Sorting out the Scientific Method #1

with Dr. E. McSquare

5TH GRADE

PHYSICAL SCIENCE

Scientist Dr. E. McSquare is compiling his scientific findings into a single volume. He forgot to give titles to the sections of his reports and now they're all mixed up! Use the definition guide to help Dr. McSquare label his reports.

Definition Guide:

Q = Question: The question is the first part of the scientific process. What question do you want to answer?

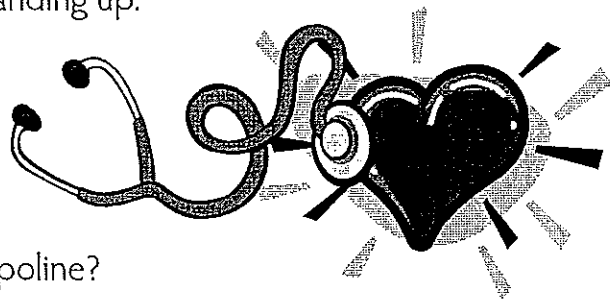
H = Hypothesis: A hypothesis is a statement that can be proven true or false. It is often written in the form "If (a), then (b)."

E = Experiment: The experiment is an activity that is used to test if your hypothesis is true or false.

D = Data: Data are the results of the experiment.

C = Conclusion: The conclusion is a final statement that describes what you learned from the experiment and results.

E I will test my lab partners' resting heart rates by counting their heart beats in three different positions: lying down, sitting, and standing up.



_____ **Object: Bounce count**
Golf ball: 4 bounces
Medicine Ball: 7 bounces
Baseball: 5 bounces

_____ Do heavier objects bounce higher on a trampoline?

_____ If standing up requires more physical effort than lying down, then one's pulse standing up will be faster than one's pulse lying down.

_____ From a fixed height, I will drop a variety of objects onto a trampoline several times and observe the number of bounces.

_____ If there is and equal an opposite reaction to every action, then heavier objects will bounce higher off a trampoline.

_____ **Maurice:** Lying down - 55 bpm, Sitting - 59 bpm, Standing - 65 bpm
Lucy: Lying down - 58 bpm, Sitting - 60 bpm, Standing - 70 bpm
Carlos: Lying down - 51 bpm, Sitting - 54 bpm, Standing - 56 bpm

_____ How does your resting heart rate change depending on your position?

_____ The experiment and data show that heavier objects bounce higher on trampolines.

_____ A person's position affects his or her resting heart rate. The heart rate is higher if the body is upright.

Sorting out the Scientific Method #2

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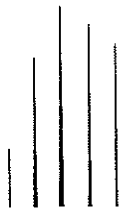
C The results of this experiment show that the boiling point of water does rise as the amount of salt in the water increases.

_____ I will drop a variety of objects from a height of 10 feet and use a stopwatch to record the time it takes for them to hit the ground.

_____ Ignoring wind resistance, if two objects are dropped at the same time, they will both hit the ground at the same time because gravity is the same for both of them.

_____ The results of this experiment showed that objects fall at the same rate despite weight differences.

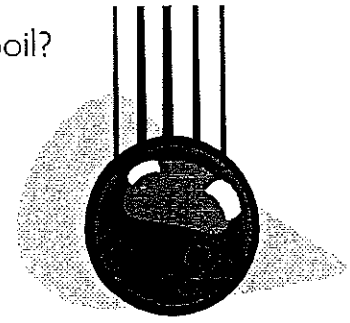
_____ **Object (weight) (drop time)**
Shoe: (15 oz) (.82 seconds)
Bowling ball: (12 pounds) (.82 seconds)
Pencil: (2 oz) (.84 seconds)



_____ I will put a thermometer in each of 3 pots of boiling water. Each pot will contain a different amount of salt. I will observe and compare the temperatures in each pot when the water begins to boil.

_____ Does adding salt change the temperature at which water begins to boil?

_____ Do heavier objects fall faster than lighter objects?



_____ **Temperature when boiling begins (salt quantity)**
Pot 1: 214.2 F (0g)
Pot 2: 216.3 F (50g)
Pot 3: 218.3 F (100g)

_____ If adding salt to water increases the density of water, then it requires more energy to make it boil, thus increasing the boiling point temperature.

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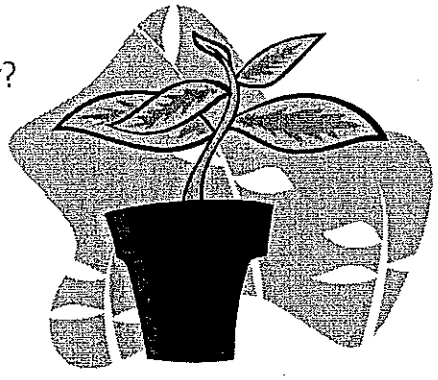
H If plants reflect green light, then they must absorb red light (the opposite of green) and thus grow faster under red lights.

_____ **Plant Specimen - Light color: Growth**
Yellow Hibiscus - Green light: +9.4cm, Red light: +12.2cm, Blue light: 11.9cm
Golden Sage - Green light: +6.6cm, Red light: +8.1cm, Blue light: +7.1cm
Soybean Plant - Green light: +7.4cm, Red light: +10.1cm, Blue light: +10.0cm
Common Gardenia - Green light: +5.1cm, Red light: +6.9cm, Blue light: +6.9cm

_____ I will place 4 different plants under green lights and compare their growth over a month with identical plants under red and blue lights.

_____ Using clear containers with measurement marks, I will compare the volume of a glass of water at room temperature with a glass of frozen water.

_____ Which color lights cause plants to grow more effectively?



_____ **Container# - State of water: height**
Container 1 - Water: 14.0ml, ice: 14.8ml
Container 2 - Water: 20.0ml, ice: 20.8ml
Container 3 - Water: 24.0ml, ice: 24.9ml

_____ Does the volume of water change when it freezes?

_____ After consistent results, I found the that water increases in volume when it freezes.

_____ The results of this experiment showed that green light was the least effective color for growing our plants. Blue and red lights caused the greatest amount of growth.

_____ If the molecular structure of solids is more dense than liquids, then water will decrease in volume when it freezes.

Sorting out the Scientific Method #4

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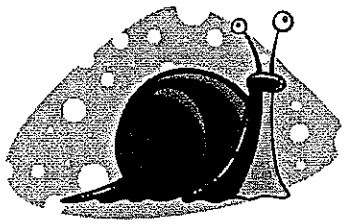
Q Do snails crawl faster on concrete or glass?

_____ **Amber: Left eye:** decreased. **Right eye:** decreased.
Julio: Left eye: decreased. **Right eye:** decreased.
Claudia: Left eye: decreased. **Right eye:** decreased.

_____ I will test my lab partners' pupils by covering one eye and shining a light directly into the other. Then, I will note the change in pupil size.

_____ If snails move faster on smoother surfaces, then a snail will move faster on glass than on concrete.

_____ The results of the experiment showed that pupil size decreases when there is more light present. In order to absorb less light, the pupils shrink.



_____ **Snail 1:** Glass - 45s, Concrete - 55s
Snail 2: Glass - 49s, Concrete - 49s
Snail 3: Glass - 55s, Concrete - 56s

_____ If a pupil changes size by how much light is visible, then it will get smaller in size when there is more light.

_____ Snails move faster on glass than on concrete.

_____ What makes the pupil in the eye change size?

_____ I will organize snail races on glass and concrete and compare how fast snails travel on each surface.