Earth Science Summer Assignment

1. Nancy noticed that the grocery store near her house is busier on different nights of the week. Nancy wrote down the following steps outlining her investigation on the number of people going to the grocery store.

I. hypothesized that more people go to the grocery store on Saturday night than on any other night of the week

II. counted the number of people going into the grocery store from 8 p.m. to 9 p.m. on each night of the week, for one week each month, for one full year

III. made a table showing the results

IV. drew a bar graph with a different color for each week

V. concluded that the hypothesis holds true

What would best describe what Nancy was doing in step III?

○ **A.** organizing data

○ **B.** comparing data

○ **C.** forming a hypothesis

○ **D.** drawing a conclusion based on observation

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2. In addition to using direct observations made from scientific investigations, research also uses information found in

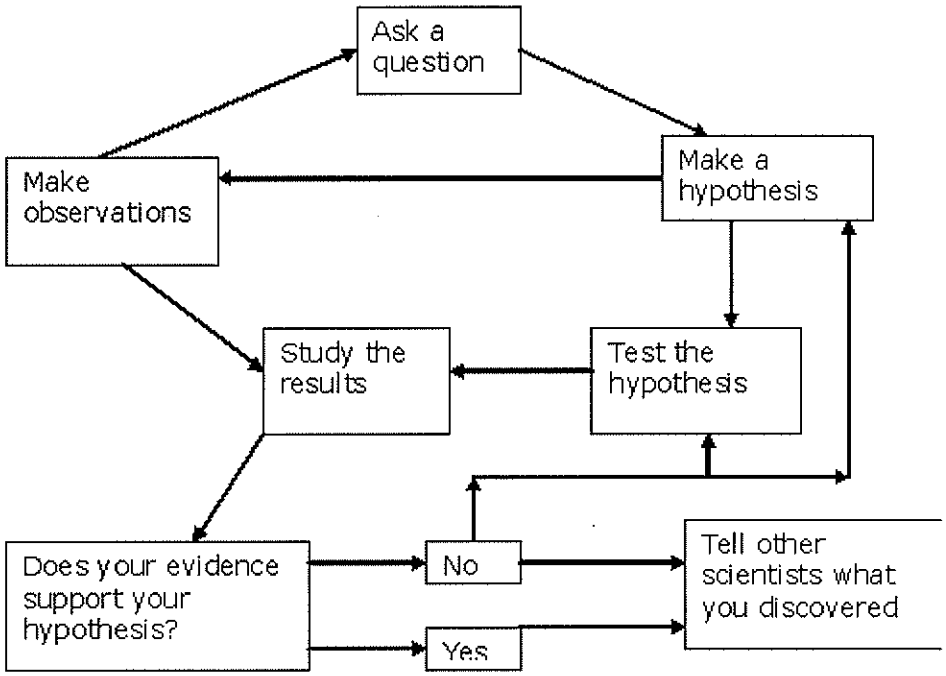
○ **A.** science fiction novels.

○ **B.** newspaper editorials.

○ **C.** tabloid magazines.

○ **D.** scientific literature.

3. Examine the scientific method flowchart below. What should you do before you form a hypothesis?



○ **A.** communicate the results

○ **B.** study the results

○ **C.** test a hypothesis

○ **D.** ask a question

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4. There are many different steps to a scientific investigation. Assuming each of the students described below is in the process of one step of an investigation, which of the students is gathering data by observation?

I. After researching flight speeds, Jaron concludes that small birds fly faster than large birds.

II. Shawna counts how many birds fly into the tree in her front yard each hour.

III. Oliver sits at the lunchroom door and keeps track of the number of students he sees buying pizza for lunch at his school for one month.

IV. Raymond hypothesizes that tall students are more likely to buy pizza for lunch than are short students.

V. Allison mixes water and sodium chloride over the stove until the salt dissolves, then sets the saltwater outside until the water has all evaporated.

○ **A.** III only
○ **B.** III and V only
○ **C.** I and III only
○ **D.** II and III only

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5. Martin is studying local stream systems. He notices that layers of sediment, deposited by the streams, vary in terms of sediment size and layer thickness. From what Martin has learned through research and observations, he proposes that these variations are due to differences in the kinetic energies of streams and in rates of deposition. Specifically, Martin proposes that the more kinetic energy a stream has, the larger the sediment the stream can pick up and eventually deposit. He also proposes that more kinetic energy results in thicker sediment deposits for a given period of time.

Martin builds a laboratory model to test his explanation. His model allows water to be run along a simulated landscape at different velocities and with various sizes of sediment.

If Martin's proposed explanation is correct, increasing the velocity of a given volume of flowing water will _____ the maximum sediment size that can be carried by the water and will result in _____ layers of sediment for a given period of time.

○ **A.** decrease; thinner
○ **B.** decrease; thicker
○ **C.** increase; thinner
○ **D.** increase; thicker

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6. A researcher would like to find out whether gamma radiation or beta radiation would penetrate a concrete wall more rapidly. Which of the following statements would be best suited as a hypothesis the researcher could test?

○ **A.** Will gamma radiation or beta radiation penetrate a concrete wall in 20 seconds or less?
○ **B.** Gamma radiation will penetrate a concrete wall more quickly than beta radiation.

○ **C.** Both beta radiation and gamma radiation can penetrate a concrete wall.

○ **D.** Beta radiation travels faster than gamma radiation.

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7. Michael is performing an indoor experiment with plants to determine how they react to light. Which of the following is a testable hypothesis that is relevant to his experiment?

○ **A.** The final height of a plant is determined by the average outdoor temperature of an area.

○ **B.** The overall health of a plant depends on whether or not it is properly fertilized.

○ **C.** The angle at which indoor plants grow is related to the location of natural light sources such as windows.

○ **D.** Placing plants in clay pots can affect the number of times the plant needs to be watered each week.

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8. A researcher needs to pour exactly 2 mL of a solution into five different Petri dishes. Which of the following instruments would best help the researcher correctly distribute the solution?

○ **A.** a graduated cylinder

○ **B.** a balance

○ **C.** a burette

○ **D.** a teaspoon

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9. David would like to determine how mixing two solutions that chemically react with each other affects the volume of the solutions. David hypothesizes that the solutions will increase in volume. David tests his experiment by:

1. Selecting the solutions to test.
2. Pouring the solutions together.
3. Measuring the volume of the solutions after the chemical reaction has taken place.
4. Recording his results

What is wrong with how David tested his hypothesis?

○ **A.** David did not time how long the chemical reaction took to occur.

○ **B.** David did not measure the solutions' volumes before mixing the solutions.

○ **C.** The hypothesis was not valid because no solutions can change in volume.

○ **D.** David did not perform the experiment on another set of solutions.

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10. Natalie's teacher told her that the Sun's rays hit the Earth's surface at different angles throughout the day. How might Natalie directly test this explanation?

○ **A.** She could measure each individual ray from the Sun with a compass.

○ **B.** She could measure the length of the shadow made by a 10-foot pole at different times throughout the day.

○ **C.** She could ask another teacher, who might know more about it.

○ **D.** She could measure the surface temperature at different times throughout the day.

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11. Hannah wants to measure the length of time it takes for a mouse's heart to beat fifty times. Which of the following tools would be the most useful for this investigation?

○ **A.** ruler
○ **B.** stopwatch
○ **C.** balance
○ **D.** thermometer

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12. A meteorologist is examining the effects of global warming on her community's climate. Which of the following instruments will be the most appropriate for the meteorologist to use?

○ **A.** a microscope
○ **B.** a burette
○ **C.** a meter stick
○ **D.** a thermometer

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13. Idriss would like to perform an experiment in which he records how a solution's temperature changes every minute over the course of 5 minutes. Which of the following tables would best help Idriss organize the data he collects?

Time (m)	Temperature
0	
5	
10	
15	
20	
25	

W.

Temperature	Time (m)
0	
5	
10	
15	
20	
25	

X.

Time (m)	Temperature
0	
1	
2	
3	
4	
5	

Y.

Time (m)	Temperature
0:00	
0:10	
0:20	
0:30	
0:40	
0:50	

Z.

○ **A.** Z
○ **B.** W
○ **C.** Y
○ **D.** X

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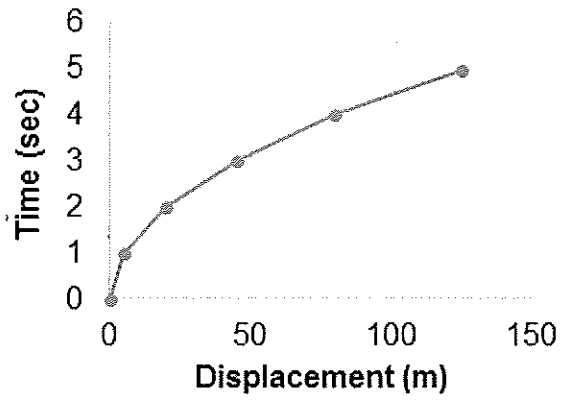
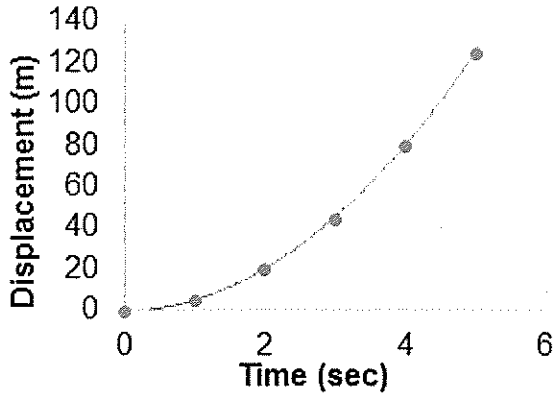
14. Valerie believes that her dog is incredibly fast and might be able to compete in dog races. To determine just how fast her dog can run, she observes her dog as it accelerates from rest to its full speed over a time period of 5 seconds. She then notes how far her dog has traveled after each second and records this data in the table below.

time (seconds)	displacement (meters)
0	0
1	5
2	20
3	45
4	80
5	125

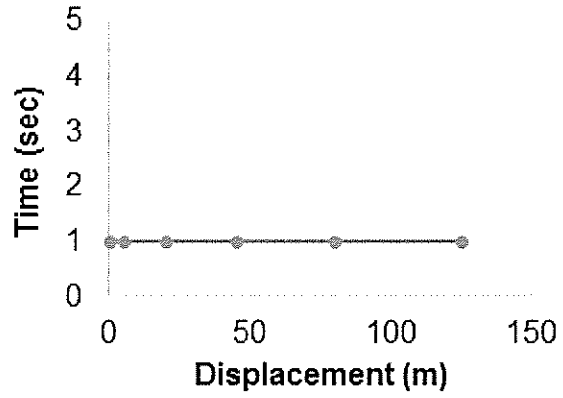
Which of the graphs below is the best way for Valerie to represent the data in her table?



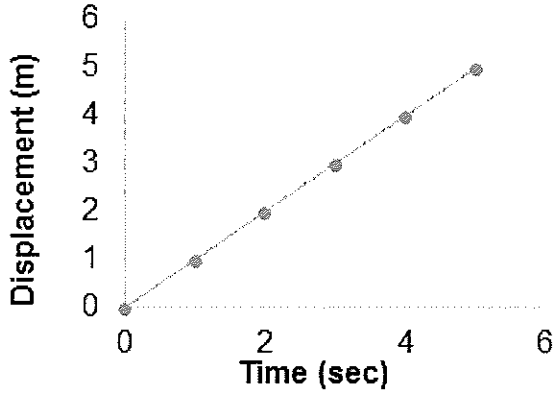
W.



X.



Y.



Z.

○ **A.** X
○ **B.** Y
○ **C.** Z
○ **D.** W

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15. Which of the following types of data organizers would be best to show a change in data that is not continuous?

○ **A.** circle graph
○ **B.** line graph
○ **C.** table
○ **D.** bar graph

16. A researcher is doing an experiment to examine the stability of a certain chemical compound at an atmospheric pressure of 29.92 inches Hg. It would be best for the researcher to use a barometer that measures from _____ inches Hg in increments of _____ inches Hg

○ **A.** 0 to 100; 0.01

○ **B.** 25 to 75; 0.1

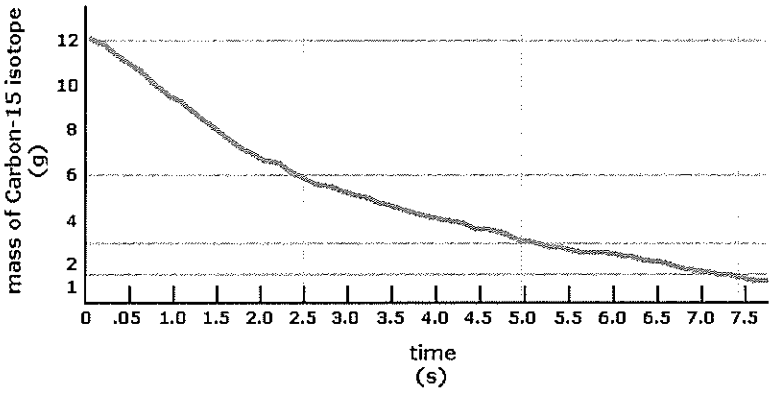
○ **C.** 0 to 100; 5

○ **D.** 25 to 75; 5

17.

Radioactive elements decay over time. The diagram below shows the mass of a sample of radioactive carbon-15 graphed over time.

Mass of Carbon-15 Sample Over Time



Based on the information in the graph, which of the following is a true statement about the relationship between the mass of the carbon isotope and time?

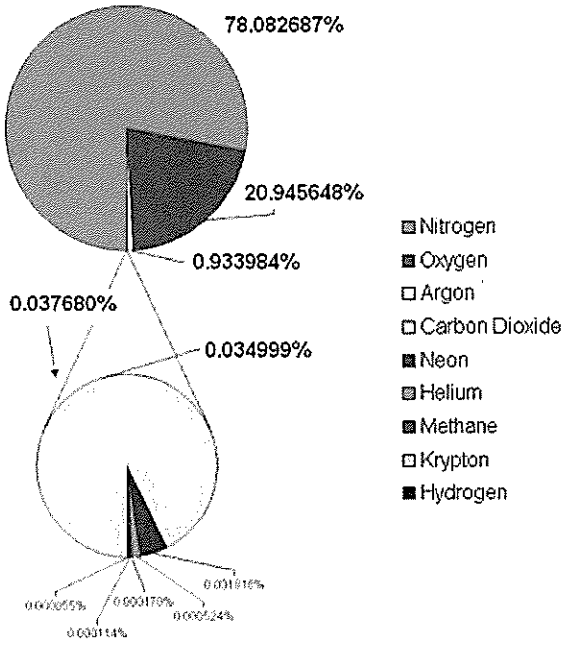
○ **A.** There is no relationship between the mass of the carbon isotope and time.

○ **B.** There is not enough information to tell how the two quantities relate.

○ **C.** There is a positive relationship between the mass of the carbon isotope and time.

○ **D.** There is a negative relationship between the mass of the carbon isotope and time.

18. Examine the graph below showing the composition of Earth's atmosphere.



Which of the following conclusions can be drawn from the graph?

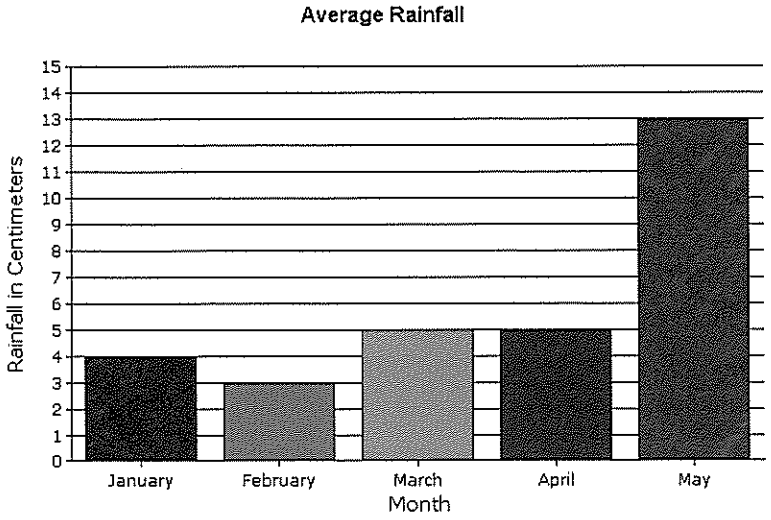
○ **A.** The majority of the gas molecules in Earth's atmosphere are nitrogen molecules.

○ **B.** The amount of argon in Earth's atmosphere is less than 0.037680%.

○ **C.** The amount of oxygen present in Earth's atmosphere varies over the course of the year.

○ **D.** The majority of the gas molecules in Earth's atmosphere are carbon dioxide molecules.

19.



Which of the tables below matches the data presented in the graph?

○ **A.**

Jan	Mar	May
4 cm	5 cm	13 cm

○ **B.**

Jan	Mar	May
5 cm	6 cm	14 cm

○ **C.**

Jan	Mar	May
4 cm	3 cm	5 cm

○ **D.**

Jan	Mar	May
4 cm	5 cm	14 cm

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20. Dr. Mendenhall knows that air particles with greater masses and lower velocities will be more strongly influenced by the Earth's gravity than lighter particles that move more quickly.

So, he hypothesizes that samples of air near the floor of his laboratory will have a higher abundance of heavy molecules than air samples taken near the ceiling. To test his hypothesis, he takes samples from various heights and decides to measure the abundances of molecular nitrogen (a relatively heavy gas) against molecular helium (a relatively light gas) in these samples. He charts his data below.

	% helium	% nitrogen
floor sample	0.11	78.0
knee-level sample	0.12	78.2
eye-level sample	0.10	77.9
ceiling sample	0.11	78.0

What does Dr. Mendenhall's data show?

○ **A.** The mass of an air molecule has a positive relationship to its height.

○ **B.** There is no clear relationship between the mass of molecular helium and molecular nitrogen and their height in his laboratory.

○ **C.** The mass of an air molecule has a negative relationship to its height.

○ **D.** An air molecule's mass has no influence on its relative abundance at different heights in the atmosphere.
