Name _____ Class _____ Date _____

Skills Worksheet

Directed Reading B

Section: Scientific Methods (pp. 14–21)

WHAT ARE SCIENTIFIC METHODS?

_____ **1.** What are the steps scientists use to answer questions and solve problems?
- **a.** observations
- **b.** formulations
- **c.** flowcharts
- **d.** scientific methods

2. List the steps that are included in the scientific methods.

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ASKING A QUESTION

_____ **3.** What does asking questions help scientists to do?
- **a.** find answers with less investigation
- **b.** focus the purpose of an investigation
- **c.** ask questions and memorize answers
- **d.** know where to look up the answers

4. Any use of the senses to gather information is called

_____.

5. Observations made with tools are called _____.

6. Efficiency compares energy output with _____.

7. Why is the efficiency of a boat important?

_____

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_____

8. What question did the two engineers James Czarnowski and Michael Triantafyllou explore?

FORMING A HYPOTHESIS

_____ **9.** After a scientist has asked questions and made observations, he or she is ready to
- **a.** answer the questions.
- **b.** explain the answers.
- **c.** start a different investigation.
- **d.** form a hypothesis.

_____ **10.** What is a hypothesis?
- **a.** an observation based on investigation
- **b.** a possible explanation based on observations
- **c.** a comparison of input and output
- **d.** a question based on conclusions

11. A good hypothesis should be _____.

12. What is wrong with a hypothesis that can't be tested?

13. What was the hypothesis that Czarnowski formed?

14. What observations did Czarnowski make before forming his hypothesis?

15. A good way to make a prediction about a hypothesis is by stating it in a(n) _____ statement.

16. How might the MIT scientists have stated their prediction in an if-then statement?

_____

_____

TESTING THE HYPOTHESIS

_____ **17.** Testing a hypothesis helps you determine if the hypothesis is
- **a.** a reasonable answer to your question.
- **b.** a controlled experiment.
- **c.** efficient.
- **d.** an adaptation.

_____ **18.** If your tests show that your hypothesis is way off the mark, you may have to
- **a.** change the topic you are studying.
- **b.** buy new measurement tools.
- **c.** repeat the tests until you get the results you want.
- **d.** change the hypothesis.

_____ **19.** A controlled experiment compares results from experimental groups with
- **a.** results from other experimental groups.
- **b.** results from other investigations.
- **c.** results from a control group.
- **d.** results from past experiments.

20. The purpose of a controlled experiment is to _____ a hypothesis.

21. In a controlled experiment, the control group and the experimental groups are the same except for a factor in the experimental groups called a(n) _____.

22. In a controlled experiment, the factors that are kept the same between groups are called _____.

23. How did Czarnowski and Triantafyllou decide to test their hypothesis?

_____

_____

24. Pieces of information gathered through observation or experimentation are called _____.

25. What was the only parameter the scientists changed in the *Proteus* experiment?

26. What could the scientists tell from changing this parameter?

ANALYZING THE RESULTS

27. After you run an experiment and collect data, you must _____ the data to see if the results support your hypothesis.

28. Organizing data into _____ and _____ can make information easier to use.

DRAWING CONCLUSIONS

_____ **29.** What must you do at the end of an experiment?

a. Draw a conclusion.
b. Analyze a graph.
c. Draw a picture.
d. Analyze a chart.

30. Give examples of general conclusions you might draw after an investigation.

31. What did the two scientists conclude after the trials of the *Proteus*?

32. Why were the scientists able to reach this conclusion?

COMMUNICATING RESULTS

33. What are some ways to communicate the results of a scientific investigation?

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34. Why is it important to communicate the results of a scientific investigation?

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