The Scientific Method Review Worksheet

Investigation # 1 - A student wanted to know what the best amount of water would be to make a bean plant grow faster. She took 4 styrofoam cups all the same size and filled them with an equal amount of soil. She planted 1 bean seed 2 centimeters into the soil in each cup and placed all the cups on the same window seal in her bedroom. Each day at 6:00 in the morning and 5:00 in the afternoon she added water to each cup. In cup A, she added 10 ml of water. In cup B, she added 15ml of water. In cup C, she added 25ml of water. And in cup D, she added 50 ml of water. She did this every day for 30 days. On the 30th day, she measured the length of the plants. The height of the plant in cup A was 23 cm above the soil. The height of the other plants: cup B – 26 cm; cup C – 30 cm; and cup D – 5 cm.

1. Which of the following questions was the student investigating?
   A. What effect does sunlight have on how fast a plant grows?
   B. What effect does soil have on how fast a plant grows?
   C. What effect does the amount of water have on how fast a plant grows?
   D. How fast does a plant grow?

2. Which of the following is the independent variable in this investigation?
   A. The amount of soil in the cups B. The amount of water in the soil
   C. The height of the plants D. The amount of sunlight on the plants

3. Which of the following is the dependent variable in the investigation?
   A. The amount of soil in the cups B. The amount of water in the soil
   C. The height of the plants D. The amount of sunlight on the plants

4. Which of the following <u>is not</u> a controlled variable in the investigation?
   A. The number of seeds in the cups B. The amount of soil in the cups
   C. The height the plants grew D. The amount of sunlight on the plants

5. Which of the following is a logical reason for the data from cup D?
   A. Cup D had too much sunlight B. Cup D was watered too much
   C. Cup D was not watered enough D. The soil in cup D was not good

6. Which of the following would be the correct results of the investigation?
   A. The data is inconclusive; can't tell the results B. The data shows that plant A grew the fastest
   C. The data shows that plant B grew the fastest D. The data shows that plant C grew the fastest

7. Which of the following would be the best way for the student's data to be validated?
   A. The student should conduct the experiment over with a different independent variable
   B. The student should conduct multiple trials for each of the plants
   C. The student should have another student look over her data table to make sure it's complete
   D. The student should publish her results in a Scientific journal

8. The student adds two more trials to her procedures and repeats the experiment over again. Which of the following would be the best way to ensure the student's results are accurate?
   A. The only way to ensure the accuracy of the results is for a professional scientist to do the experiment
   B. The student should repeat the experiment, but change the controlled variables
   C. Another student should repeat the experiment, but do even more trials
   D. Other students should replicate the experiment

Investigation # 2 - Ms. Garber wanted to find out if eating breakfast helps students learn more in Science class. She asked half of her 1st Period class to eat breakfast every morning and the other half of the class not to eat breakfast. Ms. Garber's hypothesis was that if students ate breakfast each day, then their brains would work better and they would learn more. Therefore, they would make better grades. After 30 days, Ms. Garber observed all of the students' grades in Science. Her data is shown in the data table.

	Student Science Grades			
	A	B	C	D
Ate Breakfast	4	5	3	0
No Breakfast	1	3	6	2

9. Which of the following is the independent variable?
   A. The grade the students made
   B. How much breakfast the students ate
   C. Did the student eat breakfast or not
   D. How much a student learned in class

10. Which of the following is the dependent variable?
   A. The grades the students made
   B. How much breakfast the students ate
   C. Did the student eat breakfast or not
   D. What the students ate for breakfast

11. Which of the following is the best conclusion for the investigation?
   A. As a result of her investigation, the data supports her hypothesis.
   B. As a result of her investigation, the data does not support her hypothesis.
   C. As a result of her investigation, the data doesn't mean anything.

12. Which of the following is **NOT** an error that could affect the possible outcome?
   A. Don't know what the students ate
   B. Don't know if the student paid attention in class
   C. Don't know how much the student ate
   D. There was not an average column in the data table

Investigation # 3 – Sean was thirsty, so he opened up a bottle of soda from his cabinet. It wasn't cold enough, so he put the cup of soda into the freezer to make it colder. When he came back to get it, the soda was frozen. This got him curious. Did his soda freeze faster than the ice cubes that were already there in the freezer? What about other liquids? Do all liquids take the same amount of time to freeze, or do some freeze faster than others? He decided to conduct an experiment to find out. He poured some soda into one cup, some orange juice into another cup, some milk into a third cup, water into a fourth cup, and salt water into a fifth cup. He placed each cup of liquid into the freezer and started a stopwatch. He predicted the water would freeze the fastest since it didn't have any stuff in it like sugar or salt. After one hour, he observed the liquids in the freezer to see if they had frozen yet. They were not. So he came back every thirty minutes to check on them. The next time he checked, after one hour and thirty minutes, both the water and the milk were frozen, but not the others. Thirty minutes later, he checked again. The salt water was frozen, but not the soda or juice. 30 minutes later, both the soda and juice were frozen.

13. Which of the following should be a hypothesis that Sean would make for this investigation?
   A. Yes, I think the water will freeze faster
   B. If the water froze first, then it is because it doesn't have sugar in it
   C. The data shows the water froze first
   D. If different liquids are frozen, then milk will freeze the fastest because it doesn't have anything added to it.

What are the variables for this experiment?

14. Independent
15. Dependent
16. Controlled
17. Controlled

18. Other than he only did one trial, what is another problem with Sean's investigation?

Investigation # 4 - Jordan was curious about if the mass of an object affects the speed the object falls when it's dropped. She looked around her house and selected a Rubik's cube, a basketball, a marble, and a T.V. remote control to conduct an experiment. She predicted the basketball would fall to the floor the fastest. Her reason was, the basketball is more massive than the others. She decided to drop each object three times from two meters above the floor. The results are shown in the data table.

Objects Dropped from 2 meters high					
Time it takes for an object to drop to floor (in seconds)		Marble 52.3 g	Rubik's Cube 135.8 g	T.V. Remote 284 g	Basketball 625 g
	Trial 1	1.1	1.3	1.3	1.1
	Trial 2	1.0	1.3	1.3	1.1
	Trial 3	1.1	1.3	1.4	1.0
	Average	1.1	1.3	1.3	1.1

19. Write out a full hypothesis Jordan would make for this investigation.

What are the variables for this experiment?
20. Independent
21. Dependent
22. Controlled

23. Analyze and explain Jordan's results.

24. Ciara wanted to verify Jordan's results, so she repeated the experiment just as Jordan did it. What is this process called?

25. Other than repeating more trials, how could Jordan change her experiment to see if she still gets the same results?