Name: _____ 13

Intervention 8.0.2 Science Vs. Engineering

Qualitative vs. Quantitative

Determine which of the following statements are qualitative and which are quantitative.

1. _____ The cup had a mass of 454 grams.
2. _____ The temperature outside is 250 C.
3. _____ It is warm outside.
4. _____ The tree is 30 feet tall.
5. _____ The building has 25 stories.
6. _____ The building is taller than the tree.
7. _____ The sidewalk is long.
8. _____ The sidewalk is 100 meters long.
9. _____ The race was over quickly.
10. _____ The race was over in 10 minutes.

Scientists Vs. Engineers

Indicate which of the following is a characteristic of a SCIENTISTS or ENGINEERS.

11. _____ ask questions and develops an <u>experiment</u> to answer that question.
12. _____ identify a specific <u>need</u>: Who need(s) what because why? And then, he or she creates a solution that meets the need.
13. _____ <u>create</u> new things, such as products, websites, environments, and experiences.
14. _____ study how <u>nature</u> works.
15. _____ create solutions to problems.

Scientific Method

Patrick believes that fish that eat food exposed to microwaves will become smarter and would be able to swim through a maze faster. He decides to perform an experiment by placing fish food in a microwave for 20 seconds. He has the fish swim through a maze and records the time it takes for each one to make it to the end. He feeds the special food to 10 fish and gives regular food to 10 others. After 1 week, he has the fish swim through the maze again and records the times for each.

Special Food Group
(Time in minutes/seconds)

Fish	Before	After
1	1:06	1:00
2	1:54	1:20
3	2:04	1:57
4	2:15	2:20
5	1:27	1:20
6	1:45	1:40
7	1:00	1:15
8	1:28	1:26
9	1:09	1:00
10	2:00	1:43

Regular Food Group
(Time in minutes/seconds)

Fish	Before	After
1	1:09	1:08
2	1:45	1:30
3	2:00	2:05
4	1:30	1:23
5	1:28	1:24
6	2:09	2:00
7	1:25	1:19
8	1:00	1:15
9	2:04	1:57
10	1:34	1:30

16. What was Patrick's hypothesis?

17. Which fish are in the control group?

18. What is the independent variable?

19. What is the dependent variable?

20. Look at the results in the charts. What should Patrick's conclusion be?

Scientific Method

Each of the following sentences describes a step of the scientific method. Write the step which best fits each of the examples below on the line to the left of each sentence. Use these steps of the scientific method:

a. Purpose
b. Research
c. Hypothesis
d. Experiment
e. Data/Analysis
f. Conclusion

_____ 21. Pat saw dark clouds overhead. He said, "I think it is going to rain."

_____ 22. Ed timed the eclipse in minutes and seconds. He wanted to see if the newspaper prediction was correct.

_____ 23. Every summer Paul went to the beach with his family. After several summers, he concluded that the beach is always changing.

_____ 24. Jenny told the class, "I saw the moon today on my way to school. How is that possible?"

_____ 25. A geologist gathers fossils and looks up information about the location the fossils were found.

Engineering Design Process

Students are given a challenge to design a catapult that will launch marshmallows at a target. They want their catapult to be both accurate and precise. Choosing from the steps of the Engineering Design Process, match the sentences below, with the appropriate step of the engineering design process.

a. Ask
b. Imagine
c. Plan
d. Create
e. Improve

_____ 26. Cassidy draws a design for her catapult.

_____ 27. Isaac's catapult does not shoot the marshmallows into the target. He makes adjustments to his design and tries again.

_____ 28. Damian constructs a catapult from the design that he drew and shoots his marshmallows. He draws the target and draws each place that the marshmallow lands.

_____ 29. Mrs. Scholes gives her students the challenge to design a toy that kids can use to launch marshmallows at a target.

_____ 30. Isabel and Mikah draw a series of ideas for their designs and discuss which design they think will work the best.

Variables

Students conduct a lab where they test 5 different liquids to see how many drops will fit on a penny. Identify:

Hypothesis: If _____ then _____

because _____

Independent Variable:_____ Dependent Variable: _____

Control(s): _____