Chapter one: The Nature of Science Study Guide

Key

ACROSS
4 An endeavor to find answers
9 Application of science to help people
12 A noticeable property with the use of your senses
14 The factor adjusted by the experimenter (you?)

DOWN
1 Science to advance knowledge
2 A possible explanation
3 A statement about what happens in nature and seems to be true all of the time
5 An explanation based on knowledge gained from observation and investigation
6 A factor that does NOT change during an experiment
7 The study of matter and energy
8 The actual change from the independent variable
10 A standard by which the test results can be compared to
11 A plan to test a hypothesis
13 Idea, event, or object to help people better understand
The Simpsons - Identifying the Controls and Variables

Experiment 1
Smithers thinks that a special juice will increase the productivity of workers. He creates two groups of 50 workers each and assigns each group the same task (in this case, they're supposed to staple a set of papers). Group A is given the special juice to drink while they work. Group B is not given the special juice. After an hour, Smithers counts how many stacks of papers each group has made. Group A made 1,587 stacks, Group B made 2,113 stacks.

Answer:
1. Which is the control group? B
2. Which is the experimental group? A
3. Identify the independent variable. Special juice
4. Identify the dependent variable. Stacks of paper
5. Given the experimental design, what should Smithers' conclusion be? Special juice does not make a difference
6. How do you think the experiment could be improved? Larger sample, longer period, more complex tasks

Experiment 2
Homer notices that his shower is covered in a strange green slime. His friend Barney tells him that coconut juice will get rid of the green slime. Homer decides to check this out by spraying half of the shower with coconut juice. He sprays the other half of the shower with water. After 3 days of "treatment" there is no change in the appearance of the green slime on either side of the shower.

Answer:
1. What hypothesis is Homer trying to test? Coconut juice will destroy green slime
2. What is Homer's conclusion? No change - coconut juice does not destroy slime
3. What is the control group? Water side
4. What is the experimental group? Coconut side
5. What is the independent variable? Spray
6. What is the dependent variable? Change in slime
Experiment 3  
Bart believes that mice exposed to microwaves will become extra strong (maybe he's been reading too much Radioactive Man). He decides to perform this experiment by placing 10 mice in a microwave for 10 seconds. He compared these 10 mice to another 10 mice that had not been exposed. His test consisted of a heavy block of wood that blocked the mouse food. He found that 9 out of 10 of the microwaved mice were able to push the block away. 6 out of 10 of the non-microwaved mice were able to do the same.

Answer:
1. What is the control group?  
   not microwaved
2. What is the experimental group?  microwaved
3. What is the independent variable?  microwaved or not
4. What is the dependent variable?  push block or not
5. What should Bart's conclusion be?  microwaving could make a difference
6. How could Bart's experiment be improved?  more mice, more trials, longer microwave times

Experiment 4  
Krusty was told that a certain itching powder was the newest best thing on the market. It even claims to cause 50% longer lasting itches. Interested in this product, he buys the itching powder and compares it to his usual product. One test subject (A) is sprinkled with the original itching powder, and another test subject (B) was sprinkled with the Experimental itching powder. Subject A reported having itches for 30 minutes. Subject

Answer:
1. What is the control group?  
   Original itching powder
2. What is the experimental group?  New itching powder
3. What is the independent variable?  Itch powder
4. What is the dependent variable?  Length of itchiness
5. Does the data support the advertisements claims about its product? Why or why not?  
   No, it is longer but not 50%
Use the definitions of pure science and technology listed below to decide whether the discovery described in each statement is an example of pure science or technology. Write a P for pure science or a T for technology in the space provided.

**pure science:** the study of a subject for the advancement of knowledge
**technology:** the application of scientific knowledge to improve the quality of life

1. Sarah observed that the shape of the moon seems to change slightly each night. ✗
2. A scientist observed that coating glass with certain materials helped to prevent the glass from shattering. ✓
3. A meteorologist discovered that a radar system developed to track the paths of airplanes could also be used to track the paths of storms. ✓
4. While on a field trip, a geology student discovers a new kind of mineral. ✓
5. A biologist discovered that bacteria could not grow in an environment where a certain kind of mold was present. The mold was later used to make the drug penicillin. ✓

Place a check mark beside each item that is likely to be studied by a physical scientist.

✓ 6. the energy given off by the sun
✓ 7. the bones that make up the human body
✓ 8. the composition of the bones in the human body
✓ 9. the temperature at which ice melts
✓ 10. the substances that make up a drug
✓ 11. the distance from the sun to Earth
✓ 12. the fish population in a pond
✓ 13. the speed at which electricity travels through a certain kind of wire
✓ 14. how heat from the sun can be used to heat a home on Earth
✓ 15. when the next bird migration occurs
✓ 16. the amount of precipitation that falls in a desert
✓ 17. the chemical makeup of a newly discovered mineral
Physical Science and You

Read each group of terms. Circle the two terms that are most related. In the spaces provided, explain how the terms are related. Write your answers in complete sentences.

1. matter, animals, energy
   - Matter and energy make up the study of physical science.

2. knowledge, pure science, technology
   - Pure science is the pursuit of knowledge.

3. pure science, technology, applied science
   - Technology is applied science.

4. sunlight, matter, energy
   - Sunlight is a form of energy.

5. rocks, matter, energy
   - Rocks are an example of matter.

6. electricity, sunlight, matter
   - Electricity and sunlight are forms of energy.

7. hardness, observing, questioning
   - Processes of science

For each term listed, write a definition using your own words.

8. technology: Application of scientific knowledge to improve the quality of human life.

9. physical science: The study of matter and energy.

Answer the following question with complete sentences on the lines provided.

10. How does “pure” science differ from technology?
    - Pure science is centered around the advancement of knowledge. Technology is geared towards the improvement of the quality of life.