 1st law, all it does is push the bottle into the ketchup. Now try it by whacking the top of the bottle (now at the bottom). This moves the bottle suddenly away from the ketchup, moving the ketchup down, relative to the bottle. (The green stuff is Solarcaine.)

References

Other Uses

Suggestions for Improvement

GLASS WATER HAMMER

DCS # 1F30.21 Status Active

Area 1 Mechanics

Location 17

Topic 1F Newton's First Law

Rating old not effective for lecture

Concept 1F30 Inertia of Motion

Demo # 139

Checked Yes

Related Demos



Date Checked 9/9/2019

Brief Description When water inside the vacuum tube falls, it sounds like a hammer hitting a nail.

Keywords glass water hammer, Newton, first law, inertia, vacuum, pressure, force,

Equipment Needed

25 cm-long all glass tube with a bulb at one end, is filled with water, evacuated and vacuum sealed.

Detail In this demonstration the water falls just as a solid object, making a clank as it hits bottom.

Cannot be outside during winter months!

References

Central Scientific Company (CENCO'99,122); The Physics Teacher (TPT2(4),178); Hilton (M-6c); Sutton (M290).

Other Uses

Suggestions for Improvement

BALL LAUNCHER

DCS # 1D60.40 Status Active

Area 1 Mechanics Location 18

Topic 1F Newton's First Law Rating old but effective

Concept 1F10 Measuring Inertia Demo # 146

Checked Yes

Date Checked 2/20/2020

Related Demos



Brief Description

1. Put the foam balls (only 2 remain) into the pitching machine
2. Turn on pitching machine and let it warm-up
3. Quickly depress/click the "Home Plate" pad and observe the balls motion
4. IMPORTANT: Please keep an

Detail

1. Once the Pitching Machine has been "warmed up" it should take approximately 10 seconds before you can launch the first ball and 5 seconds to launch the second ball.

Keywords ball launcher, projectile motion, two dimensions (2D), parabolic trajectory, fall, drop, gravity, range

Equipment Needed

In Box:

1. Motorized Pitching Machine with attached "Home Plate" stepping pad
2. 2 foam balls (2 balls are missing)

Additional Equipment:

3. 3 C-size batteries (1.5 V each)

References The Physics Teacher (15(7), 432).

Other Uses

Suggestions for Improvement

FREEFALL BUCKET

DCS # 1G20.40 Status Active

Area 1 Mechanics Location 19

Topic 1G Newton's Second Law Rating good and engaging

Concept 1G10 Force, Mass, and Acceleration Demo # 150

Checked Yes

Date Checked 9/9/2019



Related Demos

Brief Description Drop the bucket with two tennis balls on rubber bends, extending from the center over the edge of a bucket. Two ball are pulled in to the bucket in free fall.

Keywords force, mass, acceleration, Newton, second law, bucket, tennis ball, drop, free fall, gravity,

Equipment Needed Bucket with two tennis balls on the rubber bends. Rubber bands attached to the metal hook in the center of bucket bottom.

Detail

References American Journal of Physics (AJP 30(12), 929), The Physics Teacher (TPT 21(8), 521).

Other Uses

Suggestions for Improvement Ropes are not elastic.

ATWOOD'S MACHINE

DCS # 1G10.40 Status Active

Area 1 Mechanics Location 17

Topic 1G Newton's Second Law Rating old but effective

Concept 1G10 Force, Mass, and Acceleration Demo # 134

Checked Yes

Date Checked 9/9/2019

Related Demos



Brief Description Attach pulley wheel to the lab stand, place pulley cord with mass hangers on the wheel. Use set of different masses to demonstrate Equilibrium, Newton's Second Law.

Keywords Atwood, Atwoods, machine, force, mass, acceleration, equilibrium, Newton, second law

Equipment Needed Stand with a rod

Detail

References Freier & Anderson (Ms-7), Sutton (M-110).

Other Uses

Suggestions for Improvement

REMOTE CONTROLLED RACE CAR

DCS # 1G10.55 Status Needs Repair

Area 1 Mechanics Location 19

Topic 1G Newton's Second Law Rating □□□ old

Concept 1G10 Force, Mass, and Acceleration Demo # 153

Checked Yes

Related Demos

Date Checked 9/9/2019



Brief Description This race car does not rotate its wheels to turn, just one of its interesting characteristics. You can adjust the pitch of the main chassis, bringing the moment arm of the vehicle into play. It has two different sizes of main wheels to run on, can spin in a circle indefinitely, and has

Keywords race car, force, mass, acceleration, Newton, second law, conservation, momentum, torque,

Equipment Needed Race Car, Remote Control, 6 Volt battery for car, 9 Volt battery for control, Battery charger for 6 Volt.

Detail The 6 Volt Battery loses power quickly. Recommend recharge after every use.

References

Other Uses

Suggestions for Improvement Battery pack does not work, even after full charge. This is the same battery (6V in 100) that is used for the collision car (demo 152)

CENTER OF MASS WOODEN STICK

DCS # 1J10.09 Status Active

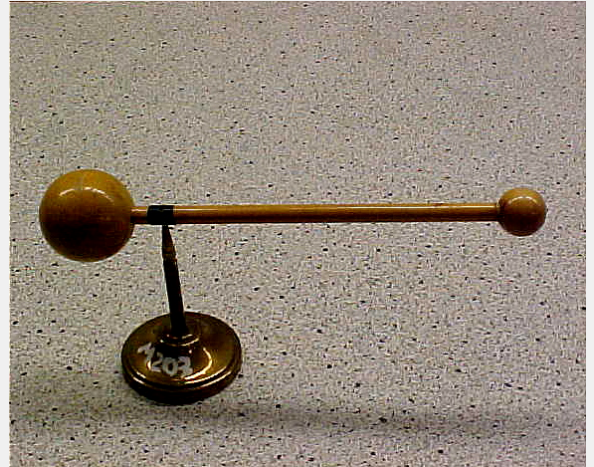
Area 1 Mechanics Location 17

Topic 1J Statics of Rigid Bodies Rating good but lacks zest

Concept 1J10 Finding the Center of Gravity Demo # 131

Checked Yes

Date Checked 2/14/2020



Related Demos

Brief Description Place center of mass of the wooden stick with wooden balls (balls are different diameters and different mass) at its ends on the stand with the sharp point. This demonstration shows that center of mass of a system defines its stability.

Keywords center of mass, wooden stick, gravity, balance, statics, stable, stability,

Equipment Needed

Wooden stick with a small and a big wooden balls attached to the ends of the stick; Metal stand with a sharp point at the end.

Detail

References

Other Uses

Suggestions for Improvement

Does not balance about the hole in the stick. Mass needs to be added to the side with the small ball.

CENTER OF GRAVITY CHALKBOARD

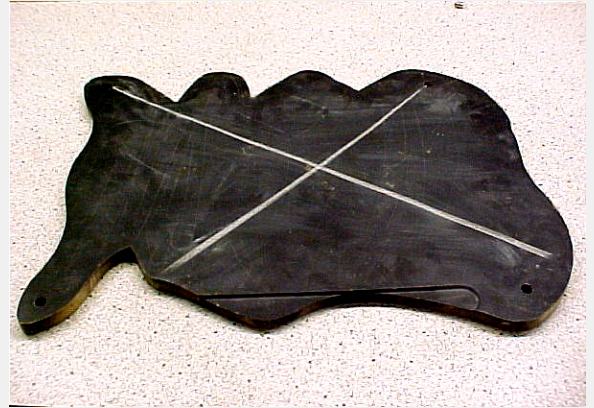
DCS # 1J10.12 Status Active

Area 1 Mechanics Location 30

Topic 1J Statics of Rigid Bodies Rating good and engaging

Concept 1J10 Finding the Center of Gravity Demo # 148

Checked Yes



Related Demos

Date Checked 9/9/2019

Brief Description Hang board at one hole(use the included rod), hang plumb bob from same point, and use a chalk to make a quick vertical line on the board (repeat 4 times). Now, hang the board at another hole and make a vertical line again. After this is done two or three times, the lines should

Keywords center of gravity, chalk board, chalkboard, hang, suspend, mass,

Equipment Needed Irregular shape black board with four holes; White chalk.
Optional: stand to hang the board from

Detail If using stand, one must hold the stand to prevent tipping over.

References Freier & Anderson (Mp-1,3,4,8,9,11; Mu-18).

Other Uses

Suggestions for Improvement

Center of Mass - 2 Liter Bottle & Oak Board

DCS # Status Active

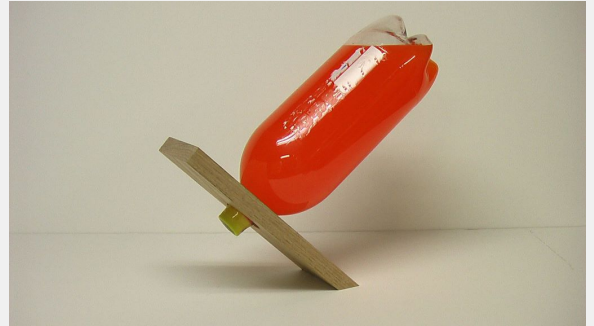
Area 1 Mechanics Location 19

Topic 1J Statics of Rigid Bodies Rating

Concept 1J10 Finding the Center of Gravity Demo # 128

Checked Yes

Related Demos



Date Checked 2/14/2020

Brief Description A two liter bottle with the neck stuck through a board balances perfectly, illustrating the center of mass of the system.

Keywords Center, gravity, board, balance, soda bottle

Equipment Needed
In Box:
1. 2 Liter Bottle with Orange Soda
2. Oak Board with small hole

Detail

References

Other Uses

Suggestions for Improvement

Balancing Birds

DCS # 1J10.09 Status Active

Area 1 Mechanics Location 17

Topic 1J Statics of Rigid Bodies Rating good but lacks zest

Concept 1J10 Finding the Center of Gravity Demo # 133

Checked Yes

Related Demos

Date Checked 2/14/2020



Brief Description Place bird on the stand found in box, your finger, or any other object and watch it balance! Bird is made so center of mass is directly below it's beak.

Keywords center of mass, balance, balancing birds

Equipment Needed

stand can be found in box or be creative and find your own stand

Detail

References

Other Uses

Change the center of mass by adding tape and other objects

Suggestions for Improvement

LEANING TOWER OF PISA

DCS # 1J11.10 Status Active

Area 1 Mechanics Location 17

Topic 1J Statics of Rigid Bodies Rating good and effective

Concept 1J11 Exceeding Center of Gravity Demo # 138

Checked Yes

Date Checked 2/14/2020



Related Demos

Brief Description This tower shows that center of mass of a system defines its stability.

Keywords leaning tower of Pisa, inertia, statics, center of mass, gravity, stable, stability,

Equipment Needed

The base of the leaning tower, the top of the leaning tower.

Detail A model of the tower constructed in sections. Place the tower on the table without the top and it will remain upright. Place the top on the tower and center of gravity is now shifted and the tower will fall over.

References Sutton (M-34), Hilton (M-18b.1), Freier & Anderson (Mp - 1, 3, 4, 8, 9, 11; Mu - 18).

Other Uses

Suggestions for Improvement

DOUBLE CONE AND PLANE

DCS # 1J11.50 Status Active

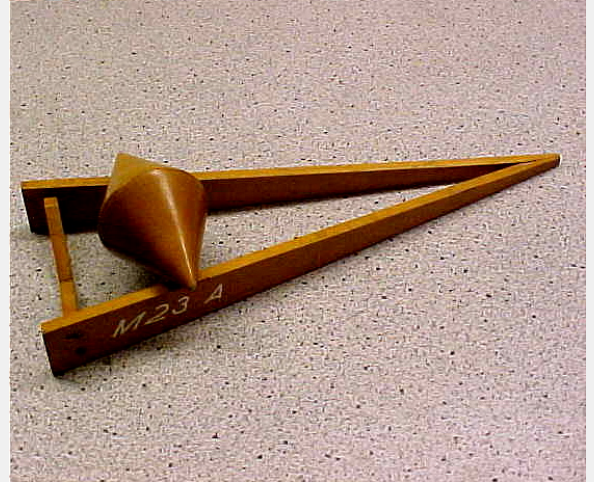
Area 1 Mechanics Location 21

Topic 1J Statics of Rigid Bodies Rating good and engaging

Concept 1J11 Exceeding Center of Gravity Demo # 147

Checked Yes Related Demos 054

Date Checked 9/9/2019



Brief Description Set the double cone on the bars of the inclined plane - its center of gravity is lower so, although the cone appears to roll up the plane, its center of gravity is actually moving downward.

Keywords double cone, inclined plane, center of mass, gravity, statics, roll, rolling, up, uphill, hill

Equipment Needed

Double coned cylinder; Increasing width inclined plane.

Detail May need a slight push to start rolling. BE SURE YOU HAVE A LEVEL SURFACE!!!!!!!!!!

References Central Scientific Company CENCO'99,40); Freier & Anderson (Mr-1); Sutton (M-37); Hilton (M-18a.3).

Other Uses

Suggestions for Improvement

CENTER OF MASS HAMMER AND BOARD

DCS # 1J11.51 Status Active

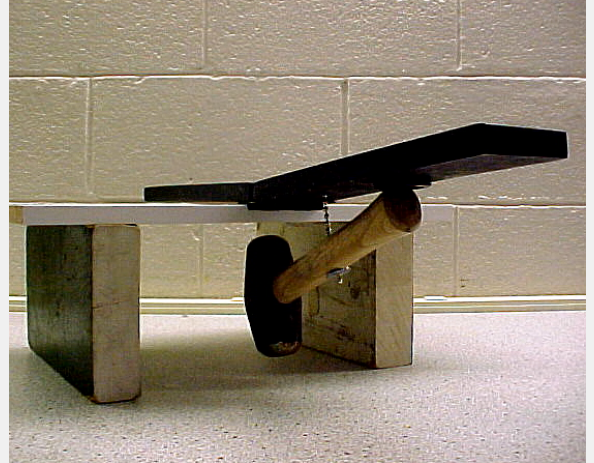
Area 1 Mechanics Location 18

Topic 1J Statics of Rigid Bodies Rating good but lacks zest

Concept 1J11 Exceeding Center of Gravity Demo # 132

Checked Yes

Date Checked 9/9/2019



Related Demos

Brief Description Place center of mass of the board with a hammer on the edge of the table. You can see, that the center of gravity of the system can define its stability.

Keywords center of mass, gravity, statics, balance, hammer, support, torque

Equipment Needed

In Box:
Two part board with a hinge and a hammer suspended from one part of the board.

Detail Even though the hammer is connected past the hinge, the location of the center of mass does not pull the board down.

Additional Equipment:
Two wooden blocks and a wooden board (for table)

References

Other Uses

Suggestions for Improvement

TENSION IN A STRING

DCS # 1J30.20 Status Active

Area 1 Mechanics Location 2

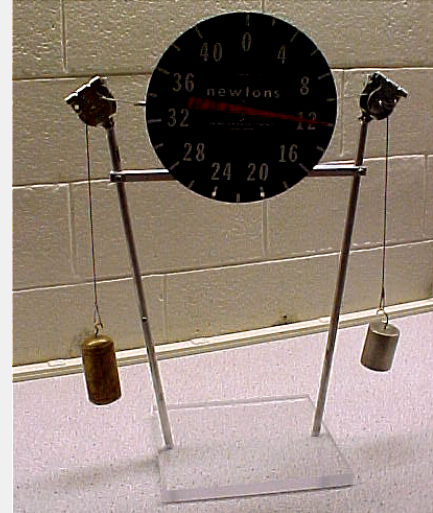
Topic 1J Statics of Rigid Bodies Rating good but lacks zest

Concept 1J30 Resolution of Forces Demo # 159

Checked Yes

Date Checked 9/9/2019

Related Demos



Brief Description Notice the weight of a single mass hung from a spring scale. Compare it to the weight shown on a spring scale between two equal masses over pulleys. The weight of a mass hung from a single spring scale is compared to the weight shown on a spring scale between two masses

Keywords Newton, scale, weights, resolution, force, statics, tension, string,

Equipment Needed Newton's scale mounted to the stand with two pulleys; metal cable and two weights - 1000g each.

Detail

References PIRA 500

Other Uses

Suggestions for Improvement

WOODEN CARTS

DCS # 1J30.? Status In Storage

Area 1 Mechanics Location Storage (outside)

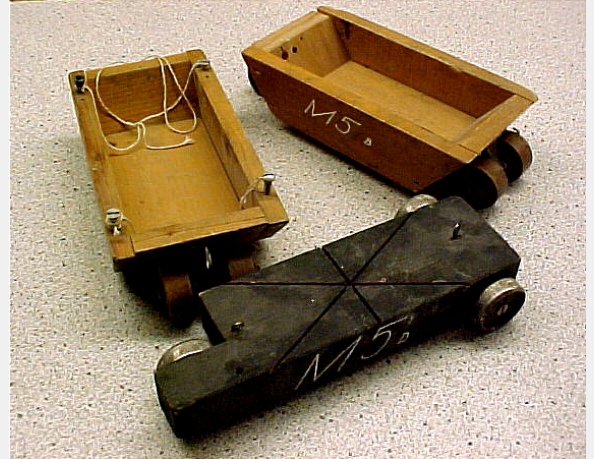
Topic 1J Statics of Rigid Bodies Rating old

Concept 1J30 Resolution of Forces Demo # 312

Checked Yes

Date Checked 9/9/2019

Related Demos



Brief Description Use this carts when you want to demonstrate resolution of forces, acceleration down a plane, work and potential energy, and friction.

Keywords wooden carts, resolution of forces, friction, mass, acceleration, statics, potential energy,

Equipment Needed Inclined plane with pulley; Cart with a string and set of weights.

Detail Put cart with a string on the inclined plane with a pulley. Hang weights on the string over the pulley so the system is in static equilibrium. Add mass to the cart until it begins slide down the incline; the frictional force must be in the upward direction. Hang additional weight on the string over the pulley until the cart begins to slide up the incline; the frictional force must be in the downward direction.

References University of Maryland Physics Lecture-Demonstration Facility (B2-03); Central Scientific Company (CENCO'99,42).

Other Uses

Suggestions for Improvement

BREAKING STRING WITH HINGE

DCS # 1J30.30 Status Active

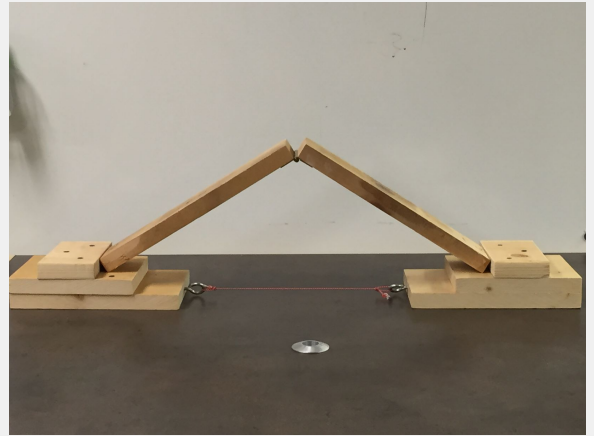
Area 1 Mechanics Location 19

Topic 1J Statics of Rigid Bodies Rating good and engaging

Concept 1J30 Resolution of Forces Demo # 170

Checked Yes

Date Checked 9/9/2019



Related Demos

Brief Description A hinged board gives enough mechanical advantage to break a string tied between two blocks.

Keywords break, breaking, string, hinge, statics, resolution, force, tension, vector,

Equipment Needed White string. Red string is a little too tough

Detail When the ends of the hinged pieces of wood are placed in the notches of the two wooden blocks and the hinged block is loaded, the rope, fastened to two heavy screw eyes, may be broken by the application of a much smaller force than would be required in the case of a direct pull.

References Sutton (M-16); Freier & Anderson (Mj-3).

The extra piece of wood can be used between the hand of the presenter and the hinge to avoid pinching.

Other Uses

Suggestions for Improvement

PARALLEL ARMS BALANCE

DCS # 1J40.50 Status Active

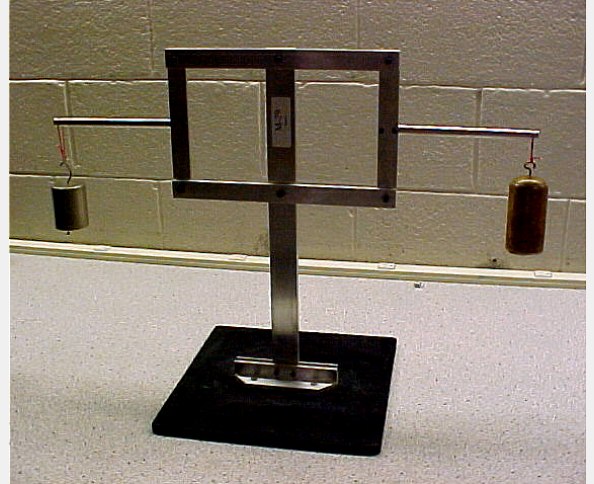
Area 1 Mechanics Location 5

Topic 1J Statics of Rigid Bodies Rating old but effective

Concept 1J40 Static Torque Demo # 162

Checked Yes Related Demos

Date Checked 9/11/2019



Brief Description This parallel arms frame is in neutral equilibrium when equal weights are placed onto the two outer arms, it will remain at rest in any position. If a net weight is placed on either side, that side will go down.

Keywords Roberval balance, parallel arms, statics, torque, force, stable, equilibrium, neutral,

Equipment Needed

Parallel arms frame on a stand; two 1000g weights.

Detail Small loops of rope are included in box to hang weights from.

Does not return to zero by itself

References Sutton (M-42); University of Maryland Physics Lecture-Demonstration Facility (B2-41).

Other Uses

Suggestions for Improvement Lube the contacting surfaces.

METER STICK BALANCE

DCS # 1J40.20 Status Active

Area 1 Mechanics Location 18

Topic 1J Statics of Rigid Bodies Rating old but effective

Concept 1J40 Static Torque Demo # 137

Checked Yes

Related Demos

Date Checked 9/11/2019



Brief Description The position of the center of gravity of the balance may be varied by sliding the knife edge up and down on the rod in the center of the meter stick.

Keywords meter stick, meterstick, balance, center of mass, gravity, torque, knife edge,

Equipment Needed All included.

Detail Because the difference in density may be different on each side of the stick, the 50 cm point is not necessarily the point at which the knife edge should be located in order to bring the meter stick exactly horizontal.

References

Other Uses

Suggestions for Improvement

WALKING THE SPOOL

DCS # 1K10.30 Status Active

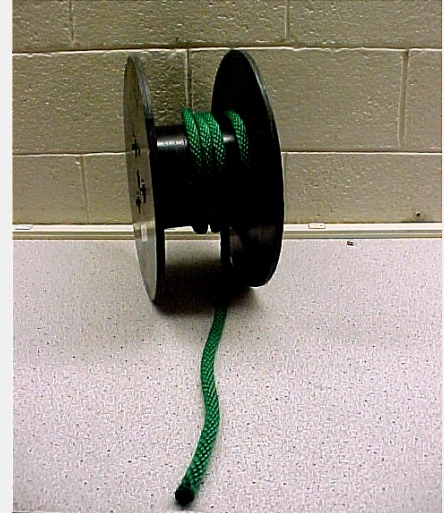
Area 1 Mechanics Location 11

Topic 1K Application of Newton's Laws Rating good and engaging

Concept 1K10 Dynamic Torque Demo # 300

Checked Yes

Date Checked 2/14/2020



Related Demos

Brief Description Pull on the rope wrapped around the hub of a spool at various angles to make the spool go forward or back.

Keywords walking the spool, torque roller, rope, dynamic, friction,

Equipment Needed

Big wooden spool with a rope wrapped around the hub of a spool.

Detail

References

Freier & Anderson (Mo-3); Sutton (M-24); Hilton (M-10d).

Other Uses

Suggestions for Improvement

INCLINED PLANE WITH PROTRACTOR

DCS # 1K20.35 Status Active

Area 1 Mechanics Location 43

Topic 1K Application of Newton's Laws Rating basic measurement

Concept 1K20 Friction Demo # 075

Checked Yes Related Demos 171

Date Checked 12/3/2019



Brief Description This inclined plane can be used with friction blocks or loaded roller for precision force resolution or friction coefficient measurements.

Keywords incline, plane, Newton, law, friction, angle, protractor, force, pulley, resolution, coefficient, angle of repose,

Equipment Needed Inclined plane with 1 cm wide slit along it's centerline and built-in length and angle scales (included)

Detail The plane scales arrangement allows angle measurements to be made directly or by trigonometry.

References Central Scientific Company (CENCO'99,42); Hilton (M-11a).

Other Uses

Suggestions for Improvement

CHAIR-O-NAILS

DCS # 1K30.11 Status Active

Area 1 Mechanics Location Floor/Cart

Topic 1K Application of Newton's Laws Rating good and engaging

Concept 1K30 Pressure Demo # 352

Checked Yes Related Demos

Date Checked 9/11/2019



Brief Description Sit down on the chair with nails. How about no.

Keywords chair of nails, bed, stool, Newton, pressure,

Equipment Needed

Chair with nails. Safety styrofoam cover. Balloon adds to show sharpness of nails.

Detail

References PIRA 200

Other Uses

Suggestions for Improvement

UPHILL ROLLER

DCS # 1K10.50 Status Active

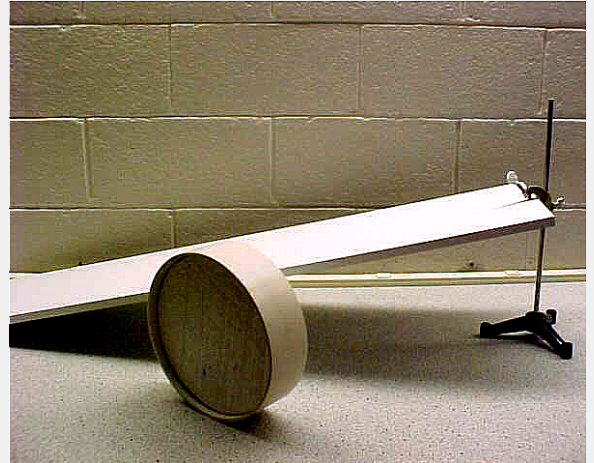
Area 1 Mechanics Location 20

Topic 1K Applications of Newton's Laws Rating good but lacks zest

Concept 1K10 Dynamic Torque Demo # 054

Checked Yes Related Demos 041, 042

Date Checked 9/9/2019



Brief Description This disk will move up if you will put it on the adjustable ramp.

Keywords uphill roller, statics, center of mass, gravity, disk, cylinder,

Equipment Needed Adjustable Ramp and Metal Stand.

Detail Be careful with this demo as dropping it may cause the weight to fall out of the wheel. It's only styrofoam!

References Freier & Anderson (Mp-3).

Other Uses

Suggestions for Improvement

Friction Blocks

DCS #		Status	Active
Area	1 Mechanics	Location	20
Topic	1K Applications of Newton's Laws	Rating	□□□□□
Concept	1K20 Friction	Demo #	171
Checked	Yes	Related Demos	075
Date Checked	4/11/2015		



Brief Description Friction blocks can be pulled across the lecture table with a dial scale. The block may be turned on different edges to show the independence of frictional forces on area. Similar blocks with various types of surfaces can be used to show the effects of different kinds of contact planes.

Keywords friction, coefficient of friction, static, dynamic, force

Equipment Needed Dial scale, friction blocks

Detail Friction blocks can be dragged on the lecture bench-top using a scale. Additionally, by flipping the block over onto one of its edges, one can demonstrate that the frictional force between two sliding surfaces is independent of the area of contact. Further, by stacking identical blocks on top of the sliding block, the spring-scale indicates that the frictional force is a function of the normal force applied by the sliding object to the plane surface. And finally, to demonstrate the dependence of the coefficient of friction (both static and dynamic) on the nature of the sliding surfaces, sandpaper and rubber have been glued onto some of the surfaces.

References

Other Uses Can use an inclined plane to show how different surfaces have different amounts of friction

Suggestions for Improvement

JACK SCREW

DCS # 1M20.35 / 1M50.? Status In Storage

Area 1 Mechanics

Location Storage

Topic 1M Work and Energy

Rating old but effective

Concept 1M20 Simple Machines

Demo # 313

Checked Yes

Related Demos

Date Checked 9/11/2019



Brief Description These Jack Screws purpose to demonstrate simple machines, efficiency and mechanical advantage.
You can use Jack screw to lift the back end of the red wagon with load or even a person aboard. It can be easily operated with one hand.

Keywords jack screw, mechanical power, inclined plane, work, energy, simple machine, efficiency,

Equipment Needed One Jack Screw; Metal rod as a handle; Red wagon; Wooden block (placed between Screw and wagon); Load in the wagon.

Detail

References Central Scientific Company (CENCO'99,144); University of Maryland Physics Lecture-Demonstration Facility (B3-22).

Other Uses

Suggestions for Improvement

RATTLEBACK

DCS # 1M40.90 Status Active

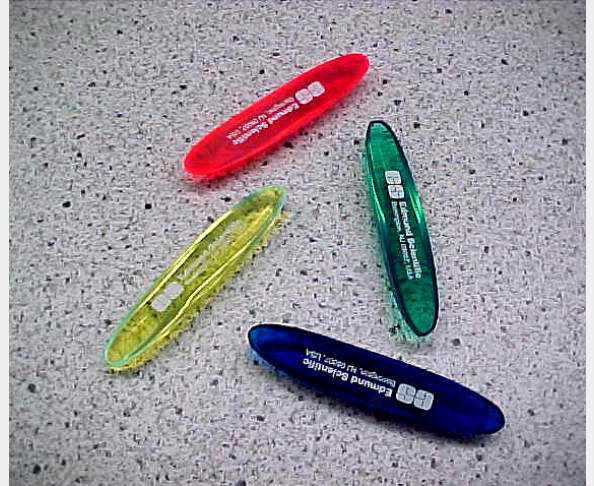
Area 1 Mechanics Location 19

Topic 1M Work and Energy Rating good but not for lecture

Concept 1M40 Conservation of Energy Demo # 155

Checked Yes

Date Checked 9/11/2019



Related Demos

Brief Description Place "Rattle back" flat side up on smooth level surface. Tap it gently on either end and it will spin. Rock it and it will spin. Spin it clockwise - and it will stop and turn backward.

Keywords rattleback, top, rotational, stability, conservation, angular momentum, inertia, kinetic, torque, work energy,

Equipment Needed A Rattle Back - a half-ellipsoid object carved so that it will spin in only one direction.

Detail They can magnify if you will turn them over FLAT SIDE DOWN.

References Educational Innovations (EI'01(10),37).

Other Uses

Suggestions for Improvement

DOUBLE LOOP THE LOOP

DCS # 1M40.21 Status Needs Repair

Area 1 Mechanics

Location 21

Topic 1M Work and Energy

Rating old not effective for college age

Concept 1M40 Conservation of Energy

Demo # 174

Checked Yes

Related Demos



Date Checked 9/11/2019

Brief Description Send car down the launch ramp and it will go through double speed loops

Keywords double loop the loop, high speed, work, energy, friction, conservation, potential, kinetic, Hot Wheels, car, track,

Equipment Needed 1 vehicle, 11 ft. (3.3 m) of track, C-clamp, 2 loop bases, stand with rod to make a launch ramp.

Detail A launch ramp height could be adjusted and one loop could be used instead of two ones. You can attach ramp clamp to the end of the table or use a high lab stand for that.

Since track pieces are curved in box, it helps to unbox this one early and straighten out the track pieces.

References Central Scientific Company (CENCO'99, 57); University of Maryland Lecture-Demonstration Facility (D1-53).

Other Uses

Suggestions for Improvement Larger box so track pieces can lie without bending and becoming permanently curved. More track connecting pieces as some are broken.

YO-YO

DCS # 1M40.50 Status Active

Area 1 Mechanics Location 18

Topic 1M Work and Energy Rating old

Concept 1M40 Conservation of Energy Demo # 154

Checked Yes

Related Demos

Date Checked 9/11/2019



Brief Description Hold the end of the string to allow the yo-yo to unwind and wind back up again. It illustrates transformation between various forms of energy.

Keywords yo-yo, yo yo, work, energy, conservation, friction, angular momentum, centripetal force, central, centrifugal,

Equipment Needed Yo-yo.

Detail

References The Physics Teacher (TPT 28,92 (1990)); University of Maryland Physics Lecture-Demonstration Facility (D1-65).

Other Uses

Suggestions for Improvement New yo-yos

BOWLING BALL PENDULUM

DCS # 1M40.10 Status Active

Area 1 Mechanics Location Shelf 3

Topic 1M Work and Energy Rating good and engaging

Concept 1M40 Conservation of Energy Demo # 353

Checked Yes

Date Checked 9/11/2019



Related Demos

Brief Description Stand and bring the bowling ball up to your nose. Release the ball with no initial velocity. Stand very still until the ball swings back. Do not lean forward! Hold a bowling ball suspended from the ceiling against your nose and let it swing.

Keywords bowling ball pendulum, work, energy, conservation, swing,

Equipment Needed Rope and hook to mount to.

Detail Good but need to have stable place to hang from.

References The Physics Teacher (TPT 22(6),384); Freier & Anderson (Mr-6), Meiners (9-1.2); Hilton (M-14b).

Other Uses

Suggestions for Improvement

LOOP THE LOOP

DCS # 1M40.20 Status Active

Area 1 Mechanics Location 31

Topic 1M Work and Energy Rating good and engaging

Concept 1M40 Conservation of Energy Demo # 184

Checked Yes



Related Demos

Date Checked 9/11/2019

Brief Description

Release a metal ball down the track and it will not leave the track while passing around the loop-the-loop.

Loop and Ramp are marked for height in cm above 0 point.

Keywords

loop the loop, high speed, work, energy, friction, conservation, potential, kinetic, Hot Wheels, car, track, ball, rolling,

Equipment Needed

Big Metal Loop and Metal Ball.

Detail

Note: the ball will complete the loop from the ~75cm point and higher (though it will become briefly airborne at 75cm). Expect the ball to fall off below this.

References

Central Scientific Company (CENCO'99, 57); The Physics Teacher (TPT 34, (1996)); University of Maryland Physics Lecture-Demonstration Facility (D1-53).

Other Uses

Suggestions for Improvement

STOPPED PENDULUM

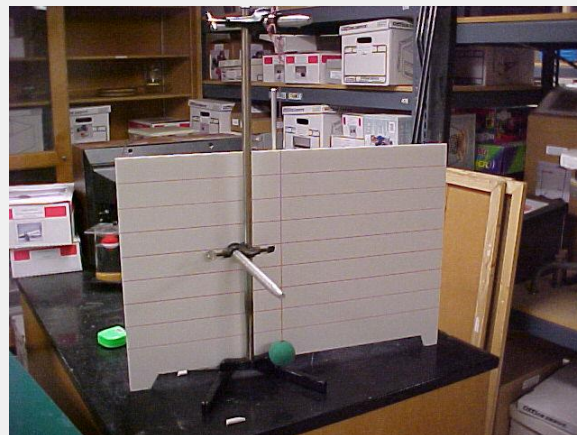
DCS # 1M40.15 Status Missing

Area 1 Mechanics Location 1 Mechanics

Topic 1M Work and Energy Rating good and engaging

Concept 1M40 Conservation of Energy Demo # 9008

Checked No



Related Demos

Date Checked 9/11/2019

Brief Description A pendulum is started at the height of a reference line and returns to that height even when a stop is inserted.

Keywords stopped, pendulum, conservation, energy, height, work, oscillations, period

Equipment Needed

- The lined foam-core board
- 3 aluminum rods, 1 at 4 ft., 2 at 1 foot. 2 clamps to attach all the rods
- a 1 kg mass to use use as a pendulum
- 3 to 4 feet of string

Detail The foam-core board is used to measure the height on either side of the swinging pendulum. In the middle of it's swing, one of the rods stops its swing so that only a fraction of the original length of string is used for the swing to the other side. despite losing a significant portion of it's length the mass will still go as high on the other side as it started, conserving energy.

References

Other Uses

Suggestions for Improvement

PILLOW PUNCHERS

DCS # 1N10.? Status Active

Area 1 Mechanics Location 14

Topic 1N Linear Momentum Rating old but effective

Concept 1N10 Impulse and Thrust Demo # 169

Checked Yes

Related Demos

Date Checked 9/11/2019



Brief Description We can use this couple of pillow punchers for impulse experiment. Punch with glove and without, impulse is the same, but force is different.

Keywords pillow punchers, linear momentum, impulse, force, thrust, collision, impact, time, dampening

Equipment Needed Pillow punchers.

Detail Don't punch to hard, may cause personal injury!

References

Other Uses

Suggestions for Improvement

COLLISION CAR

DCS # 1N10.35 Status Needs Repair

Area 1 Mechanics Location 18

Topic 1N Linear Momentum Rating good but lacks zest

Concept 1N10 Impulse and Thrust Demo # 152

Checked Yes

Related Demos

Date Checked 9/11/2019



Brief Description Run it forwards and backwards into walls and barricades. You can rebuild it by pressing the activation button, this car automatically repairs itself, stretching back to full length. Then, run it again.

Keywords collision car, linear momentum, impulse, force, thrust, collision, impact, time, remote control,

Equipment Needed Radio controlled vehicle, 6 Volt Rechargeable NiCd Battery Pack for vehicle, Transmitter and 9 Volt Alkaline Battery for it, 6 Volt NiCd battery 4 hour Charger.

Detail ALWAYS turn main vehicle switch off after play and remove battery!
DO NOT charge the Battery Pack immediately after use. Wait until it is cooled before charging!
DO NOT charge the Battery Pack for more than 5 hours!

References

Other Uses

Suggestions for Improvement Battery pack does not work, even after full charge. This is the same battery (6V in 100) that is used for the race car (demo 153)

MAGNETIC SKATES

DCS # 1N20.10 / 5H20.? Status Active

Area 1 Mechanics Location 6

Topic 1N Linear Momentum Rating good and engaging

Concept 1N20 Conservation of Linear Demo # 175

Checked Yes



Related Demos

Date Checked 9/11/2019

Brief Description Use the X -knife to cut the electrical tape, which held magnetic skates together. You will show that skates will hit two masses at the same time. Wooden ruler lets you set masses at the same distance from the skates.

Keywords magnetic skates, linear momentum, conservation, force,

Equipment Needed The pair of the magnetic skates; Meter stick; Two 1000 g masses; Smooth surface; Set of weights. (electrical tape)

Detail See what happens if you place some weight on one skate and repeat the demonstration.

You can use white board (incline plane board without stand) as a good surface for this demonstration. If you will use a small piece of electrical tape, you do not need to cut it with knife, tape will slide from one skate in 10 seconds or so.

References American Journal of Physics (AJP 33(1), xxv), Freier & Anderson (Md-3, Mp-16), Hilton (M-15c).

Other Uses

Suggestions for Improvement

MAGNETIC AIR HOCKEY PUCKS

DCS # 1N40.20 Status Active

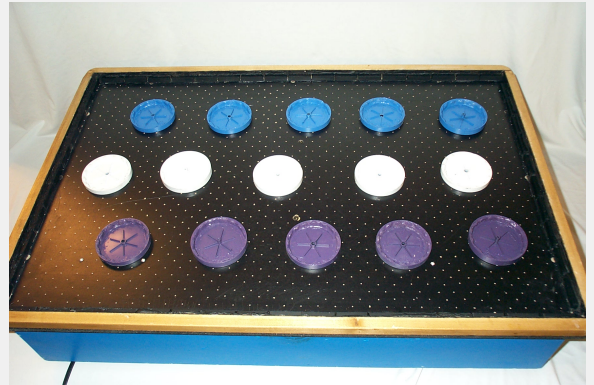
Area 1 Mechanics Location 21

Topic 1N Linear Momentum Rating good and engaging

Concept 1N20 Conservation of Linear Demo # 172

Checked Yes Related Demos 173

Date Checked 2/14/2020



Brief Description Turn on the air and the magnetic pucks tend toward a static structure as shown in picture. A change of position of one puck influences others. Waves can be made to travel back and forth through the structure. Model of electron flow?

Keywords magnetic air hockey pucks, friction, molecular, crystal, structure, energy level, wave motion, travelling waves, air table

Equipment Needed

Detail There is a button on back of table that will turn table on for 20 seconds

References

Other Uses

Suggestions for Improvement

MAGNETIC AIR HOCKEY PUCK SUPPLIES

DCS # 1N40.20 Status Active

Area 1 Mechanics Location 21

Topic 1N Linear Momentum Rating good but lacks zest

Concept 1N20 Conservation of Linear Demo # 173

Checked Yes Related Demos 172

Date Checked 2/14/2020



Brief Description Turn on the air and the magnetic pucks tend toward a static structure as shown in picture. A change of position of one puck influences others. Waves can be made to travel back and forth through the structure. Model of electron flow?

Keywords magnetic air hockey pucks, friction, molecular, crystal, structure, energy level, wave motion, travelling waves,

Equipment Needed

Detail

References

Other Uses

Suggestions for Improvement

NEWTON'S CRADLE

DCS # 1N30.10 Status Active

Area 1 Mechanics Location 2

Topic 1N Linear Momentum Rating good and engaging

Concept 1N30 Collisions in One Dimension Demo # 065

Checked Yes Related Demos 066, 067

Date Checked 9/11/2019



Brief Description Observe the effects of displacing different numbers of balls, working with Newton's Cradles. Try one ball first, then two and so on up to five balls at once.

Keywords Newton's cradle, conservation, momentum, energy, collision, kinetic, balls, suspend, elastic,

Equipment Needed

Newton's cradle - stand with a five suspended nickel-plated steel balls.

Detail First check that the wires are hanging straight.

References

The Physics Teacher (TPT 34, 181-183 (1996)); Central Scientific Company (CENCO'99,78); PIRA 200.

Other Uses

Suggestions for Improvement

Devise fine-adjustment method for tightening and loosening strings to align balls that does not require pliers.

NEWTON'S CRADLE - SMALL

DCS #	1N30.10	Status	Missing
Area	1 Mechanics	Location	19
Topic	1N Linear Momentum	Rating	□□□□ good and engaging
Concept	1N30 Collisions in One Dimension	Demo #	066
Checked	No	Related Demos	065, 067
Date Checked	9/13/2019		



Brief Description Observe the effects of displacing different numbers of balls, working with Newton's Cradles. Try one ball first, then two and so on up to five balls at once.

Keywords Newton's cradle, conservation, momentum, energy, collision, kinetic, balls, suspend, elastic,

Equipment Needed

Newton's cradle - stand with a five suspended nickel-plated steel balls.

Detail First check that the wires are hanging straight.

References The Physics Teacher (TPT 34, 181-183 (1996)); Central Scientific Company (CENCO'99,78); PIRA 200.

Other Uses

Suggestions for Improvement

One ball broke off of its supporting string. Glue makes a repair impractical. Replacement is likely cheaper than the time to repair.

AIR TABLE

DCS # 1N40.20 Status Missing

Area 1 Mechanics Location 24

Topic 1N Linear Momentum Rating □□□□ good but lacks zest

Concept 1N40 Collisions in Two Dimensions Demo # 088

Checked No Related Demos 087, 172

Date Checked 9/13/2019



Brief Description Turn on the Air Table, which is equipped with a built-in air blower that emits a continuous, even stream of air. With several pucks on the air table you can show two-dimensional, almost friction-free movement, and collisions in two dimensions.

Keywords air table, friction, conservation, linear momentum, collision, two dimensions, 2D,

Equipment Needed Air table and three pucks.

Detail There is another air table (demo 172), so this one is redundant.

References Central Scientific Company (CENCO'99,73); University of Maryland Physics Lecture-Demonstration Facility (C7-42).

Other Uses

Suggestions for Improvement

AIR TRACK Carts & Accessories

DCS #	1N30.30	Status	Active
Area	1 Mechanics	Location	30
Topic	1N Linear Momentum and	Rating	□□□□ good but lacks zest
Concept	1N30 Collisions in One Dimension	Demo #	062
Checked	Yes	Related Demos	068, 069, 070, 071, 087
Date Checked	2/14/2020		



Brief Description 1. This air track helps you to show collision experiments.

Keywords air track, glider, cart, velocity, motion, inertia, momentum, collision, conservation, energy, dynamic, friction, Newton, first law, second law, third law, fan cart,

Equipment Needed

1. Air Track
2. Set of Air Track Gliders (boxed)
3. Quiet Air Source on Equipment Shelf

Detail

References Central Scientific Company (CENCO'99, 68).

Other Uses

Suggestions for Improvement

Giant Newton's Cradle

DCS # 1N30.11 Status Active

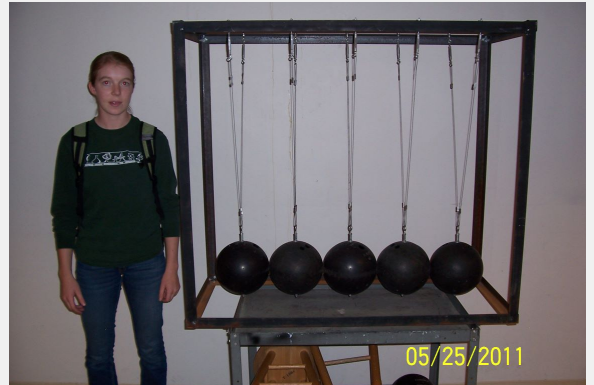
Area 1 Mechanics Location Floor/Cart

Topic 1N Linear Momentum and Rating good and engaging

Concept 1N30 Collisions in One Dimension Demo # 067

Checked Yes Related Demos 066, 065

Date Checked 9/11/2019



Brief Description HUGE Newton's cradle made with bowling balls.

Keywords Newton's cradle collision, conservation of energy, momentum.

Equipment Needed

Detail It only goes for a few hits as the bowling balls absorb some motion are not perfectly mounted inline.

Can demonstrate elastic and inelastic collisions.

References

Other Uses

Suggestions for Improvement

Replace bowling balls with object that provide better elastic collisions.

HOOP AND DISK

DCS # 1Q10.30 Status Active

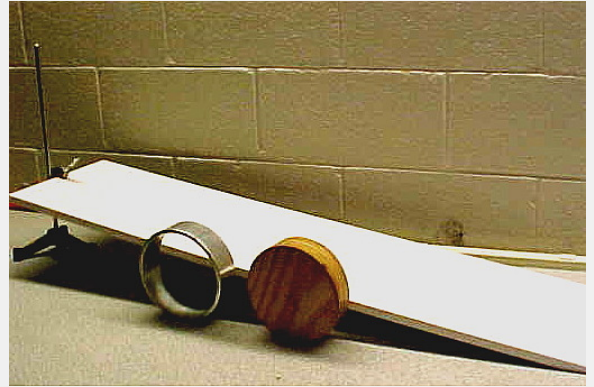
Area 1 Mechanics Location 20

Topic 1Q Rotational Dynamics Rating good and engaging

Concept 1Q10 Moment of Inertia Demo # 048

Checked Yes

Date Checked 9/13/2019



Related Demos

Brief Description A metal hoop and a wooden disk have equal masses and equal diameters. When you place the ring and disc on an inclined plane and release them, they accelerate at noticeably different rates as they roll.

Keywords hoop, disk, moment of inertia, rotational, kinetic energy, acceleration,

Equipment Needed

Adjustable ramp, metal stand, metal hoop, wooden disk.

Detail The smaller moment of inertia of the wooden disk leads to a larger acceleration, although both have the same kinetic energy at the bottom of the ramp.

References PIRA 200, Hilton (M-19c), Freier & Anderson (Ms-3)

Other Uses

Suggestions for Improvement

MOMENT OF INERTIA RODS (WANDS)

DCS # 1Q10.10 Status Active

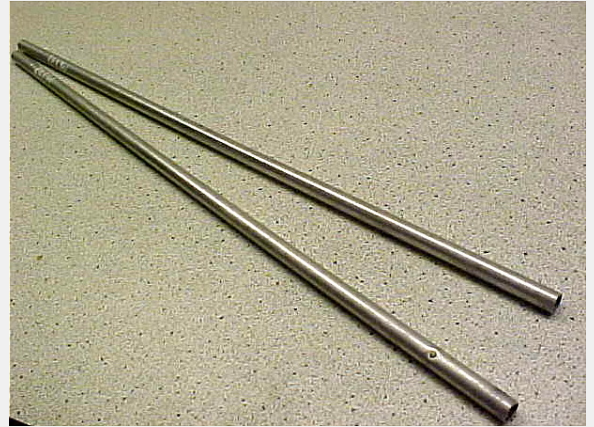
Area 1 Mechanics Location 29

Topic 1Q Rotational Dynamics Rating good and engaging

Concept 1Q10 Moment of Inertia Demo # 040

Checked Yes

Related Demos



Date Checked 2/14/2020

Brief Description

1. Hold one rod at its center in your hand & rotate it by twisting your wrist
2. Do the same with the second rod
3. You can feel that less effort is needed to rotate one rod and more effort is needed to rotate the other rod

Keywords inertia rods, torque twisters, rotation, center, mass,

Equipment Needed

1. Inertia Rod with a large mass located at its center
2. Inertia Rod with large masses located at its ends

Detail

1. The rods have the same mass, but the placement of the mass is different for each rod
2. One rod has most of its mass at the center, while the other has most of its mass at the ends
3. You need less effort to rotate the rod with the mass at the center

References Central Scientific Company (CENCO'99,88); PIRA 200; Meiners (12-3.3).

Other Uses

Suggestions for Improvement Both rods are missing from the box.

RACING SOUP CANS

DCS # 1Q10.50 Status Inactive (trashed)

Area 1 Mechanics

Location 20

Topic 1Q Rotational Dynamics Rating good and engaging

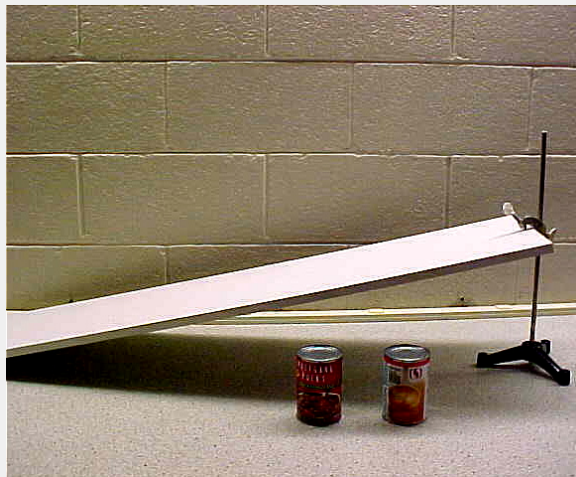
Concept 1Q10 Moment of Inertia

Demo # 050

Checked Yes

Related Demos

Date Checked 9/13/2019



Brief Description Three soup cans - one with chicken broth, one with variable density and one with very thick soup. They have the same weight. Roll them down on the ramp and see which one will be faster.

Keywords soup cans, inclined plane, rolling objects, moment of inertia, rotational, kinetic energy, acceleration,

Equipment Needed Cans of different density soup - one with chicken broth and the other one with hearty soup (the same weight). Adjustable ramp with stand.

Detail

References The Physics Teacher (TPT 16(8), 553).

Other Uses

Suggestions for Improvement One of the cans has a significantly different mass than the other two.

MOMENT OF INERTIA ROLLERS

DCS # 1Q10.?

Status Active

Area 1 Mechanics

Location 19

Topic 1Q Rotational Dynamics

Rating good and engaging

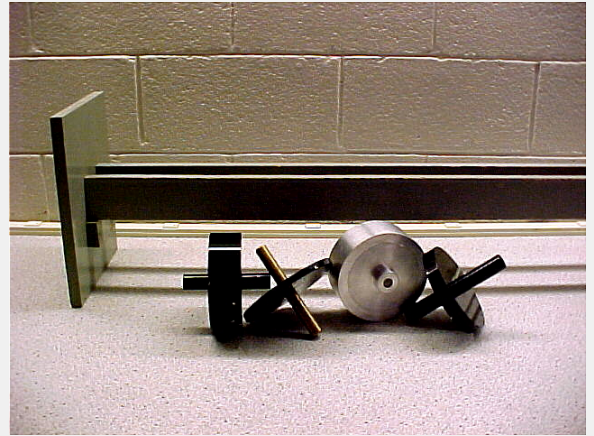
Concept 1Q10 Moment of Inertia

Demo # 043

Checked Yes

Related Demos 409

Date Checked 9/13/2019



Brief Description The different rollers have different mass disks and different diameter axles. When they roll in the track, the disks will spin at different rates, and so the disks with smaller axles will move more slowly - more energy is put into rotation and less into translation.

Keywords Rollers, rotational energy, disks, track, mass, moment of inertia, kinetic, velocity,

Equipment Needed Rotational Energy Discs; Wooden track with blocked ends located near the pillar (Demo 409), Metal track with one end open.

Detail It is also interesting to use the inclined track with the open end and let the disks continue on the tabletop after the end of the track. The disks will speed up noticeably after reaching the table.

References

Other Uses

Suggestions for Improvement

INERTIA AXLE

DCS # 1Q10.70 Status Active

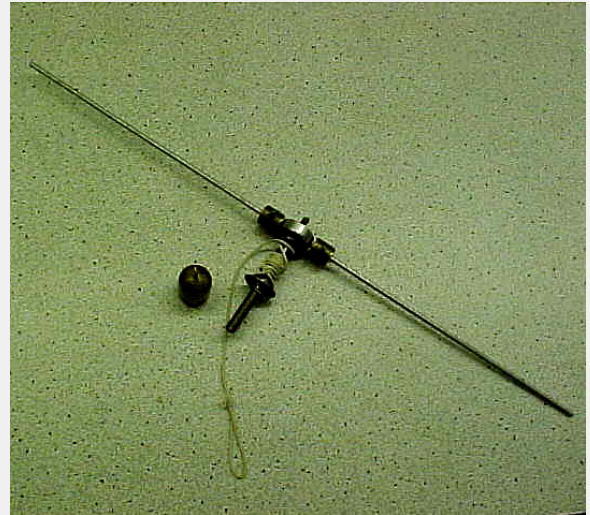
Area 1 Mechanics Location 20

Topic 1Q Rotational Dynamics Rating good but lacks zest

Concept 1Q10 Moment of Inertia Demo # 055

Checked Yes

Date Checked 9/13/2019



Related Demos

Brief Description Place this apparatus in a clamp on the lab stand so it could have a vertical rotation. Attach the 200 g weight with the hook to the loop at the end of the rope. The rod with two weights will spun by the falling mass.

Detail The moment of inertia can be changed by adjusting the position of the weights, changing the acceleration of the mass.

Keywords inertia axle, rotational, moment of inertia, angular momentum, energy, rotator,

Equipment Needed Inertia Axle - metal rod with two masses connected in its middle to the metal bar with a rope; Long lab stand with clamps, attached to the edge of the table; 200g weight with hook.

References American Journal of Physics (AJP 33(10),848); Sutton (M-166).

Other Uses

Suggestions for Improvement

MOMENT OF INERTIA RACING DISCS

DCS # 1Q10.40 Status Inactive

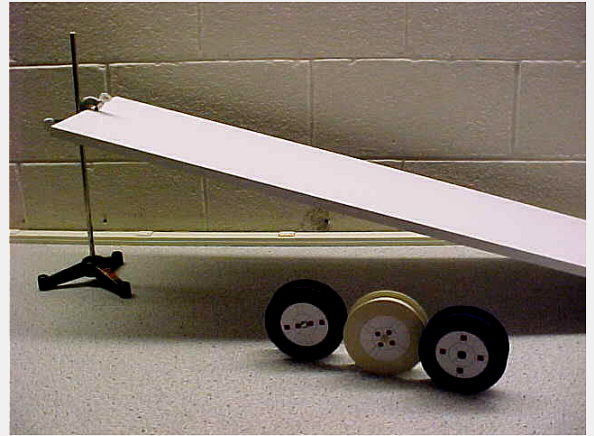
Area 1 Mechanics Location 20. Combined with demo 48

Topic 1Q Rotational Dynamics Rating good and engaging

Concept 1Q10 Moment of Inertia Demo # 045

Checked Yes Related Demos 041, 042

Date Checked 9/13/2019



Brief Description Roll these three discs down an inclined plane and see which one rotates faster.

Keywords inclined plane, rolling objects, hoop, disk, moment of inertia, rotational, kinetic energy, acceleration, racing disks

Equipment Needed Three discs of identical mass, but weighted at the different places; incline plane and lab stand.

Detail

References University of Minnesota Handbook (1A12.01).

Other Uses

Suggestions for Improvement

CUP AND BALL DROP

DCS # 1Q20.50 Status Active

Area 1 Mechanics Location 30

Topic 1Q Rotational Dynamics Rating good and engaging

Concept 1Q20 Rotational Energy Demo # 160

Checked Yes

Date Checked 9/13/2019

Related Demos



Brief Description Use: To illustrate faster than gravity acceleration

Keywords cup, ball, drop, faster than gravity acceleration, inclined board, hinge, stick, angular, rotational

Overview: Inclined board, where the end of the board moves faster than gravity to catch a ball.

Equipment Needed Apparatus, balls (all in box)

Detail Procedure: Set the apparatus up as shown. Quickly grab the supporting stick from between the hinged pieces. The ball that is on the end of the stick should land in the cup. The foam pad in the bottom of the cup will help prevent the ball from bouncing out. The supporting stick should be placed green side down. Placing the green end of the stick on the yellow dot (on the base of the apparatus) should produce consistent results.

References

Other Uses

Works extremely consistently with tennis ball and billiard ball.

Suggestions for Improvement

MARBLE TWISTER

DCS # 1Q40.70 Status Active

Area 1 Mechanics Location 20

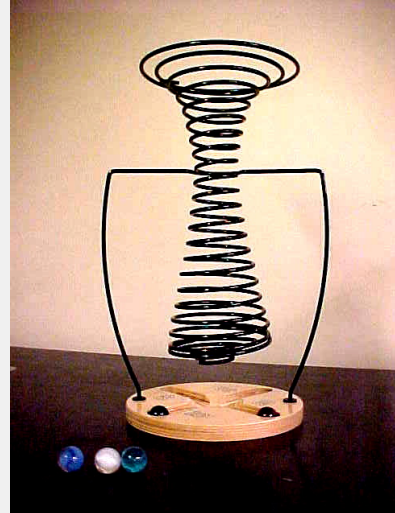
Topic 1Q Rotational Dynamics Rating good but lacks zest

Concept 1Q40 Conservation of Angular Demo # 056

Checked Yes

Date Checked 4/10/2015

Related Demos



Brief Description Marbles, racing down the interior of the Marble Twister, will increase both their speed and their ability to “hug” the inside tracks made by the wires as the spirals become tighter. Marbles decrease their speed, when tracks become wider.
*Be sure top spirals are not bent/out

Keywords marble twister, rotational, conservation, angular momentum, funnel, centripetal force, centrifugal, central, circular, Newton, first law, acceleration, energy, potential, work, race

Equipment Needed Marble twister with wooden base, five marbles.

Detail The spiraling wire path of the Marble Twister prevents the speeding marbles from being propelled outward in a straight line, forcing them into a curve and giving us the illusion that they are somehow defying gravity - which, in fact, they are not.

References Educational Innovations (EI'01(10),37).

Could be used as a game for reviews.

Other Uses

Suggestions for Improvement

ANGULAR MOMENTUM STOOL

DCS # 1Q40.10 Status Active

Area 1 Mechanics Location Floor/Cart

Topic 1Q Rotational Dynamics Rating good and engaging

Concept 1Q40 Conservation of Angular Demo # 355

Checked Yes Related Demos

Date Checked 2/14/2020



Brief Description Sit down on a stool with your arms extended, holding the weights. After the system is set into rotation, you pull the weights in to your chest, decreasing moment of inertia of the system and increasing the angular speed of the system.

Keywords angular momentum stool, rotational, conservation, spin, weights, ice skater, torque, moment of inertia

Equipment Needed Rotating stool; Two masses; Big bicycle wheel.

Detail You can use a big bicycle wheel with this stool. Sit down on a stool, and turn spinning bicycle wheel over and back.

References Central Scientific Company (CENCO'99, 94); University of Maryland Physics Lecture-Demonstration Facility (D3-04); The Physics Teacher (TPT 18, 1980).

Other Uses

Suggestions for Improvement Rotating mechanism works fine but wobbles slightly. Not sure if this is repairable without replacing.

Hero's Engine

DCS # 1Q40.80 Status Active

Area 1 Mechanics Location 20

Topic 1Q Rotational Dynamics Rating good and engaging

Concept 1Q40 Conservation of Angular Demo # 051

Checked Yes Related Demos

Date Checked 9/13/2019



Brief Description Heat the bottom of the can with a torch while the top is suspended and free to spin. A small amount of water (you need to add at the start) in the can will turn into steam and shoot out of the small pinhole openings in the arm-like appendages on the sides of the can.

Keywords Hero's engine, heat, spin, rotate, conservation, angular, momentum, rotational, dynamics, heros engine

Equipment Needed

Detail Torch is located on shelf 57, and strikes are on shelf next to breaker box. When using the torch, put the torch

References

Other Uses

Suggestions for Improvement

Large Hoberman's Sphere

DCS # Status Active

Area 1 Mechanics Location 19

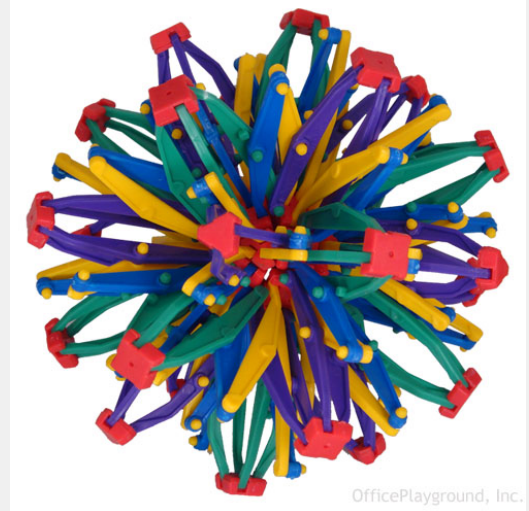
Topic 1Q Rotational Dynamics Rating

Concept 1Q40 Conservation of Angular Demo # 142

Checked Yes

Related Demos

Date Checked 2/14/2020



Brief Description Demonstrate conservation of angular momentum for a collapsing and expanding sphere.

Keywords angular momentum, momentum, collapsing sphere, expanding sphere

Equipment Needed None. Stands typically do not end well in this demo.

Detail Suspend the Hoberman sphere and pulley assembly. Start it turning in the open position. Pull on the lower string to collapse the sphere and note how the sphere spins much faster. The string can be released to let the sphere expand again.

Hold sphere yourself and have student pull the string.

References

Other Uses

Suggestions for Improvement

ALIEN ORBITER GYRO TOP

DCS # 1Q50.? Status Active

Area 1 Mechanics Location 20

Topic 1Q Rotational Dynamics Rating good but lacks zest

Concept 1Q50 Gyros Demo # 038

Checked Yes

Date Checked 9/16/2019

Related Demos



Brief Description Energize Giro-top by blowing in to one of the three intake ports. Place its pointed tip on top of the base. Giro-top will stay balanced until its energy depletes. You can place the energized Giro-top on its side on top of the base. It will spin there until its energy runs out.

Keywords alien orbiter, gyroscope, gyro, top, rotational, stability, precession, conservation, momentum, inertia, kinetic,

Equipment Needed Gyro-top, base (two types)

Detail This system has been demonstrated to obey Newton's three laws of motion: 1. The Law of Inertia; 2. The Law of constant acceleration; 3. The Law of Conservation of Momentum. You can place Giro-top on your finger, the palm of your hand, a table, the floor, or any flat, smooth, stable surface. Try placing it right sight-up, upside-down, and on its edge. Each time, the Gyroscopic forces will work to hold Giro-top in that position, defying the forces of gravity!

References

Other Uses

Suggestions for Improvement Since this requires blowing with mouth, wipe with alcohol before/after using. Traditional gyroscope has too much play causing vibrations that make it unstable at high angular velocity. Suggest a new one or remove from demo

GYROSCOPE WHEEL

DCS # 1Q50.20 Status Active

Area 1 Mechanics Location 12

Topic 1Q Rotational Dynamics Rating old but effective

Concept 1Q50 Gyros Demo # 308

Checked Yes

Related Demos

Date Checked 9/16/2019



Brief Description Place Gyroscope on a stand and spin it.

Keywords gyroscope, gyro, wheel, top, rotational, stability, precession, conservation, momentum, inertia, kinetic,

Equipment Needed Gyroscope wheel with adjustable length pin in the middle. Gyroscope base.

Detail This gyroscope can be mounted either with the center of mass above, coincident with, or below the pivot point. This changes the direction that the gyroscope precesses (or stop it from precessing at all).

References

Other Uses

Suggestions for Improvement Wheel is slightly out of balance.

GYROSCOPE BICYCLE WHEEL

DCS # 1Q50.20 Status Active

Area 1 Mechanics Location Hanging near center pillar

Topic 1Q Rotational Dynamics Rating good and engaging

Concept 1Q50 Gyros Demo # 344, 345, 346

Checked Yes Related Demos

Date Checked 9/16/2019



Brief Description This Gyro is large enough for students to see. Start wheel spinning and place a ball at one end of a bike wheel axle into a socket of the big lab stand.

Keywords gyroscope, gyro, wheel, bicycle, top, rotational, stability, precession, conservation, momentum, inertia, kinetic,

Equipment Needed Stand with a long metal rod; Big gyro wheel.

Detail Wheel 345 works best on the stand. Wheel 346 does not have a spherical end and as such is better suited for hanging or other demonstrations. Wheel 344 has rough bearing/hub and vibrates when turning.

References American Journal of Physics (AJP 30(7),528).

Other Uses

Suggestions for Improvement

Vector Nature of Angular Momentum

DCS # Status Active

Area 1 Mechanics Location 12

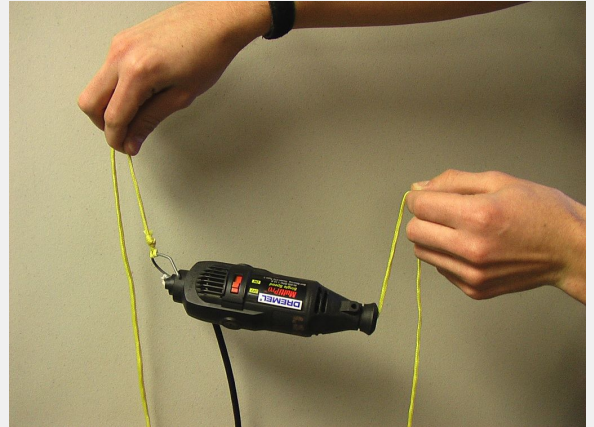
Topic 1Q Rotational Dynamics Rating

Concept 1Q50 Gyros Demo # 101

Checked Yes

Related Demos

Date Checked 2/26/2020



Brief Description The dremmel tool displays how angular momentum is a vector.

Keywords angular momentum, momentum, vector

Equipment Needed

Detail When the dremmel is OFF you can pull on a string at one end of the dremmel and you will see one end lift up. When the dremmel is TURNED ON and one string is pulled up, the dremmel's spinning motor will cause the device to flip around.

References

Other Uses

Suggestions for Improvement

RING SHOOTERS (Mechanics)

DCS # 1Q??.? Status Active

Area 1 Mechanics Location 20

Topic 1Q Rotational Dynamics Rating good and engaging

Concept various Demo # 049

Checked Yes

Date Checked 9/13/2019

Related Demos



Brief Description These launchers fitted with soft and durable rings demonstrate angular momentum.

Keywords ring shooter, launcher, angular momentum, rotational dynamics,

Equipment Needed Vortex Tornado Launchers, Vortex Tornado Spin Fire Rings

Detail Make sure the thick edge of the ring faces forward during flight.

CAUTION: Do not fire at people.
Never load any object other than the provided rings.

References

Other Uses

Suggestions for Improvement

ALUMINUM HONEYCOMB

DCS # 1R20.? Status Active

Area 1 Mechanics

Location 21

Topic 1R Properties of Matter

Rating good but lacks zest

Concept 1R20 Tensile and Compressive

Demo # 037

Checked Yes

Related Demos



Date Checked 9/16/2019

Brief Description

Keywords aluminum honeycomb, tensile, compressive, stress, force, pressure, crystal, structure, lattice,

Equipment Needed

Detail

References

Other Uses

Suggestions for Improvement

HAPPY / SAD BALLS

DCS # 1R40.30 Status Active

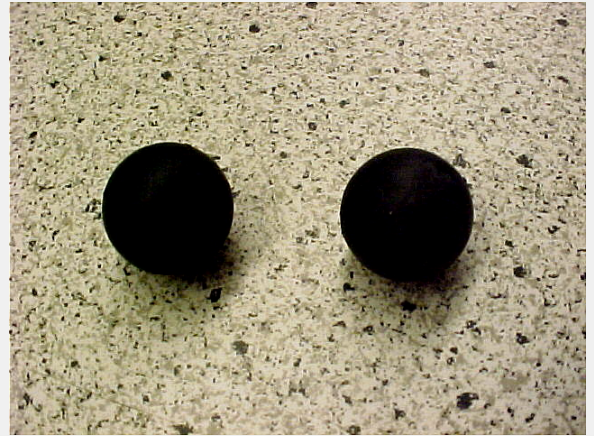
Area 1 Mechanics Location 27

Topic 1R Properties of Matter Rating good and engaging

Concept 1R40 Coefficient of Restitution Demo # 046

Checked Yes

Date Checked 9/16/2019



Related Demos

Brief Description Two seemingly identical black spheres. They have the same density, mass, color and appearance; when dropped to the floor, however, one jumps wildly and the other is motionless.

Keywords coefficient of restitution, ball, bounce, collision, rubber, elastic, rebound, bouncing, friction, hysteresis, Norsorex, choositz, decision

Equipment Needed Pair of black spheres - one is formed from a proprietary rubber compound ("sad ball"), the other one is made of conventional neoprene rubber ("happy ball").

Detail Fact sheet on physical and chemical properties , plus experiments for classroom use included.

References Educational Innovations (EI'01(10),36).

Other Uses

Suggestions for Improvement

COEFFICIENT OF RESTITUTION

DCS # 1R40.10 Status Active

Area 1 Mechanics Location 20

Topic 1R Properties of Matter Rating good and engaging

Concept 1R40 Coefficient of Restitution Demo # 039

Checked Yes

Date Checked 9/16/2019



Related Demos

Brief Description Drop steel ball on a steel plate (concave side) and ball will bounce for an extremely long time before stopping.

Keywords

coefficient of restitution, ball, bounce, collision, steel, elastic, rebound, bouncing,

Drop the same ball on the foam and it will not even bounce.

Equipment Needed

Steel ball with a slightly concave steel plate, foam pad.

Detail

References

Other Uses

Suggestions for Improvement

BLACKBOARD MECHANICS KIT

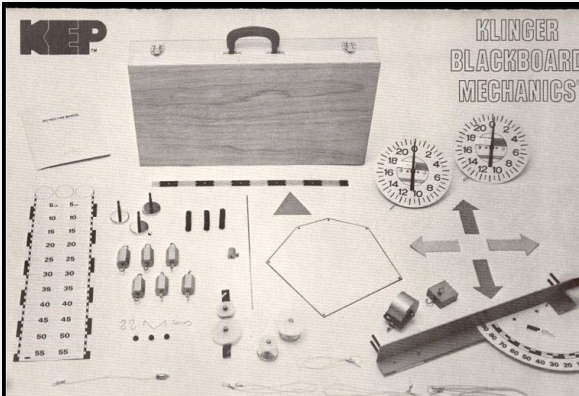
DCS # 1 (mechanics; many categories) Status Active

Area 1 Mechanics Location 17

Topic various Rating old but effective

Concept various Demo # 085

Checked Yes



Related Demos

Date Checked 9/4/2019

Brief Description

A self contained kit, containing many different demos from the area of mechanics. It is magnetic and will stick to old style blackboards.

Keywords

black, board, chalk, scale, magnetic, mechanics, pulley,

Equipment Needed

Wooden case labelled "Blackboard Mechanics"

Detail

An excellent resource. The kit contains many different demos from various topics in mechanics. It has large face scales (visible in the large lecture halls) to show forces.

The Instruction manual contains a list of equipment and many suggested demos.

You will need more string!!

References

Other Uses

Suggestions for Improvement

System to hold items in lid when closing to prevent them from falling out.

GLASS COHESION PLATES

DCS # 2A10.35 Status In Storage

Area 2 Fluid Mechanics Location Storage

Topic 2A Surface Tension Rating good but lacks zest

Concept 2A10 Force of Surface Tension Demo # 322

Checked No

Related Demos

Date Checked 2/26/2020



Brief Description Plates are moistened with water and pressed together. Then, you can demonstrate the high forces of cohesion as you try to pry the plates apart.

Keywords glass cohesion plates, surface tension,

Equipment Needed

Set of two flat-surface glass plates with handles.

Detail

References Sutton (M-259); Central Scientific Company (CENCO'99,113).

Other Uses

Suggestions for Improvement

Electrostatic Water Funnel

DCS # 2A10.84 Status Active

Area 2 Fluid Mechanics Location 13

Topic 2A Surface Tension Rating

Concept 2A10 Force of Surface Tension Demo # 335

Checked Yes

Related Demos

Date Checked 2/26/2020



Brief Description A blue funnel and a small clear tube connect to show how fluid behaves as a small stream.

Keywords

Equipment Needed

Funnel apparatus; water

Detail

References

Other Uses

Suggestions for Improvement

Demo itself works fine, but demo instructions should be expanded.

Floating Paperclip

DCS # 2A10.20 Status Active

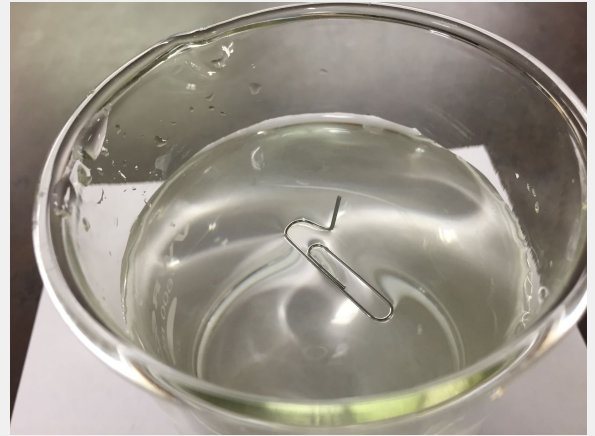
Area 2 Fluid Mechanics Location 17

Topic 2A Surface Tension Rating good but lacks zest

Concept 2A10 Force of Surface Tension Demo # 400

Checked Yes

Related Demos



Date Checked 2/26/2020

Brief Description A paperclip can float on top of water, but will sink when soap lowers the surface tension.

Keywords Surface tension, soap film, paperclip, float, sink

Equipment Needed Paperclips (included), beaker of water, dish soap, toothpick or similar

Detail Once the paperclip is floating, a toothpick or similar object can be used to dip a small amount of soap into the beaker.

To make the paperclips easier to float, bend one end of the paperclip perpendicular to the plane of the paperclip to act as a handle (as pictured). This makes it much easier to gently place the clip on top of the water.

References

Other Uses

If trying to float paperclip after applying the soap, make sure to clean the beaker well and wipe the paperclip clean of soap residue.

Suggestions for Improvement Include toothpicks

PUMPED UP PLASTIC BOTTLES

DCS # 2B30.? / 4B70.20 Status Active

Area 2 Fluid Mechanics Location 28

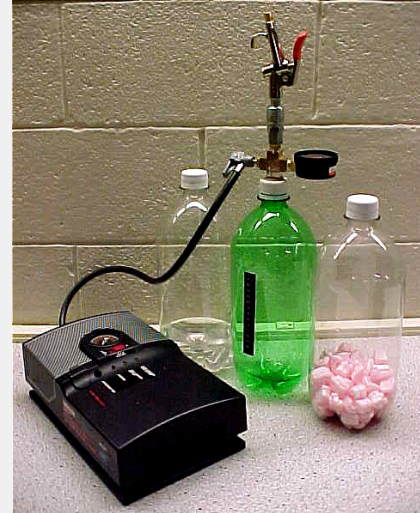
Topic 2B Statics of Fluids Rating \$\$\$\$ good and engaging

Concept 2B20 Static Pressure Demo # 117

Checked Yes

Date Checked 9/16/2019

Related Demos



Brief Description You can see how different pressure inside the bottles can change packing peanuts size, inside temperature and makes a fog.

Keywords plastic bottles, atmospheric pressure, packing peanuts, pump, compression, gas law, fog, cloud, temperature, adiabatic, vapor,

4B70.20 = Expansion Cloud Chamber

Equipment Needed 3 L-bottle with packing peanuts,

Detail Don't pump more than 30 psi (white scale in a pressure gage) - may cause explosion and personal injury.

Also within the box is a hose attachment that can be installed instead of the air valve. Put your thumb over the end of the tube and pressurize the bottle. Release your thumb and the "Cloud Chamber" effect is increased.

References

Other Uses

Suggestions for Improvement

PASCAL'S VASES

DCS # 2B20.40 Status Active

Area 2 Fluid Mechanics Location 12

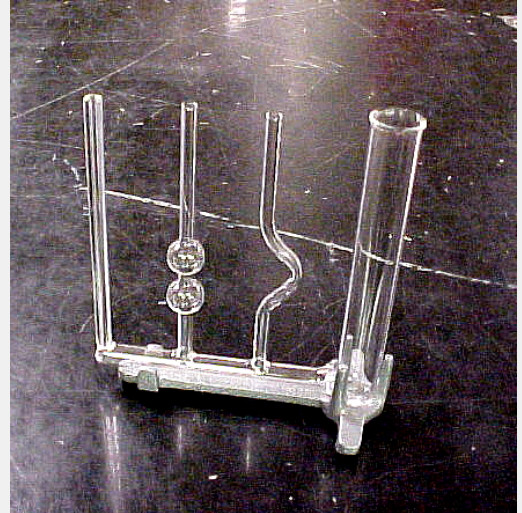
Topic 2B Statics of Fluids Rating good but lacks zest

Concept 2B20 Static Pressure Demo # 100

Checked Yes

Date Checked 9/16/2019

Related Demos



Brief Description This apparatus shows that when wide connected tubes are filled with liquid, the liquid rises to the same level in all.

Keywords Pascal, tubes, vases, pressure, fluid height,

Equipment Needed Four differently shaped tubes are securely sealed to a manifold, all on support base. Colored water

Detail Food coloring is included in this box.

References Sargent-Welch 2001-2002, 694 (CENCO);

Other Uses

Suggestions for Improvement

HOVERCRAFT

DCS # 2B20.80 Status Active (need to install batteries)

Area 2 Fluid Mechanics Location 13

Topic 2B Statics of Fluids Rating good and engaging

Concept 2B20 Static Pressure Demo # 106

Checked Yes

Related Demos



Date Checked 9/16/2019

Brief Description

1. Good for large classes
2. Decent pressure demonstration
3. Turning the switch on (located on top, front-left side) is the only set up task
4. Good with multiple pressure demos, since it is a quick demo

Keywords hovercraft, friction, fluids, pressure, forces

Equipment Needed need to install batteries

Detail

1. There isn't much to it - its a small blower powered toy that shows pressure concepts
2. It uses 4 AA batteries

**Needs a smooth clean surface- demo table works, floor may not.

References

Other Uses

Suggestions for Improvement

SQUIRT GUNS

DCS # 2B20.68 Status Active

Area 2 Fluid Mechanics Location 13

Topic 2B Statics of Fluids Rating good and engaging

Concept 2B20 Static Pressure Demo # 108

Checked Yes

Related Demos



Date Checked 9/16/2019

Brief Description Compare the area/velocity of the trigger handles to that of the exit hole.

Keywords squirt gun, ink, pressure, Pascal, hydraulic, force, area, velocity, speed, flow, fluid, (Dont use the "Splat Master" stuff)

Equipment Needed

Detail

References

Other Uses

Suggestions for Improvement

MAGDEBURG PRESSURE PISTON

DCS # 2B30.31 Status Active

Area 2 Fluid Mechanics Location 12

Topic 2B Statics of Fluids Rating good but lacks zest

Concept 2B30 Atmospheric Pressure Demo # 103

Checked Yes Related Demos 110,102,326

Date Checked 9/20/2019



Brief Description Evacuate the piston, shut the valve and try to pull it apart.

Keywords pressure piston, atmospheric pressure, force, vacuum, Magdeburg hemispheres, pump,

Equipment Needed

Two parts pressure piston with valve. Vacuum pump.

Detail You can use vacuum pump to evacuate this piston.

References

PIRA 200; American Journal of Physics (AJP 36(3), ix); The Physics Teacher (TPT 3(6),285); Freier & Anderson (Fd-2); Hilton (M-22b.3).

Other Uses

Suggestions for Improvement

MAGDEBURG FLAT PLATES

DCS # 2B30.33 Status Active

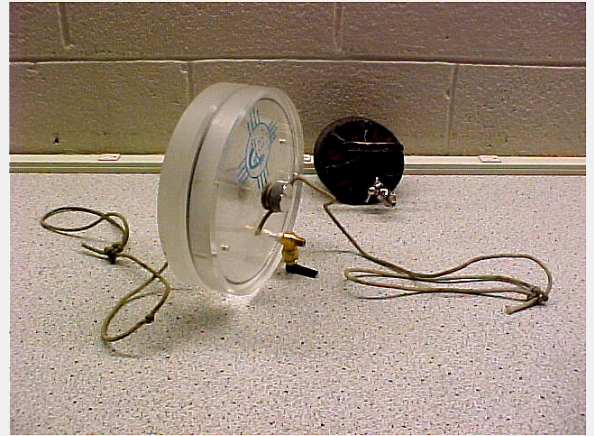
Area 2 Fluid Mechanics Location 13

Topic 2B Statics of Fluids Rating good and engaging

Concept 2B30 Atmospheric Pressure Demo # 110

Checked Yes Related Demos 102,103,326

Date Checked 9/20/2019



Brief Description Join the hemispheres, hook them up to a vacuum pump, and evacuate them. It will be impossible to pull them apart. Open the stopcock to let air in, and the hemispheres separate easily.

Keywords flat pressure plates, atmospheric pressure, force, vacuum, Magdeburg hemispheres, pump,

Equipment Needed

Two sets of hemispheres - clear 9" Plexiglas and 5" metal ones, with "O" ring in between; Vacuum Pump.

Detail *** The clear plates have been missing since before fall 2010.***

References Central Scientific Company (CENCO'99,122).

Other Uses

Suggestions for Improvement

MAGDEBURG PRESSURE JAR

DCS # 2B30.32 Status Active

Area 2 Fluid Mechanics Location 12

Topic 2B Statics of Fluids Rating good and engaging

Concept 2B30 Atmospheric Pressure Demo # 102

Checked Yes Related Demos 103,110,326

Date Checked 9/20/2019



Brief Description -Set up is limited to how long it takes to pump the air out of the jar.
 -Can be interactive. Uses 2 people to try to pull the jar open with ropes
 -Very good demonstration of how strong air pressure really is.

Keywords Magdeburg, hemisphere, atmospheric, pressure, force, vacuum, fluid, pump,

Equipment Needed Pressure Jar and Pump (both included)

Detail This is class interactive experiment. A small hand pump is used to pull the air out of a jar that has a sealable top. The jar cannot be opened with out tremendous force at this point. There are ropes attached to the two halves of the jar for use in trying to open the jar when it's evacuated. Make sure to press down hard enough on the valve when evacuating cylinder to make a good seal.

References

Other Uses

Suggestions for Improvement

VACUUM CANNON

DCS # 2B30.70 Status Active

Area 2 Fluid Mechanics Location 29 & rack over shelf 70

Topic 2B Statics of Fluids Rating good and engaging

Concept 2B30 Atmospheric Pressure Demo # 122

Checked Yes

Date Checked 5/13/2015

Related Demos



Brief Description Uses a PVC pipe and atmospheric pressure to launch a ping pong ball at several hundred miles per hour.

Keywords ping pong, cannon, vacuum bazooka, atmospheric, pressure, vacuum, force, momentum,

Equipment Needed Vacuum Pump

Detail This should be done where there is little risk of injury to students as the effect is quite violent. When fired from a distance of about 10 meters into a classroom wall the ping pong ball is completely crushed.

References

Other Uses COMPLETE INSTRUCTIONS ARE IN BOX! (outdated but sufficient)

Suggestions for Improvement

MAGDEBURG HEMISPHERES

DCS # 2B30.30 Status Active

Area 2 Fluid Mechanics Location 18

Topic 2B Statics of Fluids Rating good and engaging

Concept 2B30 Atmospheric Pressure Demo # 326

Checked Yes Related Demos 102, 103, 110

Date Checked 9/20/2019



Brief Description Evacuate Magdeburg hemispheres and try to separate them.

Keywords Magdeburg, hemisphere, atmospheric, pressure, force, vacuum, pull apart,

Equipment Needed Vacuum pump

Detail

References

Other Uses

Suggestions for Improvement Needs a new gasket.

CARTESIAN DIVER

DCS # 2B40.30 / 2B20.? Status Active

Area 2 Fluid Mechanics Location 12

Topic 2B Statics of Fluids Rating good and engaging

Concept 2B40 Density and Buoyancy Demo # 107

Checked Yes

Date Checked 9/20/2019

Related Demos



Brief Description Pictured pump not included. Squeeze the bottle with your hands and the "squid" will sink. No ketchup

2B20.? = Static Pressure (Pascal's Law)

Keywords

cartesian diver, pop bottle, plastic, pump cap, Fizz Keeper, ketchup packet, density, buoyancy, sinking, floating, pressure, bubble,

Equipment Needed

2L bottle with water, two packs of ketchup and lid with pump.

Detail By squeezing a water-filled plastic soda bottle, a floating object becomes denser and sinks; releasing the pressure causes the diver to become less dense and float to the surface.

References

Sutton (M-321), Educational Innovations (EI'01(10),49).

Other Uses

Suggestions for Improvement

DENSITY SAMPLES

DCS # 2B40.? Status In Storage

Area 2 Fluid Mechanics Location Storage

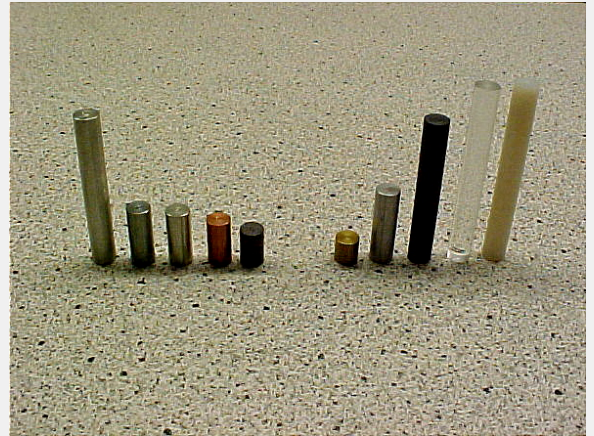
Topic 2B Statics of Fluids Rating good but lacks zest

Concept 2B40 Density and Buoyancy Demo # 315

Checked No

Date Checked 2/26/2020

Related Demos



Brief Description Use these two sets of cylinders in your density experiments to illustrate reciprocal density. One set - five metal cylinders of equal mass are made of aluminum, copper, lead, tin, and zinc. The other one - five cylinders of different materials, but all have the same mass.

Keywords density, sink, float, buoyancy, fluid, samples, cylinder, samples,

Equipment Needed Five metal density cylinder set and five cylinders of different materials set.

Detail In each set the cross-sectional areas of cylinders are the same, so their lengths are inversely proportional to their densities.

References Central Scientific Company (CENCO'99,104).

Other Uses

Suggestions for Improvement

DENSITY CYLINDER

DCS # 2B40.59 Status Active

Area 2 Fluid Mechanics Location 13

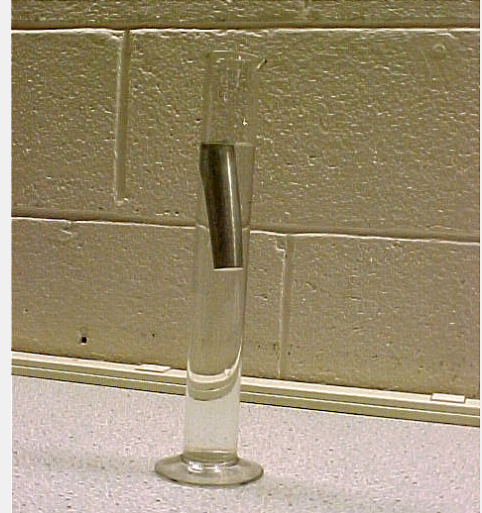
Topic 2B Statics of Fluids Rating old but effective

Concept 2B40 Density and Buoyancy Demo # 111

Checked Yes

Related Demos

Date Checked 9/20/2019



Brief Description	<p>The density rod shows how temperature affects density of a Liquid. The hollow cylinder floats in cold water and sink in hot water.</p> <p>Also includes 500ml flask for alternate demo</p>	Keywords	<p>density cylinder, density, buoyancy, temperature, float, sink, hot, cold, buoy, self right</p>
Detail	<p>Fill beaker with cold tap water. Place the Density Rod into the beaker and observe that it floats. Note the temperature. Add a hot water in to the beaker (hot water from the metal can on the hot plate), Density Rod will sink (this can work with hot tap water as well)</p> <p>See the Basic Theory page for Explanation of Density Variation with Temperature.</p> <p>To prevent corrosion of the aluminum cylinder, it should be wiped dry after the demonstration.</p>	Equipment Needed	<p>Glass beaker; Sealed Hollow Aluminum Cylinder; Thermometer; Cold Tap water, Hot plate and Metal Can with water.</p>
		References	<p>Central Scientific Company (CENCO'99,106).</p>
		Other Uses	<p>Alternate: Buoy Demo</p> <p>Fill included flask to about 1 inch above 500ml marking with cold tap water. Drop into flask with X side down. The</p>
		Suggestions for Improvement	

ARCHIMEDES' PRINCIPLE APPARATUS

DCS # 2B40.20 Status In Storage

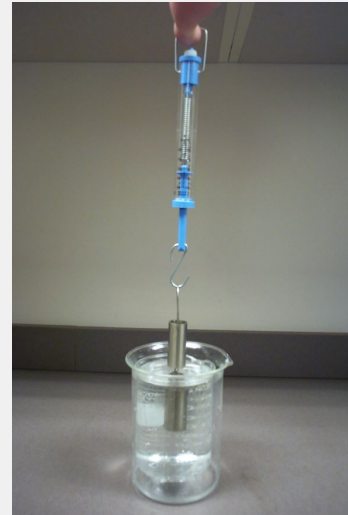
Area 2 Fluid Mechanics Location Storage

Topic 2B Statics of Fluids Rating good but lacks zest

Concept 2B40 Density and Buoyancy Demo # 323

Checked No

Date Checked 2/26/2020



Related Demos

Brief Description

Keywords Archimedes principle, density, buoyancy, fluids, machined bucket, cylindrical cavity, plummet,

Equipment Needed

Detail From a scale, suspend the "bucket" and from the "bucket" suspend the solid cylinder. Note the scale reading before and after lowering the solid cylinder into a full container of water. Catch the displaced water as it overflows and put it into the "bucket." The weight of this water will equal the buoyant force and return the scale reading to its value before the solid cylinder was lowered into the water.

References

Other Uses

Suggestions for Improvement

WEIGHT OF AIR

DCS # 2B40.45 Status Active

Area 2 Fluid Mechanics Location 13

Topic 2B Statics of Fluids Rating good and engaging

Concept 2B40 Density and Buoyancy Demo # 104

Checked Yes Related Demos 121

Date Checked 2/26/2020



Brief Description Weight of sphere (with air in it) is the same as the solid mass, so they balance. Put entire unit in a vacuum and the weight is now heavier than the sphere (without air in it).

Keywords density, buoyancy, weight of air, vacuum, bell jar, balance, hollow sphere, scale,

Equipment Needed vacuum pump, bell jar

Detail Use with Nalgene bell jars (Demo 121 Shelf 14) because the glass bell jars are not large enough.

References

Other Uses

Suggestions for Improvement

BELL JAR DEMO KIT

DCS #		Status	Active
Area	2 Fluid Mechanics	Location	14
Topic	2B Statics of Fluids	Rating	□□□□ good and engaging
Concept	various	Demo #	121
Checked	Yes	Related Demos	104
Date Checked	9/16/2019		



Brief Description A kit that contains many of the popular demos associated with bell jars. Includes two nalgene bell jars, one base, all connecting fittings and hoses, styrofoam peanuts, shaving cream (with container to put it in), and a personal alarm. The kit also has an instruction sheet with

Keywords bell jar, vacuum, sound, pressure, Styrofoam, shaving cream

Equipment Needed

Vacuum pump (use the one on the red cart. Bottom one doesn't work)Note: the kit uses gaskets to seal. **DO NOT** use grease to seal the bell jar)

Detail It is recommended that you look at the printed instruction sheet before use--it has good experiments and ways to avoid creating a mess.

One of the bell jars has a hook epoxied into it so you can hang demos.

References

The hose fitting to connect the bell jar to the vacuum pump has a quick connect and a shutoff valve so that you can evacuate the bell jar in the demo room and take it to class without the pump.

Other Uses

Another good demo for use with the bell jars (though not included in the kit) is the "Weight of Air Balance" (Demo 104 Shelf 13) and a good one to ask the class for predictions before doing the demo (a good way to demonstrate

Suggestions for Improvement

VELOCITY OF EFFLUX

DCS # 2C10.10 Status Active

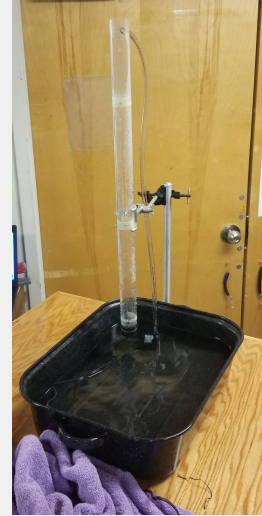
Area 2 Fluid Mechanics Location 16

Topic 2C Dynamics of Fluids Rating good and engaging

Concept 2C10 Flow Rate Demo # 115

Checked Yes Related Demos 9020

Date Checked 9/20/2019



Brief Description Fill this tube with water. The water will flow in 3 different paths from its 3 evenly spaced 3 mm holes.

Keywords 3, three, hole, tube, flow rate, fluids, pressure, depth, height, Mariotte's bottle, Toricelli's tank, efflux, velocity,

Equipment Needed Clear plastic tube with three holes; water and container for water flowing from the holes.

Detail Plugging all holes while filling the tube requires 3 hands or some sort of closure over the holes that can be quickly removed before the water drains.

There is a Submersible Water Pump located on shelf 15. The setup is as pictured.

The pump (9020 shelf 15) is not strong enough to keep all three holes flowing at the same time. So, plug the two bottom holes to allow the water fill. Then release (watch out the water from the second hole goes far) and repeat.

References Central Scientific Company (CENCO'99, 116).

Other Uses

Suggestions for Improvement

FLOATING BALL

DCS # 2C20.30 Status Active

Area 2 Fluid Mechanics Location Shelf 1

Topic 2C Dynamics of Fluids Rating good and engaging

Concept 2C20 Bernoulli Force Demo # 116

Checked Yes

Date Checked 9/20/2019

Related Demos



Brief Description Turn on the air blower, place the beach ball in the air stream. Change the angle of the air stream until the ball falls. Use a large funnel upside down to demo also.

Keywords floating, flying, ball, Bernoulli, force, air pressure, flow, beach ball, leaf blower, Bernoulli funnel

Equipment Needed

Air Blower and Beach Ball.

Can use Bernoulli funnel with this demo (located on shelf 1)

Detail The blower is extremely loud, hearing protection recommended. Seriously very loud!!

References

Hilton (M-12b); The Physics Teacher (TPT 7,116-117 (1969)).

Other Uses

Suggestions for Improvement

LIFTING PLATE

DCS # 2C20.41 Status Active

Area 2 Fluid Mechanics Location 14

Topic 2C Dynamics of Fluids Rating good and engaging

Concept 2C20 Bernoulli Force Demo # 109

Checked Yes

Date Checked 2/26/2020



Related Demos

Brief Description Place Plexiglas plate with tube in the middle on the top of metal disc . Blow into the tube and the plates stick. You can lift both plates at once while blowing an air.

Keywords lifting plate, Bernoulli, air pressure, flow, force,

Equipment Needed Plexiglas plate with hole in the middle and with the tube glued into that hole; Metal plate with pins around it; Blower with the hose.

Detail Place metal plate on table with pins facing upwards.

References Sutton (M-295); Hilton (M-12c); University of Maryland Physics Lecture-Demonstration Facility (F5-07).

Other Uses

Suggestions for Improvement

Vortex Generators

DCS # 2C50.10 Status Active

Area 2 Fluid Mechanics Location 13

Topic 2C Dynamics of Fluids Rating good and engaging

Concept 2C50 Vortices Demo # 113

Checked Yes Related Demos 084

Date Checked 10/29/2019



Brief Description Take one can with a round hole in the bottom. Use a fogger to fill can with a smoke. Hold the can so the hole is toward the class and tap the plastic cover. A smoke ring about the size of the hole will travel across the room.

Keywords vortex generator, smoke ring, fog, vortices, angular momentum, inertia,

Equipment Needed A can with plastic cover and the hole in the bottom; Fogger shelf 11; Fog Liquid.

Detail DO NOT make too much fog, fire alarm can react on this fog.

References PIRA 200.

Other Uses

Suggestions for Improvement

FLAME TORNADO

DCS # 2C50.35 Status Missing

Area 2 Fluid Mechanics Location

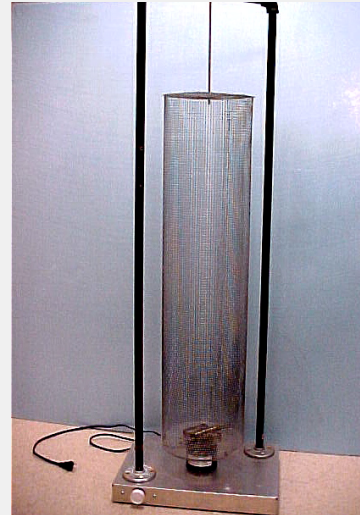
Topic 2C Dynamics of Fluids Rating good and engaging

Concept 2C50 Vortices Demo # 354

Checked No

Date Checked 2/26/2020

Related Demos



Brief Description Put a small amount of alcohol on the cloth inside the cage, use the matches to burn it. Turn the switch on and start cage rotation, you will see the Flame Tornado.

Keywords flame tornado, vortex, vortices, angular momentum, fire,

Equipment Needed

Rotating cage with the cloth on the platform at the bottom of the cage, mounted in to metal frame with the base. Alcohol.

Detail Movement of the cage is operated by the switch on the base of the system.
DO NOT put too much of the alcohol, you can get too big fire.

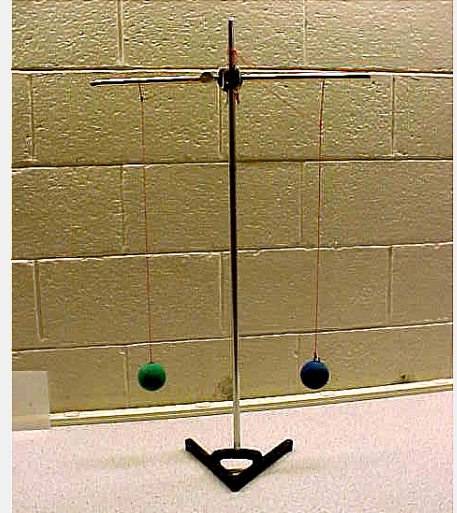
References

Other Uses

Suggestions for Improvement

DIFFERENT MASS PENDULA

DCS # 3A10.17 Status In Storage
Area 3 Oscillations and Waves Location Storage
Topic 3A Oscillations Rating good but lacks zest
Concept 3A10 Pendula Demo # 276
Checked No Related Demos
Date Checked 2/26/2020



Brief Description

Two balls with the same diameter but different mass - blue ball is heavier than green one. If these balls have the same string length they swing with the same period. So, equal length pendulum of different masses oscillate together.

Keywords

different mass pendula, heavy, light, length, mass, period,

Equipment Needed

Two rubber balls with different mass; Metal stand; Two pieces of string with the same length.

Detail

****MISSING ONE OF THE RUBBER BALLS****

References

PIRA1000, Sutton (M-81).

Other Uses

Suggestions for Improvement

PHYSICAL PENDULUM OR INERTIA BALANCE

DCS # 3A15.10 Status Active

Area 3 Oscillations and Waves Location 17

Topic 3A Oscillations Rating old but effective

Concept 3A15 Physical Pendula Demo # 123

Checked Yes

Date Checked 9/9/2019

Related Demos



Brief Description The balance consists of a horizontal metal bar supported from a heavy stand by two spring-steel strips. Place different masses on that balance and watch their vibrations in a horizontal plane. The period will be different for the different masses.

Keywords inertia balance, physical pendulum, oscillations, Newton, first law,

Equipment Needed Inertia Balance; Set of blocks with different weight; Lab stand.

Detail Best viewed from above.

References Sutton (M-106).

Other Uses Can also be classified as 1F10.10 inertia balance

Suggestions for Improvement

Masses and Springs

DCS # 3A20.10 Status Active

Area 3 Oscillations and Waves

Location 45

Topic 3A Oscillations

Rating

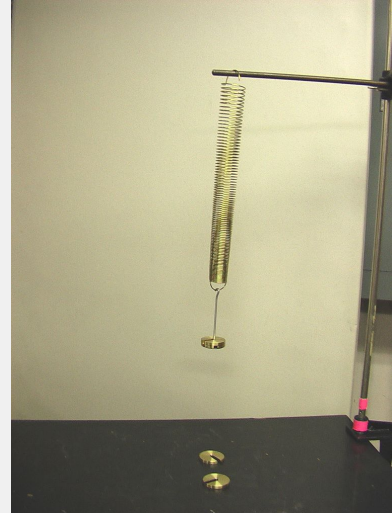
Concept 3A20 Springs and Oscillators

Demo # 259

Checked Yes

Related Demos

Date Checked 2/26/2020



Brief Description Observe the difference in oscillation frequency when different masses are hung from spring.

Keywords Harmonic motion, mass, spring, force, oscillation, waves, period

Equipment Needed Clamp stand to hold spring.

Detail

References

Other Uses

Suggestions for Improvement

UPSIDE-DOWN PENDULUM

DCS # 3A60.60 Status Active

Area 3 Oscillations and Waves Location 52

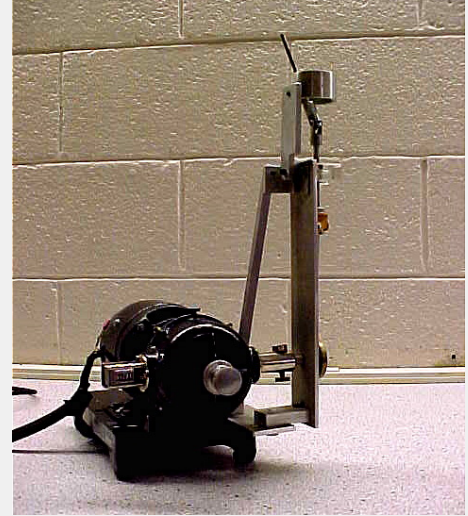
Topic 3A Oscillations Rating good and engaging

Concept 3A60 Driven Mechanical Demo # 298

Checked Yes

Date Checked 10/16/2019

Related Demos



Brief Description A variable speed motor provides vertical motion for a vertical rod. The inertia of the rod allows it to stay vertical.

Keywords upside-down pendulum, upside, down, upsidedown, driven, resonance, vertical, stability, balance,

Equipment Needed Upside-down pendulum with speed rotator.

Detail

References Freier & Anderson (Mz-9), PIRA 1000

Other Uses

Suggestions for Improvement

DRIVEN PHASE RELATIONSHIPS

DCS # 3A60.? Status Active

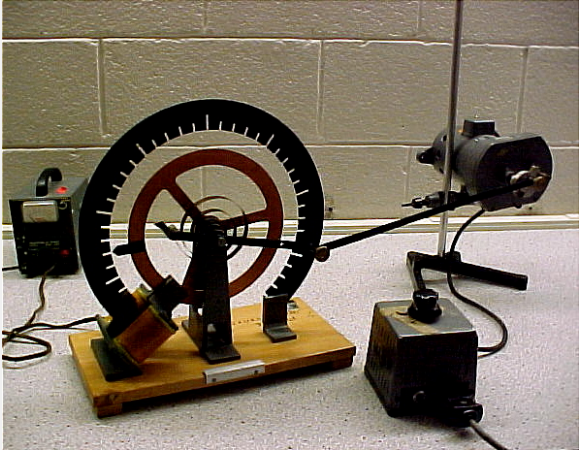
Area 3 Oscillations and Waves Location 48

Topic 3A Oscillations Rating good and engaging

Concept 3A60 Driven Mechanical Demo # 278

Checked Yes Related Demos

Date Checked 10/16/2019



Brief Description This device is used to show how amplitude and phase of an oscillatory system vary with frequency and amplitude of a driver, and with damping.

Keywords driven phase relationships, damped, oscillators, forced vibrations, harmonic motion, resonance, torsional pendulum,

Equipment Needed Torsional Pendulum; Experimental motor (110 volts, AC and DC); Speed regulator; Manual; Lab stand with clamps, DC power supply.

Detail The large wheel with the pointer is driven by the variable speed motor. The speed of the motor may be adjusted using the potentiometer on the power supply. As you vary the speed of the motor, the amplitude and phase of the oscillation may be clearly viewed. You may also add damping by passing a current through the coils on the base of the device using an external power supply; this eddy current damping is proportional to speed. The manual provides more details, you can find it in the box with this device.

References American 3B Scientific (3B'01,31).

Other Uses Can be helpful to use a newer DC supply to monitor current in electromagnet.

Suggestions for Improvement

Driver Motor with Clutch

DCS # Status Active

Area 3 Oscillations and Waves Location 46

Topic 3A Oscillations Rating

Concept 3A60 Driven Mechanical Demo # 305

Checked Yes

Related Demos

Date Checked 11/1/2019



Brief Description Driver motor for various

Keywords large motor, driver, AC

Equipment Needed

Detail Driver motor operates at a fixed speed, but the silver knob on the front of the motor controls the clutch, allowing the motor to spin with lower speed and torque at the output.

References

Other Uses

Suggestions for Improvement

Which specific demos would this be used for?

WILBERFORCE PENDULUM

DCS # 3A70.10 Status Active

Area 3 Oscillations and Waves Location 48

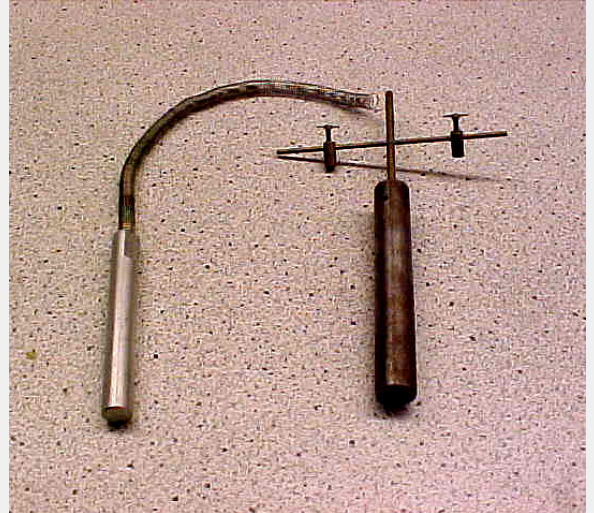
Topic 3A Oscillations Rating good but lacks zest

Concept 3A70 Coupled Oscillations Demo # 275

Checked Yes

Date Checked 10/16/2019

Related Demos



Brief Description The mass hanging from the spring demonstrate a coupled oscillator system. The spring and the mass are designed so energy and oscillatory motion are transferred back and forth between the up and down oscillation of the spring, and the rotational motion of the mass.

Keywords Wilberforce pendulum, coupled oscillations, angular momentum, inertia, rotation, transfer of energy, frequency, resonance,

Equipment Needed Wilberforce Pendulum - heavy bob with small adjustable weights, hanging vertically on a spring; 6' height stand with clamps.

Detail The adjustable weights on the bob are used to tune its moment of inertia. The spring has strongly coupled oscillation modes: a translational mode - up and down, and a rotational mode. At resonance the two modes alternate, giving one point of pure translation and one point of pure rotation. Lock pendulum holder in a clamp VERTICALLY ONLY to support the spring without damaging it.

References Central Scientific Company (CENCO'99,99); PIRA 200; Sutton (S-18).

Other Uses

Suggestions for Improvement

Changed the spring and you can see the affect better. Cannot be tuned correctly as is. Correct tuning requires the translational and torsional frequencies be very close. The period of vertical oscillation is ~2 seconds while the torsional period is on the order of ~4 seconds. No adjustment of weights can tune the torsional period close enough to the vertical period to produce this behavior.

Coupled Pendula

DCS #	Status	Active
Area	3 Oscillations and Waves	Location 35
Topic	3A Oscillations	Rating <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> good and engaging
Concept	3A70 Coupled Oscillations	Demo # 411
Checked	Yes	Related Demos
Date Checked	11/4/2019	



Brief Description	There are 3 pendula on this device (left to Right) 1: Chaotic pendulum 2: Coupled pendulum with spring 3: coupled pendulum $M_1 > M_2$	Keywords	Oscillations, Coupled, chaotic, spring, mass
Detail	1: Start the pendulum pointing up and watch the movement 2: Keep one stationary and pull one about 2 inches to the side. Then release both There are three types of motion: 1. Side to side (same direction) 2. Side to side (opposite direction) 3. Start one in motion and it will transfer all motion to the other and stop momentarily. Then the process starts over with the other pendulum (~10 seconds to arrive back to initial conditions) 3: Hold the bottom weight in place and offset the top weight. Then release both	Equipment Needed	References Other Uses Suggestions for Improvement

Ripple Tank

DCS # Status Active

Area 3 Oscillations and Waves

Location 42

Topic 3B Wave Motion

Rating

Concept

Demo # 241

Checked Yes

Related Demos

Date Checked 4/26/2015



Brief Description The ripple tank consists of a shallow tray of water with a overhead light source to illuminate the ripples in the water. The light source can be strobed so that the wave are made to look as if they are stationary.

Keywords waves, Oscillations, ripple, tank, ripple tank, strobe, water, wave generator, interference, wave motion, diffraction, motion

Equipment Needed
 Box of accessories
 Frame
 Light and mount
 Mirror and screens

Detail

- 1) Demonstrate parallel wave fronts and their reflection on a variety of different shaped surfaces.
- 2) Demonstrate the refraction of waves when the parallel wave fronts change wave speed when the water depth is changed.
- 3) Demonstrate parallel wave fronts as they defraction around a barrier. Demonstrate the interference of the wave produced by two point sources.

References

Other Uses

Time consuming setup and takedown. Needs at least 3 electrical outlets.

Suggestions for Improvement Plane wave generator arm is broken

WAVES ON A ROPE

DCS # 3B10.10 Status Active

Area 3 Oscillations and Waves Location 48

Topic 3B Wave Motion Rating good and engaging

Concept 3B10 Transverse Pulses and Waves Demo # 272

Checked Yes Related Demos 274

Date Checked 10/23/2019



Brief Description Hold this rope from both sides and demonstrate transverse wave motion.

Keywords pulse on a rope, transverse wave, wave motion, pulse, dispersion

Equipment Needed Rope.

Detail

References

Other Uses

Suggestions for Improvement

WAVES ON A RUBBER CORD

DCS # 3B10.10 Status Active

Area 3 Oscillations and Waves Location 48

Topic 3B Wave Motion Rating good and engaging

Concept 3B10 Transverse Pulses and Waves Demo # 274

Checked Yes Related Demos 272

Date Checked 2/20/2020



Brief Description You can demonstrate transverse motion with this rubber cord.
3B25.? = Impedance and Dispersion

Keywords rubber cord, transverse wave, wave motion, pulse,

Equipment Needed Rubber Cord.

Detail

References Sargent-Welch 2001-2002 (CENCO), 728.

Other Uses

Suggestions for Improvement

TRAVELING WAVE APPARATUS

DCS # 3B10.55 Status Active

Area 3 Oscillations and Waves Location 48

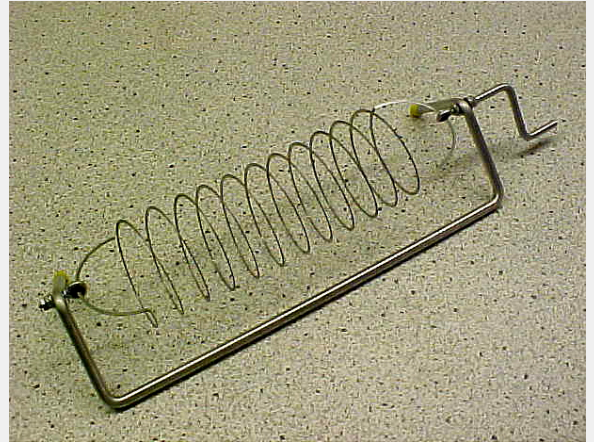
Topic 3B Wave Motion Rating good but lacks zest

Concept 3B10 Transverse Pulses and Waves Demo # 277

Checked Yes

Date Checked 10/23/2019

Related Demos



Brief Description Use overhead camera with this apparatus to show traveling waves.

Keywords travelling wave apparatus, rotate, wave motion, torsion,

Equipment Needed

Traveling Wave Apparatus; Overhead Camera.

Detail Slowly turning the crank simulates a traveling wave when viewed from directly overhead.

Turn slowly and steadily for best results.

References

Other Uses

Suggestions for Improvement

Crank handle size makes it difficult to turn handle without bumping into projector and jarring the spring. Mount on acrylic blocks to improve handle clearance?

TRANSVERSE WAVE MACHINE

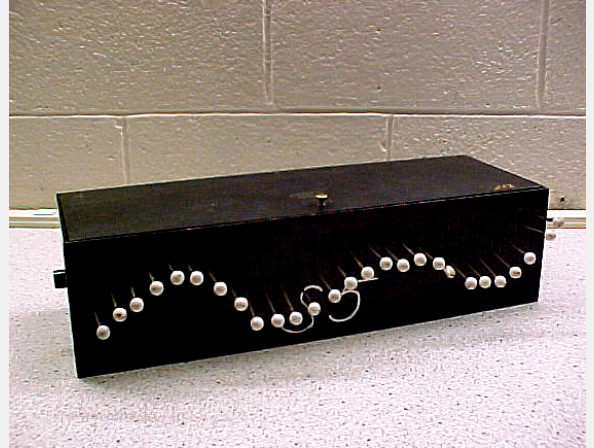
DCS # 3B10.51 Status Active

Area 3 Oscillations and Waves Location 49

Topic 3B Wave Motion Rating good but lacks zest

Concept 3B10 Transverse Pulses and Waves Demo # 286

Checked Yes



Related Demos

Date Checked 10/23/2019

Brief Description A number of small balls are fixed to the end of a set of rods that can slide up and down. Rotate a handle on the side of the black box and demonstrate the motions of waves.

Keywords waves machine, wave motion, transverse, travel, rods, vertical,

Equipment Needed

Detail

References

Other Uses

Suggestions for Improvement Good concept but could be better machined: pattern is not perfectly sinusoidal.

Torsion Wave Generator

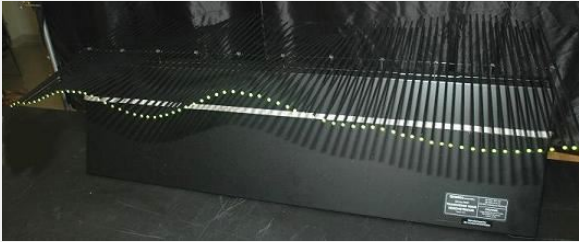
DCS # 3B10.10 Status Active

Area 3 Oscillations and Waves Location 44

Topic 3B Wave Motion Rating good and engaging

Concept 3B10 Transverse Pulses and Waves Demo # 246

Checked Yes



Related Demos

Date Checked 2/26/2020

Brief Description PASCO Transverse Wave Demonstrator consist of a set of rod attached to a torsional wire. When the end rod is moved transversly the disturbance is transmitted down the demonstrator.

Keywords Oscillations and Waves, waves, Oscillations, transverse wave, wavelength, velocity, frequency, interference, standing waves

Equipment Needed

Detail You can demonstrate: (1) wave propagation; (2) velocity in different media by two sections whose oscillators have different mass; (3) wavelength versus velocity and frequency; (4) reflection at fixed and free boundaries (by clamping the end if desired); (5) constructive and destructive interference; (6) standing waves and resonance (a mechanical oscillator for fixed known frequencies is available if desired); (7) reflection and transmission at media boundaries.

References

Other Uses

Suggestions for Improvement One of the rods on the largest demonstrator is loosened from the torsion rod.

WAVE DRIVER AND RESONANCE KIT

DCS # 3B22.11 / 3D40.? Status Active

Area 3 Oscillations and Waves Location 50

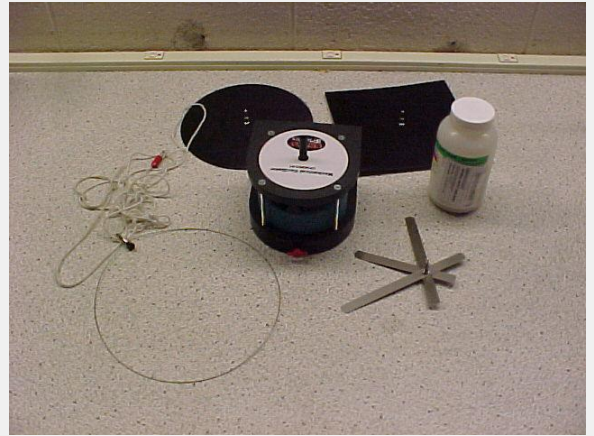
Topic 3B Wave Motion Rating good and engaging

Concept 3B22 Standing Waves Demo # 310

Checked Yes

Date Checked 10/23/2019

Related Demos



Brief Description Demonstrate various types of resonance using a frequency generator and a physical oscillator.

Keywords standing waves, vibrating string, vibrator, wave motion, Melde's, frequency, wavelength, tension, modes, length, metal bars, strips, wire hoop, loop, ring, Chladni plate, instruments, resonance demonstration, demo

Equipment Needed ALL IN BOX

Detail Be sure to lock the oscillator when changing attachments and unlock during operation to prevent damage to the diaphragms.

Attach a string to the top of vibrator and then use mass and a pulley to put tension on the string create standing waves of various frequencies by adjusting Generator-amplifier.
 Keep the frequency fixed and change the tension of the string to show that the wavelength is different and speed is changed.
 Also includes Chladni plates

References Sutton (S-35); University of Maryland Physics lecture-Demonstration Facility (G3-51; G3-52).

Other Uses

Suggestions for Improvement

STANDING WAVES

DCS # 3B22.11 Status In Storage

Area 3 Oscillations and Waves Location Storage

Topic 3B Wave Motion Rating good and engaging

Concept 3B22 Standing Waves Demo # 320

Checked No

Date Checked 2/26/2020

Related Demos



Brief Description Speed rotator makes the metal rod attached to the plank with hinge move vertically and demonstrate standing waves in the string, which attached to the rod. You can demonstrate standing waves with different wavelength by changing the speed of rotations or tension of the

Keywords standing waves, vibrating string, vibrator, wave motion, Melde's, frequency, wavelength, tension, modes,

Equipment Needed Metal frame with the vertically moving rod; Variable Speed Rotator; String; Pulley on a Lab stand; Set of Weights.

Detail Use big C-clamps to keep Frame with rod and Speed vibrator in a stable position - vibration from all rotations can make the whole system move.

References Sutton (S-35); University of Maryland Physics lecture-Demonstration Facility (G3-51; G3-52).

Other Uses

Suggestions for Improvement

SPACEPHONE

DCS # 3B25.55 Status Active

Area 3 Oscillations and Waves Location 48

Topic 3B Wave Motion Rating good but not for lecture

Concept 3B25 Impedance and Dispersion Demo # 279

Checked Yes

Date Checked 10/23/2019

Related Demos



Brief Description If one person will say something in to one end of the Space Phone, the other one can receive the message while listening on the other side of this apparatus. A long helical coil of fine wire transmits sound slowly. Speak into a sound box on one end and somewhat distorted sound

Keywords spacephone, space phone, impedance, echo, distortion, reflection, wave motion, sound, transmit,

Equipment Needed Space Phone

Detail Must be taut to transmit sound.

References

Other Uses Also a good spring for a physical waves demonstration, but be gentle.

Suggestions for Improvement

DOPPLER BUZZER

DCS #	3B40.10	Status	Active
Area	3 Oscillations and Waves	Location	49
Topic	3B Wave Motion	Rating	□□□□ good and engaging
Concept	3B40 Doppler Effect	Demo #	283
Checked	Yes	Related Demos	399 (not as good)
Date Checked	10/23/2019		



Brief Description

1. Swing a battery powered buzzer, in a net bag attached to a light-weight rope, above your head in a horizontal circle.
2. Students in the room will hear the Doppler Effect on the buzzer's sound as it continuously moves toward and away from them.

Keywords doppler effect, buzzer, wave motion

Equipment Needed

In the Box:

1. Piezo circular Buzzer (battery powered), attached to a Battery Pack w/ an "ON-OFF" Switch
2. 4 AA Batteries (1.5V each, included & installed in the battery pack)
3. Laundry/Lingerie Net Bag, attached to a approximately 4-foot long, lightweight rope with plastic handle

Detail

1. The "ON-OFF" switch on the battery pack has been highlighted in Fluorescent Orange Ink, so it can be seen well through the white net bag.
2. The Buzzer can be easily turned ON & OFF while it remains in the white net bag.
3. Use the Clear Plastic Handle on the Rope to adjust the radius of the horizontal circle above your head by allowing the rope to slide through the Handle until the desired radius is achieved.

References

Other Uses

CAUTION: Carefully estimate your radius, so as not to smash the Doppler Buzzer into a wall, blackboard, demo table, smart-room control table, student, etc.

Suggestions for Improvement

GRIFFIN RIPPLE TANK

DCS # 3B50.? / 9C35.10 Status Needs Repair

Area 3 Oscillations and Waves

Location 50

Topic 3B Wave Motion

Rating old but effective

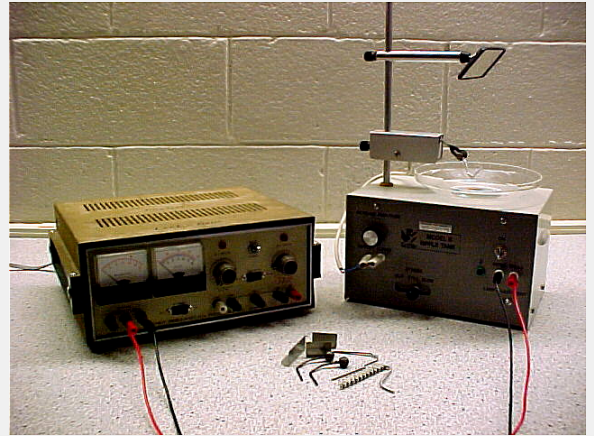
Concept 3B50 Interference and Diffraction

Demo # 290

Checked Yes

Related Demos

Date Checked 10/23/2019



Brief Description

Keywords ripple tank, waves, interference, wave motion, diffraction,

Equipment Needed

Griffin Ripple Tank, 12VAC Voltage Power Supply, Ripple Tank Accessory.

Detail The ripple tank is on 50 - the other components are on 42

References

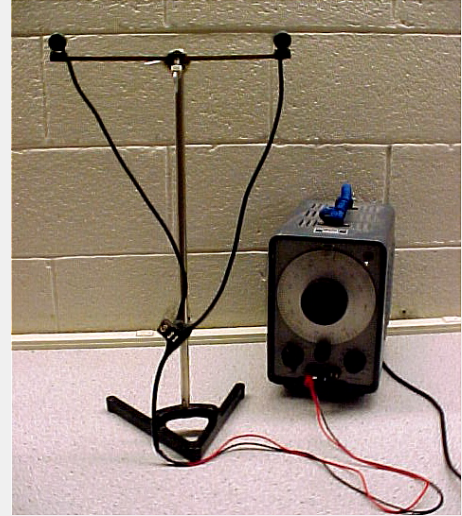
Other Uses

Suggestions for Improvement

Does not turn on. Lacks clear instructions. Redundant with other ripple tank.

TWO SPEAKER INTERFERENCE

DCS #	3B55.10	Status	Active
Area	3 Oscillations and Waves	Location	49
Topic	3B Wave Motion	Rating	□□□□ good and engaging
Concept	3B55 Interference and Diffraction of	Demo #	281
Checked	Yes	Related Demos	291 299 285 281 271 295
Date Checked	11/1/2019		



Brief Description Speakers in phase are mounted at the ends of a rotatable bar.

Keywords speaker bar, diffraction, interference, sound, speaker, bar, frequency generator, wave motion,

Equipment Needed Signal generator, clamp stand

Detail Observe how the speakers can seem to go out of phase as the bar rotates. This behavior changes for different frequencies.

Effect heard best with high frequency

References

Other Uses

Suggestions for Improvement Not good for large lecture halls.

WHITE NOISE INTERFERENCE

DCS # Status Active

Area 3 Oscillations and Waves

Location 49

Topic 3B Wave Motion

Rating □□□□□

Concept 3B55 Interference and Diffraction of

Demo # 280

Checked Yes

Related Demos

Date Checked 2/28/2020



Brief Description A box used to switch speaker leads to easily change speaker phase by 180 degrees.

Keywords Interference, phase, reverse, reversal,

Equipment Needed

Signal generator, pair of speakers, (amplifier shelf 61 for other sound sources).

Detail

References

Other Uses

Suggestions for Improvement

SLINKIES AND SPRINGS

DCS # 3B10.20 / 3B20.11 / 3B22.11 / 1G20.45 Status Active

Area 3 Oscillations and Waves Location 56

Topic 3B Wave Motion Rating good and engaging

Concept various Demo # 9010

Checked Yes



Related Demos

Date Checked 10/23/2019

Brief Description A long metal slinky and a longer but smaller metal spring. The slinky can be used to show compression waves and the smaller more sturdy spring can be used to show transverse waves.
1G20.45 = dropped slinky
3B22.50 = slinky standing waves

Keywords

slinky, spring, transverse, longitudinal, standing, waves, wave motion, pulse, compression, propagation, superposition, interference, constructive, destructive,

Equipment Needed

a metal post or student volunteer to hold one end of the spring or slinky.

Detail These are two very long springs (one a slinky) to show wave propagation on a classroom size level. Please do not use the slinky for transverse waves since slinkies have are very good at destroying themselves if handled roughly this way.
SLINKY SPRING can be used for Transverse and Longitudinal Motion demonstration - clamp the spring to the lecture table and hold the other end with some tension. Strike the spring sharply with your hand to send a traveling pulse; shake the end with various frequencies to illustrate transverse standing waves. Hold slinky in your hand vertically, a wave is pulsed and travels the length of the slinky -compressional waves demonstration.
Long SPRING WIRE COIL shows Progressive Wave Motion.

References

Brown Physics Lecture Demonstrations (3B10.20; 3B20.10); University of Maryland Physics Lecture-Demonstration facility (G3-24; G3-25).

Other Uses

Suggestions for Improvement

TOOTHED WHEELS AND TONE DISCS

DCS # 3C20.40 Status Active

Area 3 Oscillations and Waves Location 50

Topic 3C Acoustics Rating old but effective

Concept 3C20 Pitch Demo # 288

Checked Yes Related Demos

Date Checked 11/1/2019



Brief Description Put Tone disc on cordless drill, set it in motion and give a blast of ozone with Dust Off spray. You can hear different musical intervals. If you set in motion toothed wheels, you can produce different musical intervals by touching cards to the edges of the discs in various combinations.

Keywords Savart wheel, toothed, disc, pitch, holes, frequency, music, interval,

Equipment Needed Set of toothed wheels and Tone discs, cordless drill, Dust Off spray with ozone, card for toothed wheels.

Detail CAUTION: Always store and use Compressed-Gas Duster in an upright position, never shake can before or during use.

References

Other Uses

Suggestions for Improvement Seems a bit dangerous sound

ACOUSTICAL FILTER

DCS # 3C55.85 Status In Storage

Area 3 Oscillations and Waves Location Storage

Topic 3C Acoustics Rating good and engaging

Concept 3C55 Music Perception and the Demo # 316

Checked No Related Demos

Date Checked 2/28/2020



Brief Description The word "me" will be changed to "ma" when the inner cylinder is in the proper position by rotation in the outer cylinder since the high frequency components are removed.

Keywords acoustical filter, perception, acoustics, voice,

Equipment Needed

Detail

References

Other Uses

Suggestions for Improvement

AUDITORY DEMONSTRATIONS CD

DCS # 3C (acoustics, various) Status Active

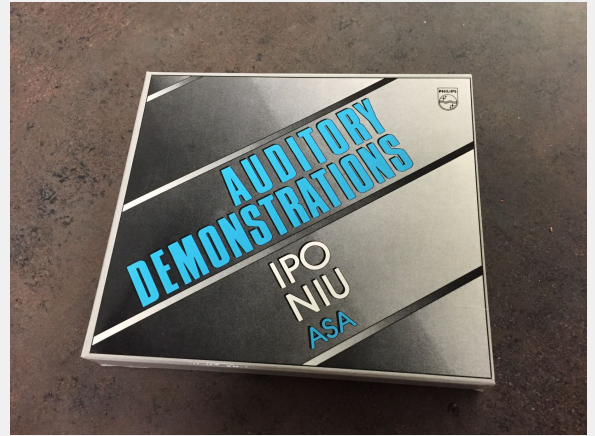
Area 3 Oscillations and Waves Location 49

Topic 3C Acoustics Rating good and engaging

Concept various Demo # 284

Checked Yes

Date Checked 2/28/2020



Related Demos

Brief Description A good CD containing audio demos of various auditory phenomena, dealing both with the physics of sound, and the perception of sound.

Keywords acoustics, audio, hearing, decibel, beats, echoes, sound, perception of sound

Equipment Needed Auditory Demos CD
Some way to play a CD

Detail The instruction/reference book included in the CD gives not only some good explanations of the physics and theory behind the demo, but also some history (e.g. when and by whom the phenomena was discovered)

References

Other Uses

Suggestions for Improvement

SONOMETERS

DCS # 3D20.10 Status Active

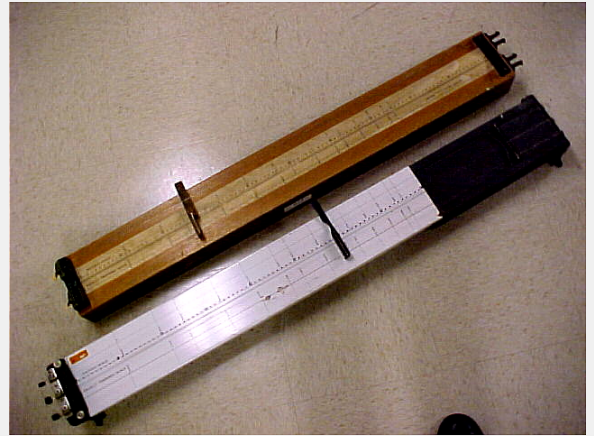
Area 3 Oscillations and Waves Location 51

Topic 3D Instruments Rating good but lacks zest

Concept 3D20 Resonance in Strings Demo # 293, 297

Checked Yes

Date Checked 11/1/2019



Related Demos

Brief Description Use these sonometers to demonstrate standing waves in a stretched wire and to demonstrate Mersenne's laws.verical

Keywords sonometer, standing waves, string, resonance, harmonic, diatonic, equal temperament

Equipment Needed Sonometers

Detail The tension in stretched wires can be separately adjusted, creating different fundamental frequencies. Stops can be inserted along the wire to observe the frequency as a function of length.

References University of Maryland Physics lecture-Demonstration Facility (H3-51); Sargent-Welch 2001-2002 (744-745).

Other Uses

Suggestions for Improvement

VERTICAL RESONANCE TUBE

DCS # 3D30.10 Status Missing Parts

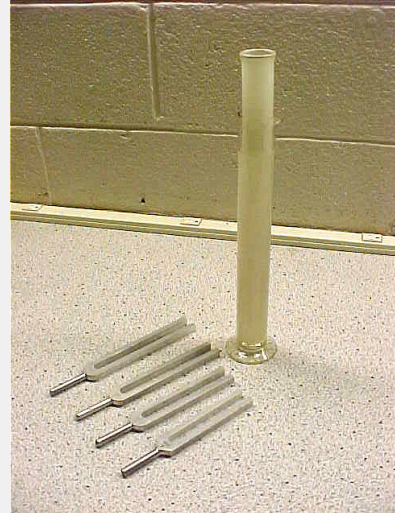
Area 3 Oscillations and Waves Location 48

Topic 3D Instruments Rating old

Concept 3D30 Resonance Cavities Demo # 304

Checked Yes Related Demos 183

Date Checked 11/1/2019



Brief Description Tuning forks demonstrate cavity resonance in correctly tuned tubes. Can either be tuned by actual length or length above water.

Keywords vertical resonance tube, resonance, cavity, tuning fork, tubes, forks

Detail The plastic tube is in the beaker with water. Place tuning fork over the tube and activate it by striking it with a resonator hammer. By moving tube up and down you can change the length of the air column and demonstrate resonance in a closed tube. 480-500 Hz and 1000 Hz can be tuned by placing the plastic tube in the glass column and adjusting the overlap until resonance is found.

Equipment Needed Tuning forks; Resonator hammer (demo 183, shelf 49)
AND
Beaker with water, plastic tube
OR
Included tubes.

References American Journal of Physics (AJP 62, 315-321 (1994)); University of Maryland Physics Lecture-Demonstration Facility (H3-21).

Other Uses

Suggestions for Improvement

SOUND TUBES

DCS # 3D30.35 / 2C20.? Status Active

Area 3 Oscillations and Waves Location 50

Topic 3D Instruments Rating good and engaging

Concept 3D30 Resonance Cavities Demo # 287

Checked Yes Related Demos

Date Checked 11/1/2019



Brief Description To produce resonant frequencies of the tube and to demonstrate standing wave resonance in an open tube hold this Twirl-A-Tune by one end, keeping that end free for flow of air, and swing it around your head. Increasing the speed of the rotation raises the harmonic produced.

Detail Up to seven harmonics can be produced, illustrating the notes of the overtone series. The fundamental can only be produced by blowing gently into one end.

Keywords sound tube, resonance, tube, bloogle, kroogah, Bernoulli, air pressure, whirl,

Equipment Needed Sound tube.

References American Journal of Physics (AJP 62, 224-227 (1994)); The Physics Teacher (TPT 32, 42-43 (1994)); University of Maryland (H3-14).

Other Uses

Suggestions for Improvement

ORGAN PIPES

DCS # 3D32.10 Status Active

Area 3 Oscillations and Waves Location 51

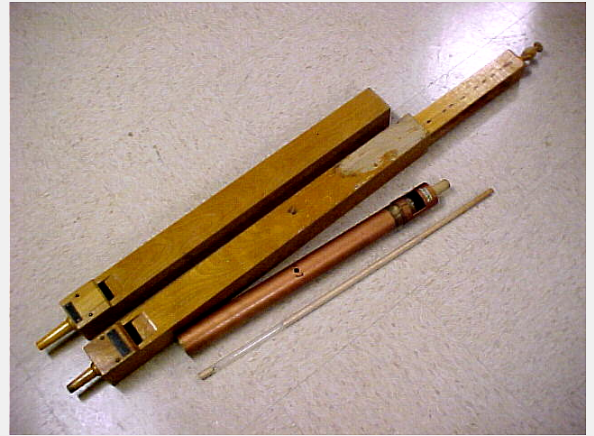
Topic 3D Instruments Rating good but lacks zest

Concept 3D32 Air Column Instruments Demo # 292

Checked Yes

Date Checked 11/1/2019

Related Demos



Brief Description Provide a simple and effective demonstration of a resonant cavity. Move the stoppers in the wooden organ pipe and in the plastic one. This provides a perfect example of the relationship between length of an air column and the frequency of the sound produced. sound tube

Keywords organ pipes, resonance, cavity, air column, instrument, acoustics,

Equipment Needed

Detail For convenience, the stopper handle, in the wooden organ pipe, is marked with the correct settings for playing notes from middle C to treble C.
To operate the metal organ pipe slip the mouth piece on the beveled end of the tube and adjust the beveled end from the base of the slit until the organ pipe responds with a clear solid tone. For more details see the instructions for the use of metal organ pipe.

References

Other Uses

Suggestions for Improvement New ones?

TUNING FORKS AND GONG

DCS # 3B60.? / 3B70.? Status Active

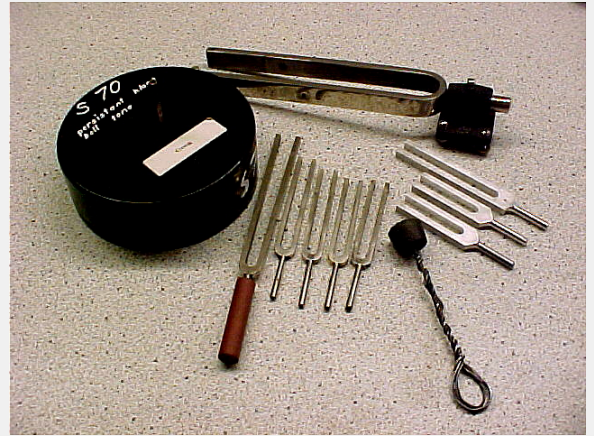
Area 3 Oscillations and Waves Location 50

Topic 3D Instruments Rating good and engaging

Concept 3D40 Resonance in Plates, Bars, Demo # 289

Checked Yes Related Demos 183

Date Checked 11/1/2019



Brief Description 3B60.? = Beats
3B70.? = Coupled Resonators
3D46.? = Tuning Forks

Keywords tuning fork, gong, beats, coupled resonator, resonance, acoustics,

Equipment Needed

Set of tuning forks, Gong, Resonator hammer

Tuning forks are in a separate box located on shelf:

Detail Contains "gong" and very large tuning fork. The rest of the smaller tuning forks are in Demo 183 on shelf 49

References

Other Uses

Suggestions for Improvement

CHLADNI PLATES

DCS # 3D40.30 Status In Storage

Area 3 Oscillations and Waves Location Storage

Topic 3D Instruments Rating

Concept 3D40 Resonance in Plates, Bars, Demo # 328

Checked No

Related Demos



Date Checked 2/28/2020

Brief Description Strike or bow a horizontal metal plate covered with sand while touching the edge at various nodal points.

Keywords Chladni plate, resonance, instrument, sand, powder, nodes, antinodes, vibration, wave, pattern,

Equipment Needed

Detail

References

Other Uses

Suggestions for Improvement

Chinese Water Spouting Bowl

DCS # 3D40.51 Status Active

Area 3 Oscillations and Waves Location 43

Topic 3D Instruments Rating

Concept 3D40 Resonance in Plates, Bars, Demo # 243

Checked Yes

Related Demos



Date Checked 2/28/2020

Brief Description These bowls create standing waves which produces water to spout up to 3 ft. high. Made from a bronze, when the handles are rubbed by the palms of the hand, the bowl begins to hum and vibrate, and the water in it spouts up due to the creation of standing waves.

Keywords waves, standing waves, water, water spouting bowl, bowl, resonance, resonant, instrument, wine glass

Equipment Needed Chinese Water Spouting Bowl
Rubber Sheet
Water

Detail The Water Spouting Bowl has 4 heavy duty rubber feet glued to the bottom at its nodes.

Fill bowl with at least 2 inches of water. Moisten hands and rub on the handles (it may take a minute to find the right pressure). The resonant effect is like a singing wine glass. Filling the bowl almost up to the handles will create more dramatic splashing and also make a bit of a mess; do not do this next to anything that cannot get wet.

References

Other Uses Used in the early Tao Temples for the purpose of meditation and as a science tool for the study of standing waves.

Suggestions for Improvement

Singing Rod

DCS # 3D40.20 Status Active

Area 3 Oscillations and Waves Location 51

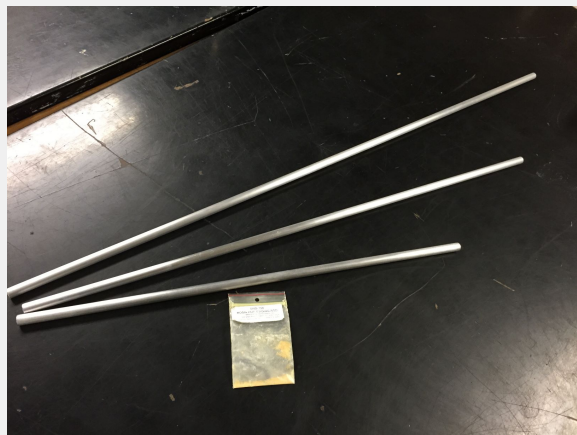
Topic 3D Instruments Rating good and engaging

Concept 3D40 Resonance in Plates, Bars, Demo # 294

Checked Yes

Related Demos

Date Checked 2/28/2020



Brief Description Slide your fingers repeatedly along this 60-cm-long metal rod, an ear-piercing sound is generated. You control how loud the sound gets from a whisper to a auditorium-filling shriek.

Keywords waves, oscillation, resonance, sound, longitudinal, transverse

Equipment Needed Rosin to lightly coat your fingers (in tube)
Instructions included in tube

Detail Absolutely incredible! This is a great experiment to demonstrate the difference between longitudinal and transverse waves. The loudest frequencies for each bar are approximately:
2480 Hz, 3100 Hz, 4140 Hz

References

Use similar pressure to a signing wine glass, it will take several strokes once the rod is vibrating to reach maximum volume. The louder the rod is singing, the less pressure it takes to maintain the vibration.

Other Uses

Suggestions for Improvement

RESONATOR BOX SET

DCS # 3D46.? Status Active

Area 3 Oscillations and Waves Location 52

Topic 3D Instruments Rating old but effective

Concept 3D46 Tuning Forks Demo # 307

Checked Yes

Date Checked 2/28/2020

Related Demos



Brief Description Resonator cases with tuning forks produce a louder tone with a greater range of audible overtones. You can provide an interesting demonstration of sympathetic vibration.
 3B60.? = Beats
 3B70.? = Coupled Resonators
 3D46.? = Tuning Forks

Keywords tuning fork, resonator box set, coupled resonator, amplification, sympathetic vibration, tone,

Equipment Needed Tuning Fork and Resonator Box sets.

Detail Sympathetic Vibration demonstration - Place two resonance cases of the same size, shape and construction near each other; a vibration is existed only in one fork, the other case and tuning fork will begin to vibrate sympathetically.

References

Other Uses

Suggestions for Improvement

BELL AND WHISTLES

DCS # 3D?? Status Active

Area 3 Oscillations and Waves Location 49

Topic 3D Instruments Rating very very old but effective

Concept various Demo # 282

Checked Yes

Date Checked 11/1/2019



Related Demos

Brief Description maybe:
3B30.55 = Two whistles of the same pitch are blown and one is then heated with a match.
3B60.15 = beat whistles

Keywords bells, whistles, resonance, instrument,

Equipment Needed

Detail

References

Other Uses

Suggestions for Improvement

LOUDSPEAKERS / SPEAKERS

DCS #		Status	Active
Area	3 Oscillations and Waves	Location	49
Topic	3E Sound Reproduction	Rating	□□□□ good but lacks zest
Concept	3E20 Loudspeakers	Demo #	285
Checked	Yes	Related Demos	291 299 285 281 271 295
Date Checked	11/1/2019		



Brief Description Speakers and frequency generator allow for experiments involving sound frequency such as resonance, interference, beats, etc.

Keywords loudspeakers, sound reproduction, source, interference.

Equipment Needed

Signal generator / amplifier for other audio source (not included)

Detail There is one pair of speakers that can be used to show the effect of speakers in/out of phase by wiring them backwards.

References

Other Uses

Suggestions for Improvement

LARGE SPEAKERS

DCS # 3E20.01 Status Active

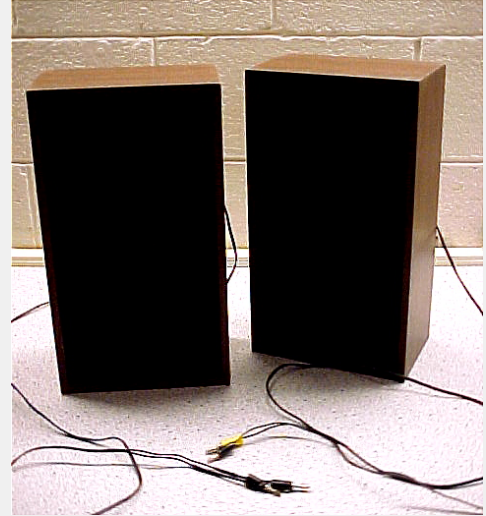
Area 3 Oscillations and Waves Location 52

Topic 3E Sound Reproduction Rating good but lacks zest

Concept 3E20 Loudspeakers Demo # 299

Checked Yes Related Demos 285291 299 285 281 271 295

Date Checked 11/4/2019



Brief Description General-Use speakers for sound/acoustical experiments

Keywords diffraction, interference, sound, speaker, wave motion,

Equipment Needed

Detail

References

Other Uses

Suggestions for Improvement

Burning Creamer Demo

DCS # Status Active

Area 4 Thermodynamics Location 12

Topic Rating

Concept Demo # 302

Checked Yes

Related Demos

Date Checked 11/18/2019



Brief Description Energy concepts demo using candle and creamer in a can.

Keywords Creamer, burning, energy, chemical potential, flame, candle

Equipment Needed

Barbecue lighter located above tv's on shelf 60

Detail Place a candle in the can opposite the hole and place the shield between the hole and candle. Sprinkle creamer powder right in front of hole and light candle. Press quickly on the pump to blow the creamer into the air and it will burn above the can.

References

Take care to point the can away from face or flammable materials.

Other Uses

Suggestions for Improvement

Boyle's Law Overhead Demo

DCS #	Status	Active
Area	Location	11
Topic	Rating	□□□□ good but lacks zest
Concept	Demo #	091
Checked	Yes	Related Demos 213
Date Checked	2/28/2020	



Brief Description Illustrates the basic relationships between pressure, volume and temperature of gases.

Keywords Pressure, volume, temperature, boyle's law, boyle, overhead, absolute zero, guage, gas law, thermodynamics

Equipment Needed Containers of hot and ice water. Hot water should be near boiling for maximum pressure change.

Detail A calibrated syringe is connected to a direct-reading pressure gauge. As the volume of the gas in the syringe is varied, the entire class sees the corresponding pressure changes projected clearly on the screen. Results are quantitatively accurate and produce the hyperbolic curve when graphed.

References

ABSOLUTE ZERO-A one-piece metal sphere is connected to the direct-reading pressure gauge of the unit projected on the screen. When the sphere, containing a gas, is immersed in water at various temperatures, students can read the pressure changes directly off the scale on the screen. When temperature vs. pressure readings are graphed, Absolute Zero is determined by extrapolation.

Other Uses The "Absolute Zero Device" works better for that application.

Suggestions for Improvement Could not observe any pressure change from cold to hot tap water. Either a problem with the metal sphere or is simply not sensitive enough.

LIQUID CRYSTALS PLATE

DCS # 4A10.50 Status Active

Area 4 Thermodynamics Location 9

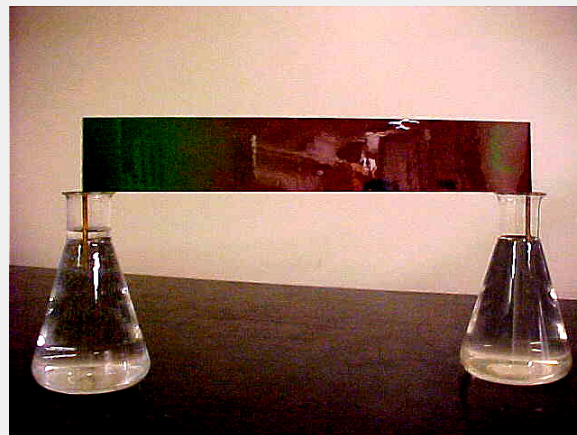
Topic 4A Thermal Properties of Rating good but lacks zest

Concept 4A10 Thermometry Demo # 080

Checked Yes

Date Checked 11/4/2019

Related Demos



Brief Description This metal strip is placed with one post in the beaker with ice water and with the other post in the beaker with hot water. We can see the colors on the crystal sheet - blue colors are associated with warmer temperatures and red colors with cooler temperatures.

Keywords liquid crystal plate, thermometer, heat, conduction, thermal, cholesteric,

Equipment Needed Thermal conductivity apparatus; two 250 ml beakers: one - with ice water, the other - with hot water.

Detail This film is sensitive to the temperature range of 25 to 35 degrees Celsius. Be careful not to heat the crystals beyond boiling and do not exert excessive pressure on the film.

Take ice from the Demo Room Refrigerator to get ice water.

References Central Scientific Company (CENCO'99,132).

Quick Hints:

Rinse first with cold water to "reset" to black
 Demo takes 5-10 minutes to "develop" with cold and hot tap water in beakers.

OR

Hold lengthwise/vertically at top , hold lit match at bottom.

Other Uses

Suggestions for Improvement

BALL and RINGS *(ball is smaller or larger than ring)*

DCS #	4A30.20	Status	Active
Area	4 Thermodynamics	Location	10
Topic	4A Thermal Properties of	Rating	□□□□ good and engaging
Concept	4A30 Solid Expansion	Demo #	074
Checked	Yes	Related Demos	092
Date Checked	11/4/2019		



Brief Description Two sizes of rings: SMALLER will allow ball to pass through when ONLY when the RING IS HOT, the Larger RING will only allow the ball to pass through when the BALL IS COOL, the brass ball or rings are heated to change the result. infrared

Keywords ball, ring, temperature, thermal, expansion, heat, through,

Equipment Needed

Brass ball and ring with wooden handles - ball has a smaller diameter than some rings, larger than others. Propane fuel cylinder and torch needed (shelf 57).

Detail Please, cool down the metal parts in the bucket with cold water after you are done with demonstration.

When using the ball and smaller ring, take care not to let the ring cool enough to get stuck over the ball or it can be difficult to remove.

References

Central Scientific Company (CENCO'99,129); Sutton (H-15).

Other Uses

Suggestions for Improvement

BIMETALLIC STRIP

DCS # 4A30.10 Status Active

Area 4 Thermodynamics Location 9

Topic 4A Thermal Properties of Rating good and engaging

Concept 4A30 Solid Expansion Demo # 076

Checked Yes

Date Checked 11/4/2019

Related Demos



Brief Description This bar made of two different materials curls when it is heated up, because the coefficients of linear expansion for brass and steel are different.

Keywords bimetallic strip, compound bar, temperature, heat, thermostat, expansion, thermal,

Equipment Needed Compound bar with wooden handle; Propane torch (shelf 57).

Detail You need to have a container with cold water to cool down the compound bar after demonstration (use a bucket from under the sink in the Demo room).

References University of Maryland Physics Lecture-Demonstration Facility (H-13); Sargent-Welch/ CENCO 2001-2002 (709).

Other Uses

Suggestions for Improvement

RUBBER BAND WHEEL

DCS # 4A30.85 Status Needs Repair

Area 4 Thermodynamics Location 3

Topic 4A Thermal Properties of Rating good and engaging

Concept 4A30 Solid Expansion Demo # 064

Checked Yes

Related Demos

Date Checked 11/5/2019



Brief Description Heating one quadrant of the wheel's spokes causes those spokes to contract, resulting in a shift of the wheel's center of mass. Gravity will then cause the wheel to slowly rotate.

** This takes a while to set up,

Detail (Wheel balancing and other detailed instructions are available in the demo box.)

Do not expect the wheel to turn really fast. Once working properly, it rotates at a Ferris wheel pace.

When storing the demo, the rubber band spokes **MUST** be unhooked and placed in a Ziplock bag to keep them from deteriorating.

Keywords rubber band wheel, rubberband, thermodynamics, expansion, contraction, heat, infrared heater, bicycle, rim, spokes, center of mass, gravity, rotate, solid,

Equipment Needed Heat source, preferably the infrared heater, so that air is not blowing across the rubber band spokes. (Infrared heater stored with "94 Infrared Heat Focusing" on shelf 5)

References

Other Uses Takes 20-30 minutes to build and balance wheel.

Suggestions for Improvement Needs new rubber bands, those included are too brittle to withstand wheel building and applied heat.

Thermal Expansion Plate

DCS # 4A30.22 Status Active

Area 4 Thermodynamics Location 30

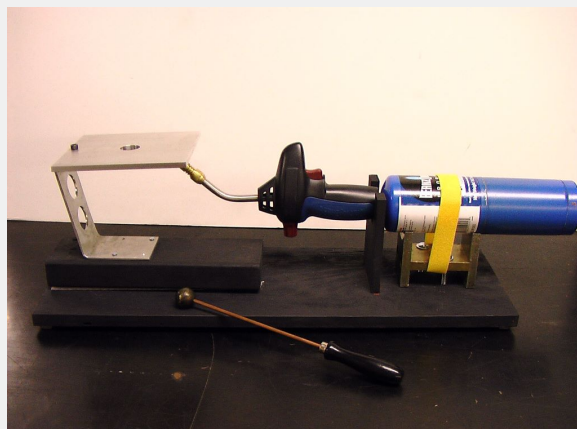
Topic 4A Thermal Properties of Rating

Concept 4A30 Solid Expansion Demo # 092

Checked Yes

Related Demos 074

Date Checked 2/28/2020



Brief Description Heating a metal plate with a hole too small for the ball can make the hole large enough for the ball to fit through.

Keywords heat, conduction, ball, temperature, thermal, expansion

Equipment Needed Sphere from "Ball and Rings" on shelf 10.
Propane burner and tank from equipment shelf

Detail 4/12/2015 Be careful not to get the sphere stuck in or through the hole! Once the ball is stuck it is difficult to heat the plate enough to extract without also heating the ball so much that it expands too.

Using the propane torch, heat the aluminum plate for ~1.5 minutes. Once plate is hot enough, the hole in the center will be large enough to allow the sphere (from ball over ring demo) to pass through. The sphere can pass through the hole for ~30 seconds.

References

Other Uses

Suggestions for Improvement

MAGIC MIRROR

DCS # 4B10.? / 6A10.? Status In Storage

Area 4 Thermodynamics Location Storage

Topic 4B Heat and the First Law Rating good but lacks zest

Concept 4B10 Heat Capacity and Demo # 327

Checked No

Related Demos

Date Checked 2/28/2020



Brief Description Good visibility in large classes
 Several subtle topics. Not good for one specific topic per se.
 Easy set up and short demo time.

Keywords magic, mirror, reflection, cooling rate, cast, heat, thermodynamics, first law, cooling,

Equipment Needed Magic Mirror, Stage lamp

Detail Reflecting the (relatively) parallel beam of light from the stage light off the shiny side of the mirror reflects the cast on the opposite side onto the wall. The effect is created by the cooling rate the mirror experienced at different points on the mirror due to the differing thickness. This variation in cooling across the mirror "imprints" the pattern on the mirror at a micron size level. Shining the lamp off the mirror amplifies the variation into something the can be seen.

References Glass Shelves #3C

Other Uses

Suggestions for Improvement

HEAT CONDUCTOMETER

DCS # 4B30.10 Status Needs Repair

Area 4 Thermodynamics Location 10

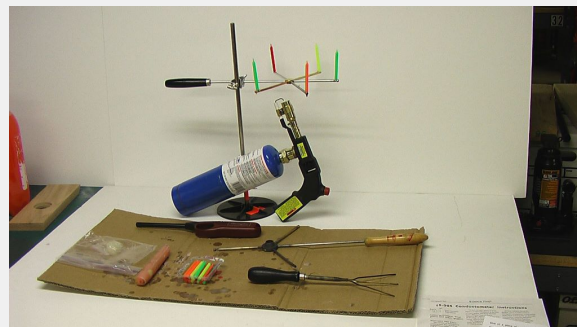
Topic 4B Heat and the First Law Rating good but lacks zest

Concept 4B30 Conduction

Demo # 086

Checked Yes

Related Demos



Date Checked 11/5/2019

Brief Description Three spokes from different metals radiate from hub. Put wax in the spokes notches, heat hub with a propane torch and compare the conductivities of three different metals.

Keywords heat conductometer, conduction, first law, wax, different metals, conductivity, thermal

Equipment Needed Non-conducting wooden handle with long rod attached to the hub with three spokes; Wax; Propane Torch; stand to mount conductometer.

Detail You need to have a container with cold water to cool down conductometer after demonstration.

To prepare, melt candles to the notches using barbecue lighter and allow to cool and solidify as pictured, such that the candles fall off when the spoke is hot enough.

References Central Scientific Company (CENCO'99,133); American Journal of Physics (AJP 60, 846-852 (1992)).

Other Uses

Suggestions for Improvement

INFRARED HEAT FOCUSING

DCS # 4B40.10 Status Active

Area 4 Thermodynamics Location 5

Topic 4B Heat and the First Law Rating good and engaging

Concept 4B40 Radiation Demo # 094

Checked Yes

Date Checked 11/4/2019



Related Demos

Brief Description A curved mirror is used to focus infrared heat onto a match, causing it to burn.305

Keywords heat, fire, focus, burn, infrared heat focusing, IR, parabolic, light the match, focal point, thermal, temperature, dish, radiation, transmission of radiant heat,

Equipment Needed Holmes heater; concave mirror platform, large kitchen matches

Detail Focal point of mirror is about 9 cm from center.

Place infrared heat source such that the ball on the string just reaches the white square. Turn heater on and let preheat for several minutes. Place match in dowel and wait 1-2 minutes for match to ignite.

References

Note that the heater may need to be moved closer if the room is particular drafty.

Other Uses

Suggestions for Improvement

Fire Starter (Fire Piston)

DCS # 4B70.10 Status Active

Area 4 Thermodynamics Location 10

Topic 4B Heat and the First Law Rating good and engaging

Concept 4B70 Adiabatic Processes Demo # 077

Checked Yes

Related Demos



Date Checked 11/18/2019

Brief Description Compress the air inside the tube using the plunger. Cotton at the bottom of the tube will ignite when pressure is increased rapidly. Shows temperature increases when a fixed mass of gas is compressed.

Keywords combustion, pressure, temperature, cotton, ignition, fire, piston, fire piston, adiabatic compression, compression

Equipment Needed cotton-in box
pipe cleaners for cleaning-in box
lubricant for O rings-in box

Detail Use a very small piece of cotton - almost as small as possible.

References

Other Uses Also demonstrate the need for oxygen to support combustion by showing that re-ignition will only occur if the piston is completely removed to allow a fresh supply of air. The apparatus can also be used to demonstrate cloud

Suggestions for Improvement

3D MODEL OF PVT SURFACES

DCS # 4C10.10 Status Active

Area 4 Thermodynamics Location 11

Topic 4C Change of State Rating good but lacks zest

Concept 4C10 PVT Surfaces Demo # 090

Checked Yes



Related Demos

Date Checked 11/5/2019

Brief Description Use these models of Thermodynamic Surfaces to show P-V-T relations for carbon dioxide and water instead of usual set of isothermal curves for these substances.

Keywords 3D model of PVT surfaces, thermodynamics, change of state, temperature, pressure, volume,

Equipment Needed Model for carbon dioxide; Model for water; Manual with usual set of isothermal curves.

Detail

References American Journal of Physics (AJP 30, 870-877 (1962)); University of Maryland Physics Lecture-Demonstration Facility (I4-01).

Other Uses

Suggestions for Improvement Could purchase new ones?

Hand Warmers (Large & Small)

DCS # 4C20.60 Status Active

Area 4 Thermodynamics Location 7

Topic 4C Change of State Rating

Concept 4C20 Phase Changes: Liquid- Demo # 098

Checked Yes

Related Demos



Date Checked 2/20/2020

Brief Description

Keywords heat pack, phase change

Equipment Needed

Detail

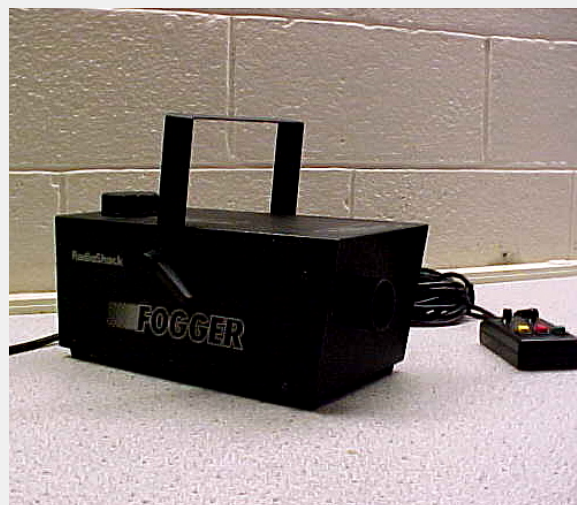
References

Other Uses

Suggestions for Improvement

FOGGER MACHINE

DCS #	4B70.21 / 4C30.?	Status	Active
Area	4 Thermodynamics	Location	11
Topic	4C Change of State	Rating	□□□□ good and engaging
Concept	4C30 Phase Changes: Liquid-	Demo #	084
Checked	Yes	Related Demos	113
Date Checked	2/20/2020		



Brief Description Use this Fogger machine to demonstrate Phase Changes (from Liquid to Gas). Dispense liquid into fog machine. Allow fog machine a few minutes to warm up. Press button for fog operation.
4C30.? = Phase Changes: Liquid-

Keywords fogger machine, temperature, change of state, phase change, liquid, gas

Equipment Needed Fogger machine; Fog Liquid - unscented, water based solution.

Detail DO NOT make too much fog, fire alarm will start working. Try to make as good ventilation as possible. Use a fan.

References

Other Uses

Suggestions for Improvement

Dippy Birds

DCS #	4C31.30	Status	Active
Area	4 Thermodynamics	Location	18
Topic	4C Change of State	Rating	□□□□ good and engaging
Concept	4C31 Cooling by Evaporation	Demo #	130
Checked	Yes	Related Demos	404
Date Checked	11/5/2019		



Brief Description Wet the head and beak of the bird with cold water. Bird with sway back and forth. A cup of cold water can be placed under the bird's beak to keep the beak moist and to simulate drinking. The bird can also function without a cup of water

Keywords Temperature differential, temperature, drinking birds, happy birds, evaporative cooling, thermodynamics, fluid mechanics, center of mass

Equipment Needed Cup filled with cold water

Detail The cup should be tall enough that the liquid can drain back into the body after tipping over (about the height of the supports. Using a softer cup than a glass beaker can lessen the impact when the bird drops forwards.

References

Other Uses It may take some time to set up the system just right. The first cycle will take the most time. Take 10 minutes to set up before lecture.

Suggestions for Improvement

Drinking Bird

DCS # 4C31.30 Status Active

Area 4 Thermodynamics Location 17

Topic 4C Change of State Rating □□□□□

Concept 4C31 Cooling by Evaporation Demo # 404

Checked Yes Related Demos 130

Date Checked 11/5/2019



Brief Description Wet the head and beak of the bird with cold water. Bird with sway back and forth. A cup of cold water can be placed under the bird's beak to keep the beak moist and to simulate drinking. The bird can also function without a cup of water

Keywords Temperature differential, temperature, drinking birds, happy birds, evaporative cooling, thermodynamics, fluid mechanics, center of mass, vapor, pressure

Equipment Needed Cup filled with cold water

Detail The cup should be tall enough that the liquid can drain back into the body after tipping over (about the height of the supports. Using a softer cup than a glass beaker can lessen the impact when the bird drops forwards.

It may take some time to set up the system just right. The first cycle will take the most time. Take 10 minutes to set up before lecture.

References

Other Uses

Suggestions for Improvement Exactly the same as Demo 130.

SLING PSYCHROMETER

DCS # 4C32.10 Status In Storage

Area 4 Thermodynamics Location Storage

Topic 4C Change of State Rating old but effective

Concept 4C32 Dew Point and Humidity Demo # 318

Checked No

Related Demos



Date Checked 2/28/2020

Brief Description Use this sling psychrometer for measurements of relative humidity.

Keywords sling psychrometer, relative humidity, temperature, heat, dew point, change of state, hygrometer, wet and dry bulb,

Equipment Needed Frame with two thermometers, wet and dry; Plastic container for water. Humidity tables.

Detail HOW TO USE: Remove the instrument from the protecting case. Saturate covering the bulb wicking with room temperature water, then whirl the instrument for 15 or 20 seconds. Stop and read the wet-bulb thermometer (repeat the whirling until two wet-bulb readings agree at the lowest indication obtainable). Read dry-bulb temperature and find the relative humidity in the tables. Keep wick clean!

References Sutton (H-92).

Other Uses

Suggestions for Improvement

FRANKLIN'S PALM GLASS

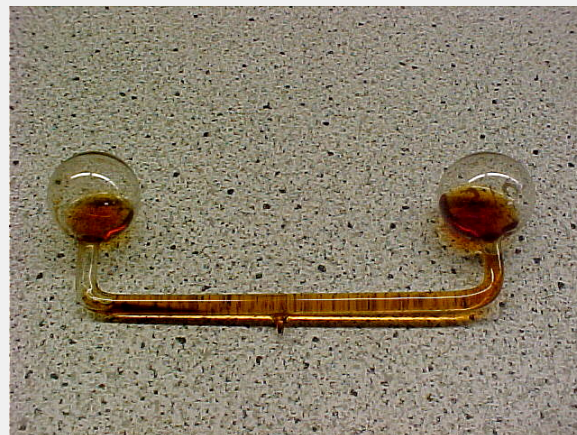
DCS # 4C33.50 Status Active

Area 4 Thermodynamics Location 17

Topic 4C Change of State Rating good but lacks zest

Concept 4C33 Vapor Pressure Demo # 072

Checked Yes



Related Demos

Date Checked 11/4/2019

Brief Description When one bulb of this Hand boiler is held in the hand, body heat causes the liquid to boil, then vapor moves into the other bulb where it bubbles rapidly. iron wir

Keywords Franklin's palm glass, hand boiler, pulse, love meter, change of state, vapor pressure, temperature, heat, volatile liquid, boil, energy conversion,

Equipment Needed Two glass bulbs, connected by a tube, contain a volatile liquid.

Detail This device should not be used with a heat source any warmer than body temperature. If the tube is held at a slight incline, the liquid will be pushed by the gas and appear to flow uphill.

References Central Scientific Company (CENCO'99,139).

Other Uses

Suggestions for Improvement

PHASE CHANGE IN IRON WIRE

DCS # 4C45.10 Status Active

Area 4 Thermodynamics Location 9

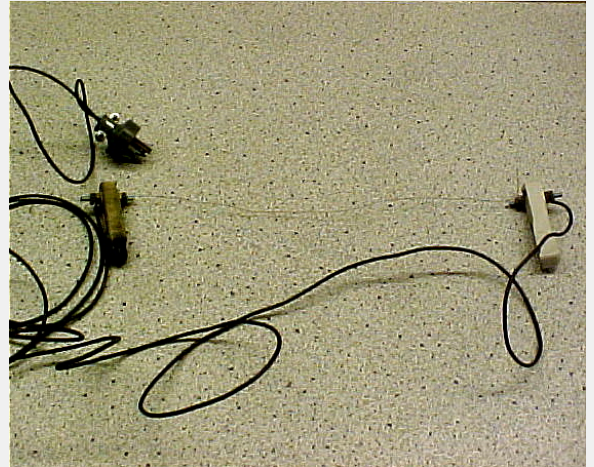
Topic 4C Change of State Rating good and engaging (BUT OLD)

Concept 4C45 Phase Changes: Solid- Demo # 082

Checked Yes

Date Checked 11/4/2019

Related Demos



Brief Description

The iron wire is strung horizontally above the lecture table. If we heat the wire by passing an electric current through it the wire will expand and sag. If the heating power is turned off the wire will cool to the room temperature in an approximately exponential manner

Keywords

phase change in iron wire, transition, heat, temperature, sag, electric current, Newton, exponential cooling, solid, crystal, thermal expansion,

Equipment Needed

1.5 m iron wire (#22 gauge); Two stands; Cable with two C-connectors and plug; Variable "Adjust-A-Volt" Transformer (shelf 61).

Detail

The wire used in this demonstration is 22 gauge (0.064 cm diameter) "Black Annealed" iron wire which is sold in hardware stores for general utility use. The wire is strung horizontally above the lecture table with only a little sag when it is cold and it is connected to a variable transformer VARIAC on shelf 61 (set **Voltage at Low** and make it **35 Volts** for **1.5 m** wire). Be careful with Voltage, wire can burn easily!

References

Sutton (H-9); The Physics Teacher (13, 290, (1975)); Physics for College Students (D.E. Tilley, W. Thumm).

Other Uses

Any transformer will work for this demo.

DO NOT PLUG INTO WALL!!!!

Suggestions for Improvement

RADIOMETER

DCS # 4D20.10 Status Active

Area 4 Thermodynamics Location 9

Topic 4D Kinetic Theory Rating good but lacks zest

Concept 4D20 Mean Free Path Demo # 081

Checked Yes

Date Checked 11/5/2019



Brief Description This sphere could be powered by the sun. In our case, when light from the lamp strikes radiometer wings, it transfers heat to each one to the different degree and vane begins to spin.m

Keywords radiometer, kinetic theory, mean free path, black, white, vanes, vacuum, radiation, absorber, radiator, absorption, energy, light, momentum, particle, transfer, reflection,

Equipment Needed

Radiometer, Gooseneck Desk Lamp (60 W light bulb).

Detail The lighter wings reflect the rays, they take on very little energy and do not bounce off very fast. The dark wings absorb the rays and they take on a great deal of energy. The vane begins to spin at terrific speed. So, the stronger the light, the more energy there is to "heat up" the dark side of the wing and vanes spin faster and faster as the light get brighter.
Handle glass radiometer (spare in cabinet 100) with care!

References Central Scientific Company (CENCO'99,135); American Journal of Physics (AJP 29, 666-668 (1961); University of Maryland Physics Facility (12--1).

Other Uses

Suggestions for Improvement

METAL CAN AND BALLOON

DCS # 4E10.15 Status Needs Repair

Area 4 Thermodynamics Location 11

Topic 4E Gas Law Rating good but lacks zest

Concept 4E10 Constant Pressure Demo # 078

Checked Yes

Date Checked 11/5/2019

Related Demos



Brief Description Place a balloon on the fitting tube in the cap of the metal can with water. Keep the can on the hot plate until the water starts boiling. See what will happen to the balloon.

Keywords metal can, balloon, gas law, constant pressure, boil water, expansion, air pressure,

Equipment Needed Metal can with metal cap and fitting tube in it; Water; Balloon; Hot plate (Demo 181, Shelf 12)

Detail Be careful, when metal can is hot! Only a small volume of water is needed.

References

Other Uses

Suggestions for Improvement Some type of fastener is needed to secure the balloon to the top of the can: rubber bands? Use a zip tie

ABSOLUTE ZERO DEVICE

DCS # 4E30.10 Status Active

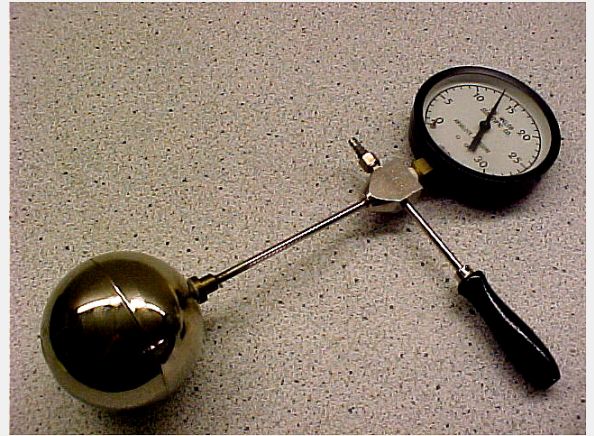
Area 4 Thermodynamics Location 39

Topic 4E Gas Law Rating good but lacks zest

Concept 4E30 Constant Volume Demo # 213

Checked Yes Related Demos 091

Date Checked 2/20/2020



Brief Description The Absolute Zero Apparatus is an air-filled metal sphere, which is attached to the pressure gauge. Immerse the sphere in water of different temperature (ice water, boiling water) and read the resulting pressure.

Keywords absolute zero device, constant volume bulb, gas law, pressure, heat, temperature, gauge, water, ice, bath,

Equipment Needed Absolute Zero Apparatus: Thermometer; Plastic container with ice; Metal container for boiling water; Hot plate (to heat water).

Detail You can plot a graph of pressure as a function of temperature. Draw the best line through the three points determined at boiling, freezing, and room temperature, and extend it so that it intersects the pressure axis, which is $T=0$ in Kelvin.

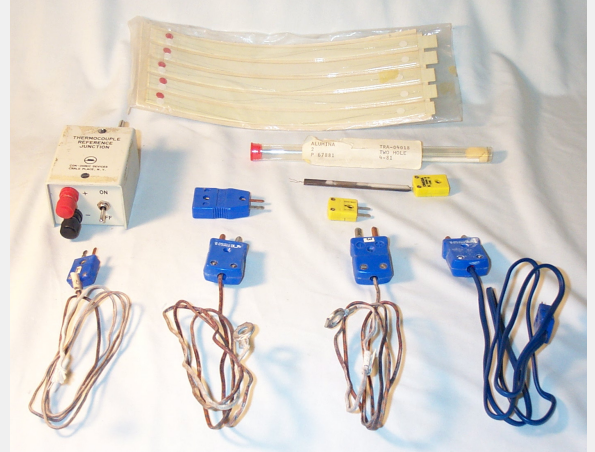
References Central Scientific Company (CENCO'99,119).

Other Uses

Suggestions for Improvement Redundant with Demo 091 Boyle's Law

THERMOCOUPLES

DCS #	4A?./4B?./4C?./5E50.10	Status	Active
Area	4 Thermodynamics	Location	10
Topic	various	Rating	<input type="checkbox"/> basic measurement
Concept	various	Demo #	167
Checked	Yes	Related Demos	
Date Checked	11/4/2019		



Brief Description Type K thermocouple thermometer with very fast response time.

Keywords thermocouple, low, small, temperature, thermometer, heat

Rated -50°C to 1350°C

Equipment Needed

Detail 4A10.25 = Measure temperatures with thermocouple
 4A20.30 = maximum density of water; A flask with a narrow stem shows volume changes and a thermocouple shows temperature changes when water is allowed to warm from 0 C.
 4B40.60 = surface absorption; A radiant heater is placed midway between two junctions of a demonstration thermocouple and the junctions are covered with black or white caps.
 4B60.? = for measuring temperature difference
 4B70.30 = adiabatic heating and cooling; An air cylinder moves a piston back and forth and a thermocouple measures the temperature.
 4C20.10 = A small test tube of water is cooled in a peltier device and the temperature is followed with a

References

Other Uses

Suggestions for Improvement

Can some of the older pieces be removed or are they actually all necessary?

ELECTROSTATIC PIN WHEEL

DCS # 5B30.50 Status Active

Area 5 Electricity and Magnetism Location 27

Topic 5A Electrostatics Rating good and engaging

Concept 5A10 Producing Static Charge Demo # 027

Checked Yes

Date Checked 11/19/2019

Related Demos



Brief Description Place pin wheel with two discharge points on the top of Van de Graaff Generator. This electric whirl starts spinning.

Keywords electrostatic pin wheel, electric field, potential, Van de Graaff, discharge, point, whirl, charge, discharge, induction, spin,

Equipment Needed Two discharge points Pin Wheel, stand, Van de Graaff Generator.

Detail When a lot of charge is placed on the whirl, the sharp points create a very high electric field. Nearby air is charged by induction and acquires some of the charges from the points by discharge. Now the air and points repel each other - and both move away.

References

Other Uses

Suggestions for Improvement

ELECTROSTATIC RODS AND PELTS

DCS # 5A10.10 Status Active

Area 5 Electricity and Magnetism

Location 32

Topic 5A Electrostatics

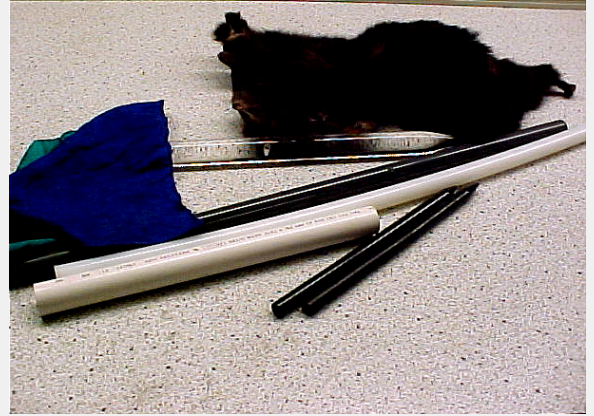
Rating old but effective

Concept 5A10 Producing Static Charge

Demo # 014

Checked Yes

Related Demos



Date Checked 11/19/2019

Brief Description Can show the different charges imparted to different types of material by different means.

Keywords electrostatic rods and pelts, fur, static, charge, discharge, conduction, electric field, attraction, repulsion, induction, polarization,

Equipment Needed

Detail

References

Other Uses

Suggestions for Improvement Some materials do not seem to work as well. May need to be replaced or cleaned.

Van de Graaff Generator

DCS #		Status	Active
Area	5 Electricity and Magnetism	Location	27
Topic	5A Electrostatics	Rating	□□□□ good and engaging
Concept	5A10 Producing Static Charge	Demo #	383
Checked	Yes	Related Demos	338, 340
Date Checked	11/20/2019		



Brief Description This is an electrostatic machine which uses a moving belt to accumulate very high electrostatically stable voltages on a hollow metal globe.

Keywords VDG, Van de Graaff Generator, electricity and magnetism, electricity

Equipment Needed Grounding sphere

Detail The Van de Graaf generator can be thought of as a constant-current source connected in parallel with a capacitor and a very large electrical resistance.

This particular generator has "hairs" that stand up and illustrate the accumulated charge. 5/27/2015

References

Other Uses

Suggestions for Improvement

ELECTROSTATIC PITH BALLS

DCS # 5A20.20 / 5B10.35

Status Active

Area 5 Electricity and Magnetism

Location 32

Topic 5A Electrostatics

Rating good but lacks zest

Concept 5A20 Coulomb's Law

Demo # 012

Checked Yes

Related Demos 163

Date Checked 11/19/2019



Brief Description Pith balls and conducting balls for use with the Van De Graaff generator and/or the Wimshurst Static Machine.

Keywords electrostatic pith balls, Coulomb's law, charge, attraction, repulsion, induction, polarization,

Equipment Needed

Detail Very old.

References

Other Uses

Suggestions for Improvement

ELECTROSTATIC FLYING SAUCERS

DCS # 5A20.31 Status Active

Area 5 Electricity and Magnetism Location 27

Topic 5A Electrostatics Rating good and engaging

Concept 5A20 Coulomb's Law Demo # 028

Checked Yes Related Demos 182

Date Checked 11/19/2019



Brief Description Aluminum plates can fly if you will place them on the top of Van De Graaff Generator.

Keywords electrostatic flying saucers, aluminum plates, pie tins, Coulomb's law, repulsion, Van de Graaff,

Equipment Needed Van De Graaff Generator, aluminum plates,

Detail If Generator doesn't keep charge well use the dryer to decrease a humidity.

References

Other Uses

Suggestions for Improvement

ELECTROSCOPES

DCS # 5A22.10 Status Active

Area 5 Electricity and Magnetism

Location 32

Topic 5A Electrostatics

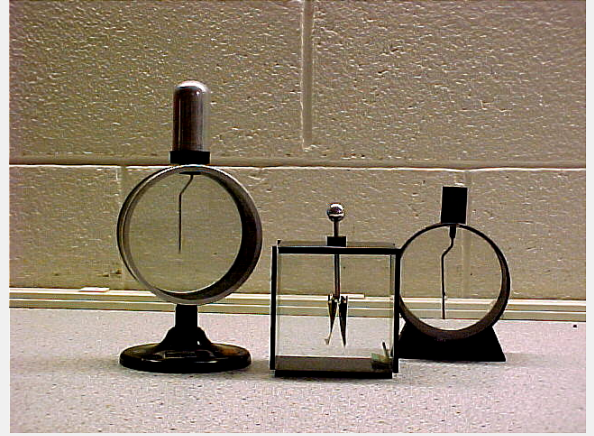
Rating static

Concept 5A22 Electrostatic Meters

Demo # 010

Checked Yes

Related Demos



Date Checked 11/19/2019

Brief Description Can be used to indicate the charge acquired by different means.

Keywords electroscopes, Braun, electrostatic, meter, leaf, needle,

Equipment Needed includes 3 electroscopes. May need fur, pvc pipe, cloths, balloon (demo 014).

Detail The pieces inside the electroscopes repel each other when static electricity is applied from the included items.

The tall round electroscopes works the best.

References

Other Uses

Suggestions for Improvement

The short round scope appears to have a missing piece.

ELECTROSTATIC GROUNDING SPHERE

DCS # 5A50.30 Status Active

Area 5 Electricity and Magnetism Location 27

Topic 5A Electrostatics Rating good but lacks zest

Concept 5A50 Electrostatic Machines Demo # 338 , 339, 340

Checked Yes Related Demos 182

Date Checked 11/19/2019



Brief Description The Van de Graaff generator builds up a charge, then dispels that charge through the grounded sphere.

Keywords electrostatic grounding sphere, globe, Van de Graaff, ground, grounded, discharge, spark, lightning,

Equipment Needed

Detail

References

Other Uses

Suggestions for Improvement

WIMSHURST STATIC MACHINE

DCS # 5A50.10 Status Needs Repair

Area 5 Electricity and Magnetism

Location 32

Topic 5A Electrostatics

Rating good and engaging

Concept 5A50 Electrostatic Machines

Demo # 163

Checked Yes

Related Demos

Date Checked 11/19/2019



Brief Description This machine provides high voltage electric charges for a variety of electrostatic experiments.

Keywords Wimshurst static machine, electrostatics, high voltage, capacitance, charge, discharge, conduction, electric field, attraction, repulsion, induction,

Equipment Needed Wimshurst Static Machine; Instructional Manual.

Detail Use electrostatic balls with this machine to demonstrate electrostatic attraction and repulsion (instead of Van de Graaff Generator) - when two conducting balls suspended from the two arms of the machine, they are oppositely charged and attract each other; when the same two balls suspended from a single arm of the machine, they will repel each other. You can find theory of operation and some experiments description in the Instructional Manual for Wimshurst Static Machine.

References

Other Uses

Suggestions for Improvement Mounts for arms are broken on both sides. One remains usable, one does not hold the arms level.

Van de Graaf Generator

DCS #		Status	Active
Area	5 Electricity and Magnetism	Location	27
Topic	5A Electrostatics	Rating	□□□□□
Concept	5A50 Electrostatic Machines	Demo #	182
Checked	Yes	Related Demos	005, 338, 339, 340, 383
Date Checked	11/20/2019		



Brief Description This is an electrostatic machine which uses a moving belt to accumulate very high electrostatically stable voltages on a hollow metal globe.

Keywords VDG, Van de Graaf Generator, electricity and magnetism, electricity

Equipment Needed

Detail The is a 400kV generator and can produce sparks up to 5-6"

The Van de Graaf generator can be thought of as a constant-current source connected in parallel with a capacitor and a very large electrical resistance.

References

The potential differences achieved in modern Van de Graaff generators can reach 5 megavolts. Applications for these high voltage generators include driving X-ray tubes, accelerating electrons to sterilize food and process materials, and accelerating protons for nuclear physics experiments

Other Uses

Suggestions for Improvement

Fun Fly Stick

DCS # Status Active

Area 5 Electricity and Magnetism Location 27

Topic 5A Electrostatics Rating good but lacks zest CHEESY

Concept 5A50 Electrostatic Machines Demo # 405

Checked Yes

Related Demos

Date Checked 11/19/2019



Brief Description Small handheld Van de Graaff generator that can replicate many of the experiments for larger generators

Keywords Van de Graaff Generator, static, electrostatic, charge, levitate

Equipment Needed 2 AA batteries

Detail Instructions and other pieces are included in box.

References

Other Uses

Suggestions for Improvement

ELECTROSTATIC DEMONSTRATION SET

DCS # 5A?? Status Active

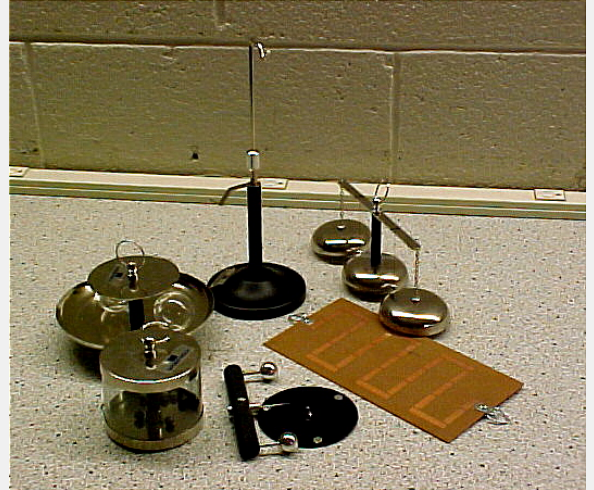
Area 5 Electricity and Magnetism Location 32

Topic 5A Electrostatics Rating good and engaging

Concept various Demo # 009

Checked Yes Related Demos 163

Date Checked 11/19/2019



Brief Description For use with the Van De Graaff generator and/or the Wimshurst Static Machine.

Keywords electrostatic demonstration set, Van de Graaff, Wimshurst machine, bell, spin, induce, charge, induction,

Equipment Needed Van De Graaff generator

Detail

References

Other Uses

Suggestions for Improvement

ELECTROSTATIC FLYING PEANUTS

DCS # 5B10.25 Status Active

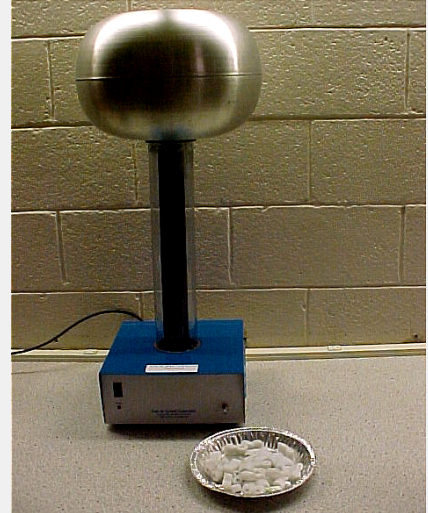
Area 5 Electricity and Magnetism Location 27

Topic 5B Electric Fields and Potential Rating good and engaging

Concept 5B10 Electric Field Demo # 005

Checked Yes Related Demos 182

Date Checked 11/20/2019



Brief Description The peanuts fly away when they are placed on top of the Van de Graaff generator and the generator is activated.

Keywords electrostatic flying peanuts, Van de Graaff, packing peanuts, repulsion, repel, electric field, styrofoam,

Equipment Needed

Detail Packing peanuts are in the demo box, multiple Van de Graaff generators are available.

References

Other Uses

Suggestions for Improvement

ELECTRIC FIELD LINES BETWEEN ELECTRODES

DCS # 5B10.40 Status Active

Area 5 Electricity and Magnetism Location 33

Topic 5B Electric Fields and Potential Rating good and engaging

Concept 5B10 Electric Field Demo # 019

Checked Yes Related Demos

Date Checked 11/20/2019



Brief Description This demo was designed to be used on an **overhead projector**. Place two electrodes, or electrode plates in the dish with salt water, connect them to the H.V. Power supply (missing). When you put Potassium Permanganate in the water, you can see electric field lines.

Keywords electric field lines between electrodes, salt water, overhead projector, potassium permanganate, dish,

Equipment Needed Plexiglas/plastic dish, (Salty) Water, various electrodes, Potassium Permanganate, H.V. Power supply

Detail There are a few ways to use this demo. There are 2 round electrodes for the water, and 2 plate electrodes. There is also a large metal hoop that can be used to simulate grounded potential at infinity. The picture here is of the two round electrodes at positive potential and the metal plate at ground. When the Potassium Permanganate is add, it spreads out along the field lines that would represent 2 protons. The plates can be used to show capacitor field lines.

References

Other Uses Sprinkle a small amount of KMN04 on the water using the included film canister.

Suggestions for Improvement

FLUORESCENT LIGHT BULBS

DCS # 5B10.? / 5N20.50 Status Active

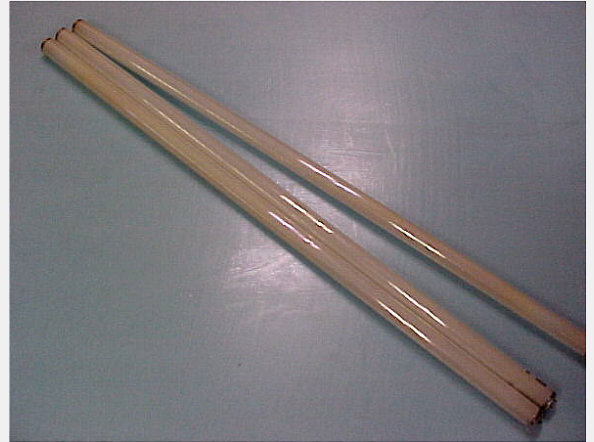
Area 5 Electricity and Magnetism Location Cabinet 70

Topic 5B Electric Fields and Potential Rating good and engaging

Concept 5B10 Electric Field Demo # 9006

Checked Yes Related Demos 178

Date Checked 11/20/2019



Brief Description Can be used to show the electric field around a Van De Graaff generator, among other things (Tesla coil)

Keywords fluorescent light bulbs, Van de Graaff, electric field, Tesla coil, electromagnetic radiation, induction,

5B10.? = Electric Field
5N20.50 = Tesla Coil

Equipment Needed

Detail Large and small tubes are in the cabinet, in different boxes.

References

Other Uses

Suggestions for Improvement

RADIO SHACK

DCS # 5B20.35 Status Active

Area 5 Electricity and Magnetism Location 028

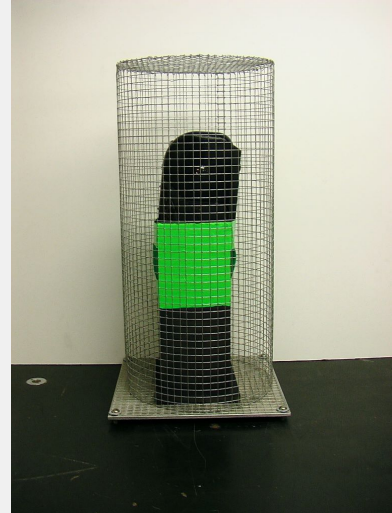
Topic 5B Electric Fields and Potential Rating good and engaging

Concept 5B20 Gauss' Law Demo # 029

Checked Yes

Date Checked 11/20/2019

Related Demos



Brief Description Outside the cage the radio can pick up transmissions. Inside the cage the radio is silent. Proves that radio waves cannot penetrate Faraday's cage.

Keywords radio in Faraday cage, radio shack, electric field, potential, gauss' law, gauss, waves,

Equipment Needed D batteries.

Detail Radio reception may not be strong in auditorium 100, so it may be worth checking before lecture. At a minimum, the cage will still block the static.

References

Other Uses

Suggestions for Improvement

ELECTROSTATIC CHARGE SHAPES

DCS # 5B30.36 Status Active

Area 5 Electricity and Magnetism Location 33

Topic 5B Electric Fields and Potential Rating good and engaging

Concept 5B30 Electrostatic Potential Demo # 020

Checked Yes

Date Checked 11/21/2019



Related Demos

Brief Description Demonstrate how the shape of an object affects the acquired charge and electric field.

Keywords electrostatic charge shapes, ball, point, blunt, sharp, electric field, potential,

Equipment Needed Van de Graaff generator.

Detail

References

Other Uses

Suggestions for Improvement

LIGHTNING ROD

DCS # 5B30.30 Status Active

Area 5 Electricity and Magnetism

Location 32

Topic 5B Electric Fields and Potential

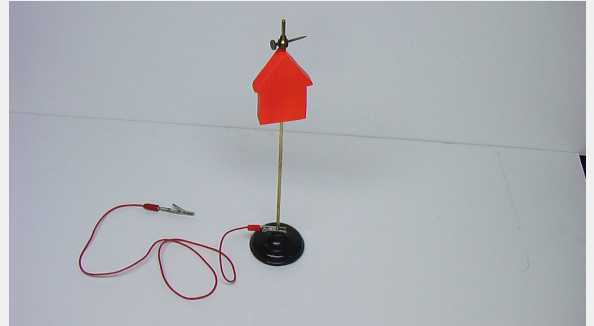
Rating good but lacks zest

Concept 5B30 Electrostatic Potential

Demo # 033

Checked Yes

Related Demos



Date Checked 11/20/2019

Brief Description Demonstrates the principle upon which lightning rods are based. There is no discharge from the Van de Graaff generator when this unit is placed near the sphere.0

Keywords lightning rod, Van de Graaff, discharge, electric field, potential, electrostatic,

Equipment Needed Van de Graaff generator; grounded discharge sphere; alligator clip to connect to ground post.

Detail

References

Other Uses

Suggestions for Improvement

LEYDEN JARS

DCS #	5C30.10	Status	Duplicate
Area	5 Electricity and Magnetism	Location	31 2L Bottle Leyden Jar and Light
Topic	5C Capacitance	Rating	□□□□ good but lacks zest
Concept	5C30 Energy Stored in a	Demo #	026
Checked	Yes	Related Demos	2L Bottle Leyden Jar and Light
Date Checked	2/28/2020		



Brief Description These jars are used to store charges from an electrostatic generator. They consist of three parts: an outer conductor, an inner conductor and a dielectric jar. Connect Jars to Van de Graaff Generator and store the charge.

Keywords Leyden jar, bottle, capacitance, energy stored in a capacitor, aluminum foil, electrostatic, conductor, insulator, dielectric, Van de Graaff, Wimshurst machine,

Equipment Needed Leyden Jar, Van de Graaff Generator, charger with an insulated handle.

Detail The outside coating of the Jar should be connected to the ground so that the repelled charge can get away. When inner and outer coatings of jars are connected together by the discharger, a heavy spark is given. It is dangerous to take the charge of the Leyden Jar when it is fully charged! The discharger has an insulated handle and the jar may be discharged by it without danger.

References

Other Uses

Suggestions for Improvement

SHORT A CAPACITOR

DCS # 5C30.20 Status Inactive

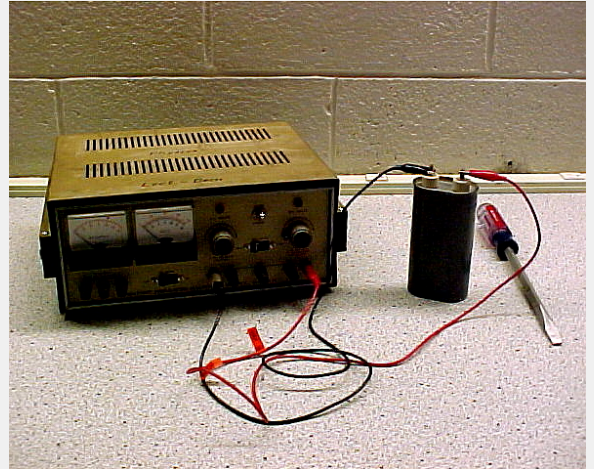
Area 5 Electricity and Magnetism Location 33

Topic 5C Capacitance Rating old but effective

Concept 5C30 Energy Stored in a Demo # 002

Checked Yes Related Demos 006

Date Checked 11/22/2019



Brief Description Connect High Voltage Power Supply (missing) to the metal studs on the capacitor and charge it. Disconnect one connector from power supply and place metal part of screw driver on the two capacitor's leads, you will see a big spark.

Keywords short a capacitor, spark, energy stored, capacitance, high voltage, charge, discharging,

Equipment Needed 10 uF Capacitor, High Voltage Power Supply and couple connectors (alligator - banana), Screw driver.

Detail Screw driver should have a good insulated handle. After spark, turn power supply off and place metal part of screw driver on the capacitor's studs again, so you could be sure that there is no charge on it. Take parts apart.

References

Other Uses

Suggestions for Improvement Demo box is empty. Need to find the following: a 10 uF capacitor, wires, screwdriver.

2L Bottle Leyden Jar and Light

DCS # 5C30.30 Status Active

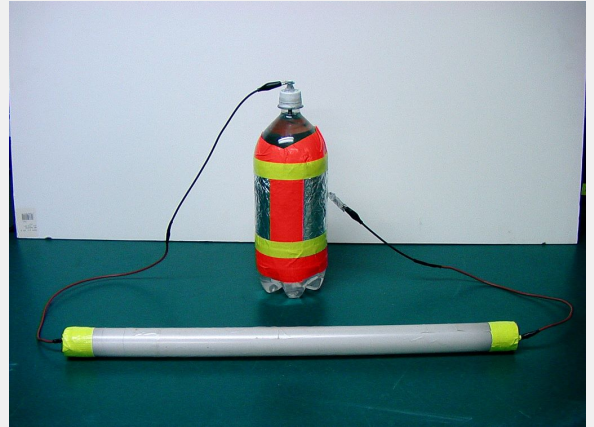
Area 5 Electricity and Magnetism Location 31

Topic 5C Capacitance Rating good but lacks zest

Concept 5C30 Energy Stored in a Demo # 026

Checked Yes Related Demos 163 LEYDEN JARS

Date Checked 11/22/2019



Brief Description Leyden jar made of a two liter soda bottle can store enough charge to light a fluorescent light bulb.

Keywords capacitor, capacitance, leyden, leyden jar, jars, 2L bottle, two liter bottle, florescent light, Van de Graaff, Wimshurst machine

Equipment Needed Wimshurst machine (shelf 32)
or
Van de Graaf Generator

Detail Charge 2L Bottle with the Wimshurst machine or the Van de Graaf Generator. Allow several sparks to connect with the screw in the bottle's cap. Connect one alligator clip from the florescent light to the metal tab on bottle. To discharge capacitor and light the light, touch the 2nd clip to screw in bottle's cap.

References

Other Uses

Suggestions for Improvement

OHM's Law

DCS # Status Active

Area 5 Electricity and Magnetism

Location 37

Topic 5D Resistance

Rating

Concept

Demo # 303

Checked Yes

Related Demos

Date Checked 2/28/2020



Brief Description Giant color coded "resistors" with banana clips

Keywords Resistor, stripes, reading

Equipment Needed

Detail

References

Other Uses

Suggestions for Improvement

RESISTANCE VS. TEMPERATURE

DCS # 5D20.10 Status Active

Area 5 Electricity and Magnetism Location 33

Topic 5D Resistance Rating good but lacks zest

Concept 5D20 Resistivity and Temperature Demo # 024

Checked Yes

Date Checked 11/22/2019

Related Demos



Brief Description Change the surrounding temperature of the filament and use the brightness of the bulb to determine the relationship between the surrounding temperature and the resistance of the filament.

Keywords resistance vs. temperature, resistivity, filament, bulb, resistant heat dissipation, resistive heating,

Equipment Needed

Detail Use the filament from a 40W light bulb for better results.

** Caution: Fragile - open filament

References

Other Uses

Suggestions for Improvement

RESISTANT HEAT DISSIPATION

DCS # 5D20.31 Status Active

Area 5 Electricity and Magnetism Location 33

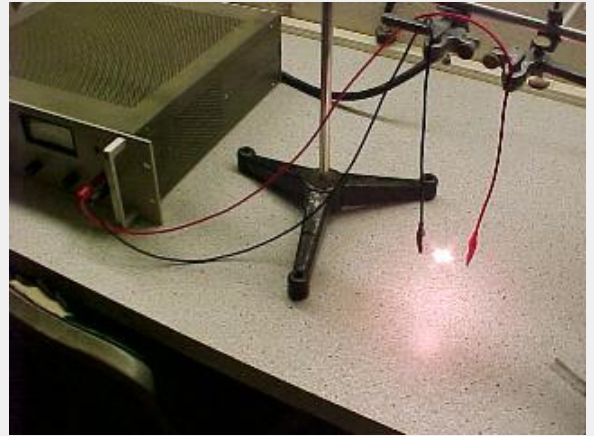
Topic 5D Resistance Rating good and engaging

Concept 5D20 Resistivity and Temperature Demo # 022

Checked Yes

Date Checked 11/22/2019

Related Demos



Brief Description -Very good demonstration of resistive heating. Does combine other more subtle but easy to explain ideas.
-Very visible to a large class
-Set up takes a minute or two if familiar with the experiment.
-Detailed Instructions in the box.

Keywords resistant heat dissipation, resistive heating, resistance, temperature, pencil lead, carbon, tungsten, filament, resistivity, bulb,

Equipment Needed

DC Power supply (must supply at least 6A). Mechanical Pencil Lead. 2 banana-alligator clips. Clamp-able stand.

Detail A piece of graphite is attached as a resistor load to a power supply. Initially the resistance is about an ohm but as the current through the graphite heats it up, some of the graphite burns away. As this happens the cross-sectional area get smaller increasing the resistance. Increased resistance dissipates more heat and eventually the lead glows (as seen in the picture). Once the graphite gets narrow enough the heat burns through it. Just before this happens there is a very intense flash.

References

Other Uses

Suggestions for Improvement

JACOB'S LADDER

DCS # 5D40.10 Status Active

Area 5 Electricity and Magnetism Location Floor/Cart

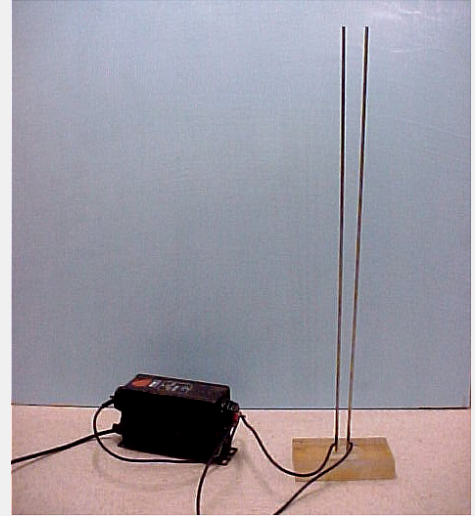
Topic 5D Resistance Rating good and engaging

Concept 5D40 Conduction in Gases Demo # 350

Checked Yes

Date Checked 11/22/2019

Related Demos



Brief Description The spark heats the air, which travels upward with accompanying sparks.

Keywords Jacob's ladder, resistance, conduction in gases, spark, heat, air, jacob's

Equipment Needed

Detail

References

Other Uses

Suggestions for Improvement

THERMOPILE

DCS # 5E50.10 / 4B40.? / 6B40.? / 7A10.50 Status Active

Area 5 Electricity and Magnetism Location 33

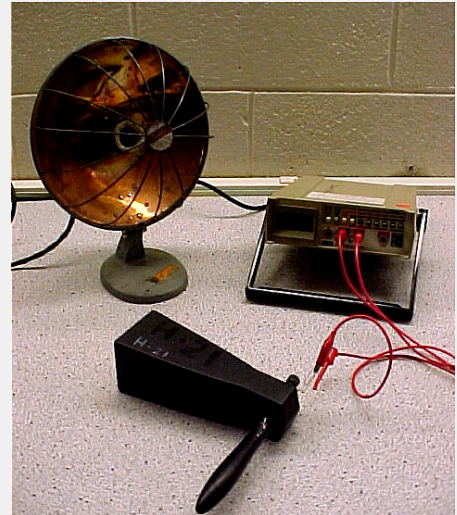
Topic 5E Electromotive Force and Current Rating good but lacks zest

Concept 5E50 Thermoelectricity Demo # 016

Checked Yes

Related Demos

Date Checked 11/27/2019



Brief Description The output from a thermopile is connected to a digital voltmeter where the voltage is proportional to the temperature observed: the hotter the object the higher the voltage. Use a small heater as a heat source.

Keywords thermopile, thermocouple, thermoelectricity, heater, voltage, radiation, blackbody, photoelectric effect, photoconduction, infrared, IR, Peltier,

Equipment Needed Thermopile; Digital Voltmeter; couple connectors and Small Heater.

Detail This is only qualitative; the system is not calibrated. Doesn't demonstrate great - the system "Thermopile-Voltmeter" is not so sensible.

4B40.? = Radiation
 6B40.? = Blackbodies
 7A10.50 = photoconduction vs. thermopile; photoelectric effect

References University of Maryland Physics Lecture-Demonstration Facility (I2-07).

Other Uses

Suggestions for Improvement

Blow a Resistor

DCS # 5F15.16 Status Active

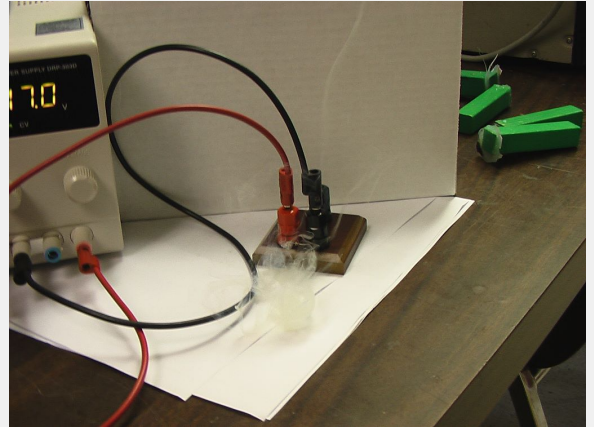
Area 5 Electricity and Magnetism Location 33

Topic 5F DC Circuits Rating old but effective

Concept 5F15 Power and Energy Demo # 006

Checked Yes Related Demos 002

Date Checked 2/28/2020



Brief Description Pass electricity through the resistor and see how much current is needed to blow the resistor

Keywords Current, resistor, ohm, electricity, resistance, voltage,

Equipment Needed Power supply

Detail Do this in a well-ventilated area as significant amounts of smoke may be produced. Many resistors included in box.

References

Other Uses

Suggestions for Improvement

SERIES AND PARALLEL CIRCUITS

DCS # 5F20.50 Status Active

Area 5 Electricity and Magnetism Location 34

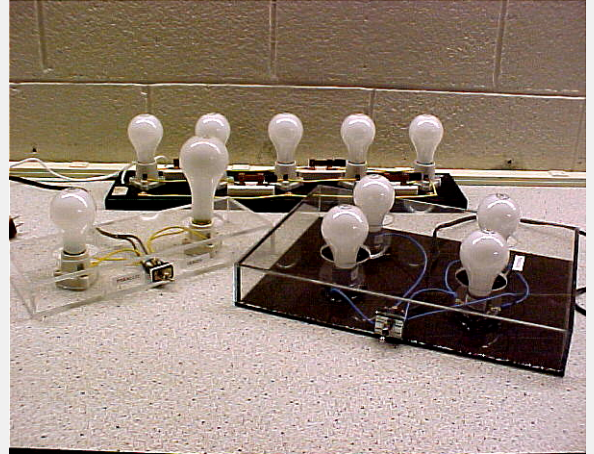
Topic 5F DC Circuits Rating good

Concept 5F20 Circuit Analysis Demo # 036

Checked Yes

Related Demos

Date Checked 11/27/2019



Brief Description Compare how resistance adds up in a parallel arrangement of bulbs to the resistance in a series arrangement.

Keywords series and parallel circuits, light bulbs, DC circuits, analysis, resistance,

Equipment Needed

Detail

References

Other Uses

Suggestions for Improvement

The switch on the large rectangular board does not fit securely in the casing. 5x1 casing has come unglued from the base.

PASCO CIRCUIT BOARD

DCS # 5F20.72 Status Active

Area 5 Electricity and Magnetism Location 33

Topic 5F DC Circuits Rating good but not for large class

Concept 5F20 Circuit Analysis Demo # 004

Checked Yes Related Demos

Date Checked 11/27/2019



Brief Description This is a very simple bread board for putting together small circuits. It is large enough to be used with the Teaching Camera to show in-class circuits.

Keywords Pasco, circuit, board, analysis, DC,

Equipment Needed 2 D batteries. Any other electronics components not already included that the instructor would like to lecture with.

Detail This kit contains several different resistors, a few capacitors of varying capacities, a potentiometer and an inductor. The inductor is built into the board and has a fitted iron core to go with it to show the effects of induction with and without a core. There are also a few LED's, transistors, diodes and light bulbs that fit into the board's built in sockets. Wires are included.

References

Other Uses

Suggestions for Improvement

CAPACITOR BANK

DCS # 5F30.11 Status Active

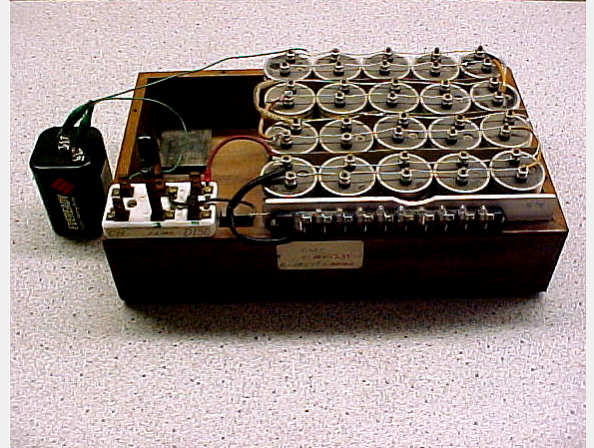
Area 5 Electricity and Magnetism Location 34

Topic 5F DC Circuits Rating good but lacks zest

Concept 5F30 RC Circuits Demo # 030

Checked Yes

Date Checked 11/27/2019



Related Demos

Brief Description The row of lights shows how energy is stored and discharged by the capacitors in series. Use AC and DC on the bank to show RC Circuit and time constant.

Keywords capacitor bank, DC circuits, RC, time constant, charge, discharge, AC, series, stored energy, capacitance

Equipment Needed Capacitor Bank, DC source (6V cell battery), AC source.

Detail

References

Other Uses

Suggestions for Improvement

Neon Bulb Flasher

DCS # Status Active

Area 5 Electricity and Magnetism

Location 32

Topic 5F DC Circuits

Rating □□□□□

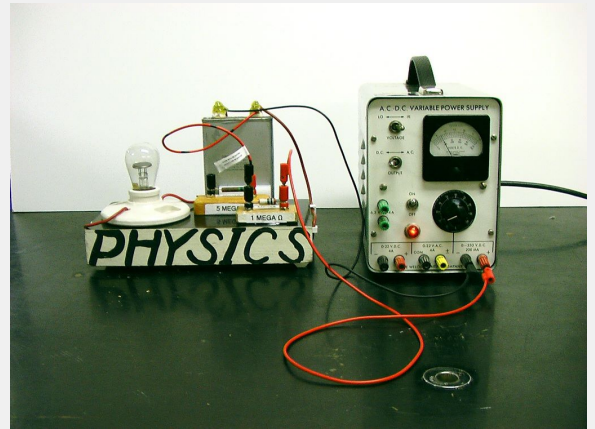
Concept 5F30 RC Circuits

Demo # 015

Checked Yes

Related Demos

Date Checked 2/28/2020



Brief Description Two resistors (5 mega ohm resistor and 1 mega ohm resistor) and a capacitor make an RC circuit . When hooked up to a power supply, the two different resistors will allow the neon bulb flash at different rates depending on the resistance used.

Keywords circuit, resistor, RC circuit, capacitor, timing, capacitance

Equipment Needed High voltage power supply.

Detail For slower flashing use 100 volts.
For faster flashing use 150 volts.

References

Other Uses

Suggestions for Improvement

RHEOSTATS

DCS # 5F10.10 / 5F20.33

Status Active

Area 5 Electricity and Magnetism

Location 34

Topic 5F DC Circuits

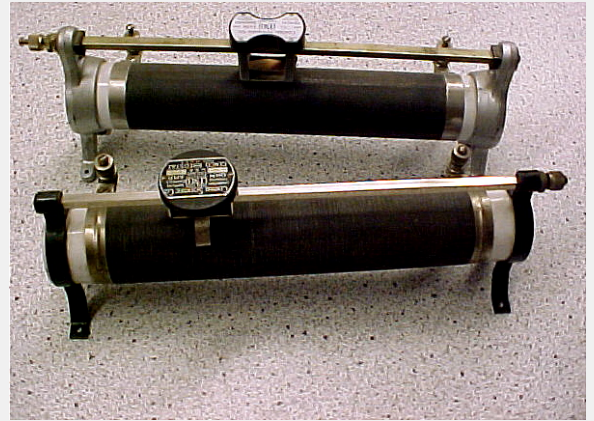
Rating good but lacks zest

Concept various

Demo # 017

Checked Yes

Related Demos



Date Checked 11/27/2019

Brief Description Slide-wire rheostats can be used as potential dividers to prove Ohm's Law or to function as potentiometers, among other things.
5F10.10 = Ohm's Law
5F20.33 = Rheostat as potential divider; circuit analysis

Keywords rheostat, potential divider, Ohm's law, DC circuits, analysis, potentiometer, variable resistance,

Equipment Needed

Detail

References

Other Uses

Suggestions for Improvement

Magnets and Strong Magnets

DCS # 5G10.14 Status Active

Area 5 Electricity and Magnetism Location 56 and bottom of demo 337 cart

Topic 5G Magnetic Materials Rating basic

Concept 5G10 Magnets Demo # 9007

Checked Yes Related Demos

Date Checked 12/2/2019



Brief Description Different sizes and shapes magnets help to show that magnets are always have two poles; when magnets are brought together, the like magnetic poles repel, and unlike magnetic poles attract. Place magnet close to the paper clips and show that magnet could magnetize

Keywords magnets, magnetic materials, poles, repel, repulsion, attraction, magnetize,

Equipment Needed Different shapes and size magnets, Box with paper clips.

Detail

References

Other Uses

Suggestions for Improvement

MAGNET AND COMPASS ARRAY

DCS # 5G20.31 / 5H10.11

Status Active

Area 5 Electricity and Magnetism

Location 33

Topic 5G Magnetic Materials

Rating old but effective

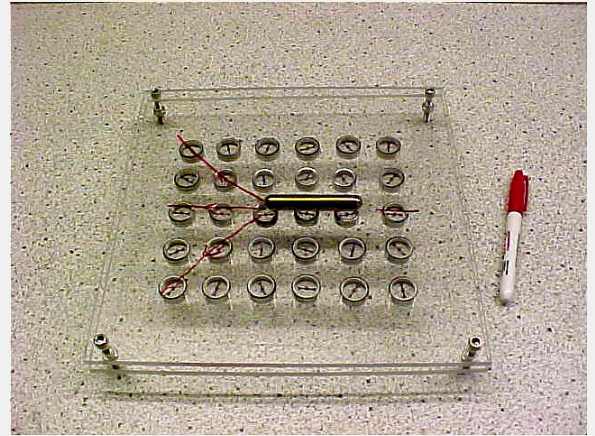
Concept 5G20 Magnet Domains and

Demo # 003

Checked Yes

Related Demos 176

Date Checked 12/2/2019



Brief Description Place magnet on the board with compasses, compass needle lines up with the field. Use marker to draw magnetic fields lines.
5G20.? = Magnetic Domains and Magnetization
5H10.? = Magnetic Fields

Keywords compass array, magnetic field lines, compass, magnet, pole, materials, clear, overhead, magnetic domains and magnetization,

Equipment Needed Dry erase marker (not included)

Detail Can be used with overhead projector since compasses are housed in transparent material.

References

Other Uses

Suggestions for Improvement

ELECTROMAGNET

DCS # 5G20.70 Status Active

Area 5 Electricity and Magnetism Location 33

Topic 5G Magnetic Materials Rating good and engaging

Concept 5G20 Magnet Domains and Demo # 023

Checked Yes Related Demos

Date Checked 12/2/2019



Brief Description This magnet is powered by a battery in an attached aluminum holder that you link by alligator clips to a DC coil.

Keywords electromagnet, magnetic materials, domains, magnetization, lift, holding force,

Equipment Needed Weight for demo included

Detail Also included is a plug-in version

References

Other Uses

Suggestions for Improvement

PERMALLOY ROD

DCS # 5G20.55 Status Active

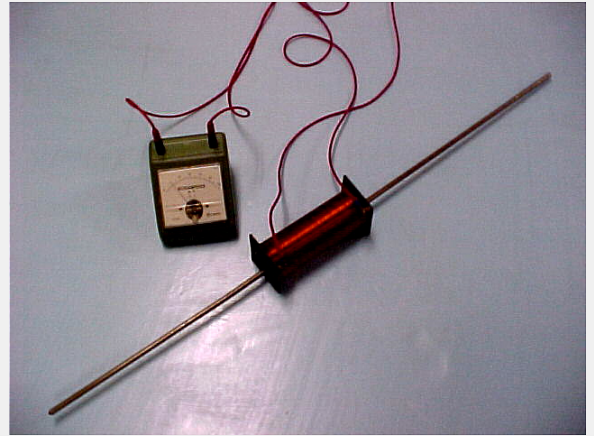
Area 5 Electricity and Magnetism Location 36 rod in PVC pipe attached to shelving structure

Topic 5G Magnetic Materials Rating good but lacks zest

Concept 5G20 Magnet Domains and Demo # 189

Checked Yes Related Demos 193 177

Date Checked 12/2/2019



Brief Description Iron filings (or small strip of iron) stick to a permalloy bar held parallel to the earth's magnetic field but fall off when it is held perpendicular.

Keywords permalloy rod, magnetic materials, domains, magnetization, earth, field, compass, iron,

Hold a permalloy rod near a compass needle.

Equipment Needed

Detail Permalloy (High Permeability) -- a permalloy rod is not itself magnetic, but if the rod is aligned with a preexisting magnetic field such as the Earth's or a magnet's, it becomes magnetic enough to pick up small pieces of iron.

References

Other Uses

Suggestions for Improvement

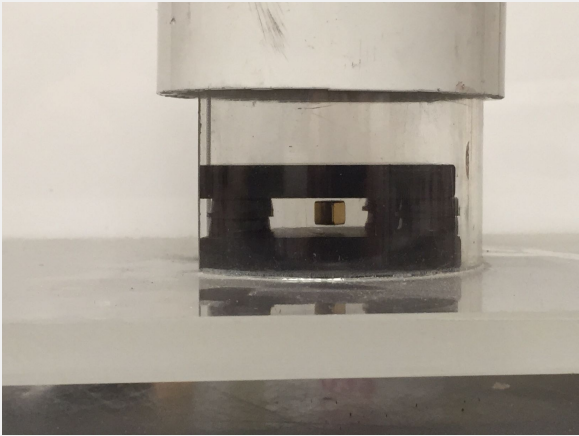
MAGNETIC LEVITATION BY DIAMAGNETISM

DCS # 5G30.? / 5H20.26 Status Active

Area 5 Electricity and Magnetism Location 34

Topic 5G Magnetic Materials Rating good and engaging but too small for lecture hall

Concept 5G30 Paramagnetism Demo # 032



Checked Yes

Related Demos

Date Checked 12/2/2019

Brief Description Place small piece of magnet between two pieces of graphite inside of clear part of plastic . Place big magnet on a top of this cylinder and adjust the distance between small and big magnet. The small magnet will float between two layers of graphite.

Keywords magnetic levitation, levitate, diamagnetism, graphite, carbon, force, diamagnetic

Equipment Needed Three parts plastic cylinder glued to the clear acrylic base with a white wall, two graphite parts, small and big magnets.

Detail CAUTION: pinch hazard. The large magnets are extremely strong. Keep away from metals and sensitive electronic equipment.

You can adjust the distance between small and big magnet by screwing the top of the cylinder. Use this magnetic levitation apparatus with overhead camera.

References

Other Uses

Suggestions for Improvement

MEISSNER EFFECT

DCS # 5G50.50 Status Active

Area 5 Electricity and Magnetism

Location 36

Topic 5G Magnetic Materials

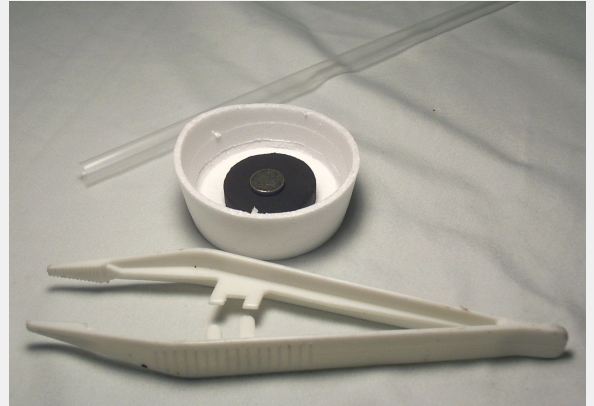
Rating good and engaging too small for lecture hall

Concept 5G50 Temperature and Magnetism

Demo # 185

Checked Yes

Related Demos



Date Checked 3/2/2020

Brief Description Cool a superconductor and a magnet floats over it due to magnetic repulsion.

Keywords meissner effect, superconductor, levitation, float, cool, magnetic repulsion, magnetism, temperature, liquid nitrogen,

Use the pincers and/or straw to manipulate the magnet.

Equipment Needed

Liquid nitrogen will need to be acquired. There is a dewar for this in the supply shelf.

Use a video camera!

Detail

References

Other Uses

Suggestions for Improvement

TWO MAGNETS AND IRON FILINGS

DCS # 5H10.30 Status Active

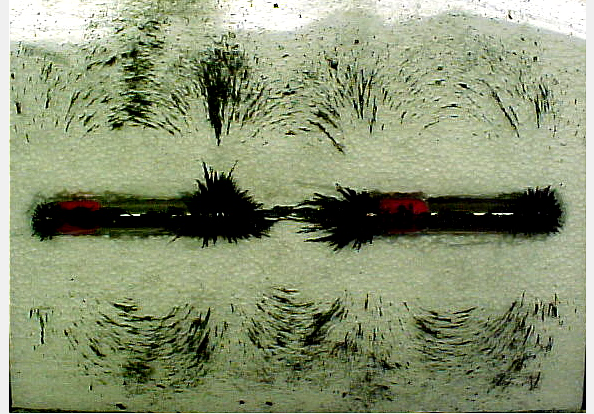
Area 5 Electricity and Magnetism Location 33

Topic 5H Magnetic Fields and Forces Rating good but lacks zest

Concept 5H10 Magnetic Fields Demo # 025

Checked Yes

Date Checked 12/2/2019



Related Demos

Brief Description Sprinkle iron filings on a piece of paper over two magnets, when magnets are facing to each other with attractive poles and with repulsive poles. You can see different iron filing patterns (magnetic fields patterns) for these two different cases.

Keywords two magnets and iron filings, magnetic fields, pole, magnetism, force,

Equipment Needed Two cylindrical magnets, Iron filings, Sheet of paper, Overhead camera.

Detail The magnetic field in this demonstration is identified by iron filing patterns. When iron filings are placed over a magnets, they become induced magnets and line up with the field.

References

Other Uses

Suggestions for Improvement

Overhead Magnetism Demo

DCS # 5H10.30 Status Active

Area 5 Electricity and Magnetism

Location 36

Topic 5H Magnetic Fields and Forces

Rating

Concept 5H10 Magnetic Fields

Demo # 188

Checked Yes

Related Demos



Date Checked 3/2/2020

Brief Description A bar magnet is placed in bottom glass pan and the second glass pan is placed on top. Iron filings are sprinkled in the top glass pan. The filings will align themselves along the magnetic field lines of the magnet. Do this on overhead projector to show the class

Keywords field lines, magnet, magnetism, iron filings, overhead, magnetic field, magnetic field lines

Equipment Needed Two glass trays, bar magnet, fine iron filings, overhead projector

Detail

References

Other Uses

Suggestions for Improvement

COIL AND COMPASS ARRAY

DCS # 5H15.10 Status Active

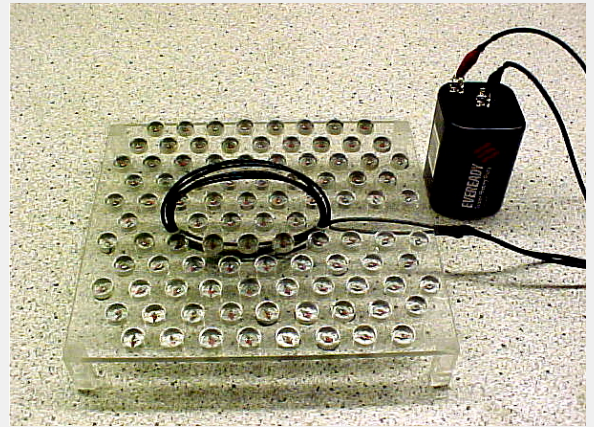
Area 5 Electricity and Magnetism Location 36

Topic 5H Magnetic Fields and Forces Rating good and engaging

Concept 5H15 Fields and Currents Demo # 176

Checked Yes Related Demos 192 003

Date Checked 12/2/2019



Brief Description The compass needles show the magnetic field produced by current in a coil.

Keywords compass array, magnetic field lines, compass, magnet, pole, materials, solenoid, toroid, coil, clear, overhead, current, force, wire,

Equipment Needed

Detail Not for use with an overhead projector, since the compasses are not in transparent housings. Use the overhead camera.

A 12DCV @1.2A Power Supply is included. DO NOT LEAVE PLUGGED IN FOR EXTENDED PERIODS OF TIME

References

Other Uses

Suggestions for Improvement

LENGTH OF SOLENOID

DCS # 5H15.43 Status Active

Area 5 Electricity and Magnetism Location 37

Topic 5H Magnetic Fields and Forces Rating good but lacks zest

Concept 5H15 Fields and Currents Demo # 202

Checked Yes Related Demos

Date Checked 12/2/2019



Brief Description A large solenoid is constructed to make it easy to change the spacing of turns and therefore the length. A magnetometer or coil can be used to show field strength.

Keywords length of solenoid, coil, current, magnetic field lines, force, spacing, turns,

Equipment Needed Demo 120e shelf 30 for magnetic field sensor, and large power supply.

Detail

References

Other Uses

Suggestions for Improvement

COILS AND COMPASSES

DCS # 5H15.50 Status Active

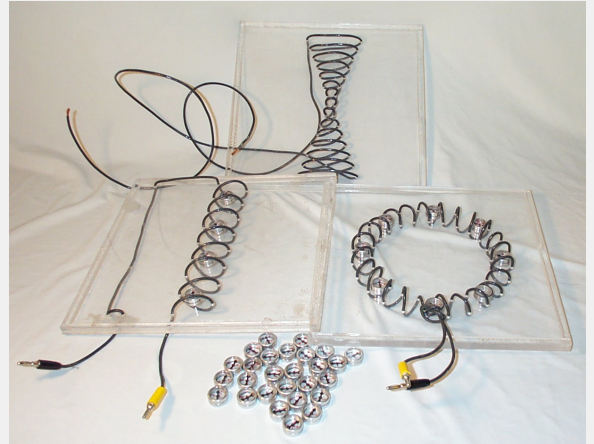
Area 5 Electricity and Magnetism Location 36

Topic 5H Magnetic Fields and Forces Rating good and engaging

Concept 5H15 Fields and Currents Demo # 192

Checked Yes Related Demos 176

Date Checked 12/2/2019



Brief Description The compass needles show the magnetic field produced by current in the coils.

Keywords magnetic field lines, coil, compass, magnet, pole, materials, solenoid, toroid, clear, overhead, current, force, wire,

Equipment Needed DC power supply.

Detail Can be used with overhead projector since compasses are housed in transparent material.

References

Other Uses

Suggestions for Improvement

Magnetic Field Kit

DCS # 5H15.40 Status Active

Area 5 Electricity and Magnetism Location 34

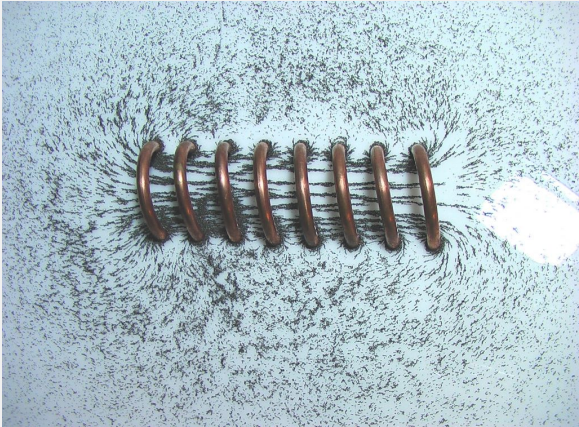
Topic 5H Magnetic Fields and Forces Rating good but lacks zest

Concept 5H15 Fields and Currents Demo # 035

Checked Yes

Date Checked 3/4/2020

Related Demos



Brief Description several platforms allow you to use iron filings to see the magnetic field lines of a solenoid, single loop solenoid, and a magnet of your choosing. Use the lecture camera to show class.

Keywords magnetic field lines, magnetic field, magnetism, solenoid, magnet, field lines, current

Equipment Needed Sears battery charger / engine starter power supply. Located on floor on east end of shelf 38

Detail BE CAREFUL NOT TO GET IRON FILINGS ON MAGNET

Use the large Sears engine starter power supply on the 12V, 50A setting.

The straight rod and the single loop work well. The large solenoid can work, but appears to have some conductivity problems in some of the welds, so you may have to experiment on how to clip the power supply to make it work.

References

Other Uses

Suggestions for Improvement

LEVITRON

DCS # 5H20.25 Status Active

Area 5 Electricity and Magnetism Location 36

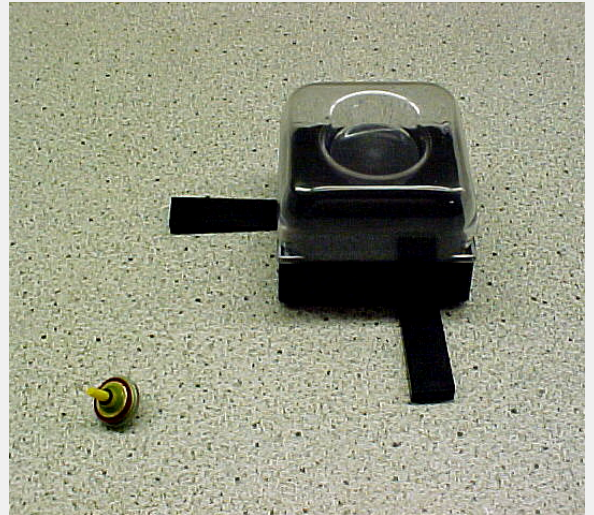
Topic 5H Magnetic Fields and Forces Rating good and engaging

Concept 5H20 Forces on Magnets Demo # 180

Checked Yes

Date Checked 12/2/2019

Related Demos



Brief Description Spin the top on the lifter plate over the center of the base magnet. Raise the lifter plate approximately 1" above the surface of the base magnet and continue lifting but very slowly. The top will levitate and will stay in the air for a long time.

Keywords levitron, levitation magnets, force, field, spin, rotate, stable, torque, spinning,

Equipment Needed Floating top, Magnetic Levitron Base, Assortment of Adjustment Weights. Lifter (the clear plastic cover), 2 Shims, Instruction Leaflet, Levitron Physics Leaflet

Detail Magnetic field produced by the base magnet should be precisely vertical for successful levitation. So, it is sometimes necessary to insert the shims under one or even two edges of the base. The instruction leaflet tells how to find the right weight for the top and how to adjust the base magnet.

References

Other Uses ****This demo is hard to get correctly balanced to work. The top tends to spin off wildly once it is "levitating."**

Suggestions for Improvement

GAUSS ACCELERATOR

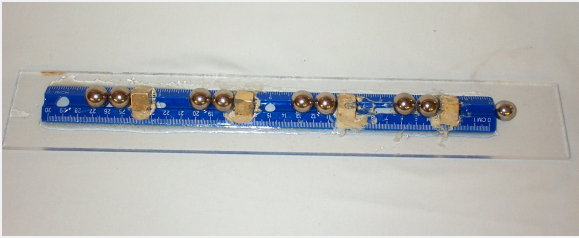
DCS # 5H20.? Status Active

Area 5 Electricity and Magnetism Location 36

Topic 5H Magnetic Fields and Forces Rating good and engaging

Concept 5H20 Forces on Magnets Demo # 186

Checked Yes



Related Demos

Date Checked 12/2/2019

Brief Description

- Not very visible to large classes
- Combines mechanics and magnetism ideas
- Easy to explain and very easy to reproduce

Keywords gauss, accelerometer, energy, levels, propulsion, attraction, kinetic, potential, binding, energy, momentum, force, work,

Equipment Needed 9 steel ball bearings and the track with magnets.

Detail This is a well known demo. It shows a great many principles such as kinetic and potential energy, magnetism, linear momentum and forces. Consists of 4 magnets and 9 steel ball bearings. The bearings are arranged such that as one rolls towards a the magnet it, it is pulled into another ball bearing between it and the magnet. Its momentum is then transferred through the ball bearing, the magnet, and finally to another ball bearing on the other side of the magnet forcing it to

References

Other Uses

Suggestions for Improvement

MALTESE CROSS

DCS # 7B35.40 Status Active

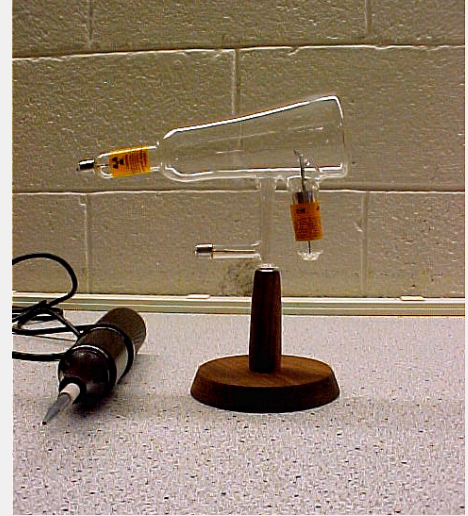
Area 5 Electricity and Magnetism Location Shelf 36

Topic 5H Magnetic Fields and Forces Rating good and engaging

Concept 5H30 Force on Moving Charges Demo # 330

Checked Yes Related Demos 190 191

Date Checked 12/3/2019



Brief Description A Maltese cross shape partially blocks the path of the electrons in this Cathode Ray Tube. We can see a shadow of Maltese Cross that falls on the tubes screen.

Keywords Maltese cross, ray, atomic, electron, cathode ray tube, CRT, shadow effect, magnetic deflection, beam, handheld, tesla coil canal rays, positive rays, ions, bending an electron beam, cathode ray tube, CRT, deflect, magnet, force,

Equipment Needed Handheld Tesla coil (Shelf 36 Demo 178)

Detail

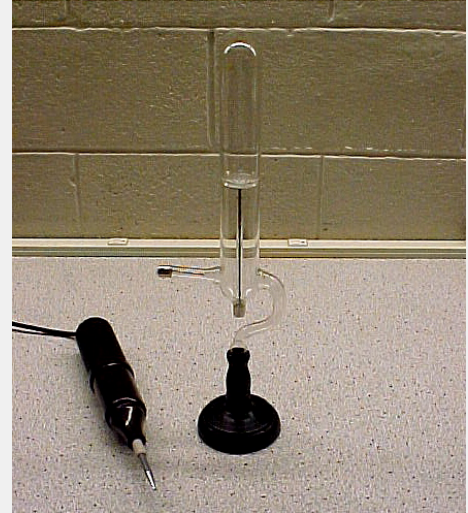
References

Other Uses

Suggestions for Improvement

BENDING AN ELECTRON BEAM - CANAL RAY

DCS # 5H30.15 Status Active but does not work well
Area 5 Electricity and Magnetism Location 36
Topic 5H Magnetic Fields and Forces Rating good and engaging
Concept 5H30 Force on Moving Charges Demo # 190
Checked Yes Related Demos 191
Date Checked 12/3/2019



Brief Description Perforations in the cathode of the tube permit positive ions to pass through the cathode, forming "canal rays" or "positive rays". If you place magnet close to the tube you can view deflection of the beam.

Keywords canal rays, positive rays, ions, bending an electron beam, cathode ray tube, CRT, deflect, magnet, force, moving charge, handheld, tesla coil

Equipment Needed Handheld Tesla coil (Shelf 36 Demo 178)

Detail

References

Other Uses

Suggestions for Improvement

BENDING AN ELECTRON BEAM - CRT #2

DCS # 5H30.15 Status In Storage

Area 5 Electricity and Magnetism Location 36

Topic 5H Magnetic Fields and Forces Rating good and engaging

Concept 5H30 Force on Moving Charges Demo # 191

Checked Yes Related Demos 190

Date Checked 12/3/2019



Brief Description This tube has a metal plate with a gap on it and provide green electron beam. Use a bar magnet to view an electron beam deflection.

Keywords bending an electron beam, cathode ray tube, CRT, deflect, magnet, force, moving charge, handheld, tesla coil

Equipment Needed Cathode ray tube, Tesla Coil (#HS-10), Bar magnet.

Detail

References

Other Uses

Suggestions for Improvement Missing bar magnet

Thomson Tube

DCS # 5H30.25 Status Active

Area 5 Electricity and Magnetism Location Cart for demo 412

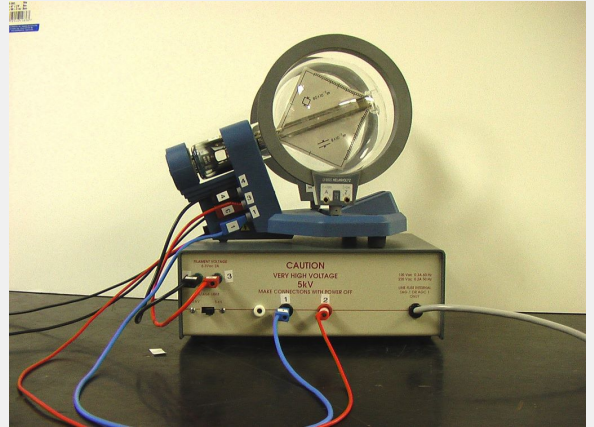
Topic 5H Magnetic Fields and Forces Rating □□□□□

Concept 5H30 Force on Moving Charges Demo # 034

Checked Yes

Date Checked 3/4/2020

Related Demos



Brief Description In the Thomson tube, the vertical deflection of a horizontal electron beam can be observed on a fluorescent screen. Such a deflection can be generated by a vertical electric field or by a horizontal magnetic field that is perpendicular to the direction of motion in the

Keywords Tel-Atomic, Helmholtz, Magnetic Field, Cathode, Electric Field, deflection of electron beam, electron

Equipment Needed

DC power supply in addition to the included 5kV supply

Detail FRAGILE!! Includes power supply and complete instructions.

References

Other Uses

Suggestions for Improvement

TELEVISION SET (rainbow)

DCS # 5H30.10 Status Active

Area 5 Electricity and Magnetism

Location 60

Topic 5H Magnetic Fields and Forces

Rating □□□□□

Concept 5H30 Force on Moving Charges

Demo # 252

Checked Yes

Related Demos

Date Checked 11/13/2019



Brief Description Old CRT television set.

Keywords TV, television, cathode ray tube, electron beam,

Equipment Needed Magnet

Detail When approaching with a magnet, the magnetic field lines appear. If the screen retains any memory of the magnetic field, spin the large magnet perpendicular to the axis of the cylinder and slowly move it away from the screen. this brings the screen colors back to normal.

References

Other Uses

Suggestions for Improvement

VIBRATING LAMP FILAMENT IN MAGNETIC FIELD

DCS # 5H40.23 Status Active

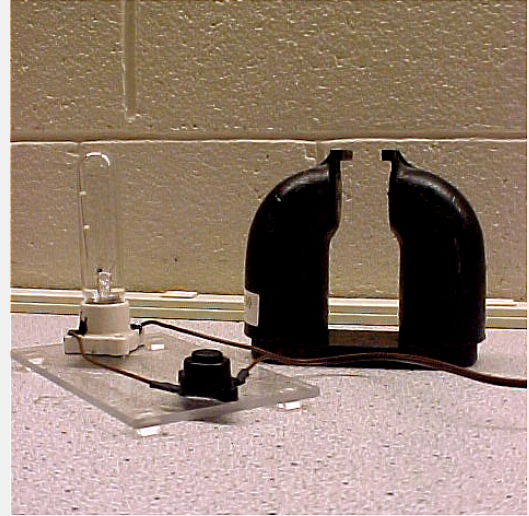
Area 5 Electricity and Magnetism Location 32

Topic 5H Magnetic Fields and Forces Rating good but lacks zest

Concept 5H40 Force on Current in Wires Demo # 007

Checked Yes Related Demos 401

Date Checked 12/3/2019



Brief Description The filament warps and vibrates in the presence of the magnetic field. Magnet included.

Keywords vibrating lamp filament in magnetic field, force, current, wire, dancing lightbulb,

Equipment Needed

Detail The AC current in the filament is interacts with the magnetic field. Use with overhead camera in lecture for all students to see.

Be careful not to let the magnet for the light bulb near the transformer, especially with strong handheld neodymium magnets.

References

Demo 401 is the same concept, but can be operated in either AC or DC mode.

Other Uses

Suggestions for Improvement

Force on Wire within Magnetic Field

DCS # 5H40.36 Status Active

Area 5 Electricity and Magnetism

Location 35

Topic 5H Magnetic Fields and Forces

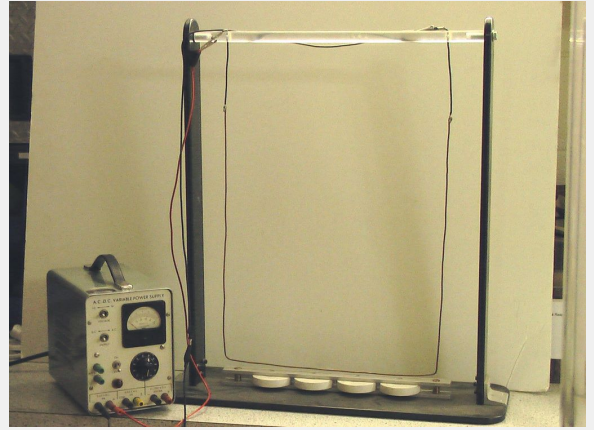
Rating

Concept 5H40 Force on Current in Wires

Demo # 306

Checked Yes

Related Demos



Date Checked 4/19/2015

Brief Description A DC current is passes through the copper wire which hangs above several magnets. When a current flows through the wire it swings to one side or the other.

Keywords current, magnet, magnetic field, field, force, DC

Equipment Needed

DC power supply. Use colored "flags" on copper wire to make movement more visible to class

Detail

References

Other Uses

Suggestions for Improvement

Disassembled Speaker

DCS # 5H40.37 Status Active

Area 5 Electricity and Magnetism Location 32

Topic 5H Magnetic Fields and Forces Rating □□□□□

Concept 5H40 Force on Current in Wires Demo # 013

Checked Yes

Related Demos

Date Checked 3/4/2020



Brief Description Show the effects of a magnetic field on a current running through a coil of wire.

Keywords speaker, magnet, sound, coil, current, disassembled, current

Equipment Needed signal generator or...

Detail The diaphragm will only produce sound in the presence of the magnetic field.

Amplifier (shelf 61) and Music device (MP3 player, computer) Microphone to RCA cable-in box

References

Other Uses

Suggestions for Improvement

Victorian Light Bulb

DCS # 5H40.23 Status Active

Area 5 Electricity and Magnetism Location 32

Topic 5H Magnetic Fields and Forces Rating □□□□ good

Concept 5H40 Force on Current in Wires Demo # 401

Checked Yes Related Demos 007

Date Checked 3/4/2020



Brief Description

A light bulb filament will move in a magnetic field. The behavior of the filament, however, depends on whether an AC or DC current flows through the filament. A DC current will cause the filament to pull sideways, while an AC current will cause it to vibrate in a magnetic

Keywords

current, magnetic field, force, DC, AC.

Equipment Needed

Strong magnet

Detail

From supplier website: The bulb's filament is very fragile. When using the bulb in AC mode, we suggest holding a small neodymium magnet about 1 inch above the top of the bulb for short periods of time. Placing a magnet closer than 1 inch to the AC current bulb could break the bulb's filament.

References

Same concept as demo 007 but this one has both AC and DC modes.

Other Uses

Suggestions for Improvement

TORQUE ON CURRENT LOOP

DCS # 5H50.20 Status Active

Area 5 Electricity and Magnetism Location 31

Topic 5H Magnetic Fields and Forces Rating good and engaging

Concept 5H50 Torques on Coils Demo # 408

Checked Yes

Related Demos

Date Checked 12/3/2019



Brief Description The current in the inner loop interacts with the magnetic field induced by the outer loop, causing the inner loop to rotate.

Keywords torque on current loop, force, coil, magnetic field,

Equipment Needed Power supply from shelf 61

Detail Use the clips on the inner loop to connect the batteries. Be careful not to break the string suspending the inner loop. Now connect the provided cable to a power supply (shelf 61). Crank up the current and press the button. The inner loop will rotate. If you press the button repeatedly and timed correctly, you can get the loop to rotate really fast

References

Other Uses

Suggestions for Improvement

INDUCTIVE COIL PENDULUM WITH LAMP

DCS # 5K10.25 Status Active

Area 5 Electricity and Magnetism Location Floor/Cart

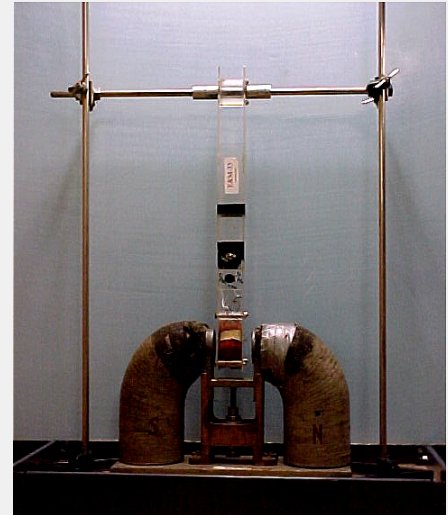
Topic 5K Electromagnetic Induction Rating good and engaging

Concept 5K10 Induced Currents and Demo # 347

Checked Yes

Date Checked 5/13/2015

Related Demos



Brief Description Swing pendulum between big magnet and the light flashes when pendulum goes through the magnetic field.

Keywords inductive coil pendulum with lamp, pendulum light, electromagnetic induction, induced current, force, magnetic field, horseshoe magnet, eddy current, damping, damped oscillations

Equipment Needed

Detail With bottom switch set to "Coil" induced currents in the loop will quickly damp the oscillations. With the switch set to "Light Bulb" the current can be sent either through an incandescent bulb or a pair of LEDs.

It can be tough to see but there are two small pulses for the incandescent bulb as the flux changes direction in the center of the magnet.

References

Other Uses

Suggestions for Improvement Mount LEDs in something permanent (acrylic block or sheet metal plate)

GALVANOMETER

DCS # 5K10.20 Status Active

Area 5 Electricity and Magnetism Location 36

Topic 5K Electromagnetic Induction Rating □□□ old but effective

Concept 5K10 Induced Currents and Demo # 187

Checked Yes Related Demos 177

Date Checked 12/5/2019



Brief Description You can produce electric current by inserting a magnet into a coil of wire.

Keywords induction coil, magnet, galvanometer, electromagnetic, induced current, force, Faraday,

Equipment Needed

Galvanometer with wire coil and magnet.

Detail Use with overhead camera. Note, the included projection meter works, but not as well as the large projection meter and demo 177.

References

Other Uses

Suggestions for Improvement

INDUCTIVE COIL WITH LAMP

DCS # 5K10.25 Status Active

Area 5 Electricity and Magnetism Location 36

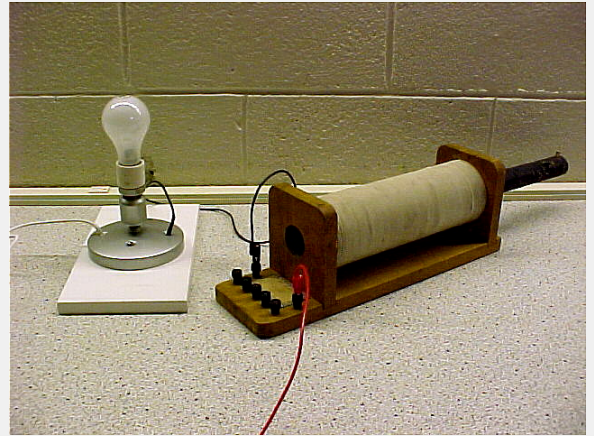
Topic 5K Electromagnetic Induction Rating good and engaging

Concept 5K10 Induced Currents and Demo # 193

Checked Yes

Date Checked 12/6/2019

Related Demos



Brief Description The light bulb and the solenoid are in series. Placing an iron-core inside a solenoid will increase the inductance of the solenoid. When this happens the energy in the magnetic field being created is used to magnetize the iron thereby increasing the drain on the current

Keywords inductive coil with lamp, variable turn coil, electromagnetic induction, induced current, force, core,

Equipment Needed If light bulb is out, use only a 100W light bulb

Detail

References

Other Uses

Suggestions for Improvement

MAGNETIC INDUCTION BALANCE

DCS # 5K10.19 Status Active

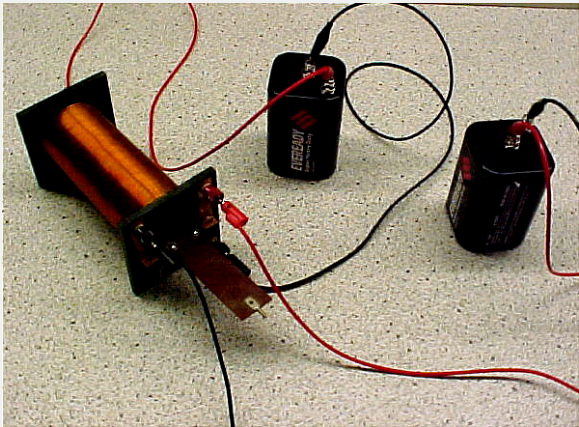
Area 5 Electricity and Magnetism Location 41

Topic 5K Electromagnetic Induction Rating good but lacks zest

Concept 5K10 Induced Currents and Demo # 232

Checked Yes

Date Checked 12/5/2019



Related Demos

Brief Description Balance a length of string by varying magnetic field and current flowing perpendicular to it.

Keywords magnetic induction balance, induced current, force, electromagnetic induction,

Equipment Needed 2 DC power supplies (shelf 61). There is a wiring setup included in the box so that only 1 P.S. is needed, however, this method reduces the amount of mass that can be balanced.

Detail Vary the mass hanging off the threaded end of the balance arm to balance the magnetic force on the end in the solenoid.

Precise balance to measure mass of string

Detailed experimental procedure and theory in box.

References

Other Uses

Suggestions for Improvement

EARTH FLIP COIL

DCS # 5K10.60 Status Active

Area 5 Electricity and Magnetism Location 38

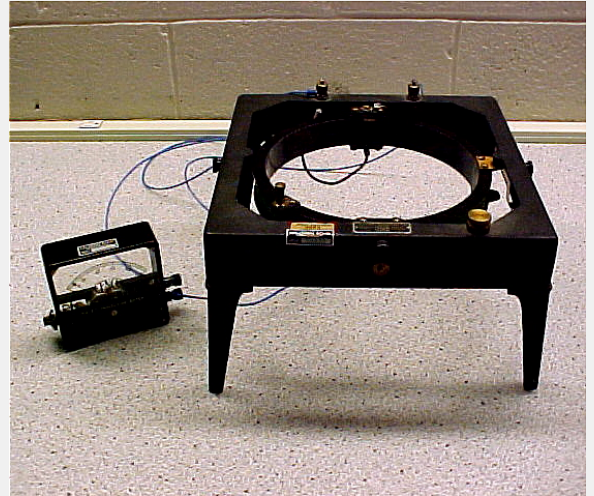
Topic 5K Electromagnetic Induction Rating good and engaging

Concept 5K10 Induced Currents and Demo # 211

Checked Yes

Date Checked 4/24/2015

Related Demos



Brief Description Flip the standard Earth coil attached to a galvanometer. *Needs a sensitive meter

Keywords earth flip coil, galvanometer, magnetic field, electromagnetic induction, induced current, force,

Equipment Needed Sensitive galvanometer (contains sensitive ammeter)

Detail The change in magnetic flux from the Earth's magnetic field through the coil as it flips produces a voltage and current which can be measured via the galvanometer

References

Other Uses

Suggestions for Improvement

Faraday's Flashlight

DCS # 5K10.25 Status Active

Area 5 Electricity and Magnetism Location 33

Topic 5K Electromagnetic Induction Rating good but lacks zest

Concept 5K10 Induced Currents and Demo # 359

Checked Yes

Date Checked 12/4/2019

Related Demos



Brief Description When you shake the flash light a strong magnet inside will slide through a coil of copper wire generating a current which is then stored in a capacitor to power the flashlight.

Keywords magnet, electromagnet, shake, Faraday's Law of Induction, capacitor, current, induced current, flashlight

Equipment Needed

- No set-up
- No batteries
- Great explanation of induction
- Handy if there is a power outage during class

Detail SHAKE THE FLASHLIGHT HORIZONTALLY`

References

Other Uses

Suggestions for Improvement

EDDY CURRENT PENDULUM

DCS # 5K20.10 Status Active

Area 5 Electricity and Magnetism Location Floor/Cart

Topic 5K Electromagnetic Induction Rating good and engaging

Concept 5K20 Eddy Currents Demo # 337

Checked Yes Related Demos 206

Date Checked 11/20/2019



Brief Description Pendulum motion is damped by eddy currents.

Keywords Eddy current pendulum, Lenz' law, damping, electromagnetic induction, magnetic brake, magnetic braking, horseshoe magnet,

Equipment Needed

Detail Pendulum motion is heavily damped with solid plate, but is not damped when the sliced plate passes through the magnet.

Also includes a large cutaway eddy tube and strong magnet.

For best results using the eddy tube, place the included 50g mass on top of the magnets while falling.

References

Other Uses

Suggestions for Improvement

RING SHOOTER

DCS # 5K20.30 Status Active
Area 5 Electricity and Magnetism Location Floor/Cart
Topic 5K Electromagnetic Induction Rating good and engaging
Concept 5K20 Eddy Currents Demo # 343
Checked Yes

Related Demos

Date Checked 12/6/2019



Brief Description A solid aluminum ring on the vertical transformer jumps while a split ring does not.

Keywords ring shooter, jumping ring, electromagnetic induction, Eddy current, magnetic field, current,

Equipment Needed Ring shooter, solid ring, ring with small break (all on cart)

Detail Very powerful, use only in rooms with extremely high ceilings and no lights directly above.

DO NOT HOLD BUTTON FOR LONGER THAN 1 SECOND!!!!

References

Other Uses

Suggestions for Improvement

EDDY CURRENT DAMPING ROTOR

DCS # 5K20.23 Status In Storage

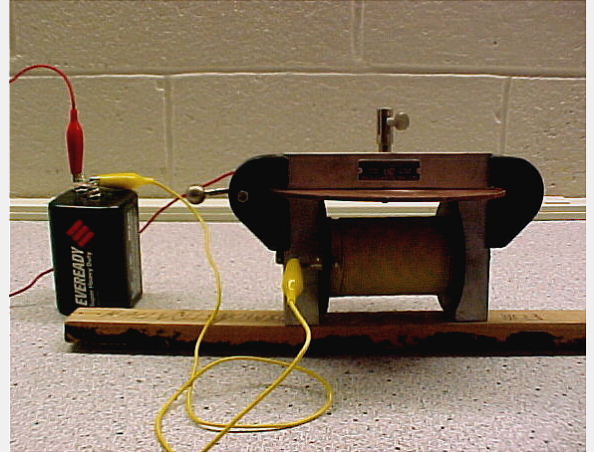
Area 5 Electricity and Magnetism Location 37

Topic 5K Electromagnetic Induction Rating good but lacks zest

Concept 5K20 Eddy Currents Demo # 203

Checked No Related Demos

Date Checked 3/4/2020



Brief Description Turn the rotor by hand when the battery is connected and feel the effect of the damping.

Keywords Eddy current damping rotor, induction disk, electromagnetic induction, force, spinning, damping, feel,

Equipment Needed 6V battery, alligator clips.

Detail

References

Other Uses

Suggestions for Improvement Could be mounted more securely onto more boards to make a sturdy base

INDUCTION DISK

DCS # 5K20.22 / 5K20.44 Status Active

Area 5 Electricity and Magnetism Location 37

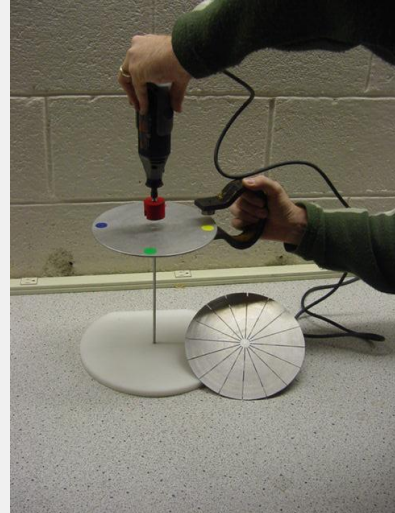
Topic 5K Electromagnetic Induction Rating good and engaging

Concept 5K20 Eddy Currents Demo # 197

Checked Yes

Related Demos

Date Checked 3/4/2020



Brief Description A metal disk that has been balanced on a pin sized tip to eliminate friction. Applying a spinning magnetic field to this starts the disk spinning via the induction current formed on the disk. Strong magnets will demonstrate magnetic braking.

Keywords induction disk, electromagnetic induction, Eddy currents, force, spinning, aluminum, magnet, slit, magnetic braking, Arago's disk, brake,

Equipment Needed

Detail Hold the magnet-drill assembly close to the balanced disc and operate the drill. The magnet exerts a torque (via eddy currents) on the disc, causing it to spin the same direction as the magnet. Demonstrates one method used in speedometers. The spinning magnetic field is created with a strong magnet attached to the end of a Dremel. The disk can be brought up to high speed very very quickly. There is also a second disk made of the same material that has slits cut along it to eliminate eddy currents from forming. For best results, remove the aluminum disc from the magnet, oil the base at the contact point, and hold the magnet very close to the disc.

References

Other Uses

Suggestions for Improvement

MAGNETS IN EDDY TUBES

DCS # 5K20.25 Status Active

Area 5 Electricity and Magnetism Location Floor/Cart

Topic 5K Electromagnetic Induction Rating □□□□□

Concept 5K20 Eddy Currents Demo # 206

Checked Yes Related Demos 337

Date Checked 12/6/2019



Brief Description Drop magnets and non-magnets down copper or aluminum tubes, rods, or rails. The magnets fall more slowly due to magnetic damping caused by induced eddy currents.

Keywords magnets, eddy currents, damping, Lenz's law, copper, aluminum, magnetism, tube, rod, pipe,

Equipment Needed

Detail A larger eddy tube is on the cart with the eddy pendulum.

References

Other Uses Very large cutaway eddy tube on cart with eddy current pendulum

Suggestions for Improvement .

HAND-CRANKED GENERATOR

DCS # 5K40.80 Status Active

Area 5 Electricity and Magnetism

Location 37

Topic 5K Electromagnetic Induction

Rating old but effective

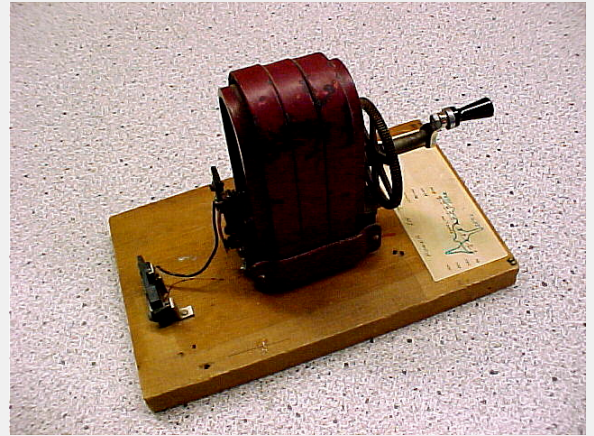
Concept 5K40 Motors and Generators

Demo # 201

Checked Yes

Related Demos 301

Date Checked 4/24/2015



Brief Description A simple, hand-cranked generator that lights a small light bulb

Keywords hand-cranked generator, hand cranked, electromagnetic induction, electric energy, transfer, kinetic, work,

Equipment Needed Generator

Detail

References

Other Uses

Suggestions for Improvement

INDUCTION MOTOR

DCS # 5K40.50 Status Active

Area 5 Electricity and Magnetism Location 37

Topic 5K Electromagnetic Induction Rating good and engaging

Concept 5K40 Motors and Generators Demo # 200

Checked Yes

Date Checked 1/31/2020

Related Demos



Brief Description Current through two internal coils, 90 degrees out of phase with each other, turn the disk.

Keywords induction motor, two coils, 90 degrees, phase, electromagnetic induction, pop can motor, horseshoe magnet,

Equipment Needed

Detail Not the best for large lecture hall, but works good.

References

Other Uses

Suggestions for Improvement

DC MOTOR FOR BIG MAGNET

DCS # 5K40.10 Status In Storage

Area 5 Electricity and Magnetism Location Storage

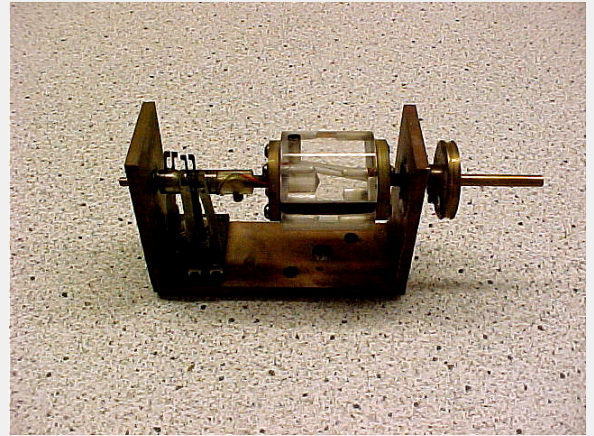
Topic 5K Electromagnetic Induction Rating good but lacks zest

Concept 5K40 Motors and Generators Demo # 319

Checked Yes

Date Checked 1/31/2020

Related Demos



Brief Description DC current supplied to the brushes will make the motor turn when its placed between the poles of a strong magnet.

Keywords DC motor for big magnet, electromagnetic induction, horseshoe magnet,

Equipment Needed

Detail

References

Other Uses

Suggestions for Improvement

AC/DC MOTORS

DCS # 5K40.40 Status Active

Area 5 Electricity and Magnetism Location 37

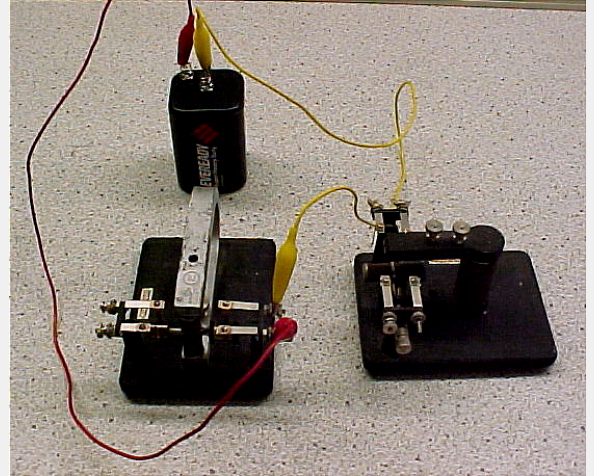
Topic 5K Electromagnetic Induction Rating good but lacks zest

Concept 5K40 Motors and Generators Demo # 199

Checked Yes

Date Checked 1/31/2020

Related Demos



Brief Description One of these units has a regular magnet, the other has a coil which produces an induced magnetic field when connected to a battery. In either case, a DC source connected to the smaller coil of the motor produces AC current as that coil rotates through the field.

Keywords AC/DC motors, electromagnetic induction,

Equipment Needed

Motor generators, DC power supply or 6V cell batteries, leads, galvanometer set to measure AC voltage.

Detail DC power supply offers variable speed.

Not the best for lecture.

References

Other Uses

Suggestions for Improvement

HAND-CRANKED GENERATOR

DCS # 5K40.80 Status Active

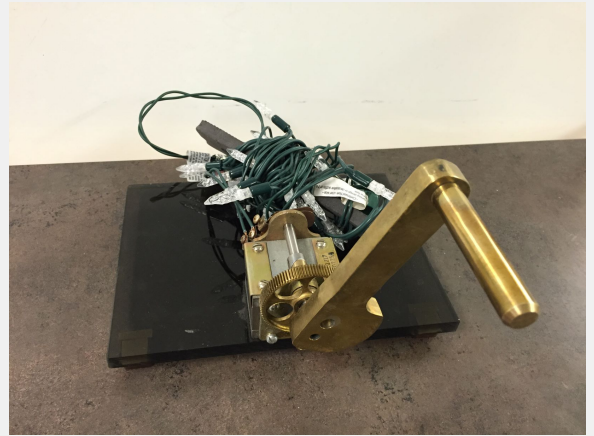
Area 5 Electricity and Magnetism Location 37

Topic 5K Electromagnetic Induction Rating good but lacks zest

Concept 5K40 Motors and Generators Demo # 301

Checked Yes Related Demos 201

Date Checked 1/31/2020



Brief Description A simple, hand-cranked generator that lights a string of LED Christmas lights.

Keywords hand-cranked generator, hand cranked, electromagnetic induction, electric energy, transfer, kinetic, work,

Equipment Needed

Detail

References

Other Uses

Suggestions for Improvement

LIGHT BULB WITH TESLA COIL

DCS # 5N20.50 Status Active

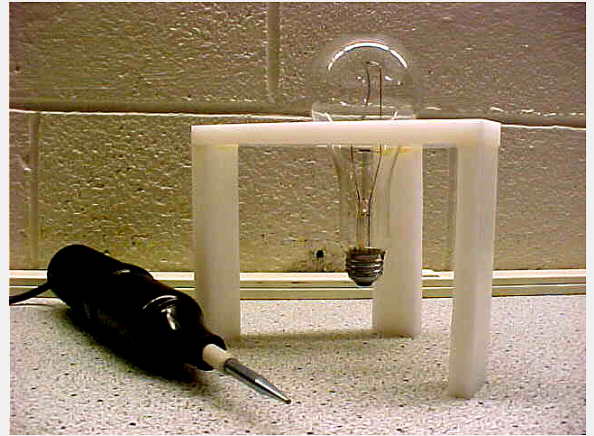
Area 5 Electricity and Magnetism Location 36

Topic 5N Electromagnetic Rating good and engaging

Concept 5N20 Tesla Coil Demo # 179

Checked Yes Related Demos 178

Date Checked 1/31/2020



Brief Description 300 W light bulb in the small stand. The Tesla Coil can be used to "light" up the bulb.

Keywords light bulb with Tesla coil (Shelf 36), handheld, Tesla coil, induction coil, electromagnetic radiation, high frequency, lightbulb

Equipment Needed Plastic stand, 300 W light bulb, small Tesla Coil #HS-10.

Detail Please handle stand with bulb in it with care. To avoid damage to Tesla Coil: Do NOT use adjustment screw at end of coil as an ON/OFF switch. Use the push button on the side! Precautions - shock hazard!

Not the best for large lecture hall.

References

Other Uses

Suggestions for Improvement

DC INDUCTION SPARK COIL

DCS # 5N20.13 Status Active

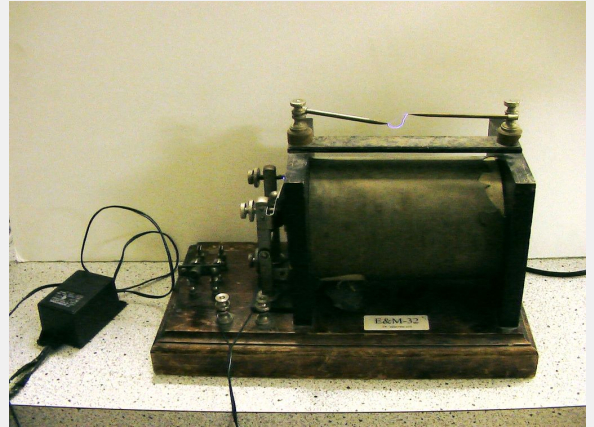
Area 5 Electricity and Magnetism Location 37

Topic 5N Electromagnetic Rating good and engaging

Concept 5N20 Tesla Coil Demo # 204

Checked Yes

Date Checked 1/31/2020



Related Demos

Brief Description A 12V power pack is connected to the screw terminals. The low 12 volt output from the power pack is converted to an extremely high voltage at the spikes on top.

Keywords DC induction spark coil, electromagnetic radiation, Tesla coil, voltage

Equipment Needed Nothing is needed. The power pack can be easily removed and two 6 volt batteries can be used if they are available.

Detail

References

Other Uses

Suggestions for Improvement

HANDHELD TESLA COIL

DCS #	5N20.10	Status	Active
Area	5 Electricity and Magnetism	Location	36
Topic	5N Electromagnetic	Rating	□□□□ good and engaging
Concept	5N20 Tesla Coil	Demo #	178
Checked	Yes	Related Demos	179
Date Checked	1/31/2020		



Brief Description This is just what the name implies, a hand held Tesla coil.

Keywords handheld, Tesla coil, induction coil, electromagnetic radiation, high frequency,

Equipment Needed Search Demo database for keyword handheld to find demos that use this device

Detail The tip of the coil slides over the end of the coil very easily. the knob at the bottom adjusts the voltage produced at the tip. This knob should NOT be used to turn the coil on and off as it will damage the coil if adjusted while running. The on/off switch is a rather inconspicuous silver button on the side. It makes no clicking sound or any other indication that is has been turned on. It also functions as the off switch. It is recommended that the instructor take time before class to familiarize themselves with the button.

References

Other Uses Use to light florescent light bulbs at various distances

Suggestions for Improvement

MICROWAVE TRANSMITTER AND RECEIVER

DCS # 5N30.30 Status Active

Area 5 Electricity and Magnetism Location 38

Topic 5N Electromagnetic Rating good and engaging

Concept 5N30 Electromagnetic Demo # 198

Checked Yes

Date Checked 1/31/2020

Related Demos



Brief Description Useful for standing waves experiments. Use a mirror or metal sheets to show reflection, standing wave patterns, interference, or polarization.

Keywords microwave transmitter and receiver, electromagnetic radiation, spectrum, wave,

Equipment Needed

Detail

References

Other Uses

Suggestions for Improvement

Near Infrared Detector

DCS # Status Needs Repair

Area 5 Electricity and Magnetism

Location 44

Topic 5N Electromagnetic

Rating good and engaging

Concept 5N30 Electromagnetic

Demo # 247

Checked Yes

Related Demos



Date Checked 5/1/2015

Brief Description Surrounding lights and the LED found on the radio are detected by the solar cell on the amplifier and the light signal is translated to sound. The solar cell can also detect near IR from the remote controls.

Keywords infrared, remote control, IR, filter, reflection, absorption, pulse, near infrared, radio

Equipment Needed check batteries, If IR filter is missing, talk to Brian Jones

Detail A 60 Hz hum from the fluorescent lights can be heard. The radio can be heard in a similar way through light. the radio sends signals to the LED which pulses rapidly. The solarcell detects this and it can be heard on the amplifier.

Use the infrared filter to block the signal from the remote controls and other light sources

References

Detailed instructions in box.

Other Uses

Suggestions for Improvement Needs new batteries (AA and AAA), missing amplifier, missing IR filter

HOLLOW CONDUCTING SPHERES

DCS # 5A40.? / 5B30.? Status Active

Area 5 Electricity and Magnetism Location 27

Topic various Rating old but effective

Concept various Demo # 011

Checked Yes Related Demos 182

Date Checked 11/19/2019



Brief Description Hollow, conducting balls will pick up charge from a Van de Graaff generator.
5A40.? = Induced Charge
5B30.? = Electrostatic Potential

Keywords hollow conducting spheres, globes, induced charge, electrostatic potential, Van de Graaff, Wimshurst machine,

Equipment Needed

Detail

References

Other Uses

Suggestions for Improvement

ANGLED MIRRORS

DCS # 6A10.40 Status Needs a lot of TLC

Area 6 Optics Location 39

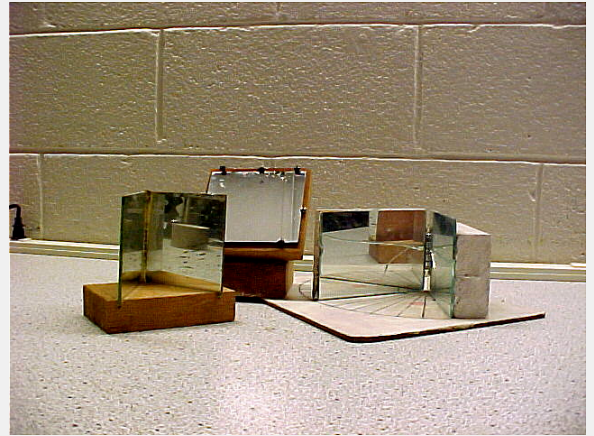
Topic 6A Geometrical Optics Rating good but lacks zest

Concept 6A10 Reflection from Flat Surfaces Demo # 209

Checked Yes

Date Checked 4/25/2015

Related Demos



Brief Description Angled mirrors and protractor board to determine angle between mirrors.

Keywords angled mirror, reflection, geometrical optics, hinge, vertical, multiple, image, flat surface,

Equipment Needed

Detail

References

Other Uses

Suggestions for Improvement Mirrors should be replaced. Most are damaged to some extent

PHANTOM LIGHT BULB

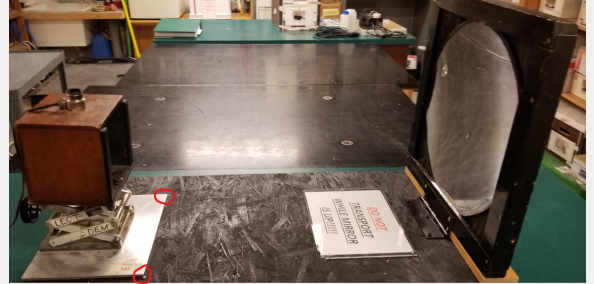
DCS # 6A20.30 Status Active

Area 6 Optics Location 27

Topic 6A Geometrical Optics Rating good and engaging

Concept 6A20 Reflection from Curved Demo # 342

Checked Yes



Related Demos

Date Checked 2/11/2020

Brief Description A hidden bulb at the center of curvature of a parabolic mirror appears up top in the empty light socket.

Keywords phantom light bulb, geometrical optics, concave, curved, mirror, reflection, parabolic, focal point, focus, image,

Equipment Needed

Detail To align, put the two corners of the metal base up to the two screws in the board (red circles in pic). Do not transport while the mirror is up

References

Other Uses

Suggestions for Improvement

Uber-Big Convex and Concave Mirrors

DCS # 6A20.45 Status Active

Area 6 Optics Location 27

Topic 6A Geometrical Optics Rating

Concept 6A20 Reflection from Curved Demo # 362, 363

Checked Yes

Date Checked 4/19/2015

Related Demos



Brief Description Extremely large concave and convex mirrors

Keywords mirror, large, concave, convex, giant, converging, diverging, reflecting.

Equipment Needed

Detail Take care when using the concave mirror in direct sunlight or other bright light.

References

Other Uses

Suggestions for Improvement

PRISMS AND GLASS PLATES

DCS # 6A40.?

Area 6 Optics

Topic 6A Geometrical Optics

Concept 6A40 Refractive Index

Checked Yes

Date Checked 4/25/2015

Status Active

Location 40

Rating good but lacks zest

Demo # 233

Related Demos



Brief Description Miscellaneous prisms and glass plates.

Keywords prism, glass plate, refraction, index of refraction, reflection, dispersion, color, light, thin film interference, geometrical optics,

Equipment Needed

Detail

References

Other Uses

Suggestions for Improvement Large glass prism is broken.

INTERFERENCE PLATES

DCS # 6A40.20 Status Active

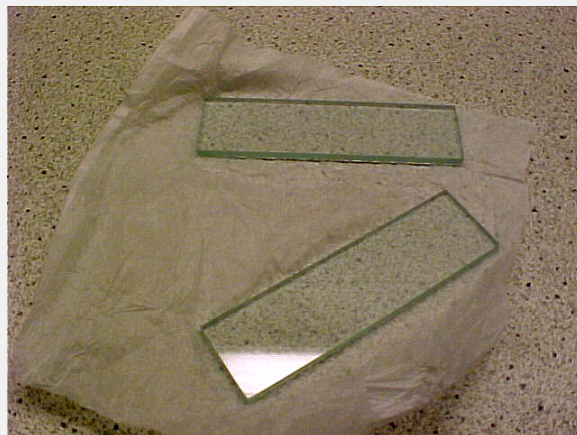
Area 6 Optics Location 46

Topic 6A Geometrical Optics Rating good but lacks zest

Concept 6A40 Refractive Index Demo # 263

Checked Yes Related Demos 269

Date Checked 5/1/2015



Brief Description Use these glass plates to view the "wedge fringes" of interference. Works well viewing the reflection of a diffuser that's back lit by the sodium lamp.

Keywords interference plate, geometrical optics, index of refraction, thin film, wedge fringes,

Equipment Needed Sodium lamp (with diffuser) shelf 46. Lens cleaning cloths (included)

Detail Allow sodium lamp to warm up for at least 5 minutes. Fit diffuser over sodium lamp and clean glass plates with lens wipes. To view fringes, the plates may actually have to be squeezed together slightly to make a narrow enough gap to view wedge interference fringes.

References

Other Uses

Suggestions for Improvement

FISH EYES

DCS # 6A40.?

Status Active

Area 6 Optics

Location 39

Topic 6A Geometrical Optics

Rating good but lacks zest

Concept 6A40 Refractive Index

Demo # 212

Checked Yes

Related Demos 406

Date Checked 4/25/2015



Brief Description Compare four scenarios where the object is always inside the container:

- container and object both in air
- container in air, object in water
- container in water, object in air
- container and object both in water

Keywords fish eyes, optics, refraction, refractive index, index of refraction, magnification, bigger, smaller, globes, image, spheres, water, balls,

Equipment Needed Large water tank.

Detail

References

Other Uses Demo 406 is a fish tank which is large enough to submerge these fish bowls in.

Suggestions for Improvement

Glass in Wesson Oil

DCS # 6A40.30 Status Active

Area 6 Optics Location 40

Topic 6A Geometrical Optics Rating

Concept 6A40 Refractive Index Demo # 224

Checked Yes

Related Demos

Date Checked 4/26/2015



Brief Description Wesson oil has nearly the same index of refraction (n) as Pyrex glass ($n = 1.474$). No reflection will occur at the boundary and there will be no refraction of the transmitted light. The object will be invisible.

Keywords Index of refraction, glass, wesson, oil, invisible

Equipment Needed Pyrex objects- in box
Wesson oil- in box

Detail There are several Pyrex objects that can be immersed in the vessel containing pure Wesson vegetable oil. It is suggested you only partly submerge the objects because it can be difficult and messy to remove an object that has fallen into the Wesson oil vessel.

References

Please wipe oil from the glass pieces immediately after use. When left alone, the oil can form a residue that is very difficult to remove. Residue can be removed with a cloth and 91% isopropyl alcohol.

Other Uses

Suggestions for Improvement

PINE-SOL YARD GLASS

DCS # 6A44.21 Status Active

Area 6 Optics Location 35

Topic 6A Geometrical Optics Rating good and engaging

Concept 6A44 Total Internal Reflection Demo # 336

Checked Yes

Date Checked 2/11/2020

Related Demos



Brief Description Shows total internal reflection of laser beam inside the tall glass filled with Pine-Sol.

Keywords laser, pine-sol, pine sol, tall glass, yard glass, geometrical optics, index of refraction, total internal reflection, fiber optic,

Equipment Needed

Stand with a tall glass, bottle of Pine-Sol, laser.

Detail Please handle tall glass with care. Try to avoid bubbles when you fill glass with Pine-Sol.

The green laser pointer seems to work best because the human eye sensitivity is peaked in the green region, but a HeNe laser works fine in a dark room.

References

Other Uses

Suggestions for Improvement

WATER STREAM LIGHT PIPE

DCS # 6A44.45 Status Active

Area 6 Optics Location 44

Topic 6A Geometrical Optics Rating good and engaging

Concept 6A44 Total Internal Reflection Demo # 248

Checked Yes

Date Checked 2/11/2020



Related Demos

Brief Description As a stream of water flows from a hole in this apparatus, a laser beam travels along the length of the water's curve, bouncing from side to side within the stream.

Keywords water stream light pipe, water flow beam, total internal reflection, index, refraction, geometrical optics, laser, fiber optics, lightpipe

Equipment Needed

Plastic jug with a cap, pre-drilled with two lined-up holes.
Helium Neon Gas Laser (shelf 45).
Clamp stand for laser
Container for water to flow into (Could use a 5gal bucket from shelf 7 and pour off the table into bucket)

Detail The laser beam is passed through a glass plate securely mounted on the side of the jug.

References

Other Uses

Suggestions for Improvement

Pine-Sol with Spherical Beaker

DCS # 6A44.22 Status Active

Area 6 Optics Location 40

Topic 6A Geometrical Optics Rating good and engaging

Concept 6A44 Total Internal Reflection Demo # 226

Checked Yes Related Demos 336

Date Checked 2/11/2020



Brief Description

Keywords

pine-sol, pine sol, pinesol, spherical beaker, round, laser, geometrical optics, total internal reflection, index, refraction, fiber optics,

Equipment Needed

pine-sol, laser, lab stand supports

Detail

Does not showcase total internal reflection as well as the Pine Sol Yard Glass

References

Other Uses

Suggestions for Improvement

ULEXITE "TELEVISION STONE"

DCS # 6A44.41 Status Active

Area 6 Optics Location 41

Topic 6A Geometrical Optics Rating good and engaging not good for lecture hall

Concept 6A44 Total Internal Reflection Demo # 231

Checked Yes Related Demos Calcite (in box)

Date Checked 2/11/2020



Brief Description When the polished bottom surface of this stone is placed upon a printed page, the words can be read on the top surface, giving the appearance of television screen.

Keywords ulexite, television stone, crystal, fiber optic, geometrical optics, total internal reflection, light pipe,

Equipment Needed Piece of Ulexite, printed page, overhead camera.

Detail Ulexite (mineral specimen of hydrated sodium calcium borate) is composed of thousands of fibrous fragments which transmit light.

Also included are two pieces of birefringent calcite.

References

Other Uses

Suggestions for Improvement

FIBER OPTICS KIT

DCS # 6A44.40 Status Active

Area 6 Optics Location 44

Topic 6A Geometrical Optics Rating good but lacks zest

Concept 6A44 Total Internal Reflection Demo # 250

Checked Yes Related Demos

Date Checked 11/15/2019



Brief Description Various fiber optic materials to shine a light through. The large one at the top of this picture works best for showing large groups more easily.

Keywords fiber optics, kit, cable, total internal reflection, critical angle, light pipe, communications,

Equipment Needed light source (flashlight or laser)

Detail

References

Other Uses

Suggestions for Improvement

Large Lenses

DCS # Status Active

Area 6 Optics Location 42

Topic 6A Geometrical Optics Rating

Concept 6A65 Thick Lens Demo # 239

Checked Yes

Related Demos

Date Checked 4/26/2015



Brief Description Very large lenses.

Keywords large, lens, convex, concave, thick

Equipment Needed

Detail

References

Other Uses

Suggestions for Improvement

MIRRORS

DCS # 6A10.15 / 6A20.45 Status Active

Area 6 Optics Location 39

Topic 6A Geometrical Optics Rating very old but effective

Concept various Demo # 208

Checked Yes Related Demos 362,363

Date Checked 2/11/2020



Brief Description Several mirrors for various demos.

Keywords mirror, reflection, image, plane, curved, concave,

Equipment Needed

Detail Extremely large concave and convex mirrors are available in demo 362-3 on shelf 27

References

Other Uses

Suggestions for Improvement Some mirrors are scratched, warped, etc.

LENSES

DCS # 6A60.? / 6A65.?

Status Active

Area 6 Optics

Location 39

Topic 6A Geometrical Optics

Rating good but lacks zest

Concept various

Demo # 210

Checked Yes

Related Demos

Date Checked 2/11/2020



Brief Description Thin and thick, concave and convex lenses.

Keywords lens, lenses, thin, thick, refraction, index, convex, concave, image, real, virtual, geometrical optics,

Equipment Needed

Detail Some lenses are mounted in table tennis paddles and some are loose for mounting in the included mount.

References

Other Uses

Suggestions for Improvement

GROUND GLASS SCREEN

DCS # 6A60.? / 6A65.? / 6A70.? Status Active

Area 6 Optics Location 39

Topic 6A Geometrical Optics Rating static

Concept various Demo # 214

Checked Yes Related Demos 207

Date Checked 4/25/2015



Brief Description Various uses.

Keywords ground glass screen, image, virtual, picture, telescope, projection, projected,

Equipment Needed

Detail Can be used to show coiled coil filament of demo 207.

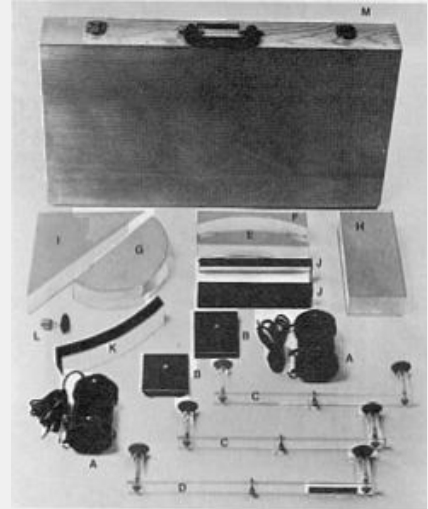
References

Other Uses

Suggestions for Improvement

BLACKBOARD OPTICS KIT

DCS #	6 (optics; many categories)	Status	Active
Area	6 Optics	Location	41
Topic	6A Geometrical Optics	Rating	□□□□ good but lacks zest
Concept	various	Demo #	235
Checked	Yes	Related Demos	237
Date Checked	2/11/2020		



Brief Description A demo kit showcasing a variety of different optical phenomena. It is basically a big version of a ray box (with lenses, mirrors, etc.) that will mount with magnets to an old style blackboard.

Keywords thin, lens, straight, curved, mirror, ray box, refraction, reflection, black board, chalkboard

Equipment Needed

Wooden case labelled "Blackboard Optics Kit"

AND

Detail This kit is an excellent demo for many optical phenomena, and is easily seen even in large lecture courses.

Transformer to power the light sources (it is stored with the wooden case)

The instruction book contains a list of equipment, how to use it and suggested demos.

References

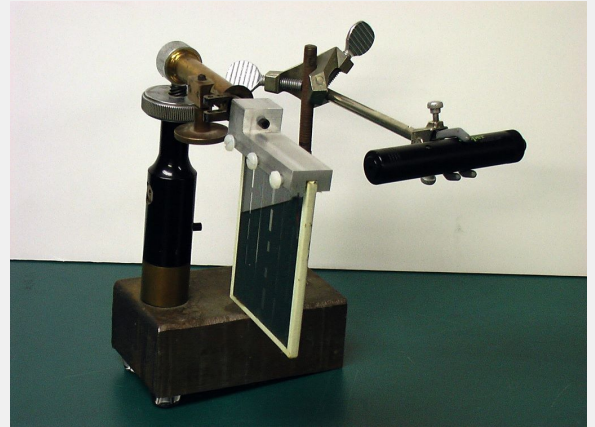
Do not forget the transformer that powers the ray sources. It is stored with the wooden case. No wires or connectors are necessary; there are banana plug lead wires on the light sources.

Other Uses

Suggestions for Improvement

Cornell Plate

DCS #		Status	Active
Area	6 Optics	Location	44
Topic	6C Diffraction	Rating	□□□□□
Concept	6C20 Diffraction around Objects	Demo #	245
Checked	Yes	Related Demos	261
Date Checked	4/30/2015		



Brief Description Cornell plate to show different laser diffraction patterns.

Keywords optics, diffraction, interference, laser, cornell plate

Equipment Needed Green laser (shelf 45)

Detail The Cornell plate stand allows the plate to be adjusted vertically and horizontally so the laser beam can move easily from one set of slits to another. The stand can be set up in the back of the large lecture hall to project on the front screen. It can also be set up on your desk but the stand should be at a greater angle

References

Can be used with the He-Ne lasers on shelf 45 but a different aiming mechanism is needed for the larger lasers.

Other Uses

Schematics of slits are included in the box

Suggestions for Improvement

OPTICAL SET OF SLIDES

DCS # 6C10.10 / 6C10.20 / 6D10.10 / 6D20.? Status Active

Area 6 Optics Location 40

Topic 6C Diffraction Rating good and engaging

Concept various Demo # 229

Checked Yes Related Demos

Date Checked 4/25/2015



Brief Description This optical set (gratings, slits, meshes, polarizing filters, hologram) lets us observe the diffraction and interference effects of light, the effect of polarization, demonstrate spectra.

Keywords optical set of slides, diffraction, interference, single slit, double slit, grating, pinhole, Cornell plate,

Equipment Needed Optical set of different slides, source of light.

Detail Mercury and sodium light sources could be used with this optical set.

References

Other Uses

Suggestions for Improvement

INTERFERENCE TRANSPARENCY MODEL

DCS # 6D10.05 / 3B50.40 Status Active

Area 6 Optics Location 41

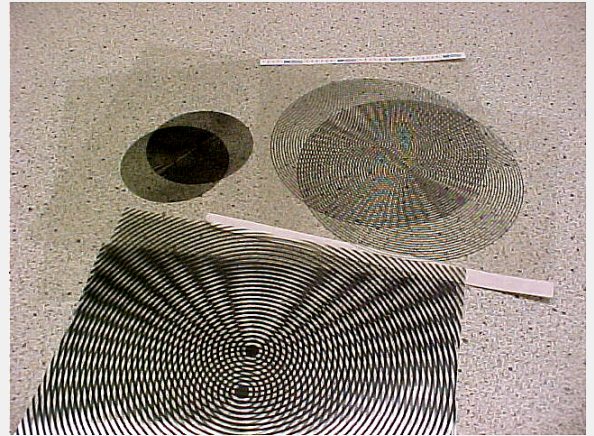
Topic 6D Interference Rating static

Concept 6D10 Interference from Two Sources Demo # 230

Checked Yes

Date Checked 2/11/2020

Related Demos



Brief Description This set of transparent plastic plates with concentric circles demonstrates how light interference is created. Concentric circles represent wavefronts.

Keywords interference transparency model, two sources, wave motion, diffraction, Moire pattern, overhead

Equipment Needed Set of transparent plastic plates with concentric circles, overhead projector or camera.

Detail Move the centers of the two plates relative to one another and dramatic interference patterns appear.
3B50.? = Wave motion; interference and diffraction; Moire pattern,

Two sets of straight lines (wavefronts) with different spacing can be used to demonstrate phase and group velocity concepts.

References

For use with overhead projector.

Other Uses

Suggestions for Improvement

REFLECTION GRATING

DCS # 6D20.? Status Active

Area 6 Optics Location 45

Topic 6D Interference Rating good and engaging

Concept 6D20 Gratings Demo # 258

Checked Yes Related Demos 269,270

Date Checked 4/30/2015



Brief Description Step 3m away from the source of light with this grating and you will see spectrum of light on the wall or on the screen.

Keywords reflection, grating, interference, spectrum, white light, project, mercury, sodium, lamp,

Equipment Needed Reflection grating, source of light (mercury lamp, sodium lamp)

Detail Sodium (nearly monochromatic) gives one diffraction pattern.

Mercury clearly resolves green and orange emission lines.

References

Other Uses

Suggestions for Improvement

Overhead Projector

DCS # 6D20.20 / Status Active

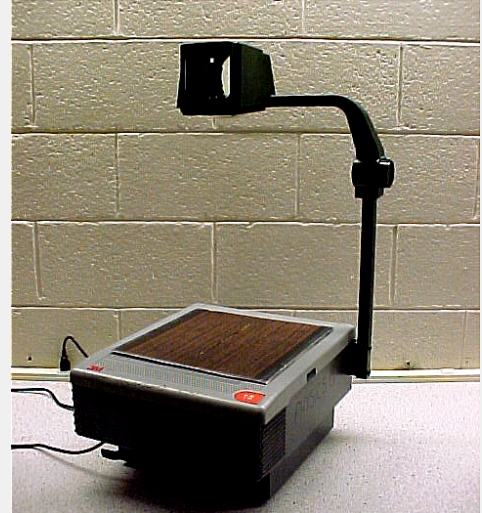
Area 6 Optics Location Floor/Cart

Topic 6D Interference Rating good and engaging

Concept 6D20 Gratings Demo # 349

Checked Yes Related Demos 053

Date Checked 5/8/2015



Brief Description Overhead projector for transparencies, polarization, diffraction, etc.

Keywords projector with diffraction grating, interference, rainbow, white light, slit, spectrum,

Equipment Needed

Projector with a diffraction grating mounted in to it, Sheet of card board with a gap in the middle of it.

Detail The backlight on the overhead projector makes it well-suited for polarization demos.

References

Other Uses

Suggestions for Improvement

No diffraction grating or cardboard, just an overhead projector. Shelf location is precarious. Bulb is burnt out

ADDITIVE COLOR MIXING LIGHTS #1

DCS # 6F10.10 Status Active

Area 6 Optics Location 46

Topic 6F Color Rating good and engaging

Concept 6F10 Synthesis and Analysis of Demo # 264

Checked Yes Related Demos 268

Date Checked 2/12/2020



Brief Description This board with different colors light bulbs illustrates the results of blending the primary colors of light. Insert an object between the lights and the screen to observe colored shadows.

Keywords additive color mixing lights, synthesis, analysis, eye, red, green, blue, primary, colored shadows,

Equipment Needed

Board with four light bulbs (red, blue, green and white).

White screen

Detail The pull chains allow you to turn on individual combinations of lights. In this manner you can show which lights need to be on to produce these magenta, yellow, and cyan shadows.

Object to block one color at a time.

References

Other Uses

Suggestions for Improvement

BENHAM'S DISK

DCS # 6F10.27 Status In Storage

Area 6 Optics Location Storage

Topic 6F Color Rating good and engaging

Concept 6F10 Synthesis and Analysis of Demo # 314

Checked No

Date Checked 08-13-2013

Related Demos



Brief Description Spin the disk and one sees colors instead of just black and white. Spin the disk the other way and the colors change positions.

Keywords Benham's disk, color, eye, black, white, synthesis, analysis, spinning, rotating, alternating pattern,

Equipment Needed Disk, Drill

Detail

References

Other Uses

Suggestions for Improvement

COLOR DISKS AND STROBOSCOPE

DCS # 6F10.25 Status In Storage

Area 6 Optics Location Storage

Topic 6F Color Rating old but effective

Concept 6F10 Synthesis and Analysis of Demo # 321

Checked No

Related Demos

Date Checked 08-13-2013



Brief Description Disks with colored sectors are spun until the colors blend together. Other disks are spun so images can blend together to simulate motion and/or illusions.

Keywords Newton's color disk, stroboscope, optical illusion, persistence of vision, afterimage, eyes, synthesis and analysis of color, motion, color mixing, frequency, spinning disk,

Equipment Needed

Detail

References

Other Uses

Suggestions for Improvement

Color Filters

DCS # 6F10.20 Status Active

Area 6 Optics Location 44

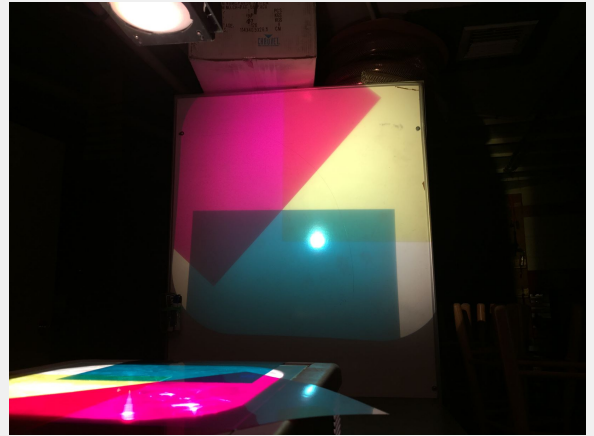
Topic 6F Color Rating

Concept 6F10 Synthesis and Analysis of Demo # 249

Checked Yes

Related Demos

Date Checked 5/8/2015



Brief Description Color filters.

Keywords color, filters, rgb

Equipment Needed Light source to filter.

Detail Use with overhead projector or other light source. Contains [Red; Green; Blue] and [Cyan; Magenta; Yellow] filters

References

Other Uses

Suggestions for Improvement

Linear Polarized Filters

DCS # 6H10.10 Status Active

Area 6 Optics Location 40

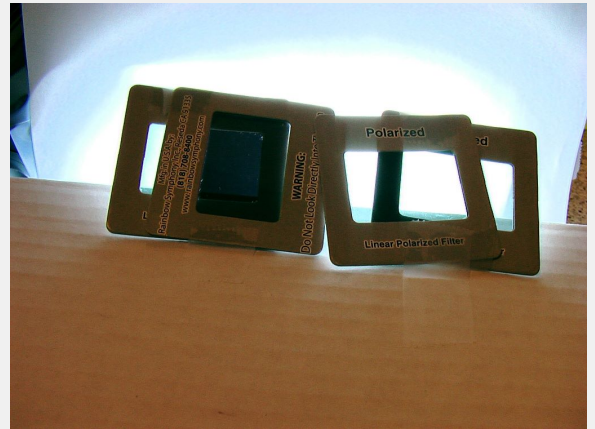
Topic 6H Polarization Rating

Concept 6H10 Dichroic Polarization Demo # 221

Checked Yes

Related Demos

Date Checked 4/26/2015



Brief Description Place two filters on top of one another then rotate the screens. When the screens are at 90 degrees to each other, no light will pass through.

Keywords polarized filter, light, student interactive demo, polarized

Equipment Needed Two polarized filters found in box.

Detail There are dozens of polarizing filters in box.

Use an overhead projector to show entire class.

References

Other Uses

Suggestions for Improvement

Kayro Syrup Barber Polarization

DCS # 6H30.30 Status Under Development

Area 6 Optics Location 43

Topic 6H Polarization Rating

Concept 6H30 Circular Polarization Demo # 244

Checked Yes

Related Demos

Date Checked 07/14/2013



Brief Description The sugar molecules in the syrup are optically active, so they circularly polarize the light. A thicker layer of sugar will rotate the light through a different angle than a thinner angle, thus different wavelengths (colors) of light are seen.

Keywords circular polarization, optical activity, corn syrup, light,

Equipment Needed Polarized glasses to view.

Detail NEEDS WORK

Polarized disk rotates in front of light source which then shines via a mirror, through the bottom of the corn syrup container.

References

Other Uses

Suggestions for Improvement

This effect is more powerful if the syrup is illuminated (backlit in particular) by a polarized white light source and a rotating polarizing filter is used between the viewer and the syrup. Perhaps use a fixed filter inside and a rotating filter outside between the viewer and syrup. See "polarization kit."

POLARIZATION KIT

DCS #	6H??	Status	Active
Area	6 Optics	Location	44
Topic	6H Polarization	Rating	□□□□ good and engaging
Concept	various	Demo #	053
Checked	Yes	Related Demos	349
Date Checked	2/12/2020		



Brief Description Using this set you can demonstrate both the physical phenomenon of polarization and its use for analyzing stress.

Keywords polarization, dichroic, polarizer, analyzer, reflection, circular, stress, colors, plastic, birefringence, circularly, polarized, karo

Equipment Needed Polarizers, plastic shapes, tape, corn syrup.
Overhead projector

Detail When you stress the included plastic shapes between the polarizers, they become birefringent and create bright colors and patterns along lines of internal strain.

You can stack the two polarizing sheets attached to the boards on top of an overhead projector (there are marble "bearings" to stack them on so you can rotate them and note the change in transmitted intensity).

With the two mounted sheets oriented with polarization axes perpendicular, you can then slide one of the loose sheets in between (with its polarization vector at a 45° angle to one of the sheets) and note that now light can pass through

References J. J. Sakurai "Modern Quantum Mechanics"

Other Uses The transmission of light through 3 sheets (two perpendicular and one at 45°) can be used to discuss circularly polarized light. It can also be used in quantum mechanics to illustrate the Stern-Gerlach experiment via

Suggestions for Improvement

Energy vs. Wavelength; Psuedo-Photoelectric Effect

DCS # Status Active

Area 7 Modern Physics Location 45

Topic 7A Quantum Effects Rating

Concept 7A10 Photoelectric Effect Demo # 260

Checked Yes

Related Demos

Date Checked 4/30/2015



Brief Description Different colors of LED lights of similar intensity are shone on a phosphorescent sheet and the amount of glow is compared.

Keywords Photon, energy, wavelength, frequency, fluorescent, fluorescence, glow in the dark.

Equipment Needed
1. LED Photon Micro-Lights (Red, Orange, Yellow, Green, Blue, Violet, White)
2. Phosphorescent Vinyl Sheets, 12"x12" (2)

Detail Shorter wavelength lights are much more effective at illuminating the sheet than long wavelength lights. Below a certain threshold, the light cannot make the sheet glow at all no matter how long it shines, analogous to the photoelectric effect.

References

Other Uses

Suggestions for Improvement

GAS SPECTRUM TUBES

DCS # 7B10.11 Status Active

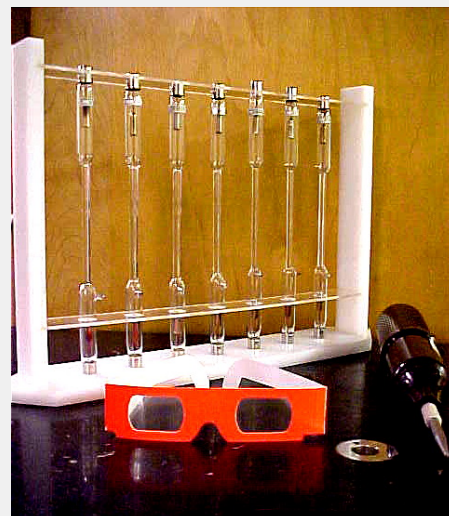
Area 7 Modern Physics Location 11

Topic 7B Atomic Physics Rating good and engaging

Concept 7B10 Spectra Demo # 083

Checked Yes Related Demos 093, 178

Date Checked 10/7/2019



Brief Description Tubes containing samples of several different gases are mounted in a stand. The handheld Tesla coil can be used to light up the tubes, one at a time.

Keywords spectrum tubes, rainbow, glasses, diffraction, spectroscopy, color, spectrometer, slit, line spectra, gas, Handheld Tesla coil, emission spectra, atomic,

Equipment Needed Spectrum tubes, handeld Tesla coil (shelf 36) #HS-10, Rainbow Glasses or other student spectroscopes/

Detail How to use - with the Tesla coil.
 Precautions - shock hazard.
 Tube life is extended if operation is cyclic for no more than 30 seconds "on", 30 seconds "off", etc., increasing the usable life of the tubes.
 How to use in classes - for Modern Physics, for optics, etc.

References

Other Uses Missing, but other spectrum tubes are available in demo 093, shelf 30.

Suggestions for Improvement

SPECTROMETER

DCS # 7B10.10 / 6C10.21

Status In Storage

Area 7 Modern Physics

Location Storage

Topic 7B Atomic Physics

Rating good but lacks zest

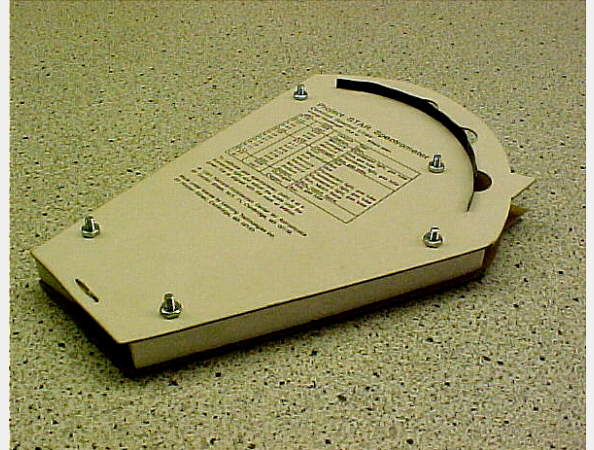
Concept 7B10 Spectra

Demo # 329

Checked No

Related Demos

Date Checked 08-13-2013



Brief Description

Keywords spectrometer, diffraction, spectrum, spectroscopy, slit, line spectra, diffraction, color, atomic,

Equipment Needed

Detail

References

Other Uses

Suggestions for Improvement

RAINBOW GLASSES

DCS # 7B10.10 Status Active

Area 7 Modern Physics Location 40

Topic 7B Atomic Physics Rating good and engaging

Concept 7B10 Spectra Demo # 222

Checked Yes

Date Checked 2/12/2020



Related Demos

Brief Description These glasses split light from any source into its spectral components

Keywords rainbow, glasses, diffraction, spectrum, spectroscopy, color, spectrometer, slit, line spectra, atomic,

Equipment Needed

Detail

References

Other Uses

Suggestions for Improvement

Holographic Diffraction Grating Glasses

DCS # 7B10.10 Status Active

Area 7 Modern Physics Location 40

Topic 7B Atomic Physics Rating

Concept 7B10 Spectra Demo # 227

Checked Yes

Related Demos

Date Checked 4/25/2015



Brief Description Diffraction grating glasses for viewing components of light sources such as atomic spectral lines.

Keywords Holospecs, optics, diffraction grating, glasses, student interactive demo

Equipment Needed

Detail Work well with point light sources.

References

Other Uses

Suggestions for Improvement

Spectrum Tubes

DCS # 7B10.10 Status Missing Parts
Area 7 Modern Physics Location 30
Topic 7B Atomic Physics Rating
Concept 7B10 Spectra Demo # 093
Checked Yes Related Demos 083
Date Checked 4/12/2015



Brief Description Tubes containing samples of several different gases are mounted in high voltage spectrum tube power supply. The spectra of the various gases can be observed by eye. Monochromatic emission lines can be observed with spectroscope/rainbow glasses.

Detail Gases include: Air, Argon, Carbon Dioxide, Deuterium, Hydrogen, Neon, Nitrogen, Oxygen

Includes two power supplies

Keywords spectrum tubes, rainbow, glasses, diffraction, spectroscopy, color, spectrometer, slit, line spectra, gas, emission spectra, atomic,

Equipment Needed various spectrum tubes found in box, Rainbow Glasses or other student spectroscopes

References

Other Uses

Suggestions for Improvement One of the power supplies is missing as of 05/2015 (two new and one old remaining).

3D Firework Glasses

DCS # 7B10.10 Status Active

Area 7 Modern Physics Location 40

Topic 7B Atomic Physics Rating good and engaging

Concept 7B10 Spectra Demo # 223

Checked Yes Related Demos

Date Checked 4/25/2015



Brief Description Diffraction grating glasses.

Keywords optics, laser viewer, glasses, firework, student interactive demo, fireworks, diffraction grating

Equipment Needed

Detail 50 count

References

Other Uses

Suggestions for Improvement

UV LIGHT AND FLUORESCENT SAMPLES

DCS # 7B13.50 Status Active

Area 7 Modern Physics Location 29

Topic 7B Atomic Physics Rating good and engaging

Concept 7B13 Resonance Radiation Demo # 095

Checked Yes

Date Checked 2/12/2020

Related Demos



Brief Description Small blacklight with miscellaneous fluorescent samples.

Keywords UV light, ultraviolet, fluorescence, phosphorescence, resonance radiation, absorption, emission, color changing beads, chalk, rock, mineral, atomic, blacklight, black light

Equipment Needed

An additional LARGE UV light fixture is located on TOP shelf # 53

Detail Some samples included are chalks, antifreeze, tonic water, various dyes, rocks.

References

Other Uses

Suggestions for Improvement

Glow Door

DCS # 7B13.50 Status Under Development

Area 7 Modern Physics Location Floor/Cart

Topic 7B Atomic Physics Rating good and engaging

Concept 7B13 Resonance Radiation Demo # 410

Checked Yes

Related Demos

Date Checked



Brief Description Door painted with glow-in-the-dark paint that will fluoresce under illumination with visible or ultraviolet light.

Keywords door, glow, dark, light, black light, blacklight, glow in the dark, ultraviolet, UV, visible

Equipment Needed Light source:
Visible, ultraviolet, strobe, or otherwise.

Detail Can be used for 7B13.50 fluorescence or 6B10.20 inverse square law

References

Other Uses

Suggestions for Improvement

NUCLEAR FUSION FORCE MODEL

DCS # 7D20.? Status Active

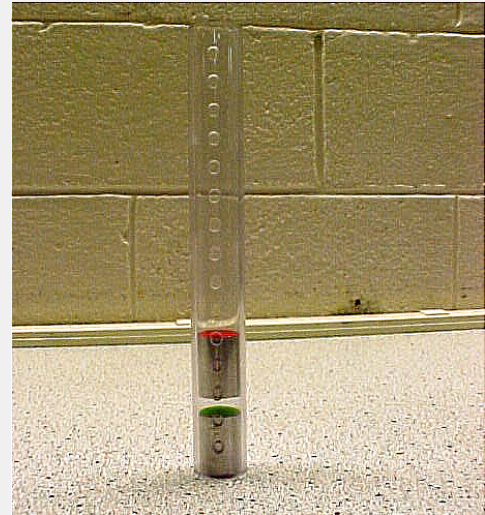
Area 7 Modern Physics Location 12

Topic 7D Nuclear Physics Rating good and engaging

Concept 7D20 Nuclear Reactions Demo # 097

Checked Yes

Date Checked 4/3/2015



Related Demos

Brief Description Put the two cylinders in the tube with the red sides facing each other. Over large distances the cylinders will repel, until at a critical distance the cylinders will begin to attract. Simulates the action of nuclear fusion.

Keywords nuclear fusion force model, reactions, repel, attract, magnets, cylinder, critical distance,

Equipment Needed

Detail

References

Other Uses

Suggestions for Improvement

DIFFUSION CLOUD CHAMBER

DCS # 7D30.60 Status Active

Area 7 Modern Physics Location Floor/Cart

Topic 7D Nuclear Physics Rating good and engaging

Concept 7D30 Particle Detectors Demo # 357

Checked Yes

Related Demos

Date Checked 5/13/2015



Brief Description	Radioactive sources and other particles from the background radiation are seen in a layer of oversaturated alcohol vapor when they pass through the chamber and leave contrails. Suggest you use with video camera.	Keywords	diffusion cloud chamber, particle detector, modern, nuclear, alpha, beta, gamma, radiation, vapor, electron, muon, cosmic ray, oversaturated, condensation, contrail,
		Equipment Needed	Ice (10 lb), water

Detail Quick-start and detailed instructions are available in the included notebook.

NOTE: The chamber requires about 1kg of ice per hour of operation. For long uses, make sure to always keep ice in the cooler to prevent damaging the heat exchanger.

- 1) Adjust chamber liner so that LED lights are showing and it touches bottom
- 2) Pour 30-40mL of 91% isopropyl alcohol in chamber and allow the liner to saturate. Use pipette to speed up saturation
- 3) Fill ice chest 1/2 full with ice and cover with water
- 4) Place water pump in ice chest and insure drainage tube is also in ice chest
- 5) Plug in cart. LED lights should come on and pump should start.

References

Other Uses

Suggestions for Improvement	If tubing ever cracks and needs to be replaced, use 1/4" ID (3/8" OD) latex hose.
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Survey Meter (Geiger Counter)

DCS # Status Active

Area 7 Modern Physics Location 10

Topic 7D Nuclear Physics Rating

Concept 7D30 Particle Detectors Demo # 165

Checked Yes

Related Demos

Date Checked 5/11/2015



Brief Description Survey Meter

Keywords Survey meter, geiger counter, radiation, radioactivity, alpha, beta particles, gamma rays, ionizing,

Equipment Needed

Detail

References

Other Uses

Suggestions for Improvement

EKG Sensor

DCS #		Status	Active
Area	9 Equipment	Location	30
Topic	9B Electronic	Rating	□□□□ good and engaging
Concept		Demo #	120c
Checked	Yes	Related Demos	120
Date Checked	5/21/2015		



<p>Brief Description</p> <p>EKG Sensor measures electrical signals produced during muscle contractions.</p>	<p>Keywords</p> <p>EKG, electricity, membrane potential, heart, Vernier, logger pro</p>
<p>Detail</p> <p>Found in Logger Pro Data Collection Kit</p> <p>It can be used for standard 3-lead EKG tracings or to make surface EMG recordings. Each of the three leads on the sensor connect to disposable electrodes.</p> <p>An EKG graph is displayed, demonstrating to students the contraction and repolarization of the heart's chambers. A package of 100 disposable electrodes is included with the sensor. A package of 100 additional electrodes is available.</p>	<p>Equipment Needed</p> <p>Demo room laptop or personal computer with Logger Pro software installed.</p> <p>Disposable electrodes (included in box).</p> <p>References</p> <p>Other Uses</p> <p>The electrodes are single-use packages and once opened, they must be used. See instructions in box for electrode storage information.</p> <p>Suggestions for Improvement</p>

Magnetic Field Sensor

DCS #		Status	Active
Area	9 Equipment	Location	30
Topic	9B Electronic	Rating	□□□□ good and engaging
Concept		Demo #	120e
Checked	Yes	Related Demos	120
Date Checked	5/21/2015		



Brief Description This sensor is sensitive enough to measure the Earth's magnetic field. It can also be used to study the field around permanent magnets, coils, and electrical devices.

Keywords magnetic field, field sensor, vernier, logger pro, earth

Equipment Needed Demo room laptop or personal computer with Logger Pro software installed.

Detail Found in Logger Pro Data Collection Kit

This sensor has a rotating sensor tip. This allows you to measure both transverse and longitudinal magnetic fields.

References

Other Uses

Suggestions for Improvement

Motion Detector

DCS #		Status	Active
Area	9 Equipment	Location	30
Topic	9B Electronic	Rating	□□□□ good and engaging
Concept	9B15 Position and Velocity Detectors	Demo #	120a
Checked	Yes	Related Demos	120
Date Checked	5/21/2015		



Brief Description Ultrasound is used to measure distance to an object

Keywords Vernier, motion, motion detector, motion, velocity, position, acceleration, laptop, logger pro

Equipment Needed Demo room laptop or personal computer with Logger Pro software installed.

Detail Found in Logger Pro Data Collection Kit. Ultrasonic pulses are emitted by the Motion Detector, reflected from a target, and then detected by the device. The time it takes for the reflected pulses to return is used to calculate position, velocity, and acceleration. This allows you to study the motion of objects.

References

Sensitivity switch to choose between measuring everyday objects and motion on Pasco carts.

Other Uses

Suggestions for Improvement

Wireless Dynamic Sensor System

DCS #		Status	Active
Area	9 Equipment	Location	30
Topic	9B Electronic	Rating	□□□□ good and engaging
Concept	9B15 Position and Velocity Detectors	Demo #	120g
Checked	Yes	Related Demos	120
Date Checked	5/21/2015		



Brief Description Wireless Dynamics Sensor System combines a 3-axis accelerometer, altimeter, and force sensor into one unit that communicates wirelessly with your computer using Bluetooth®.

Keywords force, acceleration, altitude, vernier, logger pro, accelerometer, wireless, bluetooth, pasco cart track

Equipment Needed Demo room laptop or personal computer with Logger Pro software installed.

Detail Found in Logger Pro Data Collection Kit.

Can be used as a stand-alone data logger. This data-collection system is completely free of cables.

Detailed instruction manual included in box.

References

Other Uses Can be mounted on PASCO track carts.

Suggestions for Improvement

PASCO DIGITAL FUNCTION GENERATOR/AMP

DCS # 9B30 Status Active

Area 9 Equipment Location 61

Topic 9B Electronic Rating □□□□□

Concept 9B30 Function Generators Demo # 9012

Checked Yes

Related Demos

Date Checked 2/12/2020



Brief Description Digital function generator.

Keywords Pasco, AC, digital, function, generator, amplifier, amp

Equipment Needed Cables to run from function generator to device

Detail This is a Pasco digital function generator. It can produce sine, square, and triangular waves.

2 generators are available on shelf 58.

References

Other Uses

Suggestions for Improvement

Variac

DCS # 9B50.? Status Active

Area 9 Equipment Location 61

Topic 9B Electronic Rating static

Concept 9B50 Power Supplies Demo # NA

Checked Yes

Related Demos

Date Checked 2/12/2020



Brief Description

Keywords

Equipment Needed

Detail

References

Other Uses

Suggestions for Improvement

MERCURY LAMP

DCS # 9B60.60 Status Active

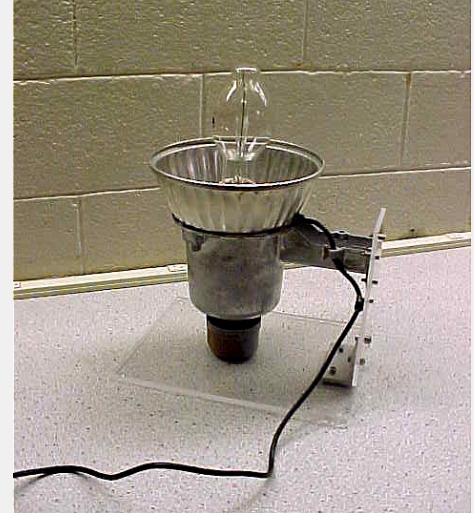
Area 9 Equipment Location 46

Topic 9B Electronic Rating good and engaging

Concept 9B60 Light Sources Demo # 270

Checked Yes Related Demos 258

Date Checked 2/12/2020



Brief Description Mercury lamp for use with diffraction gratings etc.

Keywords mercury lamp, light source, spectrum

Equipment Needed

Detail Allow several minutes for lamp to warm up. If turned off, the lamp will require several minutes to relight. As such, it is best to turn on and leave on instead of cycling on and off.

References

Other Uses

Suggestions for Improvement

LOW PRESSURE SODIUM LAMP

DCS # 9B60.60 Status Active

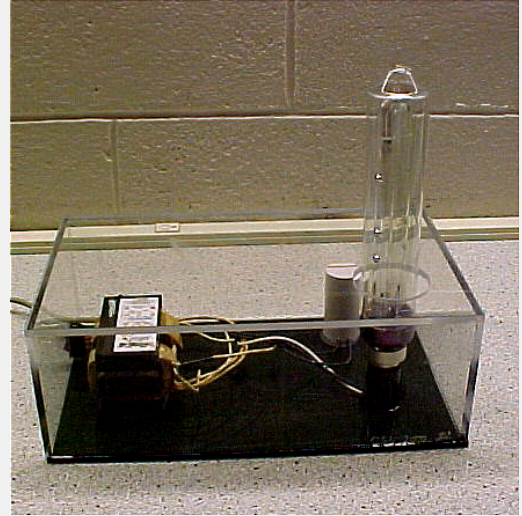
Area 9 Equipment Location 46

Topic 9B Electronic Rating good and engaging

Concept 9B60 Light Sources Demo # 269

Checked Yes Related Demos 258, 263

Date Checked 2/12/2020



Brief Description This Sodium Vapor Light Source provides sodium light at high intensity. It is perfect for all monochromatic light needs.

Keywords low pressure sodium vapor lamp, light source, monochromatic,

Equipment Needed Low pressure sodium vapor lamp (35 Watt) with a fixture for it.

Detail The lamp needs several minutes to warm up and will appear pink when turned on.

When inserting a lamp, ensure that the lamp connects properly with the electrical contacts of the lamp holder.

Before removing the lamp, turn off the switch and let the lamp cool down.

Remove the lamp immediately if the outer bulb is broken.

This lamp contains sodium. Contact with water can result in a violent reaction/ignition.

References

Other Uses

Suggestions for Improvement

Coiled Coil Filament

DCS # 9B60.10 Status Active

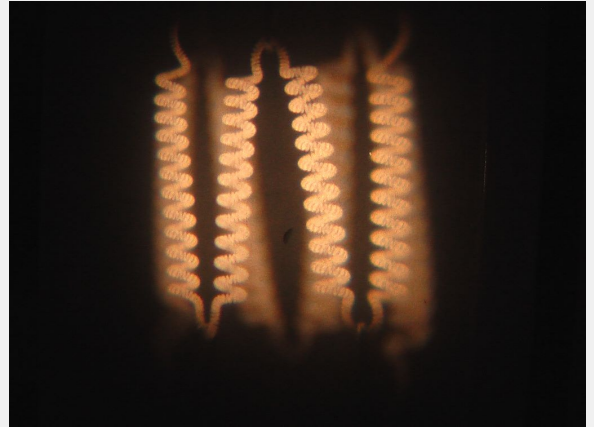
Area 9 Equipment Location 38

Topic 9B Electronic Rating old but effective

Concept 9B60 Light Sources Demo # 207

Checked Yes Related Demos 214

Date Checked 4/24/2015



Brief Description This lamp projects an image of its coiled coil filament. You can focus the image by turning the focusing knobs found on either side of the lamp. The lamp can project a clear image from the back of the large lecture hall (E100) onto the projection screen

Keywords white light, light source, filament, coiled coil, coil, resistance

Equipment Needed Ground glass screen optional (demo 214)

Detail

References

Other Uses

Suggestions for Improvement

SMALL STROBE LIGHT

DCS # 9B60.20 Status Active

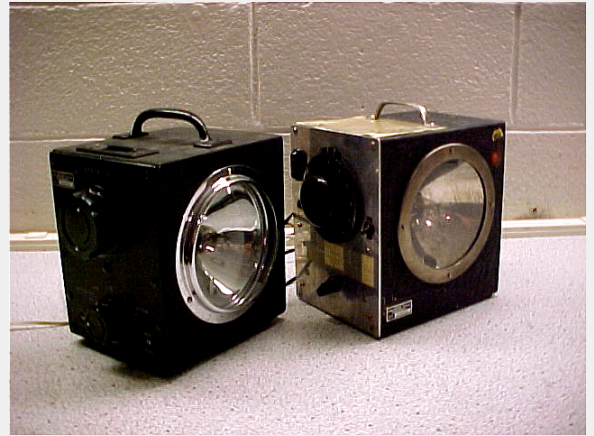
Area 9 Equipment Location 44

Topic 9B Electronic Rating good and engaging

Concept 9B60 Light Sources Demo # 251

Checked Yes Related Demos 257

Date Checked 2/12/2020



Brief Description Strobe light capable of very high flash frequencies. Can be used to measure rpm of spinning objects.

Keywords strobe light, strobe effect, light source, frequency, strobotac, rpm

Equipment Needed

Detail Only one left, takes a bit of time to warm up. Produces a dim red light rather than a bright white light like the Pasco stroboscope (demo 257)

References

Other Uses

Suggestions for Improvement

STRAIGHT LINE FILAMENT LAMPS

DCS # 9B60.55 Status Missing
Parts/Storage

Area 9 Equipment Location 46

Topic 9B Electronic Rating

Concept 9B60 Light Sources Demo # 267

Checked Yes

Related Demos



Date Checked 2/12/2020

Brief Description

Keywords straight line filament lamps, light bulbs

Equipment Needed

Detail

References

Other Uses

Suggestions for Improvement

Only one cover is present in box, there are no light bulbs or power supplies in the box. Entire demo is essentially missing.

Pasco Stroboscope

DCS #	9B60.30	Status	Active
Area	9 Equipment	Location	45
Topic	9B Electronic	Rating	□□□□□
Concept	9B60 Light Sources	Demo #	257
Checked	Yes	Related Demos	251
Date Checked	5/1/2015		



Brief Description This Digital Stroboscope combines the mesmerizing fun of the traditional strobe, with a digital frequency readout for accurate, quantitative data.

Keywords Strobe, large, light, stroboscope, RPM, revolutions per minute

Equipment Needed

light source, the large black light works well on shelf 43

Detail Can display frequency in RPM or in flashes/second. Can also respond to external trigger

References

Other Uses

Suggestions for Improvement

Point Light Source

DCS # Status Active

Area 9 Equipment Location 46

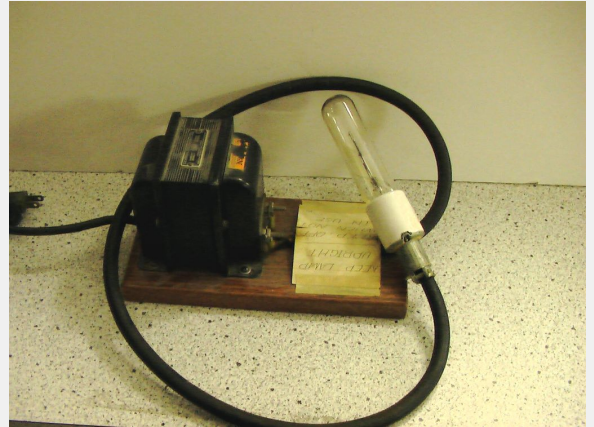
Topic 9B Electronic Rating static

Concept 9B60 Light Sources Demo # 265

Checked Yes

Related Demos

Date Checked 5/6/2015



Brief Description Bright point light is produced from light bulb, good for holospecs.

Keywords light source, point light source, light, optics

Equipment Needed Clamp stand, holder clamp

Detail For use in demos where a point light source is required. Light is emitted from a filament that is several millimeters wide.

References

Other Uses

Suggestions for Improvement

LASER LIGHT SHOW

DCS # 9B62.? / 6J11.? Status Active

Area 9 Equipment Location 45

Topic 9B Electronic Rating good and engaging

Concept 9B62 Lasers Demo # 262

Checked Yes Related Demos

Date Checked 2/12/2020



Brief Description This laser has 16 patterns. Choose from preset laser patterns or design your own patterns on the fly.
6J11.? = The Eye; Physiology; Persistence of Vision

Keywords laser light show, persistence of vision, laser patterns, light beam, sound responsive system, vibrations, waves,

Equipment Needed

Detail This is sound-responsive system with adjustable sensitivity - built-in microphone enables it to project patterns in time with any surrounding sound. You can also connect an external sound source to the AUDIO INPUT.

NEVER point laser beam at anyone!
NEVER look directly into the laser beam!

References

Other Uses

Suggestions for Improvement

Red Laser Pointers

DCS # 9B62.? Status Active

Area 9 Equipment Location 55

Topic 9B Electronic Rating good and engaging

Concept 9B62 Lasers Demo # 348

Checked Yes

Date Checked 2/12/2020



Related Demos

Brief Description

Put a diffraction pattern tip on a laser and press the touch button located on the side of the pointer. You will see a pattern on the screen.

Keywords

laser pointer, helium neon, He-Ne, diffraction pattern tips, pocket size, beam,

Equipment Needed

Pocket-size laser pointer, set of diffraction patterns.
Several identical packages are included in this box.

Detail

This Laser Pointer project a intense, solid red dot up to 500 yards. Uses 3 LR44 batteries.
Direct eye contact with laser beam may cause serious eye injury!

References

Other Uses

Suggestions for Improvement

HELIUM-NEON LASER

DCS # 9B62.?
Status Active
Area 9 Equipment
Location 45
Topic 9B Electronic
Rating good and engaging
Concept 9B62 Lasers
Demo # 255, 256
Checked Yes
Date Checked 11/15/2019
Related Demos



Brief Description There are two of these. They are simple Helium Neon Lasers that run off of wall power.

Keywords helium, neon, He-Ne, laser, optics, reflections, refraction, diffraction, interference, grating,

Equipment Needed

Detail

References

Other Uses

Suggestions for Improvement

2 GREEN SOLID STATE LASERS (532 nm)

DCS # 9B62 Status Active

Area 9 Equipment Location 45

Topic 9B Electronic Rating good and engaging

Concept 9B62 Lasers Demo # 261

Checked Yes Related Demos 245

Date Checked 2/12/2020



Brief Description Two solid state green lasers. They are both battery powered and slightly larger than a normal laser pointer. There is one plastic holder/stand in the box as well (can be used on its own or you can also use a metal rod stand with clamp to hold laser)

Keywords green, laser, 532 nm

Equipment Needed

None, unless you want to use a metal rod stand. The batteries for each are located in the box, simply install and the pointers are ready for use.

Detail

You will need the key to operate. Contact Jeff Breitschopf: jeff.breitschopf@colostate.edu 1-4130 8305564488

References

Other Uses

Suggestions for Improvement

MICROWAVE OVEN

DCS # 9B65 Status Active

Area 9 Equipment Location Under workbench next to 61

Topic 9B Electronic Rating good but lacks zest

Concept 9B65 Microwave Apparatus Demo # 253

Checked Yes

Date Checked 2/12/2020

Related Demos



Brief Description A microwave oven and sheet with fluorescent blubs.

Keywords microwave, oven

Equipment Needed

Detail Can be filled with fluorescent bulbs, and turned on.

Also can be filled with glow sticks, as the glow sticks heat up, they glow more intensely.

References

Other Uses

Suggestions for Improvement

Submersible Water Pump

DCS # 9.C.20 Status Active

Area 9 Equipment Location 15

Topic 9C Mechanical Rating Support Equip

Concept 9C20 Pumps Demo # 9020

Checked Yes Related Demos 115

Date Checked 2/20/2020



Brief Description This is for Demo 115.

Keywords

Equipment Needed

Includes clamps

Detail

References

Other Uses

Suggestions for Improvement

MityVac hand vacuum pump

DCS #

Status Active

Area 9 Equipment

Location 18

Topic 9C Mechanical

Rating basic measurement

Concept 9C25 Vacuum

Demo # 407

Checked Yes

Related Demos

Date Checked 9/16/2019



Brief Description Vacuum pump for various demos.
NOT for use with liquid.

Keywords vacuum, pump, hand, handheld

Equipment Needed

Detail

References

Other Uses

Suggestions for Improvement

Rechargeable Aerosol Spray Can

DCS # Status Active

Area 9 Equipment Location 55

Topic 9C Mechanical Rating

Concept 9C40 Other Demo # 9019

Checked Yes

Related Demos

Date Checked 5/20/2015



Brief Description Fill can with any liquid you would like to aerosolize. Pressurize the can with a bike pump or the mini air compressor to 90 psi. The can will withstand 250 PSI

Keywords spray can, aerosol spray can, pressurize, pressure, bike pump, mini air compressor, air compressor

Equipment Needed Liquid to fill can and bike pump or mini air compressor. Nozzles are included

Detail 2 cans are available.

References

Other Uses

Suggestions for Improvement

DENSITY HYDROMETER

DCS # 2B40.? Status In Storage

Area Storage Location Storage

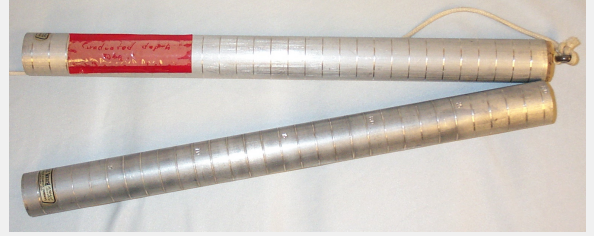
Topic 2B Statics of Fluids Rating old but effective

Concept 2B40 Density and Buoyancy Demo # 334

Checked No

Related Demos

Date Checked 2/26/2020



Brief Description Keywords density, hydrometer, buoyancy, fluid, tube,

Equipment Needed

Detail

References

Other Uses

Suggestions for Improvement

BELL JAR

DCS # 2B?./ 3B30.30 / 4C?./ 4E?./ Status Active

Area various Location 30

Topic various Rating good and engaging

Concept various Demo # 311

Checked Yes Related Demos

Date Checked 11/18/2019



Brief Description

1Q40.86 = air jet Hero's engine
2A10.37 = cohesion plates fallacy
2B35.15 = barometer
2B40.40 = buoyancy of air
2B60.23 = siphon
3B30.30 = bell
4C30.15 = boil water
4C31.21 = freeze water

Keywords

bell jar, vacuum, pump, pressure, Hero engine, cohesion, barometer, buoyancy of air, siphon, bell, boil, freeze, water, balloon, marshmallow, peep,

Equipment Needed

Vacuum pump, bell jar and base, Specific item, pressure gauge.

Detail

Place items in bell jar and evacuate. Make sure that base has a grease on its surface, so you will get better sealing.

References

Other Uses

Suggestions for Improvement

BELL JARS

DCS # 2B??.? / 3B30.30 / 4C??.? / 4E??.?
Status Active
Area various
Location 30
Topic various
Rating good and engaging
Concept various
Demo # 309
Checked Yes
Related Demos 311
Date Checked 11/18/2019



Brief Description
1Q40.86 = air jet Hero's engine
2A10.37 = cohesion plates fallacy
2B35.15 = barometer
2B40.40 = buoyancy of air
2B60.23 = siphon
3B30.30 = bell
4C30.15 = boil water
4C31.21 = freeze water

Keywords
bell jar, vacuum, pump, pressure, Hero engine, cohesion, barometer, buoyancy of air, siphon, bell, boil, freeze, water, balloon, marshmallow, peep,

Equipment Needed
Vacuum pump, bell jar and base, Specific item, pressure gauge.

Detail
Place items in bell jar and evacuate.
Make sure that base has a grease on its surface, so you will get better sealing.

References

Other Uses
No base is included in this box, though one is included in demo 311 shelf 30

Suggestions for Improvement
No base is included in this box, though one is included in demo 311 shelf 30