SAMPLE PAGES FOR

CHALLENGE THE 5TH GRADE SCIENCE

Florida **C**omprehensive **A**ssessment **T**est

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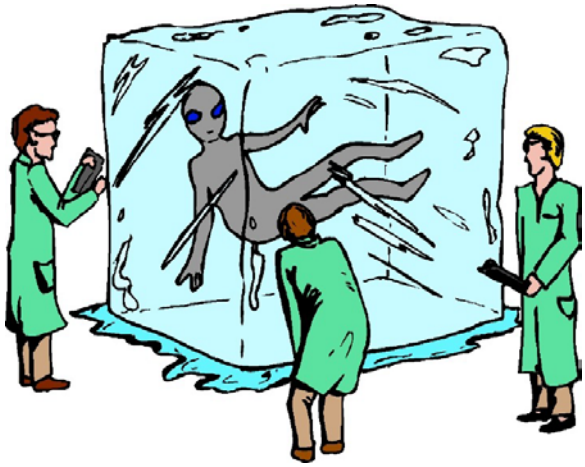
COMPARING AND CONTRASTING

What is comparing?

How are they alike? How are they different? Have you heard these questions asked in your science classes before? If so, you've been asked to **compare** and **contrast** things. Comparing is finding out how things are alike. Humans and bacteria don't look very much alike; however, you can find many things that they have in common. For instance, both **reproduce**, take in food, eliminate **wastes**, and respond to things in their **environments**.

What is contrasting?

Contrasting means to find differences between things. How are humans and bacterias different? Humans are a lot bigger than bacteria, can move larger distances more quickly, and so on. Scientists use comparing and contrasting to help classify and identify organisms. When a new species is found, scientists find all of the similarities between the organism and other, know ones. They compare the new organism with the known **species**. If they find many differences, they may create an entirely new species.



Further Study

compare	contrast	reproduce
wastes	environment	species

Questions for you to answer

1. Define the term compare.

2. Compare an apple and an orange.

3. Define the term contrast.

4. Contrast an apple and an orange.

MODELS

What is a model?

A **model** is something that **represents** something else. Why would someone want to make a model? Why not use the real object? Models represent things that are too large, too small, or too complex to normally see or understand. For instance, if you were doing a presentation on the Earth, it would be impossible to bring the entire Earth to class. You'd have a much easier time bringing in a model of the Earth, called a **globe**. In this case, the real thing, the Earth, was too large to use, so you used a model of the Earth instead.

What do models represent?

Can you think of a model that represents something too small to be seen? How about the model of the atom presented in this book? Atoms cannot be seen with the unaided eye, so a model is created that shows what we think an atom looks like. Most pictures of atoms also simplify something that is too **complex** to understand. **Electrons** are usually shown as small balls that orbit the nucleus. This is an *incorrect* model. The true model would show electrons as waves instead of as balls. However, it's a lot easier to think of electrons as balls than as waves.

Making a model requires creativity, attention to detail, and accuracy. All models have problems. True sizes, shapes or other details have to be sacrificed in order to present something that can be easily seen or understood.

Further Study

model	represents	globe
complex	electrons	

Questions for you to answer

1. What is a model?

_____

_____

2. Why are models used?

_____

_____

3. Name two limitations of models; that is, how are models inaccurate?

_____

_____

4. Name two skills that model builders must possess.

_____

_____

PREDICTIONS

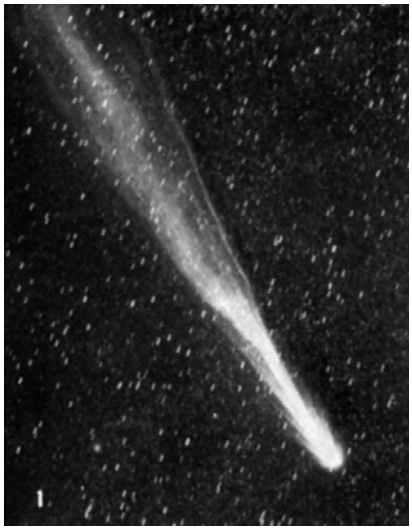
What is a prediction?

If you were given one million dollars to make a **prediction** that came true, what would you predict? Would you predict that if you flipped a coin it would come up "heads"? Your chance of being correct would be about 50%. Would you predict that a couple you know will get married, or would your prediction be much safer? How about predicting that the Sun will rise tomorrow morning? **Natural events** are often predictable. This does not guarantee that they will happen, it's just very likely. The Sun will most likely rise tomorrow morning, but there's a small possibility that it won't.

Are some things easier to predict than others?

Some natural events are more predictable than others. Things that are close and easily observed lead to better predictions. It's easier to make a correct prediction about something close and familiar than about something far away. It's easier to predict the behavior of the Moon than that of a faraway asteroid.

The more often a natural event happens, the easier it usually is to predict. The Sun rises every 24 hours, so it's rising tomorrow is fairly easy to predict. Some **comets** pass the Earth only once in a thousand years, so scientists know much less about these bodies and their predictions about them are less accurate.



A comet passing Earth

Further Study

prediction natural events asteroids comets

Questions for you to answer

1. What is a prediction you could make that would be more probable than predicting you'd get heads when you flipped a quarter?

2. What is a prediction that would be less likely than predicting "heads" when you flipped the quarter?

3. Why are some natural events more predictable than others?

Objective #42

TECHNOLOGY

What are tools used for?

What would you do if you were in the jungle and were about to be attacked by a huge tiger? Would you pick up a stick and try to scare off the cat? Would you throw things at the tiger? If so, you would have used a **tool** to solve a problem.

Scientists are constantly **inventing** new tools to help them solve problems and do their work. Scientists have invented a number of useful tools, such as computers, calculators, microscopes, telescopes, and even branches of mathematics that help them solve problems. Issac Newton was unable to do some problems in physics so he created the branch of mathematics called **calculus**. Now that's pretty smart.

Why was the Internet created?

The **Internet** was created so scientists could share data quickly with others. The Internet has become so crowded with nonscientist users using it that scientists are now using Internet 2 to communicate. They are even planning an Internet 3 to use when the public starts using Internet 2.

Scientists use computers in a number of ways.

Further Study

tool inventing calculus Internet

Questions for you to answer

1. Why do scientists invent new tools?

2. What tool invented by scientists has impacted your life the most? Please explain your response.

3. Some people say that everything that can be invented has already been invented. What do you think about this idea?

SCIENTIFIC METHOD

What is the scientific method?

Science is a way of asking questions of nature. People who do scientific studies use guidelines, called the **scientific method**, to conduct their investigations.

The Scientific Method

1. Ask a question
2. Collect information about the question.
3. Make a guess or hypothesis that answers your question.
4. Test your hypothesis.
5. Tell others about your find.

Although these guidelines don't have to be exactly followed in a precise set order, most scientists follow these steps: (1) ask a question; (2) collect information about the question; (3) make a guess, called a **hypothesis**, that answers your question; (4) test your hypothesis; (5) tell others what you found.

Does everyone follow the method exactly?

When using the scientific method remember that the steps are flexible and don't have to be followed in a particular order. Making a wrong turn and proposing an incorrect idea are common steps not included in the scientific method. Scientists rarely find what they're looking for the first time they try. Scientists often make mistakes. But some of these mistakes have led to great discoveries, such as the discovery of penicillin. Penicillen was discovered when a scientist forgot to throw away a sample when he was cleaning up his lab.

Further Study

science	scientific method	hypothesis
flexible	discoveries	

Questions for you to answer

1. What is the scientific method?

2. Do all scientists follow the scientific method in exactly the same way? Please explain your response.

3. Are mistakes a "bad thing" in science? Please explain your response.

SCIENTIFIC RESPONSIBILITY

Can science create problems?

What thoughts come to your mind when you hear **nuclear bomb**, **anthrax**, or **nerve gas**? Fear, anger, disgust? Many scientific discoveries can be used for the good of humans, while others could wipe out the entire human race. Try to think of a world without cars, air conditioning, safe foods, and other items created by scientists to improve the quality of your life. Science has definitely improved life, but it has also created some deadly problems.

What are ethics?

Scientists have a **responsibility** to protect others from harm caused by their research and activities. In fact, before a scientist creates and builds something, she/he should first think how it might affect other people. It's dangerous for a scientist to create something that could wipe out humans. Creating a **pesticide** that kills all mosquitoes sounds good, but the pesticide could wreck the balance of nature and lead to other organism deaths. Science **ethics** demands that scientists must not knowingly subject their co-workers, students, or the community as a whole to health or property risks.

Is killing all pests a good idea?

Further Study

anthrax	nerve gas	responsibilities
pesticide	ethics	

Questions for you to answer

1. Name two beneficial discoveries made by scientists that have led to your having a better life.

_____

_____

2. Name two discoveries made by scientists that could potentially harm you.

_____

_____

3. What is science ethics?

_____

_____

THE NATURE OF SCIENCE

The following 17 multiple-choice questions cover the topics presented in Chapter 8. Try to avoid guessing at answers. Make sure that you completely understand each question and answer. If not, review the material presented in the chapter.

1. What is the name of the attempt to put the universe in order?
   a. biology b. science
   c. universology d. technology

2. True or false? All scientists use the exact same rules and methods when experimenting.
   a. true b. false

3. True or false? Scientists should allow others to see and review their experiment results.
   a. true b. false

4. What term describes the repetition of an experiment ?
   a. subject b. sample
   c. variable d. replication

5. True or false? Most scientists work as part of a team.
   a. true b. false

6. Which of the following is *not* one of the "rules" that all scientists should follow?
   a. Keep data secret so that no one else can see the results.
   b. Keep accurate and neat records.
   c. Share data with other scientists working in the same and other fields.
   d. Repeat experiments many times.

7. What term describes how two things are alike?
   a. accuracy b. precision
   c. comparison d. replication

8. What is a representation of something that is too big, too small, or too complex for a person to use?
   a. plan b. replication
   c. contrast d. model

9. True or false. Some natural events are predictable.
   a. true b. false

10. What term describes how two things are different?
   a. contrast b. synopsis
   c. growth d. precision

11. Predictions usually improve if the event happens
   a. more often. b. less often.
   c. once in a million years. d. once in a billion years.

12. True or false? All scientists work in laboratories.
   a. true b. false

13. The Internet was originally created for
   a. students to instant message each other.
   b. students to email their homework to teachers.
   c. teachers to make web pages.
   d. scientists to share data.

14. True or false? Scientists invent and use tools to solve problems.
   a. true b. false

15. Which is *not* a step of the scientific method?

a. keep results secret
b. make a hypothesis
c. ask a question
d. test a hypothesis

16. True or false? Scientists always find what they're looking for the first time they do an experiment.

a. true
b. false

17. True or false? Scientists have a responsibility to protect others from harm.

a. true
b. false