

Skeletons



Engage!

+ How does your body move?

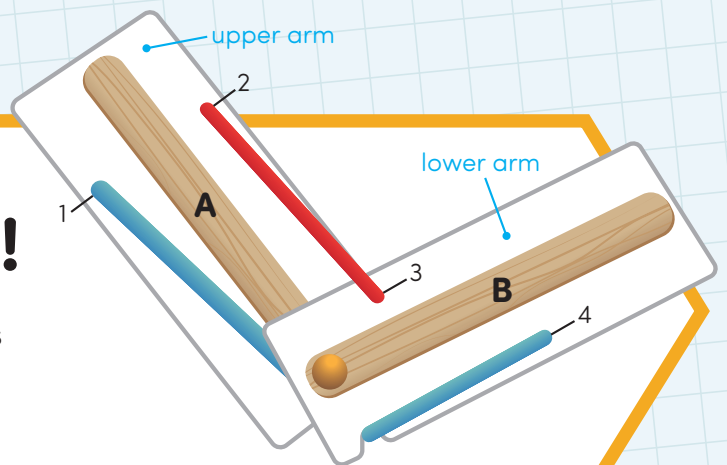
To move your body, you need **muscles** and **bones**. When your muscles **contract**, they pull on the bones and make them move.

- 1 With your arm by your side, hold a bottle of water in your hand. Bend your elbow, and lift the bottle to your shoulder. Which muscle in your upper arm contracts (gets shorter)? Which **relaxes** (gets longer)?
- 2 Now straighten your arm in front of you at shoulder height. Which muscle in your upper arm contracts? Which relaxes?

Explore!

+ Make a model arm!

Objective: Make a model showing how pairs of muscles move bones.



Method

- 1  Work with a partner. Stick a craft stick to each card. Label them "upper arm" and "lower arm." Punch two holes in each card. Cut a piece out of the lower arm.
- 2 Number the holes 1–4. Push a thumbtack through the end of both sticks. Cover the sharp end with a piece of modeling clay.
- 3 Bend the model arm. Cut the rubber bands. Push the blue band through hole 1 and tie a knot. Pull the other end through the cut and hole 4, and tie another knot. The band should be taut. Do the same with the red band through holes 2 and 3.

You will need

- ☐ 2 craft sticks
- ☐ 2 pieces of card stock
- ☐ a glue stick
- ☐ a hole punch
- ☐ scissors
- ☐ a thumbtack
- ☐ modeling clay
- ☐ a red and a blue rubber band



Observations



- 1 Where is the hand in your model arm?

- 2 Pull on each band. Does the arm straighten or bend?

Conclusions



- 1  Answer the questions.
 - a. What muscles do the bands represent? _____
 - b. What represents the bones in the arms? _____
- 2 Complete the sentences.
 - a. To move your body, you need _____ and _____.
 - b. When muscles contract, they pull on _____.
 - c. Muscles work in pairs. When one muscle in a pair _____, the other _____.



+ What is the function of the human skeleton?

The human **skeleton** has 206 bones. Bones are strong and hard, and the skeleton supports the body, gives it shape and protects internal **organs**.

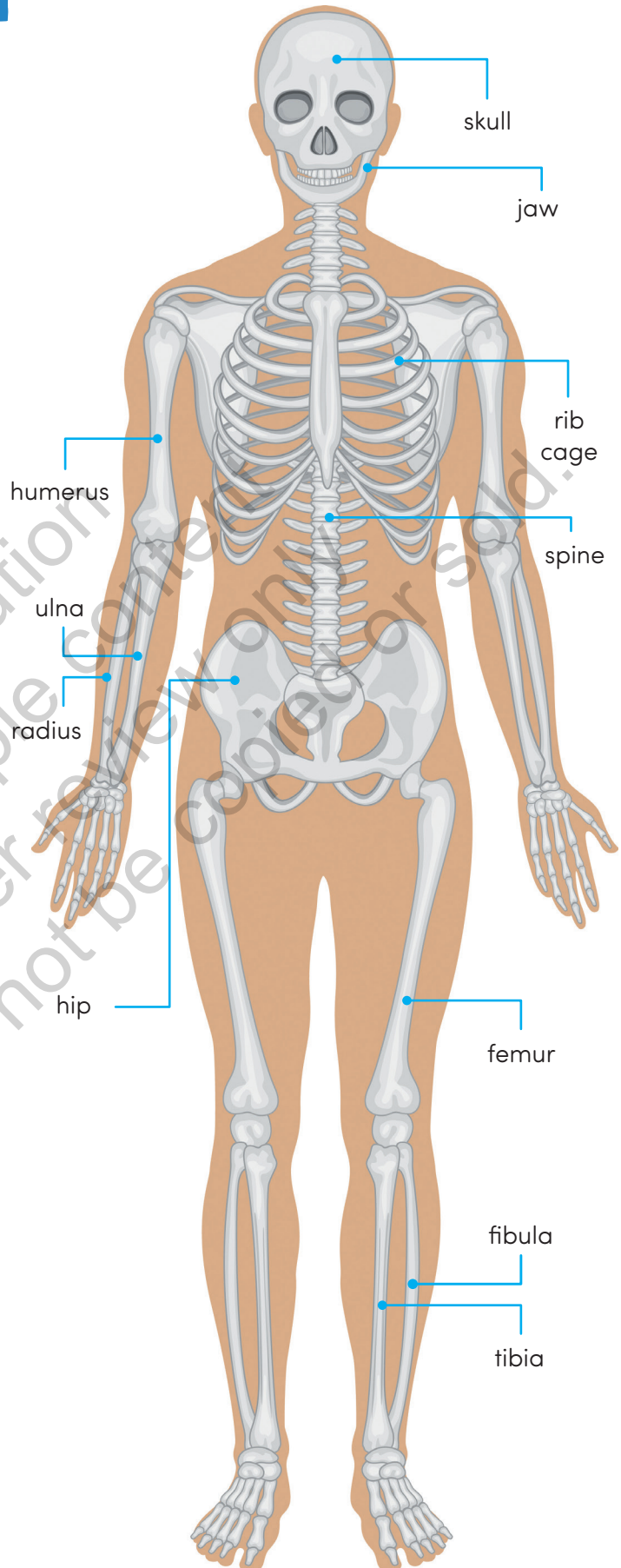
Bones also help the body move. There are **joints** where two or more bones meet. The skeleton can only bend where there are joints.

The skeleton has three main parts: the head, the torso and the limbs (the arms and legs). The head includes the skull and jaw. The torso includes the **spine**, or backbone, and the rib cage. The bones in the arms and legs help your limbs move.

There are short bones, long bones and flat bones. Short bones include the bones in the hands and feet. There are flat bones in the skull and the rib cage. And there are long bones in the arms and legs.

The spine is at the back of the torso. It has 33 bones called **vertebrae**. The spine supports the torso and gives shape to the body.

Bones also protect the soft organs inside your body. For example, the ribs protect the heart and lungs, and the skull protects the brain.



Practice

- 1 Explain. What is the function of the skeleton?



- 2 Choose the correct answers.

a. Which bones protect the heart?

☐

the ribs

☐

the skull

☐

the vertebrae

b. Which bones protect the brain?

☐

the ribs

☐

the skull

☐

the vertebrae

c. What are joints?

☐

short bones

☐

long bones

☐

the place where bones meet

- 3 Answer the questions.

a. Have you ever broken a bone? What happened, and how did you feel?

b. How do doctors fix broken bones?

c. Are bones easy to break?

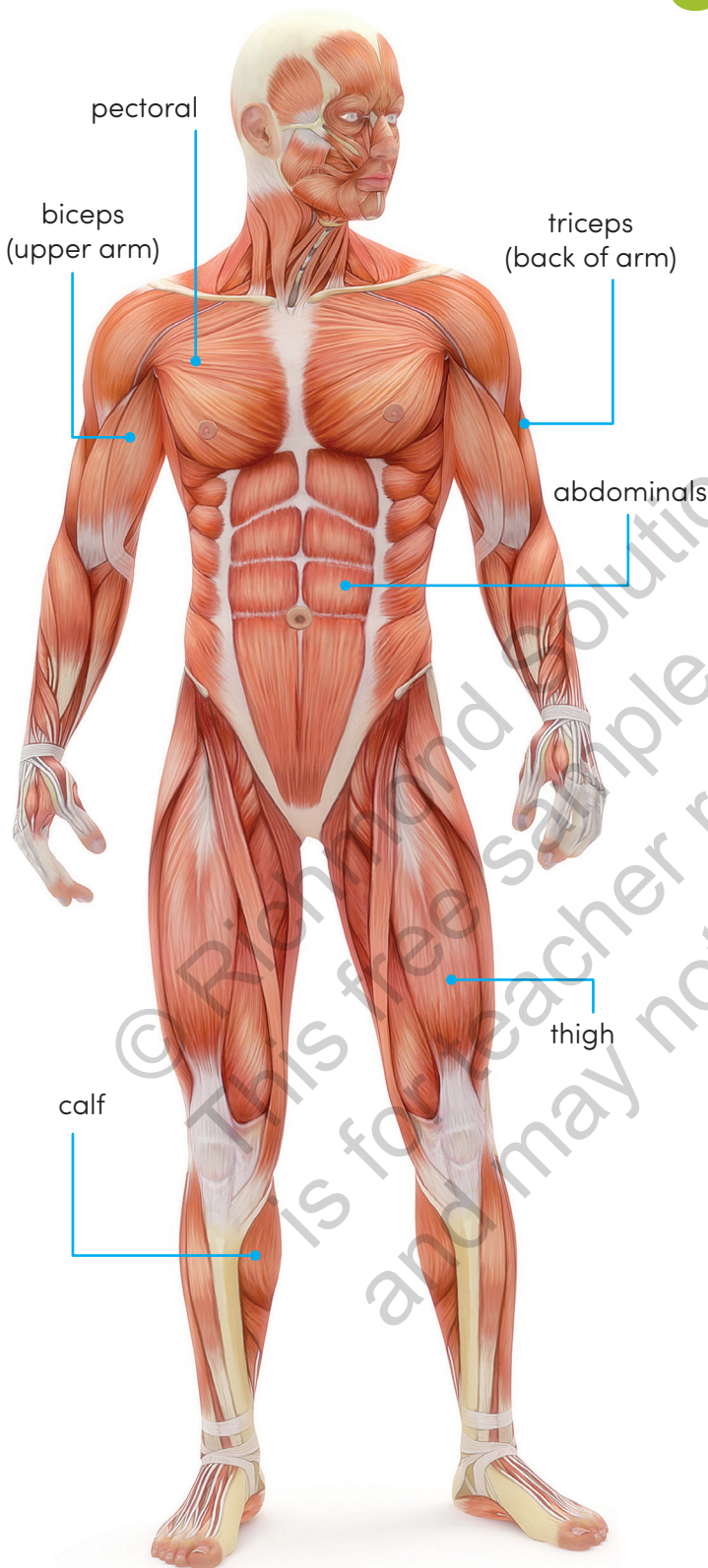


+ What is the function of the muscular system?

The muscular system is made up of all the muscles and **tendons** in the human body. Muscles **contract** and **relax**, and tendons connect muscles to bones. When muscles contract, the tendons pull on the bones and move them. Bones cannot move without muscles. There are around 650 muscles in the human body.

Muscles work in pairs. When one muscle in a pair contracts, the other relaxes. When a muscle contracts, it gets shorter. When a muscle relaxes, it gets longer. For example, when you bend your arm, the biceps contracts and the triceps relaxes. When you straighten your arm, the triceps contracts and the biceps relaxes.

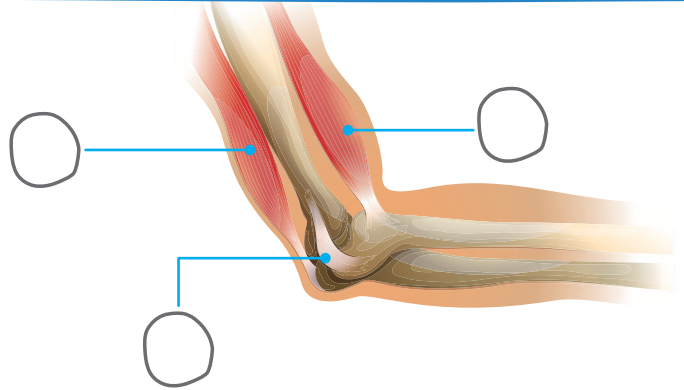
Now, find the pair of muscles at the front and back of your thigh. Which muscle contracts when you bend your leg? Which muscle contracts when you straighten your leg?



Practice

1 Label the diagram.

- a. biceps
- b. triceps
- c. tendon



2 Choose the correct ways to end the sentences.

a. The muscular system is made up of...

☐ muscles and bones.

☐ muscles and tendons.

b. When a muscle contracts, it gets...

☐ shorter.

☐ longer.

c. Tendons attach muscles to...

☐ bones.

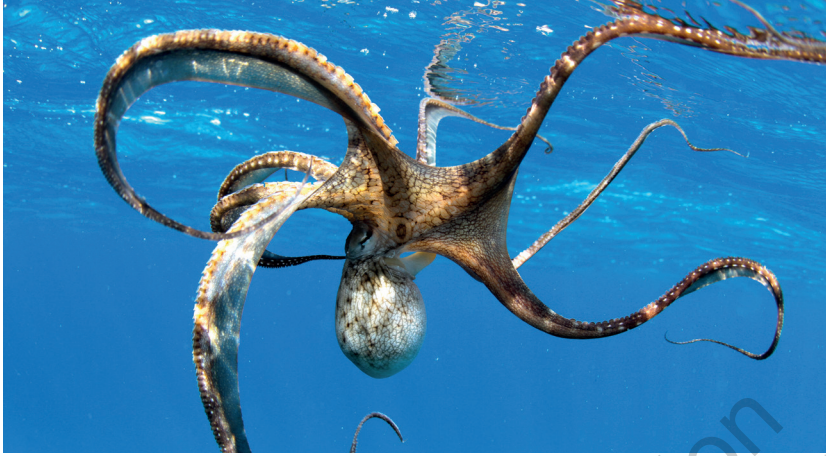
☐ organs.

3 Write. How do the muscular system and the skeleton work together to move your body?





+ Do all animals have a skeleton?



An octopus is an invertebrate. It has no bones, but it does have muscles.



Camels have a skeleton. They are vertebrates that live on land.



These birds are parakeets. All birds are vertebrates.

Scientists classify animals as **vertebrates** or **invertebrates**.

Vertebrates have a spine and an internal skeleton. Invertebrates do not have a spine or an internal skeleton. Are humans vertebrates or invertebrates?

The skeleton of vertebrates is made up of bones and joints. There are vertebrates on land, under the ground, and in water and the air.

Scientists divide vertebrates into five groups: fish, amphibians, reptiles, birds and mammals. There are around 65,000 **species** of vertebrates.

Invertebrates do not have bones. But some invertebrates have a hard material on their bodies. This is called an **exoskeleton**.

Scientists divide invertebrates into six groups:

- sponges
- jellyfish, corals and anemones
- starfish, sea urchins and sea cucumbers
- mollusks, such as snails and clams
- worms
- arthropods, such as insects, crabs and spiders

There are around 1.3 million species of invertebrates.

Practice

1 Classify the organisms. Write the letters of the photos.

vertebrates: _____

invertebrates: _____

a.



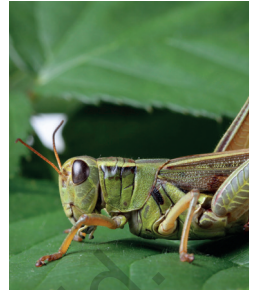
c.



e.



g.



b.



d.



f.



h.



2 Choose the true sentences.

a. ☐ Scientists classify animals by their type of skeleton.

d. ☐ There are six groups of vertebrates.

b. ☐ Fish are vertebrates.

e. ☐ There are more invertebrate species than vertebrate species.

c. ☐ The skeleton of invertebrates has bones and joints.

3  Describe how scientists classify animals.



+ What vertebrate groups are there?

Vertebrates have a spine and an internal skeleton. Scientists classify vertebrates into five groups according to their body covering, their ways of breathing and giving birth, and how they control their body temperature.



Fish

Fish live in water. They have **scales** on their body, and they breathe with **gills**. They lay eggs, and they are **cold-blooded**, which means their body temperature changes with the surroundings.



Amphibians

Amphibians live in and near water. They have wet skin, and they breathe with **lungs** and their skin. Before they become adults, young amphibians have gills. Amphibians lay eggs, and they are cold-blooded.



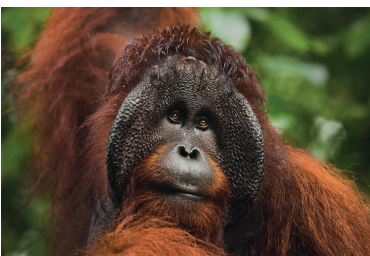
Reptiles

Most reptiles live on land, but some live in water, such as turtles. Reptiles have scales on their body, and they breathe with lungs. They lay eggs, and they are cold-blooded.



Birds

Birds have **feathers** on their body, they breathe with lungs and they lay eggs. They are **warm-blooded**, which means their body temperature does not change. Birds live on land, but many feed in water or spend a lot of time in the air.



Mammals

Mammals have hair on their body, and they breathe with lungs. They give birth to live offspring (babies), and feed their babies milk. They are warm-blooded. There are mammals on land and in water.

Practice

- 1  Work with a partner. Complete the table with features of vertebrates.

Group	Body covering	Breathing	Type of birth	Body temperature
fish				
amphibians				
reptiles				
birds				
mammals				

- 2 Write the names of the vertebrate groups that these animals are from.

a.



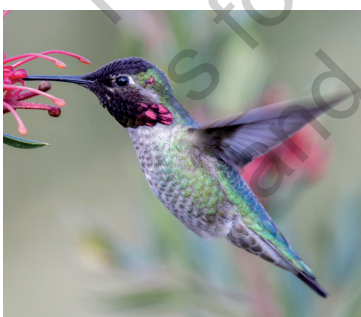
c.



e.



b.



d.



f.



- 3  Investigate. Use the internet to find three examples of animals from each vertebrate group. Write the lists in your notebook.



+ What invertebrate groups are there?

Invertebrates have soft bodies, and they do not have bones. There are six groups of invertebrates.



Sponges

Sponges live on the ocean floor and cannot move. Their bodies are like tubes, and water moves through them. They filter food from the water.



Jellyfish, anemones and corals

These invertebrates also live in the ocean. Some cannot move, like anemones and corals, and others swim, like jellyfish. They catch food with **tentacles**.



Worms

Worms have long, soft bodies and no legs. They live in water and on land.



Mollusks

Many mollusks have **shells**, like clams and snails. Others, like octopuses and slugs, do not have shells. Mollusks live in water and on land.



Starfish, sea urchins and sea cucumbers

These invertebrates live on the ocean floor and can move slowly. Their bodies are divided into five parts and covered in spines.



Arthropods

Arthropods are the largest group of invertebrates. They have an **exoskeleton** that protects their soft bodies. There are four main classes: insects (like butterflies and ants), arachnids (like spiders and scorpions), crustaceans (like lobsters and crabs), and millipedes and centipedes.

Practice

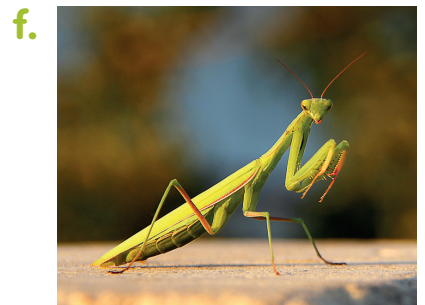
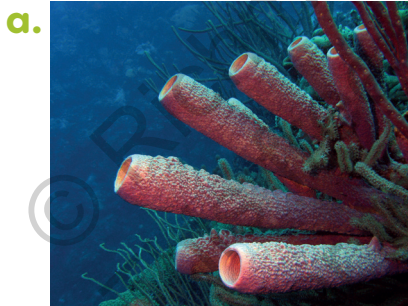
1 Write the names of the invertebrates.

- a. They live on the ocean floor and cannot move: _____,
_____ and _____.
- b. They include spiders and insects: _____.
- c. Their bodies have five parts: _____, _____ and
_____.
- d. They are the largest group of invertebrates: _____.
- e. Many have shells: _____.

2 Choose the true sentences.

- a. ☐ Sponges catch food with tentacles. c. ☐ Spiders are insects.
- b. ☐ Worms do not have legs. d. ☐ Octopuses are mollusks.

3 Write the names of the invertebrates or the groups they are from.





+ What is an exoskeleton?



A snail has a hard shell covering its soft body.



A beetle has a hard exoskeleton and jointed legs.



Millions of tiny corals with hard exoskeletons live in a reef.

An exoskeleton is a hard covering that protects the soft bodies of some invertebrates.

The exoskeletons of arthropods have joints that allow movement. As arthropods grow, their soft bodies get bigger, but their exoskeletons do not. The exoskeleton cracks, and the animal climbs out. Then the animal produces a new, bigger exoskeleton. The new exoskeleton gets hard in a few hours.

This process is called **molting**.

Molting is a dangerous time because predators can attack.

Some arthropods, such as spiders and insects, stop growing and molting when they are adults.

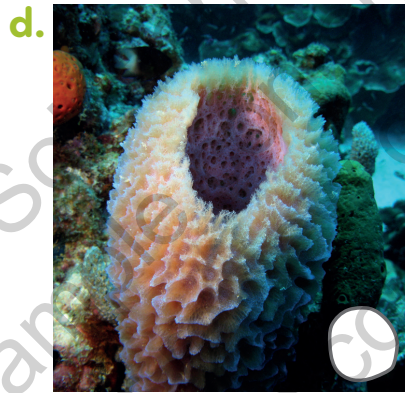
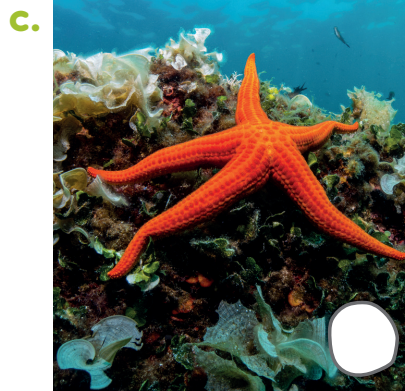
Other arthropods, like lobsters and crabs, molt all their life, and they can become very big.

Some lobsters can grow more than a meter long, and the leg span of some crabs can measure over three meters.

The exoskeleton of mollusks is called a shell. Mollusks do not molt because their shell grows with them.

Practice

1 Choose the invertebrates that have exoskeletons.



2 Answer the questions.

a. When an insect grows, what happens to its exoskeleton?

b. Do all arthropods molt during their whole life?

3  Write the names of invertebrate groups.

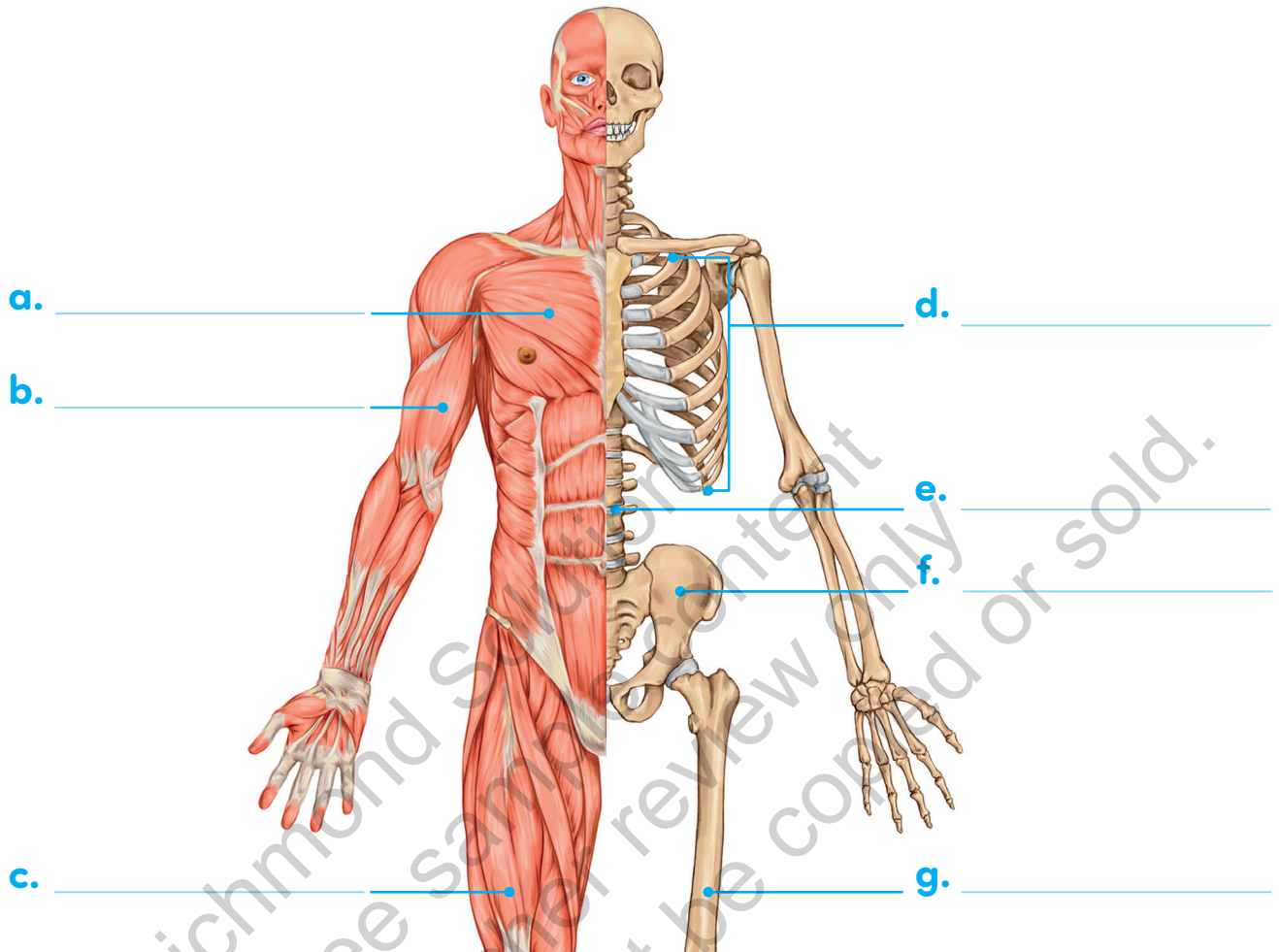
a. They molt during their whole life: _____ and _____.

b. They are very small, and millions live in underwater reefs: _____.

c. They have a hard shell: _____.

Check my progress ✓

1 Label the muscles and bones.



2 Choose Yes or No.

a. The muscular system helps you move your body.

☐ Yes

☐ No

b. The human body has around 650 muscles.

☐ Yes

☐ No

c. Joints attach muscles to bones.

☐ Yes

☐ No

3 Complete the sentences.

a. _____ do not have a spine or an internal skeleton.

b. _____ are vertebrates that only live in water.

c. Sea anemones are _____.

d. _____ are the largest group of invertebrates.

4 Classify the animals as invertebrates (I) or vertebrates (V).

a. ☐ shark

d. ☐ snake

g. ☐ human

b. ☐ starfish

e. ☐ frog

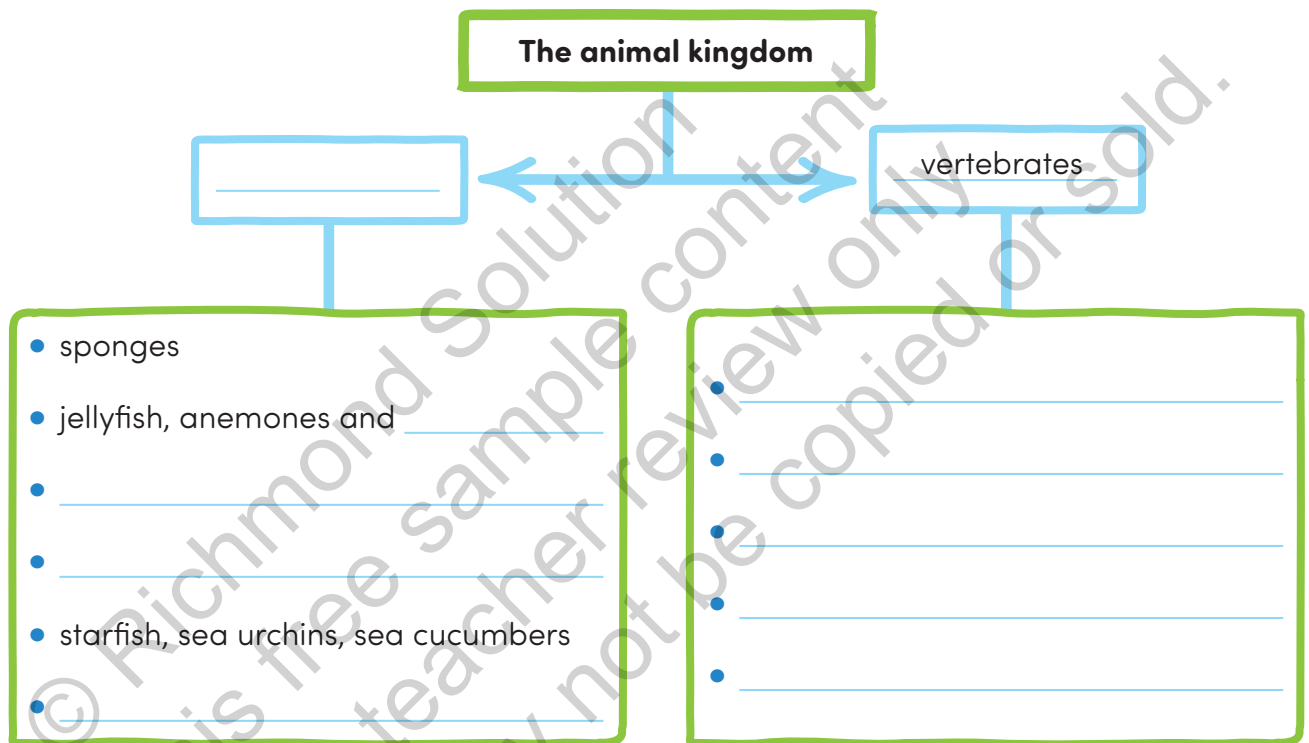
h. ☐ jellyfish

c. ☐ squid

f. ☐ worm

i. ☐ scorpion

5 Complete the diagram.



6 Choose the correct ways to end the sentences.

a. The animals that breathe with lungs are...

☐ fish, birds and reptiles.

☐ birds and amphibians.

☐ mammals, amphibians, birds and reptiles.

b. Snakes, lizards and turtles are examples of...

☐ amphibians.

☐ mammals.

☐ reptiles.



PROJECT
STEAM

1 Make a 3D model of human teeth