LEARN SCIENCE WITH MO

LIFE CYCLES

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AND MICHAEL BUXTON

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Find us on

Contents

The words in **bold** are in the glossary on page 30.

A growing MO

Mo has a favorite pair of shoes for skateboarding. But Mo, what happened last time you went skateboarding?

OH. IT WAS VERY SAD.

I PUT MY SHOES ON, EVEN THOUGH THEY FELT A BIT TIGHT. WELL, VERY TIGHT.

WE WENT SKATEBOARDING ...

... AND MY SHOES SPLIT OPEN! I GOT A BLISTER ON MY FOOT, TOO.

Disaster! It was bound to happen one day because you are growing, Mo.

You are bigger now than when you were born. In a year's time you will be bigger still. This process – being born, growing up, and (much later) getting old – is called a life cycle.

1) Baby

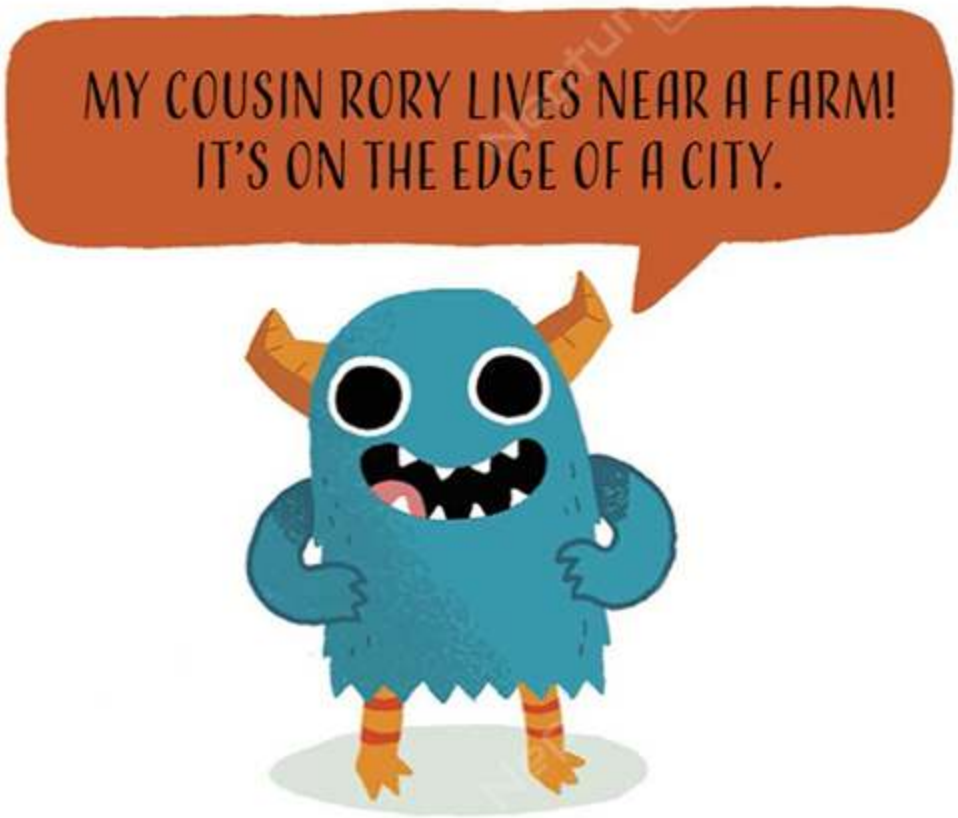
2) Toddler

3) Teenager

4) Adult

5) Elderly monster

All living things have a life cycle, from monsters to humans, plants to **bacteria**. One of the best places to find out about them is a farm.

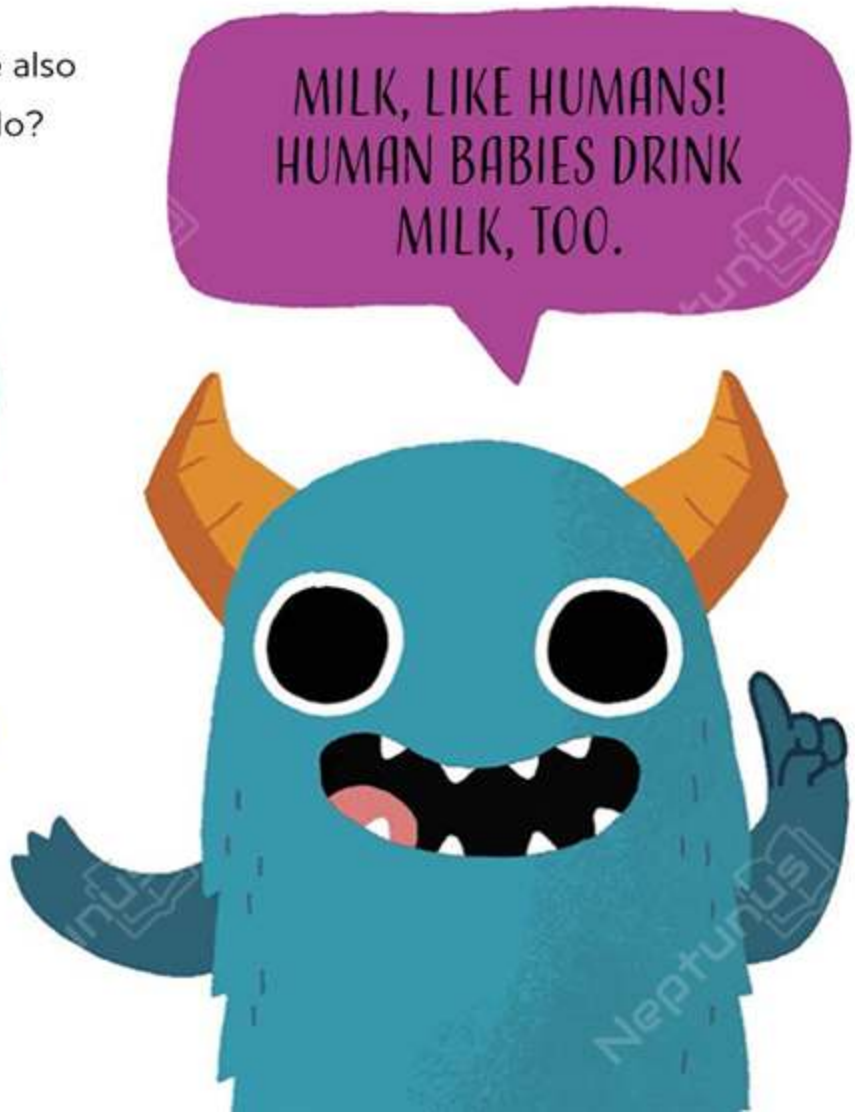


Let's go, Mo! You are off to the farm.

BABY SHEEP

Mo and Rory are visiting the baby animals that were born this spring. Which are your favorites, Mo?

Lambs can stand up almost right away. They are also hungry right away! What do lambs feed on, Mo?



That's right! Sheep and humans are both mammals. Mammal mothers feed their babies milk. Mammals also have hair and usually give birth to live young. Do you know which of these are also mammals? You can find out if you are correct on page 32.

Cow

Chicken

Frog

Dog

Whale

At the start, the mother sheep produces what the farmer calls "first milk." It contains lots of **nutrients**. These give her lamb energy and help it grow. First milk also contains **antibodies**, which help the lamb fight off diseases.

EGG TO CHICK

Next, Rory takes Mo to see some little chicks. The chicken coop is a great place to find out about bird life cycles.

Where do chicks come from, Mo?

They do! And birds are different from mammals in other ways. Can you think how?

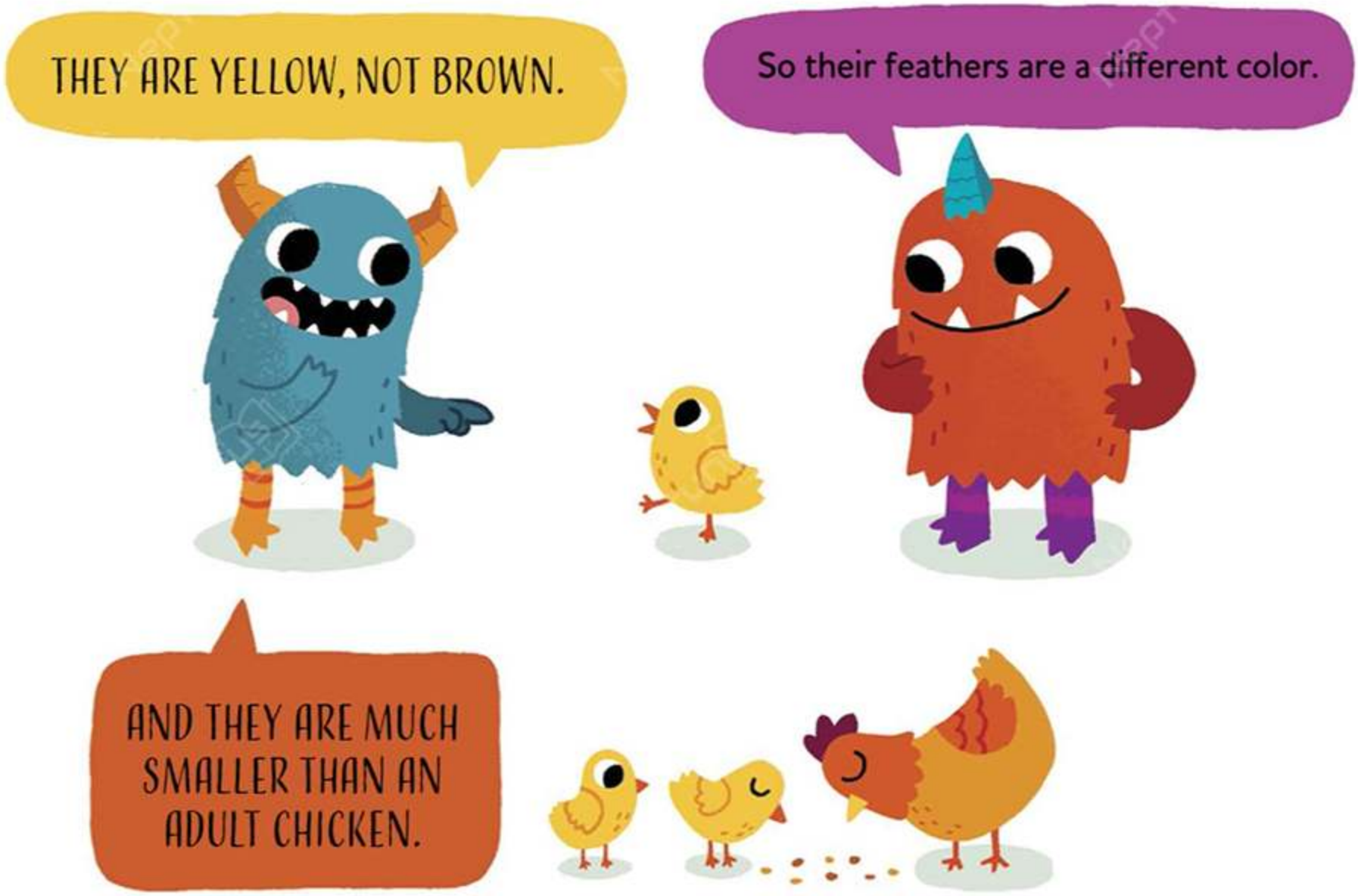
Good answers! Birds are different from mammals because they are a different kind of animal. Birds have feathers and wings.They also have a different life cycle. It goes:

Egg

Chick

Adult

Of course, the chicks still do not look exactly like adult chickens. How are they different, Mo?



All good answers! To grow, the chicks will need to eat and drink plenty. Their bodies need the nutrients in food to get a little bigger and stronger every day.

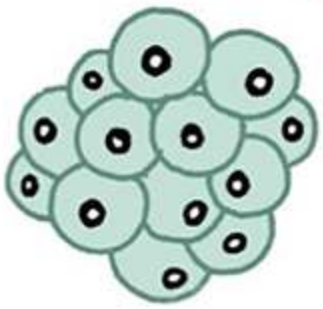
FROGSPAWN

Suddenly Mo hears a funny noise. "RIBBIT! RIBBIT!" It is coming from the frogs in the farm pond. The cousins go to see the noisy frogs. They are amphibians.

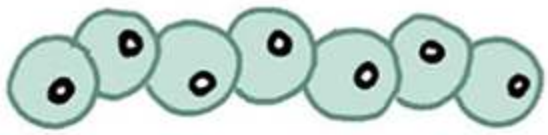
WHAT IS AN AMPHIBIAN, ANYWAY?

Amphibians are animals that start life in water, but later live mostly on land. As part of their life cycle, some amphibians, including frogs and toads, lay lots of little eggs in ponds and shallow streams.

If the eggs are in a clump, they are frogspawn.
If they are in a string, they are toadspawn.



Frogspawn in a clump



Toadspawn in a string

1. At first, the egg is just a dot in the middle of the frogspawn.

2. Before it hatches, though, you can see a tiny tadpole inside.

3. Once the egg hatches, the tadpole swims free.

At first it breathes underwater, using **gills.**

4. First the tadpole grows back legs, then front legs, too.

It still has gills, but now it mostly breathes using its **lungs.**

5. The tadpole's body starts to "eat" its own tail. Soon the tail is gone. The tadpole has become a frog.

6. The frog lives mainly on land and breathes through its lungs.

It stays near water to keep its skin wet.

The big changes some animals (such as frogs) go through as they grow are called metamorphosis.

WORKER ANTS

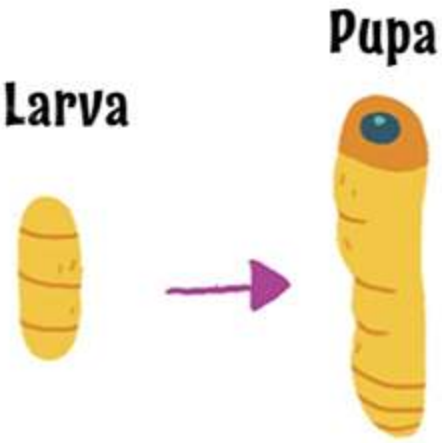
Away from the pond, Rory notices a line of ants, carrying away all kinds of things. Ants are insects, meaning their body is in three parts, and they have three pairs of legs and a pair of **antennae**.

The ants are taking food to their nest. Their queen lives in the nest. Her job is to lay eggs. Eggs are the start of each ant's life cycle.

Queen

Ant egg

Soon the egg turns into a **larva**. Worker ants feed it lots of liquid food. The larva turns into a **pupa.**



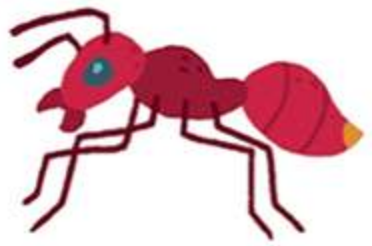
Most pupae will become worker ants. The rest become soldiers.

Worker ant

Jobs: building the nest, finding food, feeding larvae, cleaning

Soldier ant

Jobs: defending the nest by biting, stinging, or spraying acid at attackers



In the summer, male ants and new queens grow wings and **mate** in the air. Now the male ants die but the queens try to start new nests.

AT THE BEEHIVE

Mo, what is your favorite food?

HONEY! OR MAYBE CAKE ... HONEY CAKE!

The farm has three beehives full of bees. The farmer collects their honey to sell in the farm shop.

Like ants, bees are also insects. They make honey to store up food to last them through the winter months. They have an interesting life cycle, which Mo is about to discover.

1. Bees start life as an egg. Their queen lays eggs in little **cells** prepared by worker bees.

2. The egg hatches into a larva. As it grows, the larva breaks out of its skin, or molts. It does this five times. In five days, the larva grows 15 times bigger than it started.

They are, Mo. Let's do a little quiz to see what you remember about them. (You can find out the answers on page 32.)

1) In what order do these stages of a bee's life cycle happen?

Bee

Larva

Egg

Pupa

2) Which of these animals are flying insects, like bees?

a) Fruit flies

b) Spiders

c) Pigeons

d) Bats

3. After the fifth molt, the larva has become a pupa. It begins to form eyes, legs, wings, and antennae.

4. After about 12 days, the pupa has become a bee. It chews its way out of the cell.

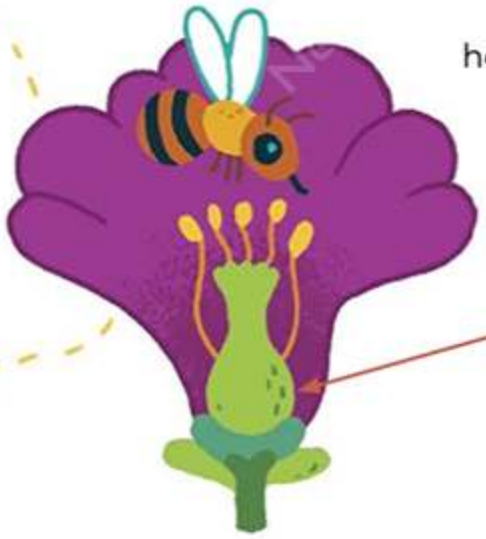
5. The pupa is now fully transformed into an adult bee.

BEES AND FLOWERS

Mo and Rory have noticed lots of the bees flying along the same invisible pathway to and from their hive.

The bees have found food to bring back to the hive. The food is nectar, a sweet liquid that flowers make to attract bees.

Great question, Mo! You are right. The flowers want the bees to help them **reproduce**. It works like this ...



When the bee arrives, it hovers in front of the flower and then crawls inside.

Nectar

A bee visits a flower to collect nectar.

Tiny bits of **pollen** get stuck to the bee's furry body as it collects nectar.

Anther

Pollen is made in the anthers, one part of the male parts of a flower.

The bee flies to a new flower for more nectar.

Stigma

Pollen from the bee's body sticks to the stigma, one part of the female parts of a flower.

This is called pollination. It is the start of how flowering plants reproduce.

Mo will find out the next bit of the story on pages 18 and 19.

FLOWERS AND PLANTS

How many flowering plants can you and Rory think of, Mo?

Don't worry – there are lots more than most people can think of. Lots of trees have flowers. So do plants, such as blackberry bushes. Even cactuses have flowers. Flowers play a **crucial** part in the life cycle of many plants.

Cactuses need flowers to make fruit and **seeds**, just like all flowering plants, Mo.

Petals

attract insects and other pollinators

Carpel

(female parts: stigma, style, and ovaries)

Stamen

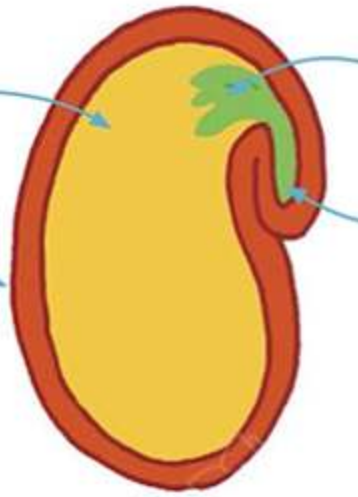
(male parts: anthers and filaments)

Ovary

one of the female parts, which later becomes a seed

Stem

After pollination, the flower forms seeds. The roots, stems, and leaves are all ready to grow inside the seeds.



Store of food

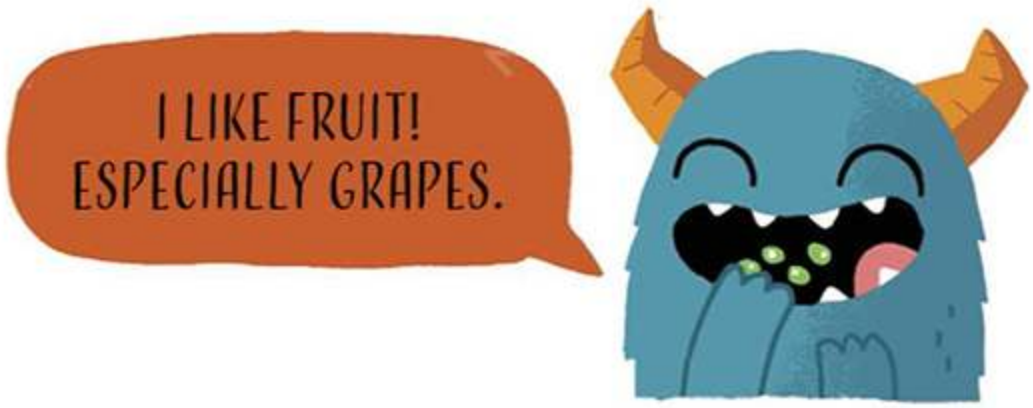
(for when the seed starts to grow)

Young stem

Young root

Protective coat

On some plants, the flowers form fruit with seeds inside. Can you think of any?



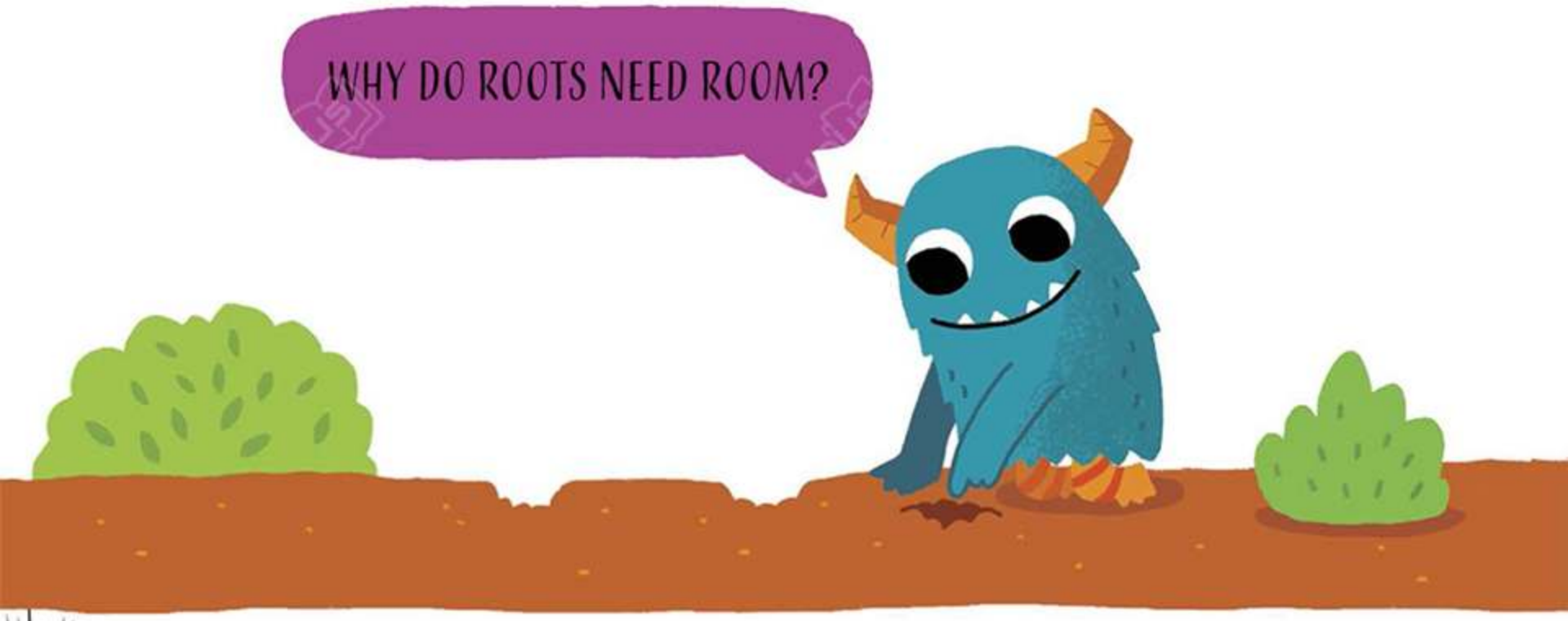
So do lots of animals. They eat the fruit and seeds – and later the seeds are pooped out somewhere else. Some seeds attach themselves to an animal's fur and then drop off elsewhere.

PLANTING TIME

Mo, next up, you and Rory are going for a mini-tractor ride. Could life get any better?

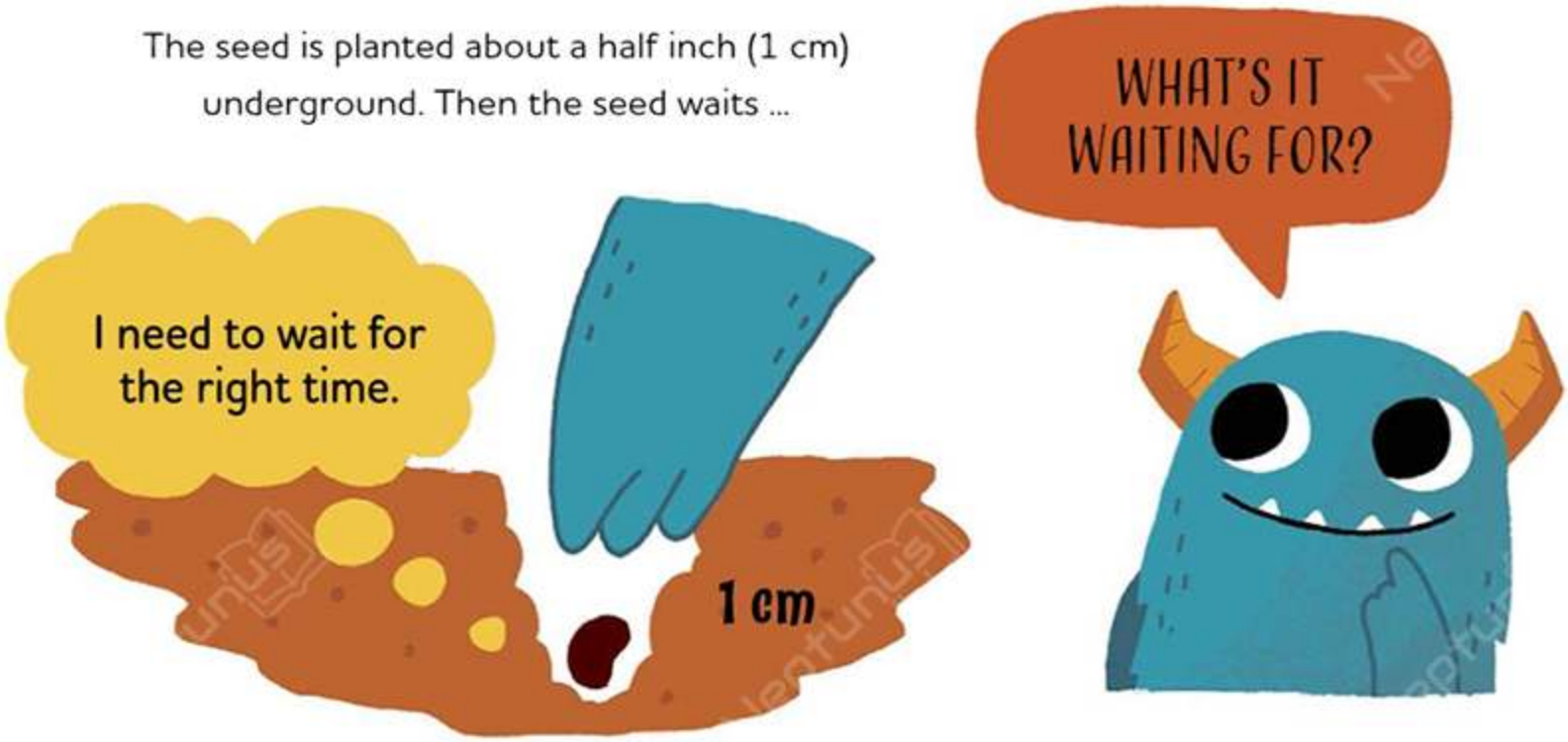
Now that you know how seeds are made, you are going to find out about the beginning of a plant's life cycle by helping to plant a **crop** of beans.

The bean seeds are planted about 4 inches (10 cm) apart so their roots have room to spread out.



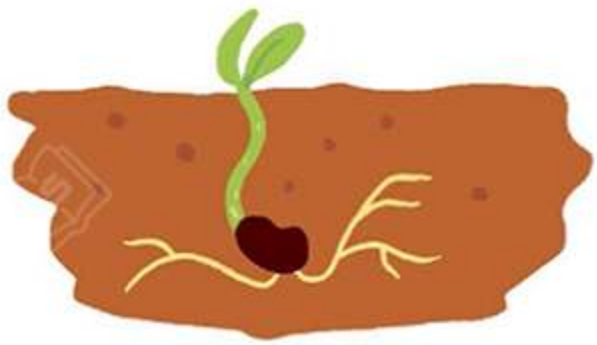
A plant's roots gather water and nutrients for growth. If the plants are too close together, they do not get enough of these.

The seed is planted about a half inch (1 cm) underground. Then the seed waits ...



Seeds only **germinate** (start to grow) when the time is right. They need water, nutrients, and the right temperature.

When everything is right, the seed germinates. Roots grow down and a stem grows up. The bean plant's life cycle has started!

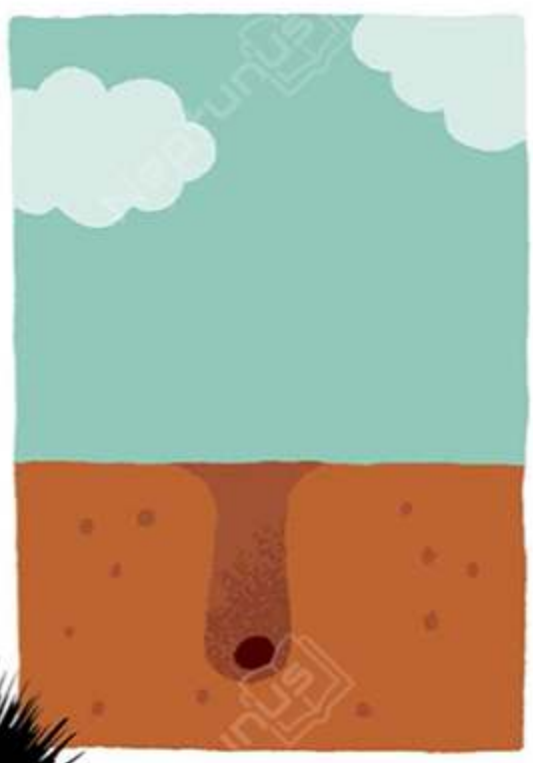


THE CABBAGE CREW

Mo, you are off to join some people **harvesting** spring cabbage. Can you guess what part of its life cycle the cabbage has reached?

Good guess – but not quite right. It WAS a bit of a trick question, sorry!
The cabbage has reached the end of its life – but not its life cycle.

1. The cabbage starts life as a seed, which is planted in soil.

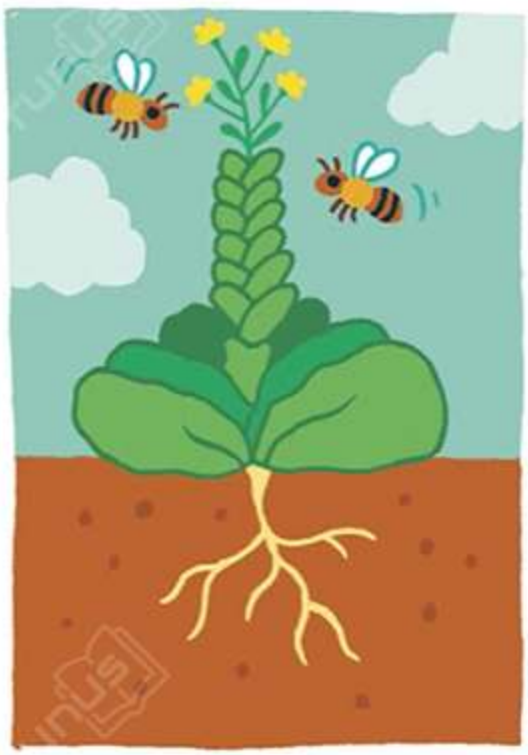


2. A few weeks later, the cabbage has grown leaves and roots.

3. After about ten weeks, the cabbage is ready to harvest.

The volunteers cut the cabbages off the roots and hand them up. Mo's job is to put them into boxes. Each box holds 10 cabbages.

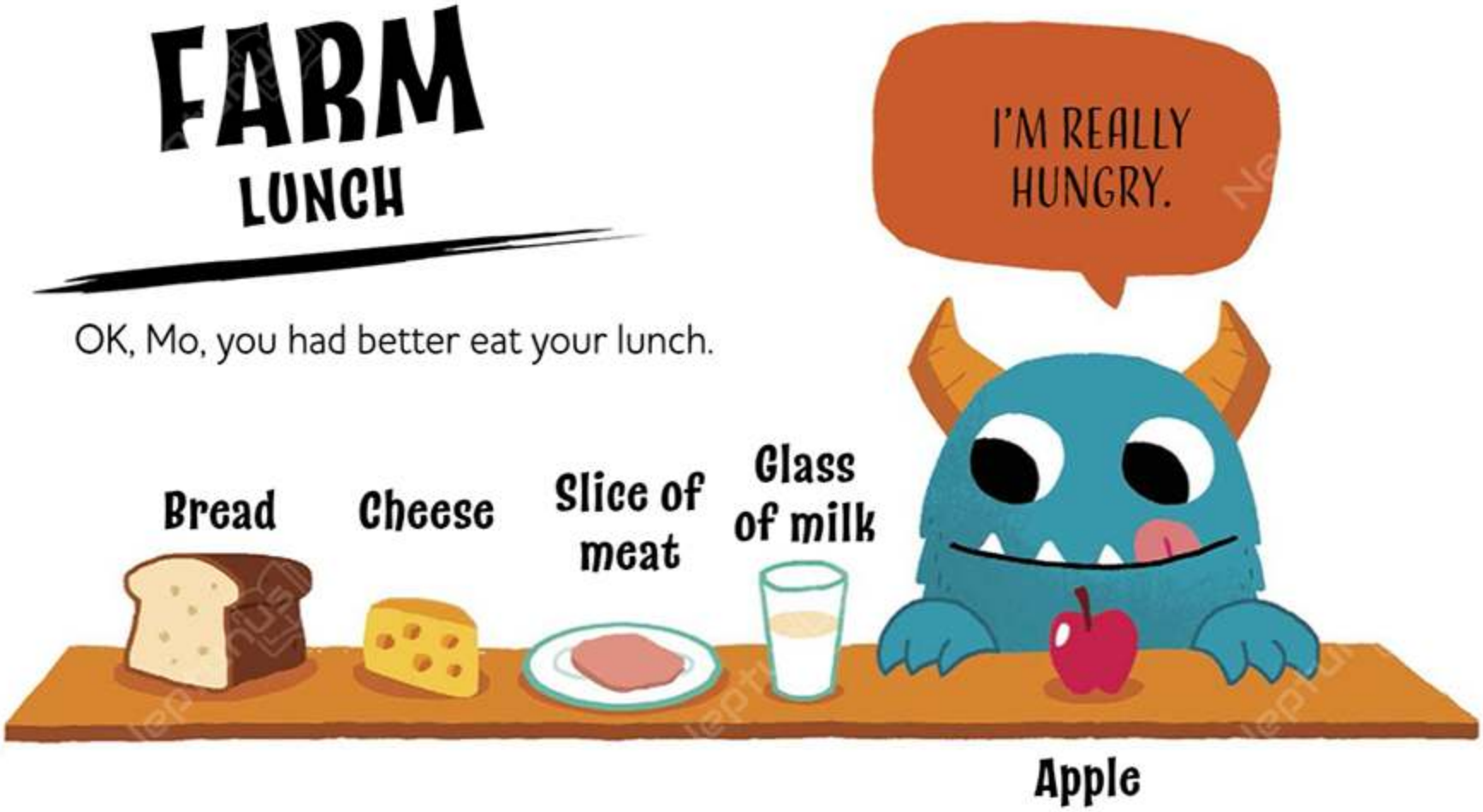
4. If it is not harvested, it will continue to grow. A seed stalk grows out of the cabbage. At the top of this, little flowers appear. The flowers are pollinated by insects.



5. As soon as they are ready, the seeds fall off the plant. They may be eaten by animals and pooped out somewhere else, or germinate where they land.

FARM
LUNCH

OK, Mo, you had better eat your lunch.

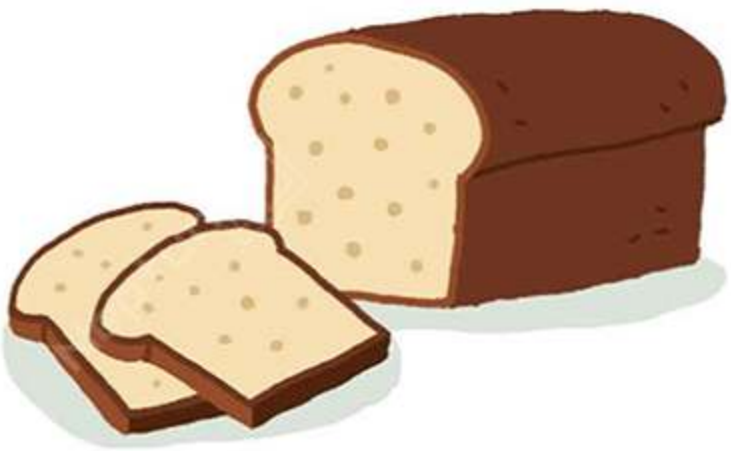


All living things need food and drink. The food contains nutrients, which help them stay healthy and grow. Eating a balance of nutrients is important when you are growing.

Brown bread

Bread contains carbohydrates, which give your body energy.

Other carbohydrates include oatmeal, rice, pasta, and potatoes.



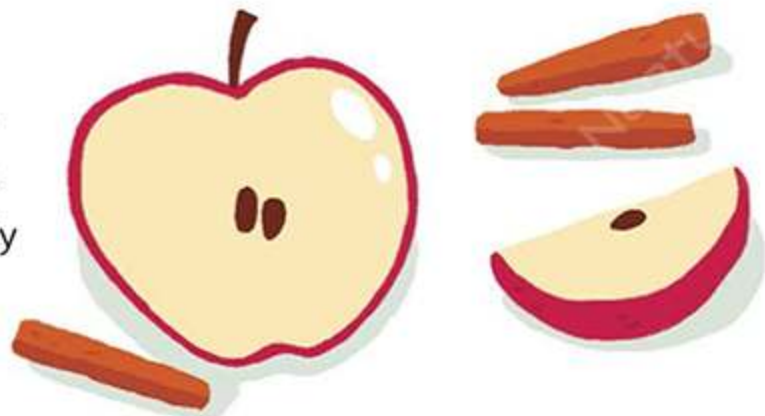
Cheese and milk

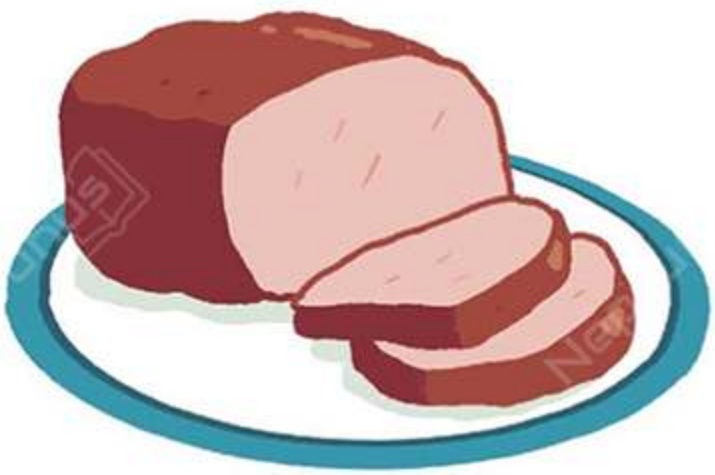
Cheese and milk are **dairy** products. They contain calcium, which keeps your bones and teeth healthy.

Other dairy foods include yogurt and butter.

Apple and carrot sticks

Apples are fruit and carrots are vegetables. They contain **vitamins**, **minerals**, and **fiber**. These help our bodies work better, especially our **digestion**.





Meat

Meat contains lots of proteins, the body's building blocks. Protein is used for growth and repair.

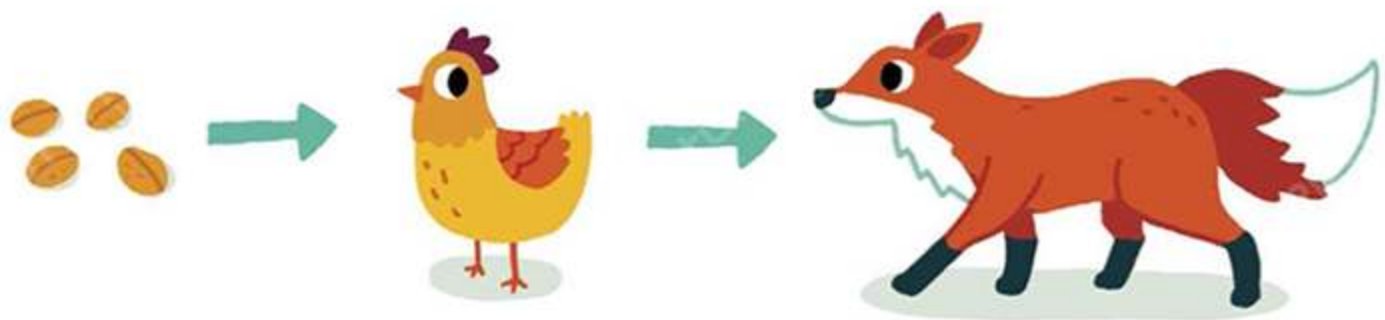
Meat, fish, eggs, nuts, lentils, and peas all contain protein.

Mo, can you plan tomorrow's breakfast and include all these different kinds of foods?

FOXES, CHICKENS, AND FOOD CHAINS

Back at the chicken coop, there has been a close call. A fox ran into the yard and tried to grab a chicken. Luckily, the chicken escaped into its coop in time for the farmer to chase the fox away.

Not all chickens are so lucky. It is just how nature works. Plants and animals are linked to each other for survival. This is called a food chain.



Food chains start with plants.

Because plants can produce their own food, they are called **producers**. They do this by converting the energy in sunlight into food by a process called **photosynthesis.**

Animals cannot produce their own food. They are called **consumers**.

The plants are eaten by animals.

Animals that eat plants are called herbivores. Some herbivores are small animals, like rabbits. Others are huge animals, such as elephants or giraffes..

Some animals are eaten by other animals.

Meat eaters are called carnivores.

Animals that hunt other animals are called predators. The animals they hunt are called prey.

Predator

Prey

Animals that eat plants AND meat are called omnivores.

Mo, what do you eat, and what kind of animal does that make you?

Yes, monsters are like humans: they can eat plants and meat. Can you remember the names for the different kinds of eaters?

1) An animal that eats everything, like Mo?

2) An animal that only eats meat?

3) An animal that only eats plants?

Find out if you were right on page 32.

FROM BUMP TO BABY

Mo, you've learned about many different life cycles – but there's one more to learn before you leave the farm. You are going to help a person harvesting broad beans, who cannot reach the lowest beans.

The volunteer is **pregnant.** The baby inside her makes it hard to bend down far enough. Her bump is one of the first steps of a human life cycle.

1. First, two human cells combine to make a new cell.

Egg (from female)

Sperm (from male)

2. Inside the female, the cell divides and grows for nine months.

3. After a baby is born, it grows quickly. After a year, babies can usually walk and are starting to talk.

4. At about 12, the young human will start changing into an adult. This is known as puberty.

5. Their brains are fully developed by their mid-twenties.

6. In their forties, human bodies slowly begin to wear down. Between 60–70, old age begins to affect them. Their bodies become weaker and slower.

7. Eventually, like all living things, a human's life cycle comes to an end.

Glossary

antennae
the long, thin stalks on the heads of some animals, which are used to sense the world around them

antibody
something in blood that helps living things fight off diseases

aquatic
living in or to do with water

bacteria
tiny, simple living things

cell
a building block from which living things are made

consumer
a living thing that gets food by eating (animals do this)

crop
a plant that is grown for use by humans, usually to eat

crucial
so important that without it, an event cannot happen

dairy
made from the millk of cows, sheep, or goats

digestion
the act of breaking down food, then taking the useful parts of it into the body

fiber
a part of food plants that helps the digestion work well

germinate
when seeds start to grow

gills
body parts that allows fish and young amphibians to breathe underwater

harvesting
picking plants

larva (larvae)
the stage of an insect's life cycle between egg and pupa

lungs
the body parts that allow animals to breathe on land

mate
when a male and a female of the same species join together to produce young

mineral
a nutrient, such as calcium, needed to stay healthy

nutrient
something a living thing needs to survive, grow, and stay healthy

photosynthesis
the process by which plants use sunlight, water, and carbon dioxide to create oxygen and store energy in the form of sugar

pollen
a fine powder produced by certain plants

pregnant
has a baby growing inside

producer
a living thing that makes its own food (plants can do this)

pupa (pupae)
stage of an insect's life cycle between larva and adult

reproduce
to create young

seed
the small part of a flowering plant from which a new plant grows

vitamin
a nutrient needed to stay healthy

Books to read

Quick Fix Science: Animals and *Quick Fix Science: Plants* by Paul Mason (Wayland, 2021)

Meet Snappy, a young Nile crocodile. Snappy is really interested in science, but not all that good at it – yet. In these books, Snappy finds out more about the lives of plants and animals.

The *Life Cycles* series, by Rachel Tonkin (Wayland, 2020), has books on the life cycles of lots of different kinds of living things, including *Acorn to Oak Tree*, *Egg to Chicken*, *Tadpole to Frog*, and *Egg to Butterfly*.

Body Bits: Eye-Popping Plant Parts and *Body Bits: Astounding Animal Body Facts* by Paul Mason, illustrations by Dave Smith (Wayland, 2021).

Leaning towards the horrifying and humorous, these books feature fascinating facts and funny cartoons. They are part of the *Body Bits* series, which also has books on human and dinosaur body bits.

Places to visit

American Museum of Natural History

200 Central Park West
New York, NY 10024

This museum has displays about all kinds of living things, their life cycles, and their habitats. Don't miss the life-size model of a blue whale in the marine exhibit or the huge skeleton of a *T. Rex* in the dinosaur hall.

Smithsonian National Museum of Natural History
10th St. and Constitution Ave NW
Washington, D.C. 20560

This museum offers hand-on experiences to teach people about the natural world. Exhibits offer fascinating facts about biomes and habitats and the extraordinary animals that live in them, both today as well as millions of years ago.

Answers

Page 7

Cows, dogs, and whales are all mammals. Whales are a special kind called an **aquatic** mammal. Chickens are a different kind of animal called a bird. Frogs are another different kind of animal called an amphibian.

Page 15

1) A bee's life cycle goes: egg; larva; pupa; bee.

2) The only one of these that is a flying insect is the fruit fly. Some people think spiders are insects, but they have too many legs (eight, not six) and not enough body parts (two, not three).

Page 27

1) Animals that eat meat and plants are called omnivores.

2) Those that only eat meat are called carnivores.

3) Animals that only eat plants are called herbivores.

Of course, although humans CAN eat both meat and plants, some choose only to eat plants. They are called vegetarians or vegans, depending on which other food groups they do not eat.

Titles in This Series

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HUMAN BODY

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TIME

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