CHAPTER 1

Classifying with Similar Traits

Look at the polar bear in the photo. Like all other animals, the polar bear has **traits**, or characteristics. Traits describe how the polar bear looks. For example, the polar bear has thick fur and large paws. Thick fur and large paws are traits.

Traits also describe how the polar bear acts. For example, the polar bear is a strong swimmer. The ability to swim long distances is a trait of the polar bear.

traits – characteristics of living things

SHARE IDEAS **Describe** traits of the polar bear that tell how it looks and acts.

A polar bear's thick fur helps keeps it warm in freezing temperatures.

Since there are so many different kinds of animals, scientists need a way to classify, or group, them. The animal **classification system** groups animals with similar traits together.

The animal classification system has seven main levels. The **kingdom** level is the largest. All animals are in the animal kingdom. Each level below the kingdom level is smaller and has fewer kinds of animals. This is because animals share more traits at each level.

Polar Bear Classification

KINGDOM:	Animalia
PHYLUM:	Chordata
CLASS:	Mammalia
ORDER:	Carnivora
FAMILY:	Ursidae
GENUS:	*Ursus*
SPECIES:	*maritimus*

The **species** level is the smallest level. It requires that animals share the most traits so it contains only one kind of animal.

The classification system also gives every kind of animal a scientific name. This name is made up of the Latin genus and Latin species names. If you look at the chart you can see that the polar bear's scientific name is *Ursus maritimus*.

classification system – a system for grouping things

kingdom – the largest level in the animal classification system

species – the smallest level in the animal classification system

KEY IDEAS The animal classification system groups animals according to similar traits. The kingdom level is the largest and the species level is the smallest.

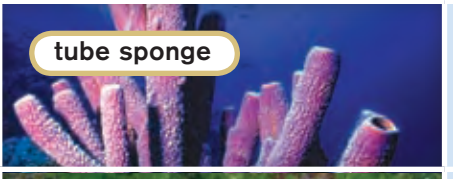
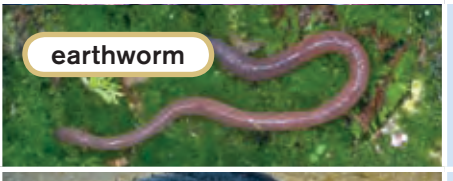
Invertebrates

All animals can be immediately classified into two groups by a trait called a backbone. A backbone is a line of bones down the middle of an animal's back. Animals that have backbones are **vertebrates**. Animals that do not have backbones are **invertebrates**.

There are more invertebrates than vertebrates. In fact, more than 95% of all animals on Earth are invertebrates. The chart below shows a few invertebrate groups and some of the traits they share.

vertebrates – animals that have backbones

invertebrates – animals that do not have backbones

Some Invertebrate Groups	Example	Shared Traits of Each Group
Sponges		• no backbone • adults do not move
Annelids		• no backbone • soft bodies with segments
Mollusks		• no backbone • most have soft bodies with a muscle-like foot
Echinoderms		• no backbone • covered with rough skin and spines
Arthropods		• no backbone • hard outer covering, or exoskeleton, for protection

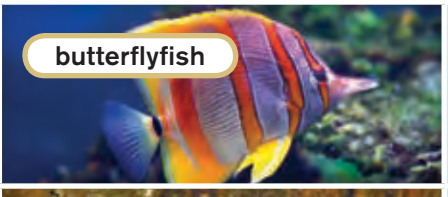
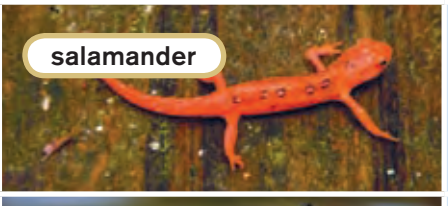
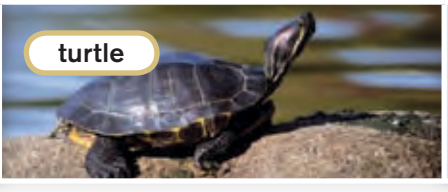
Ectothermic Vertebrates

Vertebrates are animals with backbones. Usually a vertebrate's backbone is part of a larger internal skeleton called an endoskeleton. An endoskeleton grows as the vertebrate grows.

Some vertebrates and all invertebrates are **ectothermic**. These animals do not produce enough heat inside their bodies to control their body temperature. This means their body temperature changes with the temperature of their surroundings.

For example, if it is cool outside, the body of an ectothermic animal cools down. This also slows its activities. The turtle in the photo below is sitting in the sun to warm up. If the turtle's body temperature is too low, the turtle cannot move enough to find food.

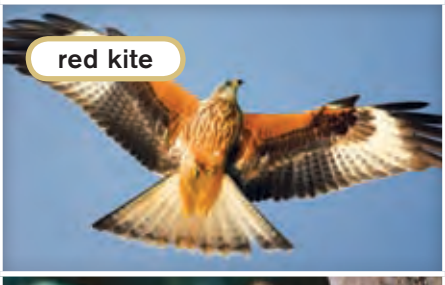
ectothermic – having a body temperature that changes with the temperature of the surroundings

Ectothermic Vertebrate Groups	Example	Shared Traits of Each Group
Fish	 butterflyfish	• backbone • gills for breathing • fins for swimming
Amphibians	 salamander	• backbone • need water for part of their life cycle • may have gills during part of their life cycle.
Reptiles	 turtle	• backbone • lungs for breathing for entire life

Endothermic Vertebrates

Other groups of vertebrates are **endothermic**. These vertebrates keep their body temperature steady by using energy from the food they eat. For this reason, endothermic vertebrates usually have to eat a lot more than ectothermic vertebrates.

endothermic – having a body temperature that is kept steady by using energy from food

Endothermic Vertebrate Groups	Example	Shared Traits of Each Group
Birds	 red kite	• backbone • feathers, wings, and hollow bones • bodies streamlined for flight
Mammals	 orangutans	• backbone • hair or fur • females produce milk

Explore Language

GREEK WORD ROOTS

endothermic
endo (within) + *thermē* (heat) = heat within

KEY IDEAS Invertebrates do not have backbones. Vertebrates have backbones. Invertebrates are ectothermic, but vertebrates can be ectothermic or endothermic.