# Physics

# How does the type of surface of an inclined plane affect how far and fast an object rolls?

(Project found at http://www. all-science-fair-projects. com/)

## *Purpose*

Determine how the type of surface affects how far and fast objects roll.

## *Materials*

- ☑ Board 24" long
- ☑ Block 2½" tall
- ☑ Matchbox™ car
- ☑ Sandpaper
- ☑ Wax paper
- ☑ Aluminum foil

## *Procedure*

1. Roll the car down the board. Measure how far it rolls.

2. Place sandpaper on the board. Repeat step 1.

3. Place wax paper on the board. Repeat step 1.

4. Place aluminum foil on the board. Repeat step 1.

5. Repeat the process ***at least*** ten times for each material. Average the distances.

# How Does the Weight and Hull Shape of an Object Affect Its Sinking Rate Through Water?

(Project found at http://www. all-science-fair-projects. com/)

## *Purpose*

The purpose of this experiment was to determine how much the hydrodynamic shape and mass of an object would affect its velocity when sinking through water.

## *Materials*

- ☑ 1 foot clear plastic tube (One end closed off)
- ☑ Four wood spheres
- ☑ Four wood cones
- ☑ Four wood cylinders
- ☑ Four wood cubes
- ☑ Shotgun shot
- ☑ Stopwatch

## *Procedure*

1. Make four pyramids, four spheres, four cubes and four cylinders.

2. Drill the core out of each shape.

3. Fill one of each shape with 30 grams of shot

4. Fill one of each shape with 60 grams of shot.

5. Fill one of each shape with 120 grams of shot.

6. Fill one of each shape with 200 grams of shot.

7. Fill all holes with same amount of glue to seal the hole.

8. Fill the tube with water almost to the top.

9. Drop all of the 30 gram shapes one at a time.

10. Record the data.

11. Drop all of the 60 gram shapes one at a time.

12. Record the data.

13. Drop all of the 120 gram shapes one at a time.

14. Record the data.

15. Drop all of the 200-gram shapes one at a time.

16. Record final data.

# What the factors that affect the strength of an electromagnet?

(Project found at http://www.all-science-fair-projects.com/)

## *Purpose*

Determine what affects the strength of an electromagnet.

## *Materials*

- ☑ One AA, C and D-cell battery
- ☑ A piece of **wire** (insulated thin copper wire - four-strand telephone wire is perfect -- cut the outer plastic sheath and you will find four perfect wires within.)
- ☑ A compass

## *Procedure*

1. Put the compass on the table and, with the wire near the compass,

2. Connect the wire between the positive and negative ends of the AA battery for a few seconds. Record your observations.

3. Repeat steps 1 & 2 with the other two batteries.

# The Effect of Ultraviolet Light on Yeast

(from All Science Fair Projects/ http://www.all-science-fair-projects.com/project924_109.htmll)

## Problem

What is the effect of UV light on yeast?

## Experiment Design

The constants in this study were:
- -The amount of yeast
- -The kind of yeast
- -The UV lamp and its distance from the fermentation flask
- -The size and shape of the fermentation flask
- -Quantity and type of apple juice
- -The temperature at the time of fermentation

The manipulated variable was whether or not the yeast was subjected to UV light during fermentation.
The responding variable was the amount of CO2 produced by the yeast as it fermented the apple juice.
To measure the responding variable I used a graduated cylinder and measured how much water was displaced by CO2 put out by the yeast during fermentation.

## Materials

| QUANTITY | ITEM |
|---|---|
| 1 | flask |
| 1 | Measuring cylinder |
| 1 | water bath |
| 1 | stopper |
| 1 | clamp and stand |
| ? teaspoon | UV lamp |
| 1 | yeast |
| 100 ml | plastic tube |
| 1 | apple juice |
| 1 | microwave |
| 1 | Heating pad |

| | |
|---|---|
| 1 | Pencil |
| 1 | Paper pad |

## Procedure

1. Get all materials.

2. Fill the water bath with water.

3. Fill measuring cylinder with water.

4. Put plastic wrap over measuring cylinder.

5. Flip the water-filled measuring cylinder over in the water bath.

6. Get the plastic tubing and attach one end to the rubber stopper.

7. Put 100ml-apple juice into 250ml flask.

8. Heat apple juice in microwave for 25 seconds.

9. Put 1/4-teaspoon yeast in flask.

10. Shake flask to mix apple juice with yeast.

11. Plug in heat pad.

12. Put flask on heat pad.

13. Slide the stopper into the top of the flask.

14. Place the rubber tubing into the water bath.

15. Slip the plastic tubing up inside the cylinder.

16. Put a straw on other side of measuring cylinder to balance it.

17. Clamp cylinder to support measuring cylinder in an upright position.

18. Watch for $CO_2$ bubbles in the measuring cylinder.

19. Record volume of captured $CO_2$ in the measuring cylinder every 10 minutes for one hour.

20. Repeat steps 1-14 with the following exception.

21. Place an UV lamp so it shines directly on the flask and the yeast during ermentation

# How Do Different Materials Block Radio Waves?

(from All Science Fair Projects/ http://www.all-science-fair-projects.com/project359_29.html)

## Purpose

The purpose of this experiment was to find out which materials block radio waves and thus cause the most interference for remote control devices.

## Experiment Design

- The constants in this study were:
- The obstacle used to obstruct the radio wave
- The distance for the radio wave to travel
- The distance for the car (receiver) to travel
- The amount of time it took the car to travel from the beginning court to half court

The manipulated variable was the amount of time it took the radio wave to pierce the obstacle (the wood, glass and brick). Then hit the receiver and cause the remote control car to move and then hit the centerline at half court.

The responding variable was the amount of time it took the car to start up from the beginning court line to then drive and arrive at the half court line.

To measure the responding variable I used a stopwatch to determine how much time it took the car to go from the beginning of the basketball court to the center of the basketball court.

## Materials

**QUANTITY** **ITEM DESCRIPTION** *C/A= Commonly Available

- *C/A Cement (brick)
- *C/A Wood
- *C/A Glass
- 1 Stop-watch
- 1 27 MHz remote control car
- 24 AA alkaline batteries **OR** batteries
- 6 9v batteries **OR**

- 1 rechargeable 9v batteries

## Procedures

1. Place remote control car's (receiver) back wheals on the very edge of the beginning line of the basketball court.

2. Get someone (friend, family) to hold the remote control (transmitter) and stand outside the door of the gymnasium.

3. Have stopwatch set to proper setting.

4. Get to eye level with the mid-court centerline or where the car will stop.

5. Shout out a signal, like "GO!" then immediately start the stopwatch.

6. When the car touches the beginning on the mid-court line stop the stopwatch and give a signal to stop, like "STOP!"

7A. Place 4 new AA alkaline batteries in car **OR**

7B. Recharge 4 AA alkaline batteries from car then replace.

8A. Place 1 new 9v battery in remote control **OR**

8B. Recharge 1 9v battery then replace.

9. Close the door of gymnasium, with assistant remaining behind the door, to give you the material of glass.

10. Repeat steps 1 - 8B; be sure to replace step 2 with step 9.

11. Have assistant stand behind the boy's locker room wall to give the material of cement.

12. Repeat steps 1 - 8B; once again replace step 2 with step 11.

13. Have assistant stand outside the closed wooden door (separating the transmitter from the receiver) to give material of wood.

14. Repeat steps 1 - 8B; replace step 2 with step 13.

15. Repeat all steps (including steps 11 and 13) at least once more to confirm previous results.