

Think like a scientist: Student reading / activity guide

Students: As you read the information below, underline important facts or definitions with your pencil or highlighter so you can find it for the written activity after the lesson.

Although you may not know it, you think like a scientist every day. Questions come up, and you try to answer them. For example, has something happened today that you didn't understand or wanted to know more about? Maybe it was a math question; maybe you wanted to know what the weather could be so you could decide what to wear to school. Think about this question for a minute and then with your teacher's approval share it with a partner.

When you try to answer questions and solve problems, you are using many of the same skills that scientists use in their jobs. Read more details about these important skills below.

Observing

When you use one or more of your five senses to gather information, you are **observing**. When you hear a dog bark, count twelve green seeds, or smell smoke, you are making observations. Scientists are fortunate because they can sometimes use special tools to enhance their senses. Microscopes, telescopes, and other special instruments help them make more detailed observations than they could make with their senses alone. A microscope, for example, can make your vision powerful enough to see tiny hairs on a caterpillar that you could never see without assistance.

The key to observation, though, is that it must be accurate and factual. It cannot be made up in order to help solve a problem. It must be exact, and to do this you must keep careful records of your observations in science class. You can do this by writing or drawing on paper or in a notebook. This information that you collect is sometimes called evidence, data, or feedback.

Inferring

After you see or observe something in the world, you try to interpret it or make a prediction about what it is based on the details you observe. This interpretation or explanation is not necessarily correct; it is an educated guess. Scientists call such educated guesses **inferences**. You are inferring when you draw a conclusion based only on what is observed and what you already know, without searching for additional information. For example, if you hear a rooster crowing while you are partially asleep in bed, you would infer that the sun has come up and it is early morning. To make this inference, you combine the evidence – the crowing rooster – and your experience or knowledge of sunrise. You know from early elementary school that roosters typically crow in the morning at sunrise. To infer without looking that it is morning and sunrise is logical.

Remember though, that an inference is not a fact; it is only one of many possible reasons or explanations. For example, the rooster could be crowing because there is an intruder in his pen or because he is injured. An inference may turn out to be incorrect even if it is based on accurate observations. The only way to confirm whether an inference is true or false is to conduct a deeper investigation.

Predicting

Do you watch or listen to weather forecasts? Even if you don't, you probably know that weather forecasts are predictions about what the weather will be like later today, tomorrow, or next week. Weather forecasts may predict the amount of rain that will fall, wind speeds, paths of hurricanes, or whether there will be a snowstorm that keeps you out of school! In order to make these predictions, weather forecasters -- also called meteorologists -- observe the weather and use their observations and their knowledge of weather patterns to **predict** what will happen. The skill of predicting involves making an inference about a future event based on current evidence and past experience.

Classifying

Every year your picture is taken and placed in your school's yearbook. You find your picture in the yearbook by looking first for your class by grade and then for your name alphabetically. Can you imagine if your picture was just placed randomly in the book? It would take you a long time to find your picture! Organization or grouping by similarities is called **classifying**. You are grouped onto a certain page with your classmates because you are in the same grade and class. You can classify items in all kinds of ways, using size, shape, purpose, color, and so on. Scientists use this skill to organize information and objects. As a scientist solving a problem you are collecting **data**, and when you group similar data together, it is easier for you to understand how they relate or connect.

Making models

Have you ever played the game where you draw a picture and another person guesses what you are drawing without talking? If so, you were drawing a type of **model**. You use and make models all the time – a hand-drawn sketch, a diagram or illustration in a textbook, or a three-dimensional, physical object that is smaller than the object it represents. A good model can help you to understand something very complex in a simpler way. For example, if you read a description of the solar system, you might have trouble understanding how the planets rotate around the sun. A diagram of the solar system or a three-dimensional model that you could touch would make the concept easier for you to understand. Another example is putting a toy together. Often the instructions include pictures as well as words to help the person who buys the toy understand the process step by step. Scientists also use models to help them simplify complicated information and ideas. Scientists' models are often generated by computers, and sometimes they are only mental models made up of mathematical equations, but these models, like the ones you use, help scientists to simplify and make sense of complicated processes.

Communicating

Every day you talk to friends, listen to what other people have to say, and write messages or even letters. Reading, writing, speaking, and listening are all part of communicating. **Communication** is simply sharing ideas and information with other people. Scientists communicate to share information, data, results, and opinions. They often use formal methods of communication such as meetings, reports, and the Internet. By communicating, they can help one another find answers to questions and problems.

Informational Resource: Prentice Hall: *North Carolina Integrated Science: Grade 6*. Pages 182-183 Section A

Name: _____

Student Activities: Application of scientific skills

Activity #1: There are three pictures below. Look at them together and with a partner answer the questions below in the space provided.

- (Observing) 1. List 3 observations.
- (Inferring) 2. Use your observations to make an inference about what has happened. What experience or knowledge did you use to make the inference?
- (Predicting) 3. Predict what will happen next. On what evidence did you use to make the inference?

**Write answers in this space.
Number each answer.**



Activity #2: Communicating

In the space provided, write out clear, specific directions on how to tie your shoe. Then, exchange your paper with a partner. See if you can follow your partner's directions by doing them exactly as they are written. Were you both successful? Could either you or your partner have written the directions more clearly? (Answer these questions below your directions.)

Directions: _____

Answers to Questions: _____

Activity #3: Who else in the real world thinks like a scientist?

Answer this question by reviewing with a partner the 12 jobs below and classifying the skills in each job.

Group Assignment: For each of the skills in the reading, identify two careers from the list below that most use the skill to perform the job.

Architect - licensed to design and build buildings, complexes, towns, and more.

Veterinarian - treats and cares for pets, livestock, and other animals.

Teacher - helps students of a specific age to learn and apply concepts in subjects such as math, science, and art.

Weathercaster - gathers information, prepares reports, and broadcasts information about the weather.

Child Care Worker - nurtures and teaches children of all ages.

Sales Clerk in Music Store - interests customers in their music in order to sell their products.

Automobile Designer - combines knowledge of how cars work with a desire to create into a plan for a new product or idea. Then creates a prototype of the design.

Artist - creates works of art to express ideas, thoughts, or feelings.

Stock Clerk - receives, unpacks, checks, stores, and tracks merchandise and materials.

Chief Executive Officer - establishes corporation's goals and policies. Ensures that operations are conducted in accordance with these policies.

Stock Broker - helps investors in the stock market place orders to a securities exchange.

Documentary Film Producer - oversees the business and financial decisions of a movie that documents facts about a person, place, or event.

Activity #3: Continued

OBSERVING

INFERRING

PREDICTING

CLASSIFYING

MAKING MODELS

COMMUNICATING

Closure

Questions for Class Discussion:

Be ready to discuss with the class at the end. You or your partner might be called upon to answer! Written answers are not required but are recommended in order to help you answer during oral review. Talk about the answers with your partner after all activities are complete.

1. Explain why you chose to put each career with a specific skill. Give an example.
2. How were your answers different from those of your partner?
3. List at least one additional skill needed for each career.
4. What characteristics were most important when you made your groups?

Extra credit homework: Parent survey



Student Name: _____

1. Choose 3 careers you believe your child would be good at. Have your child choose 3 careers that they believe they would be good at. List these careers below.

Parent list

Student list

a)

a)

b)

b)

c)

c)

2. Explain to your child why you chose each career. Listen to your child's explanation of her or his choices. Discuss with your child what specific skills would be needed for each career.

3. How does your view of these careers differ from that of your child?

4. List at least one strength of your child that could be an asset to her or him in a future career.

Parent Signature:

Yes, I completed this survey with my child. _____ Date _____