Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Chapter 1

Section 1

**Branches of Earth Science**

Focus Statement-Explore and Identify the major branches of Earth science and how they are linked to other areas of science, and the careers associated with them.

Geology is the study of the solid earth

Careers or focus areas associated with

* Volcanologist-a geologist who studies volcanoes.
* Seismologist-a geologist who studies earthquakes.
* Paleontologist- a geologist who studies fossils.

Oceanography is the study of the ocean

Careers or focus areas associated with

* Physical oceanographers study waves and ocean currents.
* Biological oceanographer studies plants and animals that live in ocean.
* Geological oceanographers study the ocean floor.
* Chemical oceanographers study natural chemicals and chemicals from pollution in the ocean.

Meteorology is the study of the entire atmosphere.

Astronomy is the study of all physical things beyond Earth including stars, asteroids, and planets.

Other branches in Earth Science

* Ecology study of relationships between organisms and their surroundings-the study of an ecosystem.
* Ecosystem a community of organisms and their nonliving environment. Fields such as wildlife management agriculture forestry conservation use principles from ecology

Geochemistry-the study of geology and chemistry, the chemistry of rocks, minerals, and soil.

Environmental science-the study which relies on life science chemistry physics and geology.

Cartography-Cartographers make maps so they are educated in geology, life science, and physics.

Ge ol o gy \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

a.

b.

Vol can ol o gist \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

a.

b.

Seis mol o gist \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

a.

b.

Pa le on tol o gist \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

a.

b.

O cean o graph y\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

a.

b.

Me te or ol o gy\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

a.

b.

Earth science can be divided into three general categories: Meteorology, Oceanography and

1. Geography.
2. Geology.
3. Geochemistry.
4. Ecology.

Meteorology is the study of

1. meteors.
2. meteorites.
3. the atmosphere.
4. maps

True or False

\_\_\_\_\_Careers in Earth science often require knowledge of more than one science.

\_\_\_\_\_Astronomy is the study of physical things beyond planet earth.

\_\_\_\_\_Paleontologist is a geologist who studies the atmosphere.

As tron o my\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

a.

b.

E col o gy \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

a.

b.

Eco sys tem\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

a.

b.

Geo chem is try\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

a.

b.

En vi ron men tal Sci ence\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

a.

b.

Car tog ra phy\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

a.

b.

Create a concept map to show the different branches of Earth Science below using the following terms-Earth Science, Meteorology, Oceanography, and Astronomy

Name the careers associated with Geology?

Name and describe the different branches of study for oceanographers?

1.

2.

3.

4.

**Chapter 1**

**Section 2**

The Scientific Method in Earth Science

Focus Statement

Explain the scientific method and how it can be used in Earth science. Identify the importance of the scientific method and why it is important for scientist to share their results.

Scientific method

Observation

Hypothesis

Sci en tif ic Me thod \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

a.

b.

Ob ser va tion \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

a.

b.

Hy poth es is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

a.

b.

What are the steps in the scientific method?, list and describe each step below-

**Chapter 1**

**Section 3**

Life in a Warmer World An Earth Science Model

Focus Statement

Demonstrate how Scientific models are used and compare mathematical with physical models, and determine the limitations of each.

Global Warming

Model

Theory

Glo bal warm ing\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

a.

b.

Sci en tif ic Mod el \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

a.

b.

Name three types of scientific models?

1.

2.

3.

What type of scientific model is the global warming model?

1. mathematical
2. physical
3. conceptual

What is the Greenhouse effect? Describe it using a picture below.

**Chapter 1**

**Section 4**

**Measurement**

Focus Statement

Explain the importance of the international system of units and determine the appropriate units to use for particular measurements.

Me ter\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

a.

b.

Vol ume\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

a.

b.

Mass \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

a.

b.

Temp er a ture\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

a.

b.

Length

Meter (m)

Kilometer (km)

Decimeter (dm)

Centimeter (cm)

Millimeter (mm)

Micrometer (μm)

Nanometer (nm

Volume

Cubic meter (m3)

Cubic centimeter (cm3)

Liter (L)

Milliliter (mL)

Mass

Kilogram (kg)

Gram (g)

Milligram (mg)

Temperature

Kelvin (K)

Celsius (°C)

The metric [system](JavaScript:WinOpen('/library/pop_glossary_term.php?oid=3904&l=','Glossary',500,300);), also known as the Système International d'Unités ([SI](JavaScript:WinOpen('/library/pop_glossary_term.php?oid=1508&l=','Glossary',500,300);)), was developed in the late 1700s to standardize [units](JavaScript:WinOpen('/library/pop_glossary_term.php?oid=848&l=','Glossary',500,300);) of measurement in Europe.

The metric [system](JavaScript:WinOpen('/library/pop_glossary_term.php?oid=3904&l=','Glossary',500,300);) is the primary [system](JavaScript:WinOpen('/library/pop_glossary_term.php?oid=3904&l=','Glossary',500,300);) of measurement used through much of the world and in science.

Each type of measurement has a [base](JavaScript:WinOpen('/library/pop_glossary_term.php?oid=1574&l=','Glossary',500,300);) [unit](JavaScript:WinOpen('/library/pop_glossary_term.php?oid=848&l=','Glossary',500,300);) to which prefixes are added to indicate multiples of ten.

Scientific notation is a shorthand for writing very small and very large numbers.

**The Metric System**

By the eighteenth century, dozens of different [units](http://www.visionlearning.com/library/pop_glossary_term.php?oid=848&l=) of measurement were commonly used throughout the world. Length, for example, could be measured in feet, inches, miles, spans, cubits, hands, furlongs, palms, rods, chains, leagues, and more. The lack of common standards led to a lot of confusion and significant inefficiencies in trade between countries. At the end of the century, the French government sought to alleviate this problem by devising a [system](http://www.visionlearning.com/library/pop_glossary_term.php?oid=3904&l=) of measurement that could be used throughout the world. In 1790, the French National Assembly commissioned the Academy of Science to design a simple decimal-based system of units; the system they devised is known as the metric system. In 1960, the metric system was officially named the Système International d'Unités (or [SI](http://www.visionlearning.com/library/pop_glossary_term.php?oid=1508&l=) for short) and is now used in nearly every country in the world except the United States. The metric system is almost always used in scientific measurement.

The simplicity of the metric [system](http://www.visionlearning.com/library/pop_glossary_term.php?oid=3904&l=) stems from the fact that there is only one [unit](http://www.visionlearning.com/library/pop_glossary_term.php?oid=848&l=) of measurement (or base unit) for each type of quantity measured (length, [mass](http://www.visionlearning.com/library/pop_glossary_term.php?oid=3417&l=), etc.). The three most common base units in the metric system are the meter, gram, and liter. The meter is a unit of length equal to 3.28 feet; the gram is a unit of mass equal to approximately 0.0022 pounds (about the mass of a paper clip); and the liter is a unit of volume equal to 1.05 quarts. So length, for example, is always measured in meters in the metric system; regardless of whether you are measuring the length of your finger or the length of the Nile River.

To simplify things, very large and very small objects are expressed as multiples of ten of the base [unit](http://www.visionlearning.com/library/pop_glossary_term.php?oid=848&l=). For example, rather than saying that the Nile River is 6,650,000 meters long, we can say that it is 6,650 thousand-meters long. This would be done by adding the prefix "kilo" (meaning 1,000) to the base unit "meter" to give us 6,650 kilometers for the length of the Nile River. This is much simpler than the American [system](http://www.visionlearning.com/library/pop_glossary_term.php?oid=3904&l=) of measurement, in which we have to remember inches, feet, miles, and many more units of measurement. Metric prefixes can be used with any base unit. For example, a kilometer is 1,000 meters, a kilogram is 1,000 grams, and a kiloliter is 1,000 liters. Six common prefixes used in the metric system are listed below.

|  |  |
| --- | --- |
| **Common Metric Prefixes** | **Unit Multiples** |
| |  | | --- | | kilo | | |  | | --- | | 1,000 | |
| |  | | --- | | hecto | | |  | | --- | | 100 | |
| |  | | --- | | deca | | |  | | --- | | 10 | |
| |  | | --- | | -- (base unit) | | |  | | --- | | -- | |
| |  | | --- | | deci | | |  | | --- | | 0.1 | |
| |  | | --- | | centi | | |  | | --- | | 0.01 | |
| |  | | --- | | milli | | |  | | --- | | 0.001 | |

Table 1: Common metric prefixes.

The subunits are used when measuring very large or very small things. It wouldn't make sense to measure your [weight](http://www.visionlearning.com/library/pop_glossary_term.php?oid=3418&l=) in grams for the same reason that you wouldn't measure it in ounces - the [unit](http://www.visionlearning.com/library/pop_glossary_term.php?oid=848&l=) is too small. You would express your weight in kilograms (each kilogram is equal to 1,000 grams or about 2.2 pounds).

The metric [system](http://www.visionlearning.com/library/pop_glossary_term.php?oid=3904&l=) is a called a decimal-based system because it is based on multiples of ten. Any measurement given in one metric [unit](http://www.visionlearning.com/library/pop_glossary_term.php?oid=848&l=) (e.g., kilogram) can be converted to another metric unit (e.g., gram) simply by moving the decimal place. For example, let's say a friend told you that he weighed 72,500.0 grams (159.5 lbs). You can convert this to kilograms simply by moving the decimal three places to the left. In other words, your friend weighs 72.5 kilograms.

Because the metric [system](http://www.visionlearning.com/library/pop_glossary_term.php?oid=3904&l=) is based on multiples of ten, converting within the system is simple. Here's a shortcut: if you are converting from a smaller [unit](http://www.visionlearning.com/library/pop_glossary_term.php?oid=848&l=) to a larger unit (moving upward in the table shown above), move the decimal place to the left in the number you are converting. If you are converting from a larger unit to a smaller unit (moving down in the table), move the decimal to the right. The number of places you move the decimal corresponds to the number of rows you are crossing in the table. For example, let's say someone told you that you had to walk 8,939.0 millimeters to get to the grocery store. That sounds like a long walk, but let's convert the number into meters to see how long it really is. The base unit, meter, is three rows above the millimeter, so the decimal should be moved three places to the left.

|  |  |
| --- | --- |
| |  | | --- | | etric converter | |

It's less than 9 meters to the grocery store - or about 30 feet. Metric [units](http://www.visionlearning.com/library/pop_glossary_term.php?oid=848&l=) can be abbreviated for simplicity. Abbreviations for the base units are the first letter of the unit name: m = meter, g = gram, and l = liter. Subunits can be abbreviated using the first letter of the prefix and the first letter of the base unit (all lowercase): mm = millimeter, kg = kilogram, etc.

**Scientific notation**

In science, it is common to work with very large and very small numbers. For example, the diameter of a red blood cell is 0.0065 cm, the distance from the earth to the sun is 150,000,000 km, and the number of [molecules](http://www.visionlearning.com/library/pop_glossary_term.php?oid=1518&l=) in 1 g of water is 33,400,000,000,000,000,000,000. It gets cumbersome to work with such long numbers, so measurements such as these are often written using a shorthand called scientific notation.

Each zero in the numbers above represents a multiple of 10. For example, the number 100 represents 2 multiples of 10 (10 x 10 = 100). In scientific notation, 100 can be written as 1 times 2 multiples of 10:

100 = 1 x 10 x 10 = 1 x 102 (in scientific notation)

Scientific notation is a simple way to represent large numbers because the 10's exponent (2 in the previous example) tells you how many places to move the decimal of the coefficient (the one above) to obtain the original number. In our example, the exponent 2 tells us to move the decimal to the right two places to generate the original number:

|  |  |
| --- | --- |
| |  | | --- | | etric notation100 | |

Scientific notation can be used even when the coefficient is a number other than 1. For example:

|  |  |
| --- | --- |
| |  | | --- | | etric notation5.7mil | |

This shorthand can also be used with very small numbers. When scientific notation is used with numbers less than one, the exponent on the 10 is negative, and the decimal is moved to the left, rather than the right. For example:

|  |  |
| --- | --- |
| |  | | --- | | etric notation6.5 | |

Therefore, using scientific notation, the diameter of a red blood cell is 6.5 x 10-3 cm, the distance from the earth to the sun is 1.5 x 108 km and the number of [molecules](http://www.visionlearning.com/library/pop_glossary_term.php?oid=1518&l=) in 1 g of water is 3.34 x 1022.

Also note that in scientific notation, the base numeral is always represented as a single digit followed by decimals if necessary. Therefore, the number 0.0065 is always represented as 6.5 x 10-3, never as 0.65 x 10-2 or 65 x 10-4.