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CHAPTER 6 COMPARISON

6-1 How We Compare Things

One of the most important ways we understand things is by comparing them to other things. How can you say that something is big or expensive unless you have some feeling for what big or expensive means. How big? How expensive? What if you describe someone as friendly or happy? Friendly and happy only have meaning when compared to unfriendly and sad.

Comparisons give meaning to descriptions. You could say that a particular hat is inexpensive, but do you mean that it costs 5 cents or $50? If you say the hat is as inexpensive as a gallon of gasoline, you have a better idea of the hat's cost. The hat has been compared to a gallon of gasoline.

The skill of comparing is important whether you are in or out of school, no matter what you are dealing with—people, studies, or any big decisions you have to make. When you have an important decision to make, comparing the situation to a past experience can make your decision easier. The goal of this chapter is to help you develop your ability to make and understand comparisons, especially in the field of science.

To compare two things, those things must have some relationship to each other, or something in common. You may have heard the phrase, "They are as different as apples and oranges." But apples and oranges are related because they are both fruits. Or you may have heard, "They are as different as night and day." But night and day are related. They are both times of the day. Both of these examples use a comparison to describe people that are different.

Basically, there are two ways to compare things. Things are either alike or they are different. The term **contrast** is used to describe the process of comparing two things that are different. The two sentences in the previous paragraph are examples of contrast. When things are different, they usually differ in one of two ways: the first item is either less than or greater than the item it is being contrasted against. The following sentences demonstrate a "less than" comparison and a "greater than" comparison respectively.

> There is less rain at 50° north latitude than at the equator.
> The polar region is colder than the equator.

Things can also be alike in two ways: they can be similar or the same. Notice the comparisons in the following examples. The first sentence is an example of a similarity. The likeness in the second sentence is an example of sameness.

> The climates between 20° and 30° north latitude and 20° and 30° south latitude are *similar.*
>
> The populations of France and Italy are roughly the *same.*

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Exercise 1 Identifying Comparisons

Decide which sentences compare or contrast and what kind of comparison they are (less, greater, similar, or the same).

For Peat's Sake

[a] The partial decomposition of plant remains produces a brownish-black material called peat. [b] Over time, peat deposits are covered by layers of sediments. [c] The weight of these overlying sediments squeezes out water and gas from the peat. [d] It then becomes a denser material called lignite, or brown coal.

[e] The pressure of more deposited sediments further compresses the lignite and forms bituminous coal, or soft coal. [f] Bituminous coal is the most abundant type of coal. [g] Where the folding of Earth's crust produces extremely high temperatures and pressure, bituminous coal is changed into anthracite, the hardest form of coal. [h] Bituminous coal and anthracite consist of 80 to 90 percent carbon and produce a great amount of heat when they burn.

(from Modern Earth Science)

a. _____

b. _____

c. _____

d. _____

e. _____

f. _____

g. _____

h. _____

Exercise 2 Similar or Different?

Decide if these pairs are similar or different. Compare or contrast the two items with a sentence using the word or words in parentheses as a basis of comparison. The first item is done for you as an example.

a. humus/topsoil (rich)

Humus is richer than topsoil.

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Section 6-1 How We Compare Things, continued

b. platinum/bronze (cost)

_____

_____

c. iron/silver (metal versus nonmetal)

_____

_____

d. emeralds/rubies (type of stone)

_____

_____

e. soy sauce/tofu (source)

_____

_____

f. dinosaurs/crocodiles (class)

_____

_____

g. monkeys/gorillas (size)

_____

_____

h. fossil fuels/solar power (pollution, cost)

_____

_____

i. nuclear power/wind power (danger, cost)

_____

_____

j. rain forests/other types of forests (variety of plants and animals)

_____

_____

k. coniferous forests/rain forests (rainfall)

_____

_____

Features

When we contrast things, we compare their different **features.** Think about Exercise 2. The bases of comparison given in parentheses are features of the two items. These features are used to compare or contrast them. **Table 6-1** uses examples from Exercise 2 to point out features used to compare or contrast the pairs.

TABLE 6-1 FEATURES OF COMPARISON

Pair	Sentence	Feature
Platinum/bronze	Platinum is more expensive than bronze.	cost
Soy sauce/tofu	Soy sauce and tofu are made from soybeans.	origin
Nuclear power/ wind power	Nuclear power is more dangerous than wind power.	danger
Coniferous forest/ rain forest	Coniferous forests have less rainfall than rain forests do.	rainfall

The features used to compare two items will depend on the topic you are studying. For example, try contrasting dolphins and rainbow trout. If you are studying ecosystems, you could compare them based on the feature of where they live. Dolphins live in the ocean. Rainbow trout generally live in streams and lakes. If you want to know more about their appearance, you could compare them based on size. Dolphins are much larger than rainbow trout. If you are studying the classification of animals, you could compare them based on class. Dolphins are mammals; rainbow trout are fish. Each of these contrasts is equally correct. Which feature you choose depends on what is important to you at that time.

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Exercise 3 Comparing Features

Read the following passage. Determine the feature being compared for each pair listed.

The Elements

Elements are classified as metals, nonmetals, and metalloids, according to their properties. Most of the elements in the periodic table are metals. Most metals are solid at room temperature. Mercury, however, is a liquid. More than half of the nonmetals are gases at room temperature. Metalloids are also called semiconductors. Metalloids have some properties of metals and some properties of nonmetals.

Metals tend to be shiny. You can see a reflection in a mirror because light reflects off the shiny surface of a thin layer of silver behind the glass. Sulfur, like most nonmetals, is not shiny.

Most metals are malleable, which means that they can be flattened with a hammer without shattering. Aluminum is flattened into sheets to make cans and foil. Nonmetals are not malleable. In fact, solid nonmetals, such as carbon (the graphite of a pencil lead), are brittle and will break or shatter when hit with a hammer. Tellurium is a metalloid. Like a metal, tellurium is shiny but it is also brittle and is easily smashed into a powder.

(from Holt Science and Technology: Physical Science)

a. most metals/half of the nonmetals

_____

b. silver/sulfur

_____

c. aluminum/carbon

_____

d. tellurium/metals

_____

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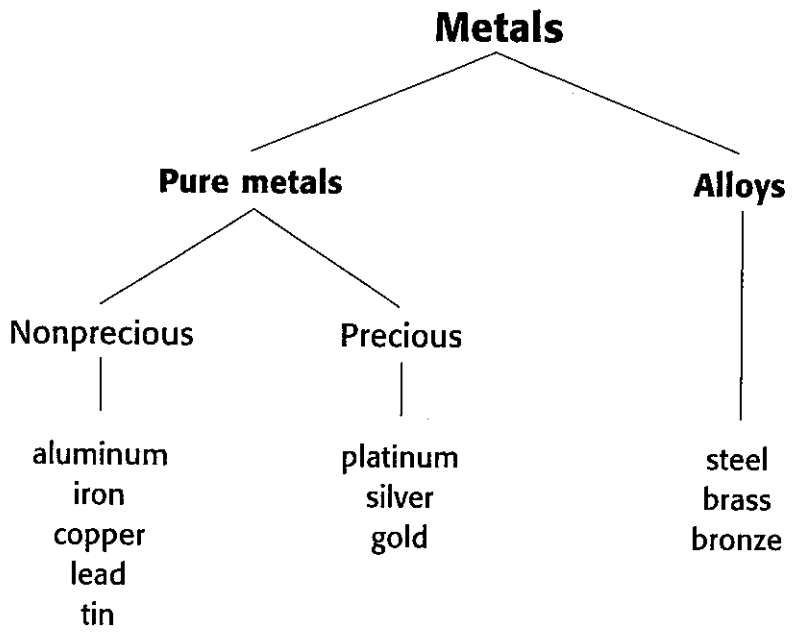
CHAPTER 6 COMPARISON

6-2 The Role of Comparison

Comparison is an important part of other thinking skills that you have studied, including describing, defining, and classifying. A formal definition compares an item to other members of its class. In Chapter 3, for example, a desert was defined as a sandy region with very little water. If a desert were simply defined as a sandy region, the definition would also include other sandy areas such as beaches. By stating that a desert is a sandy region with very little water, the definition contrasts deserts with all other sandy regions. Thus, the definition fits only deserts.

Classifying is also based on comparison. In classifying, one puts things that are similar into the same class. As an example, think about the different kinds of metals. Study the taxonomy shown in **Figure 6-1.** In this classification, metals are divided into three categories, nonprecious pure metals, precious pure metals, and alloys. All of the items in the classification tree are similar because they are all metals. The different classes provide features for comparing the different metals. What makes silver, platinum, and gold similar? What do steel, bronze, and brass have in common? Do you remember the definition of an alloy? Alloys are metals that are a mixture of more than one pure metal. The features used in this tree are composition of the metal and value of the metal.

FIGURE 6-1 Classification trees can give a visual representation of a comparison.



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Exercise 4 Contrasting Items in the Same Class

Contrast each of these items with another item in the same class. The first item is done for you as an example.

a. A tiger is a large striped cat found only in Asia. In contrast, *a lion is also a large cat, but it has no stripes.*

b. A plane is a tool used to shave the edges of wood. In contrast, _____

_____

c. A dog is a domestic animal that sometimes guards the home. In contrast, _____

_____

d. A bay is a body of water surrounded on three sides by land. In contrast, _____

_____

e. The liver is an organ that purifies the blood. In contrast, _____

_____

f. The circulatory system carries nutrients and oxygen through the body. In contrast, _____

_____

g. The biosphere includes all life on Earth and the physical environment that supports it. In contrast, _____

_____

_____

h. Biology is a science that studies living things. In contrast, _____

_____

i. Telephones are instruments that send messages along wires and cables. In contrast, _____

_____

Exercise 5 Analyzing Comparisons

Read the following passage. Decide which sentences contain statements of comparison or contrast and what kind of comparison they are (different, less than, greater than, or similar). Some sentences may contain more than one type of comparison.

Fossils and Evolution

[a] According to biologists, all organisms living today evolved from earlier, simpler life-forms. [b] The modern horse, for example, evolved from an ancestor that existed 50 million years ago. [c] The earlier relative was the size of a dog and had four toes on its front foot; its modern version has only one.

[d] Animals with backbones are called vertebrates. [e] Penguins, alligators, bats, and humans all have backbones and are thus considered vertebrates. [f] The front limbs (known as forelimbs) of all these vertebrates have similar sets of bones. [g] The functions of these structures have evolved into different uses. [h] And yet the similarity in the structure of these bones can still be seen, which suggests that all vertebrates share a common ancestor.

(from Biology Principles and Explorations)

a. _____

b. _____

c. _____

d. _____

e. _____

f. _____

g. _____

h. _____

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Comparison Tables

Most reading passages will make many comparisons of many different items. It can be quite difficult to keep all of these comparisons straight in your mind as you read the passage. If you do not find a way to organize the many comparisons a passage may contain, you will have great difficulty understanding the passage.

When a textbook is making several comparisons, one of the best ways to understand them is to draw a **comparison table.** A comparison table, as its name suggests, is a table that lists the different items being compared and the features that are used to compare them. When creating a comparison table, put the items being compared in the first column and put the features in the first row.

Look back at the passage "For Peat's Sake" from Section 6-1 on page 94. This passage contains comparisons of four different materials that all derive from the decomposition of plant remains. Exercise 1 asked you to examine these comparisons sentence by sentence. This way, it is easy to see how peat compares to lignite, or how bituminous coal compares to anthracite. But there are no sentences directly comparing peat to anthracite, or lignite to anthracite. A comparison table helps you see how all four of the decomposition products compare to one another. The table gives you a better understanding of the material in the text. A comparison table of the information in this passage might look like **Table 6-2.**

TABLE 6-2 COMPARISON TABLE OF COAL TYPES

	Feature			
Item	**Hardness/Density**	**Formation**	**% Carbon**	**Heat Production**
Peat	lightest	decomposition of plants		
Lignite	denser than peat	compression of peat		
Bituminous coal	denser than lignite	compression of lignite	80–90%	high
Anthracite	hardest	high temperature and pressure from folding of Earth's crust	80–90%	high

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Exercise 6 Writing Comparisons from a Comparison Table

Without using numbers, write a paragraph making some general comparisons between the three small celestial bodies described in the comparison table below.

	Size	Orbit	Composition	Origin
Comet	0.5 km to 100 km in diameter tail can be millions of kilometers long	orbits sun	ice rock cosmic dust	leftover from the process of planet formation
Asteroid	few meters to 900 km in diameter	orbits sun	rock some contain organic material some contain metals	leftover from formation of solar system
Meteoroid	smaller than asteroid	orbits sun	rock some contain organic material some contain metals	probably from asteroids

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CHAPTER 6 COMPARISON

6-3 The Language of Comparison

There is a whole *language* of comparison. This language is made up of **comparison words.** Comparison words are words that indicate a statement of comparison or contrast. The sentence *Five is greater than four* shows a simple example of how comparison words are used. The words *greater than* tell you that the numbers are being contrasted against one another.

Think back to Chapter 1 on descriptions. One way to describe an object was to compare it to another, more familiar object. Most of the time these descriptions were written as similarities rather than differences. Many comparison words are used to compare two similar, or like, things. **Table 6-3** lists a few comparison words used to describe likeness and gives examples of how they are used

TABLE 6-3 COMPARISON WORDS USED TO INDICATE LIKENESS

Word or phrase	Example
the same as	A meteorite is the same as a meteoroid that has entered Earth's atmosphere.
as heavy as	One atom of helium is as heavy as two atoms of hydrogen.
the same shape as	A florence flask has the same shape as a pear.
are basically the same as	Savannas are basically the same as tropical grasslands with scattered trees and shrubs.
are similar/alike	The shape of DNA is similar to a very long microscopic ladder that has been twisted.
-like	Pterodactyls were birdlike reptiles that lived 150 million years ago.

Sometimes statements of comparison are based on two items being different. These types of statements—statements of contrast—have their own comparison words. Many of these comparison words are adjectives with suffixes that indicate degree. For example, the adjective *large* can be turned into a comparison word by adding either the suffix *-er* to make *larger* or the suffix *-est* to make *largest.* **Table 6-4,** on the following page, lists some of the words, phrases, and suffixes used to express difference. The table also gives examples of the kinds of sentences in which these words might be found.

TABLE 6-4 COMPARISON WORDS USED TO INDICATE DIFFERENCE

Word, phrase, or suffix	Example
-er than	Anthracite is denser than lignite.
more than	Platinum is more expensive than gold.
less than	Silver is less expensive than gold.
-est	Pluto is the coldest planet.
compare/compared to	Jupiter is a huge planet when compared to Earth.
contrast/in contrast to	Deciduous trees lose their leaves in the fall in contrast to evergreen trees, which do not.
differ/differentiate	Metamorphic, igneous, and sedimentary rock differ in how they form.
distinct/distinguish	Electrical conductivity can be used to distinguish the metals from the nonmetals.
as opposed to	Biology is the study of living things as opposed to geology, which is the study of Earth and its rocks.
on the other hand	Farmers can be devastated by flood. On the other hand, drought can be equally disastrous.
unlike	Cheetahs are extremely fast runners, unlike turtles, which move very slowly.

Exercise 7 Comparison Words

Read the passage and list all the words that are used for comparisons. There may be more lines than you need.

Stars and Our Star

Life on Earth is dependent upon the sun, the star nearest Earth. Except for its relationship to Earth, the sun is similar to billions of other stars. From Earth, most stars in the night sky appear to be tiny specks of white light. However, if you look closely at the stars, you will notice that they vary in color.

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Stars vary in size and mass as well as in color. Some stars are less than 20 km in diameter, far smaller than Earth. Other stars have a diameter 1,000 times that of the sun. The sun, a medium-sized star, has a diameter of about 1,392,000 km. Most stars that are visible in the night sky are medium-sized stars.

Many stars also have about the same mass as the sun, which is about 330,000 times more massive than Earth. Some small stars have only 1/50 of the sun's mass. Large stars have more than 50 times the sun's mass. Stars also differ in composition, temperature, and brightness.

(from Modern Earth Science)

Exercise 8 Writing Comparisons

How many different ways can you compare the sun and Earth? Write as many sentences of comparison as you can.

Exercise 9 Using Comparison Words

What are some ways you can compare yourself to your mother, father, or other relatives? Write 4 sentences comparing and contrasting yourself to an older relative. Use as many comparison words as possible.

a. _____

_____

_____

_____

b. _____

_____

_____

_____

c. _____

_____

_____

_____

d. _____

_____

_____

_____

GLOSSARY

comparison table a table that lists the different items being compared or contrasted and their similarities or differences (101)

comparison words words that indicate a comparison (103)

contrast to compare with respect to differences (93)

feature an aspect used as a basis for comparison (96)