SEPs & Nature of Science: *20 Questions*
ANSWERS

DIRECTIONS: Add a <u>link</u> to this **PDF** in your **digital notebook** (**update** your table of content). <u>**Answer**</u> the questions on this PDF using <u>**Kami**</u>. You can **circle, type or write** answers as needed. If you are <u>**not**</u> sure of an answer it is totally cool to <u>**use your digital notebook OR online resources**</u>. *BOL...*

1) Dr. Lowe, a marine biologist who studies great white sharks off the coast of California, recorded the spotting of 25 sharks off Dana Point harbor last spring. What <u>**type of data**</u> would this be classified as?

   B. Quantitative

2) While visiting the beach, you notice and record in your notebook that some of the sea gulls have mostly white coloring and some have grey and black or even brown coloring. What <u>**type of data**</u> would this be?

   A. Qualitative

3) Apple typically sells 10 million iPhones in the first week the new version is available. What <u>**type of data**</u> would this be classified as?

   B. Quantitative

4) You notice that most of the iPhones at school are either: black, silver, gold, or white in color. What type of data are you recording about the iPhones at school?

   A. Qualitative

5) What is meant by a "<u>**variable**</u>" in science and engineering?

   It is the one thing that changes either as a result of the experiment happening (like the height a planet grows after being watered) or is the thing that the experimenter is "testing" to see what effect is has when used (the experimental medication that is being tested to see if it cures cancer).

6) A student is planning an experiment to find out how well an iPhone can withstand a drop from different heights before the screen cracks. What is the <u>**manipulated variable**</u> **(independent)** in this experiment?

   Height the iPhone is being dropped

7) **Explain** what a <u>**manipulated variable**</u> is? Give an <u>**example**</u> (write or draw) of a <u>**manipulated variable**</u>.

   It is the one thing you change between your experimental group and control group. It is called "manipulated" because it's the one you can change. In other words, you can decide if a group of patients get medicine "A" or medicine "B" or a plant gets 100 ml, 50 ml or 25 ml each day to grow.

   *In a quality experiment you should only have <u>one manipulated variable</u> at a time.

8) In the iPhone drop experiment, what is the <u>**responding variable**</u> **(dependent)?**

   The iPhone screen cracking

9) **Explain** what a <u>**responding variable**</u> is? Give an <u>**example**</u> (write or draw) of a <u>**responding variable**</u>.

   It is the result (data) of the experiment or what was measured after the treatment (manipulated variable) was tested. 85 % of medicine "A" cured cancer vs. 12 % of medicine "B". The planet that received 50 ml of water per day grew 30 cm vs. 10 cm for 25 ml per day vs. 5 cm for 100 ml of water per day.

Use the following passage to help you answer the following questions about ocean ecosystem:

Fertilizer run-off from the land into the ocean can cause too much algae to grow on the leaves of sea grass and makes the sea grass die off. When sea slugs are present, they eat the algae and it allows the sea grass to grow larger and faster. Natural predators of the sea slugs are crabs. Natural predators of the crabs are sea otters. Scientists notice that when sea otters are present, the sea grass grows healthily. When sea otters are absent from the environment, the sea grass population declines.

To test if crabs have something to do with this, scientists designed an experiment where they simulated two different ecosystems. One ecosystem had crabs and no sea otters. The other ecosystem had crabs and sea otters. The results of this experiment showed that the sea grass grew faster and larger where the sea otters were present.

10) In the above experiment, what is the **Scientific Question** being investigated**?**
   - Do sea otters eat the crabs which in turn allows the sea grass to grow better because sea slugs can eat the algae without being eaten by the crabs.   (or)
   - Do crabs influence the rate at which sea grass dies due to them eating the sea slugs (which eat the algae)?

11) Identify the **manipulated variable** and the **responding variable** in the above experiment.
   Manipulated variables: Sea otters and crabs
   Responding variables: sea grass

12) What did the scientist **conclude** from this experiment? **Explain** your answer. *(Remember you need to answer the question that the scientists were asking)*
   They concluded that the sea grass grew faster and larger where the sea otters were present as they were the ones that helped control the crab population and allow some sea slugs to live and eat the algae.

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13) **Calculate** the **volume** of this **REGULAR** solid:

   Volume of box = 15.778 or 15.78 cm³

   4.9cm
   1.4 cm
   2.3cm
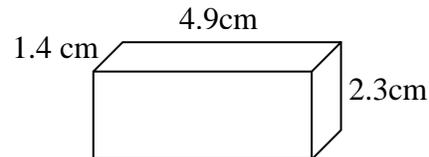
14) What is the **method** to determine the volume of an **IRREGULAR** solid called?

   Water displacement

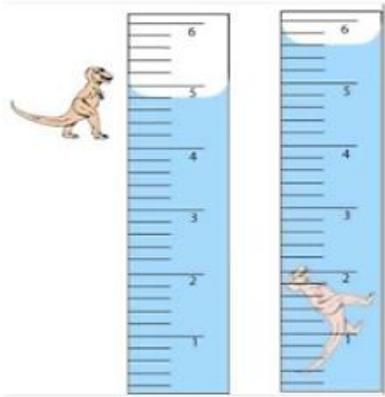15) **Why** is it called a **graduated cylinder**?

   It is in the shape of a "cylinder" and it is marked with graduations (marks) that gradually increase as they go up.

16) **Where** do you take the measurement when you use a graduated cylinder? (**hint:** it is the **curve** of the liquid)
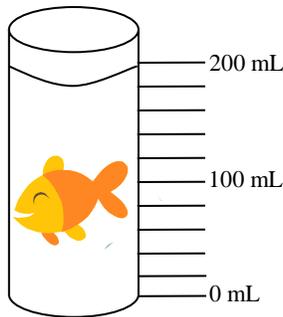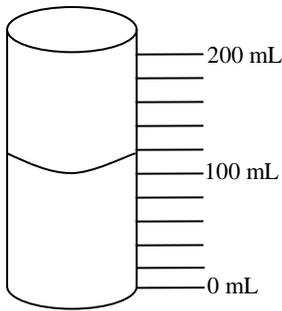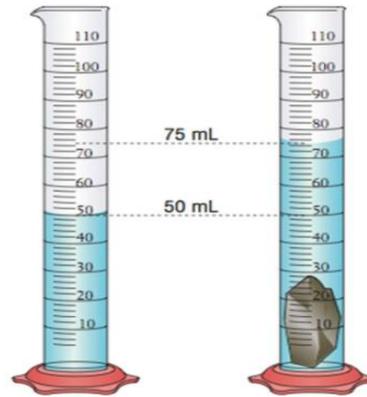
   meniscus

17) **Measure** the volume of the following **IRREGULARLY** shaped solids:
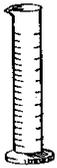
Volume of the dinosaur = 5.6 ml – 4.8 ml = .8 ml

Volume of the rock = 50ml – 75 ml = 25 ml

75 mL

50 mL

200 mL

100 mL

0 mL

200 mL

100 mL

0 mL

Volume of the fishy = 180 ml – 100 ml = 80 ml

18) Identify the following lab equipment:

graduated cylinder   beaker   triple beam balance   flask

19) For the following units, identify which of the fundamental measurements in science it is used for:

e) Centimeters (cm) = length (distance)

f) Milliliters (mL) = volume

g) seconds (s) = time

h) grams (g) = mass

e) Kilometers (km) = distance (length)

f) Pounds (lbs.) = mass (or force)

g) Joules (J) = energy

h) Celsius ($^{\circ}$C) = temperature

20) What does, "measure twice, cut once" mean in the world of construction and home building?

Be precise and accurate with your measurement before you cut. It cost a lot more to go buy another piece of wood compared to take an extra few seconds to measure a second time and get it correct.