1 Living organisms

Living things are made of tiny units called cells. Cells help living organisms to carry out one or more of the following life processes.

Draw lines to match each process to its definition.

M	MOVEMENT
R	RESPIRATION
S	SENSITIVITY
G	GROWTH
R	REPRODUCTION
E	EXCRETION
N	NUTRITION

Get energy from food.
Gets bigger or number of cells increases.
Gets rid of waste products.
Intake of particles for food.
Makes more living organisms.
Responds to what is going on around them.
The living things can change direction.

Make up a sentence to help you remember MRS GREN.

For example, you could use My Robot Should Go Round Every Night.

M_____ R_____ S_____

G_____ R_____ E_____ N_____

2 Animal and Plant cells

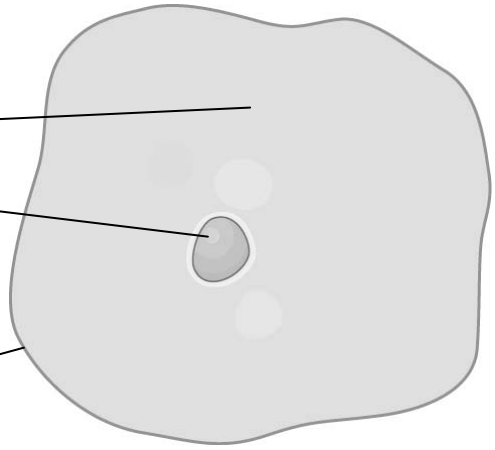
Animal cell

Look at a picture of an animal cell and read the descriptions in the boxes below.

Use these to help you label parts 1, 2 and 3 of the diagram below.
Use the words from this box for your labels.

cell surface membrane	cytoplasm	nucleus

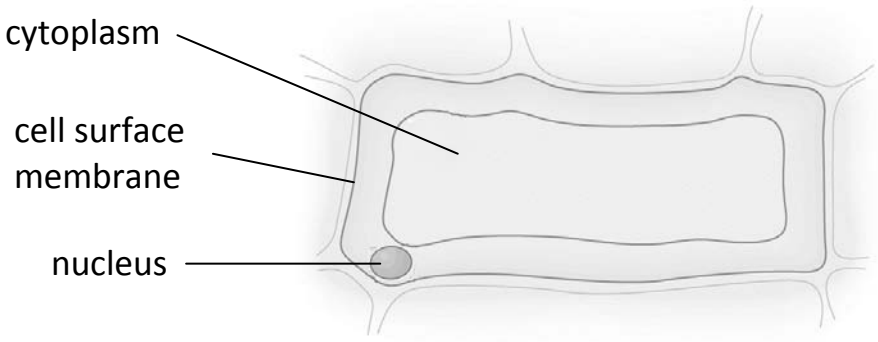
Contain chromosomes	1 _____
Watery liquid	2 _____
Controls what enters or leaves a cell	3 _____



Plant cell

Look at a picture of a plant cell.

Draw the chloroplasts and a vacuole on the diagram below and **label** them. Colour the chloroplasts green. Then label the cell wall.



Why do plant cells have:

a cell wall _____?

b chloroplasts _____?

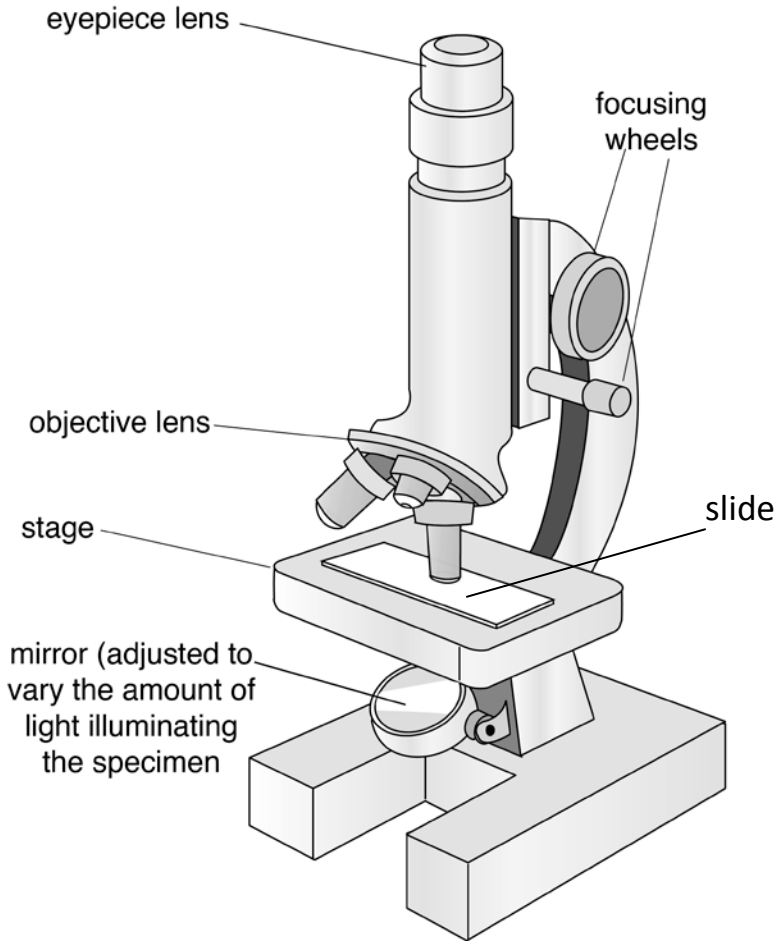
Find out what chromosomes are for. (Hint: *You need a key word starting with the letter 'g'*.)

_____

_____

3 How to look at cells

Why do we need a microscope to see cells? _____



Part of microscope	What it is needed for.
Eyepiece lens	
Objective lens	
Focussing wheels	
Slide	
Stage	
Mirror	

CLASSIFICATION AND VARIATION

You are going to prepare an onion cell sample to look at using a microscope.

You are going to write a method (instructions) to describe what to do at each step.

Step 1: Getting started

Make a list of what you need and then collect this equipment.

_____

_____

_____

_____

_____

Step 2: Getting the onion skin onto the slide.

WEAR EYE PROTECTION

Watch what your teacher does and list the steps below.
The first one has been done for you. You can use key words from below for your instructions.

forceps peel slide flat air bubbles cover slip tissue

Cut a 1cm^2 piece of onion.

_____

_____

_____

_____

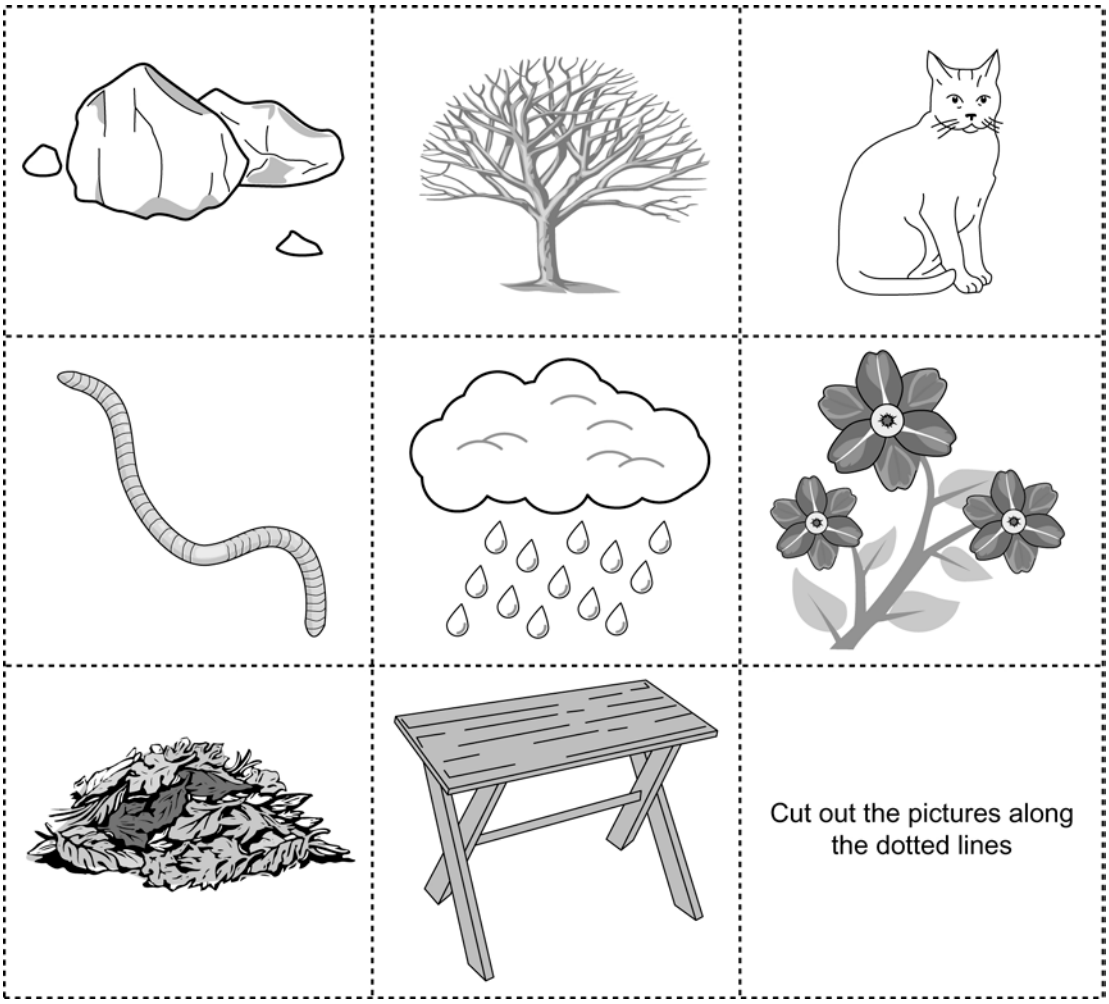
_____

Step 3: Observing the sample under the microscope.

Put the following instructions in the correct order. Number them 1 to 5, using 1 for the first thing you will do.

	Check that the smallest lens is in place and make sure that the stage is as high as it will go.
	Put the prepared slide onto stage, and clip it into place.
	Turn the microscope on.
	Draw what you see.
	Turn the focus knob until you get a clear image.
	Carry the microscope carefully and plug it in. Make sure that the leads do not dangle from the bench.

4 Living or non living?



1. Make a set of pictures of things which were never alive.
2. Make a set of pictures of things which have been alive.
3. Make a set of pictures which show living things.

Choose a living thing from the pictures above. Draw a picture in each bubble to show how it does these things.

Movement

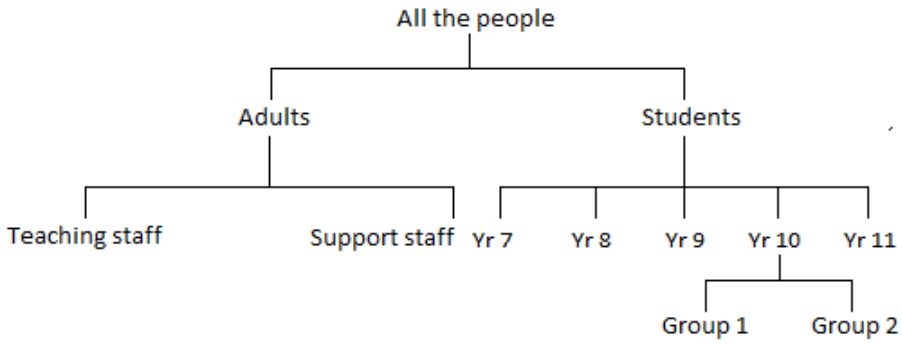
Growth

Nutrition

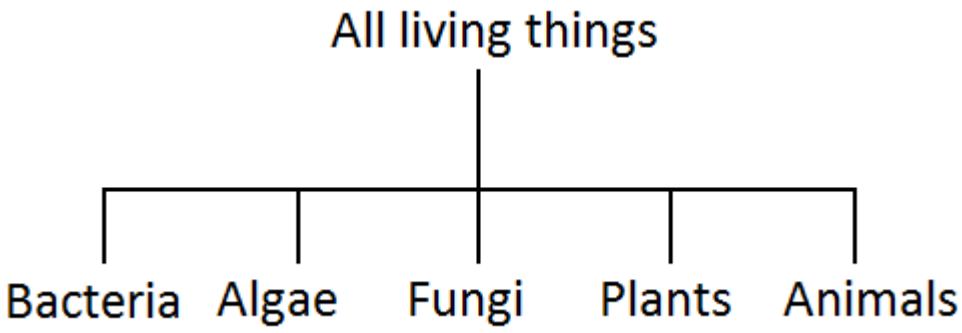
5 Classification

Classification is sorting living organisms into smaller groups based on their features.

Classification of people in a school:



Classification of all living things:



This shows that all living things can be divided into five different groups called **kingdoms**.

The five kingdoms are

b_____ f_____ p_____

a_____ and a_____.

Use a computer and see if you can find a picture of an organism from each of these groups, along with any other information, and use it to complete the table below.

CLASSIFICATION AND VARIATION

More about kingdoms

Name of kingdom	Picture	Features	Examples
Animal			
Plant			
Fungi			
Algae			
Bacteria			

6 Vertebrates and invertebrates

Use the words from the box to fill in the blank spaces in the sentences below. Words should only be used once.

backbone	bodies	crab	invertebrates	skeleton	vertebrates

Animals can be sorted into two main groups called _____ and

_____.

Vertebrates all have a _____. Vertebrates also have a

_____ to support their _____.

Some invertebrates have a hard outer shell. One example of an invertebrate is a

_____. Others like earthworms use water to give them structure.

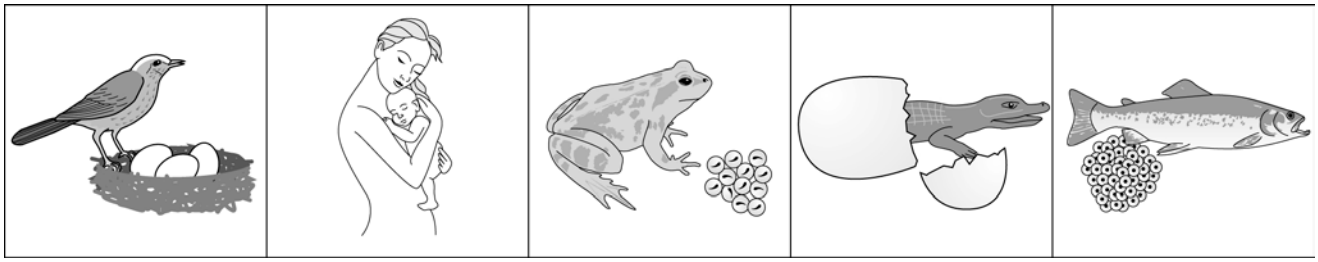
In the table below list four more examples of vertebrates and four more examples of invertebrates. If possible use a computer to find a picture for each of your examples.

Vertebrates	**Invertebrates**
e.g. trout (fish) 	e.g. worm 

7 Vertebrate Groups

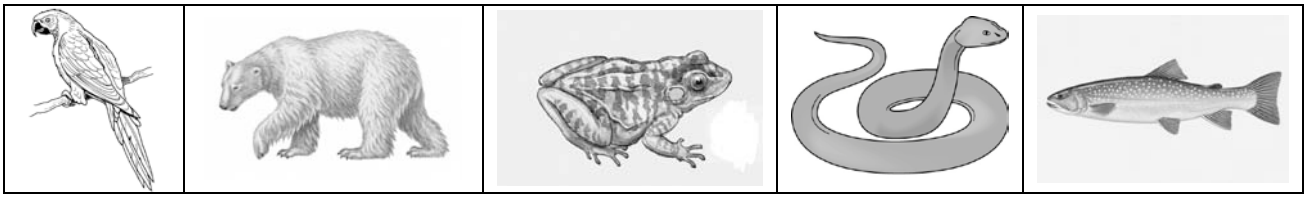
Vertebrates can be sorted into 5 main classes.

Here are 5 pictures. Use these to answer the questions below.



1. Circle the odd one out. Why is it different from the other 4 groups?

Now look at these pictures.



2. What is the difference between the skin covering on a fish and on a reptile?

   _____

3. Which class has feathers?

   _____

4. Which classes have moist skin?

   _____

5. What skin covering does the mammal called a polar bear have?

   _____

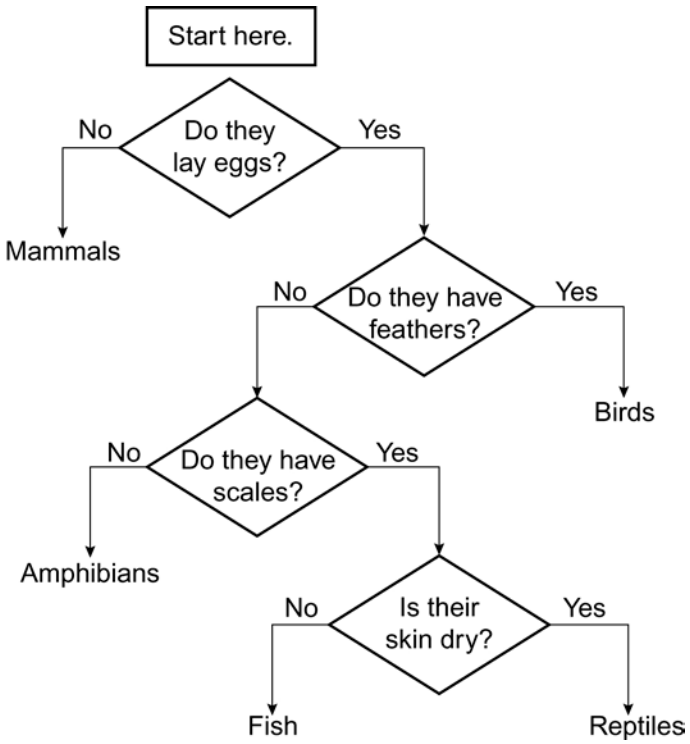
CLASSIFICATION AND VARIATION

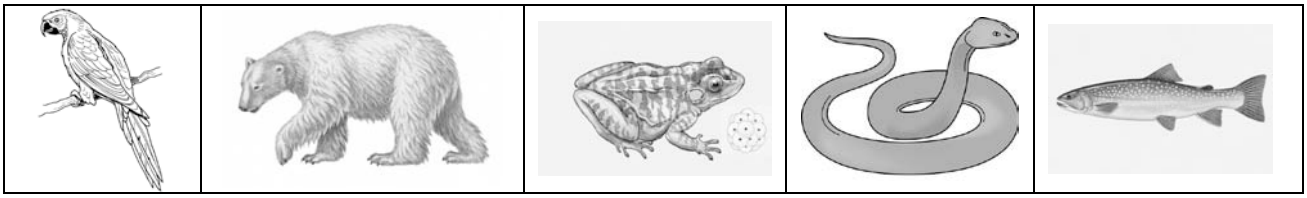
Use this information to help you to complete this table. Some features are done for you.

Class	Body temperature: variable or constant	Skin covering	Young: live birth or eggs	Oxygen uptake	Fertilisation: internal or external
Mammals	Constant			Through lungs	
Reptiles	Variable			Through lungs	
Birds	Constant			Through lungs	
Amphibians	Variable			Through lungs and skin	
Fish	Variable			Through gills	

CLASSIFICATION AND VARIATION

We often use keys to help us to classify living organisms. Here is a key to identify vertebrates. Use this to classify the animals in the picture below the key.





8 Features for survival

Organisms have adaptations (special features) that allow them to survive in different environments.

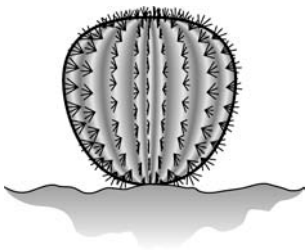
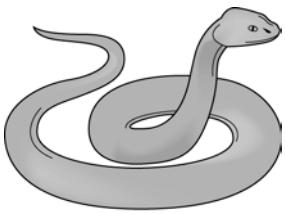
Draw a line joining the characteristic to the correct environment.

Characteristic	Environment
Blubber for insulation	Cold place
Very large feet	Sea shore
Very large ears	Desert
Deep roots	Sand dune

The three sets of pictures below show three different environments and some of the plants and animals that live there.

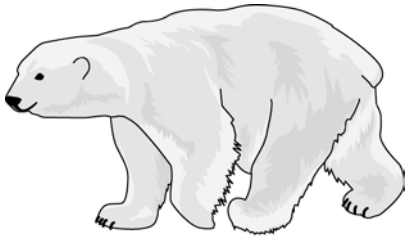
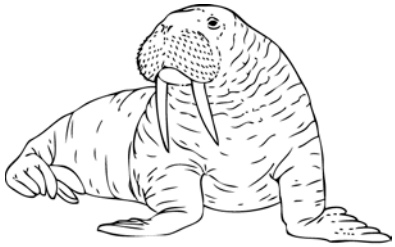
Look at each picture in turn. In the box below it, describe and explain at least 2 features of the organisms in the pictures that allow them to survive in the environment in which they live.

Desert environment:

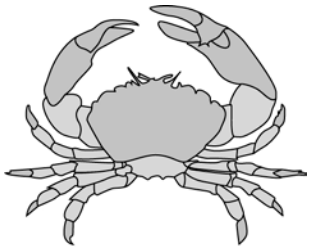
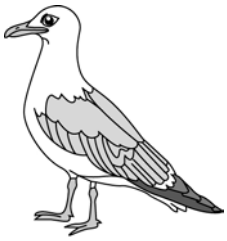
 Cactus	 Mouse	 Snake

CLASSIFICATION AND VARIATION

Polar environment:

 Polar Bear	 Walrus

Rocky shore environment:

 Sea lettuce	 Crab	 Seagull

Choose an environment: 1. Very hot 2. Very cold.

Design your own survivor with features which would let it survive in the environment you choose.

You can make your survivor either a plant or an animal.

If you choose an animal, decide whether to make it a predator or prey.

Now give your organism at least four features to allow it to survive in the environment you have chosen.

9 Making keys

Keys are used to classify organisms into groups.

Keys ask questions that allow you to put different organisms into the correct groups.

Rules for using keys:

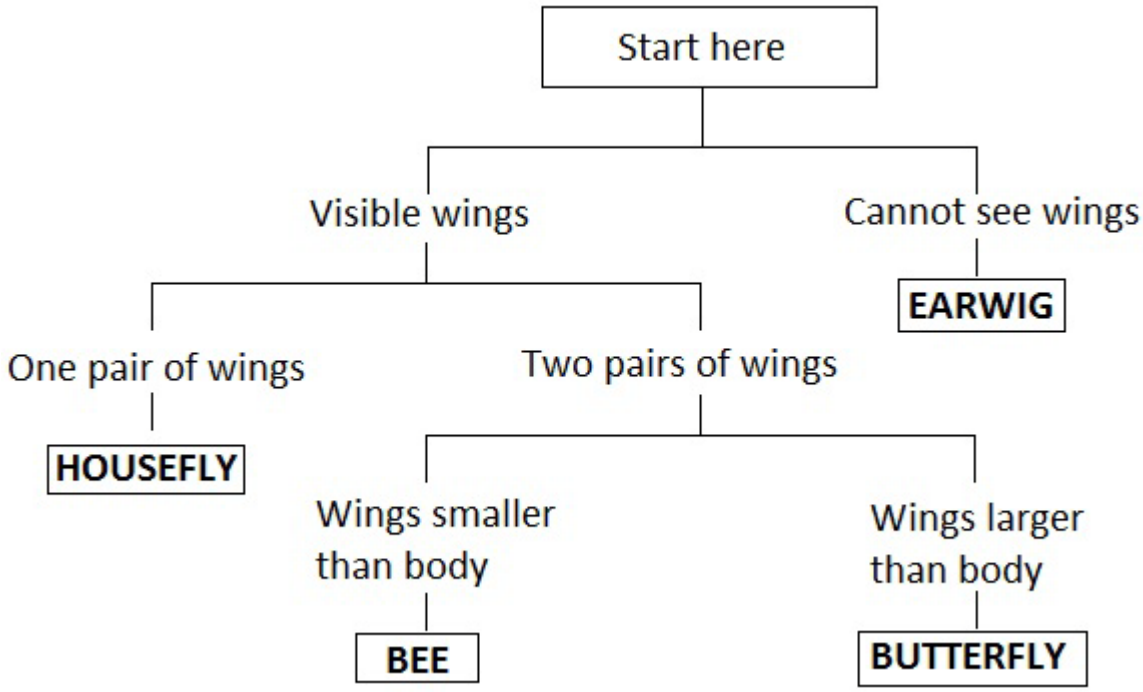
1 Start where it says **Start here**.

2 See which description of the characteristics is the best match.

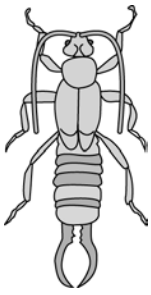
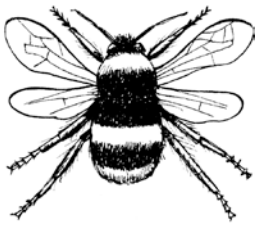
3 Follow the line to the next description.

4 Continue to the end to name the group.

Here is an insect key.

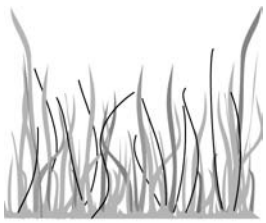
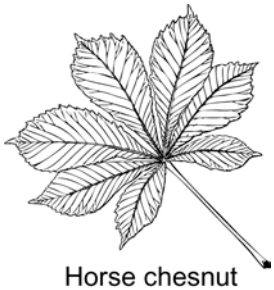


Look at the pictures and use the key above to label them.
Write each label in the box below its picture.

CLASSIFICATION AND VARIATION

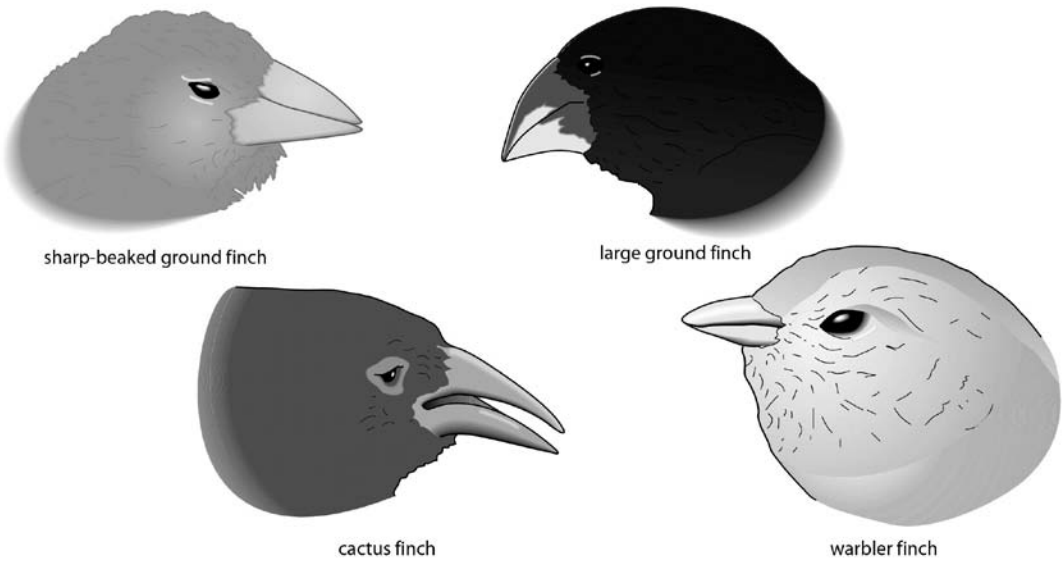
Here are four plant leaves. Make a key to allow someone else to identify them.

 Grass	 Oak	 Horse chesnut	 Silver Birch

10 Variation

When Charles Darwin visited the Galapagos Islands, he saw 13 different species of finch, each with a different shape of beak that is adapted for feeding on different food. He suggested that over time birds which had beaks that were the best shape for feeding on certain types of food survived better than birds which had beaks which were not such good shapes.

Here is a community of finches. The differences between them are called variations.



List the differences.

Feature	Differences

Now list the differences between you and the person sitting next to you.

_____

_____

_____

CLASSIFICATION AND VARIATION

Go round your class and collect data to complete the tables below:

Can you roll your tongue?	Number of people (tally)
Yes	
No	

Type of ear lobes?	Number of people (tally)
Dangly	
Straight	

Choose one of the tally charts and draw a **bar chart** on graph paper. Because the data is discontinuous, the bars should not touch. Stick your bar chart in the box below.

The pattern of our results:

Circle the correct word in each of these sentences to state the pattern in your results.

- I have found that **more** people **can / cannot** roll their tongues
- I have found that **more** people have **straight / dangly** ears.

CLASSIFICATION AND VARIATION

These are examples of **discontinuous variation** as we can put the results into **groups**.

We draw a _____ _____ for discontinuous variation.

Look back at the features of the people in your group that you made earlier.

Name at least two other features which show **discontinuous variation** (features that can be put into groups).

11 Investigating continuous variation

When differences in features can be put into groups this is called discontinuous variation.

There is another type of variation where we can collect numerical data. This is called **continuous variation**. Height, weight and handspan are examples of continuous variation.

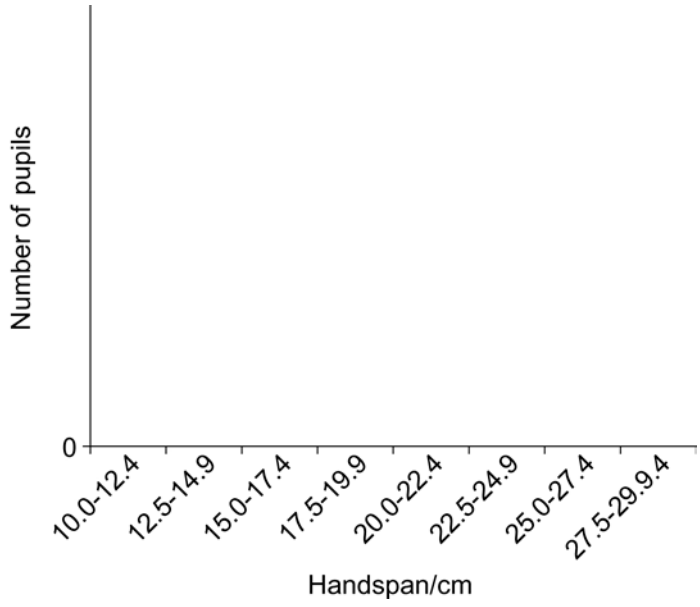
We are going to investigate continuous variation next.

Equipment	Needed for
30-cm ruler	measuring the maximum handspan. drawing graph.
pencil	to complete tally chart and graph.

What to do (method)

1. Measure the distance between your little finger and thumb when they are as far apart as you can get them. This is called your **handspan**. Measure to the nearest millimetre, for example 19.2 cm.
2. Use a tally mark to record your measurement in the correct space in the tally chart below.
3. Now measure the handspan of other students in your class and fill in the tally chart.
4. Use your data to make a bar chart. Because the data is continuous, you need to plot bars that are next to each other so they touch.

Hand span, *h* (cm)	Number of students	Range to plot (cm)
10.0–12.4		$10.0 < h \leq 12.5$
12.5–14.9		$12.5 < h \leq 15.0$
15.0–17.4		$15.0 < h \leq 17.5$
17.5–19.9		$17.5 < h \leq 20.0$
20.0–22.4		$20.0 < h \leq 22.5$
22.5–24.9		$22.5 < h \leq 25.0$
25.0–27.4		$25.0 < h \leq 27.5$
27.5–29.9		$27.5 < h \leq 30.0$



12 Inherited or environmental?

Humans inherit features from their parents. The genes for these features are in the sperm and the egg. Examples of these features are tongue-rolling and ear shape.

Some features can be changed by the environment. For example, eating too much changes our weight, and doing lots of exercises builds our muscles.

Some features are influenced by both our genes and the environment.

Look at the features listed in the boxes on the sheet, and then complete the table to show whether they are inherited, environmental or both.

Inherited	Changed by environment	Both

12A Inherited or environmental worksheet

There are some features of people listed in the boxes below.

Cut them out.

Sort into groups showing whether they are

- Inherited features
- Features changed by the environment
- Features that are both inherited and changed by the environment.

Use these to complete the table on your worksheet.

DIMPLES	TONGUE ROLLING	FRECKLES
TATTOO	HEIGHT	PIERCED EARS
EYE COLOUR	ACCENT	EARLOBES

13 Natural selection

Darwin was a scientist who studied living organisms in the 19th Century.

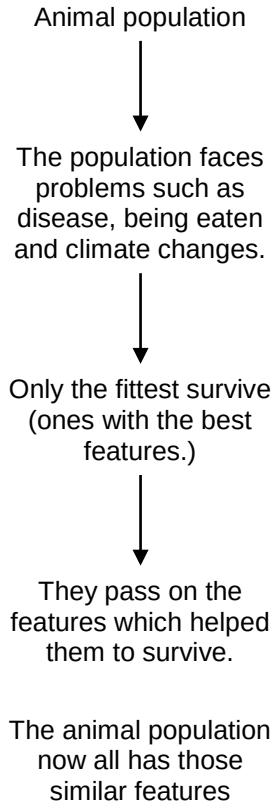
He sailed around the world and saw many different animals.

He had a theory (an idea) and collected evidence to find out if he was correct.
He made many drawings.

He called his theory **natural selection**.

This is his theory:

Any population of animals originally all had different features. This is **variation**.



14 Investigating snails

Students in a school counted the snails in the school field each September.

Here are their results for the years they counted the snails.

Year	Type of snail	
	striped	plain
1980	240	245
1990	190	260
2000	175	280
2010	130	320

1. Describe what happened to the numbers of each type of snail during this time.

   Striped snail _____

   _____

   Plain snail _____

   _____

2. Thrushes eat snails. Use the information above to suggest which type of snail the thrushes could see more easily.

   _____

3. Choose the best answer from this list to explain what was happening to the snails in this field as the years passed. Put a circle round the correct one.

   A Evolution

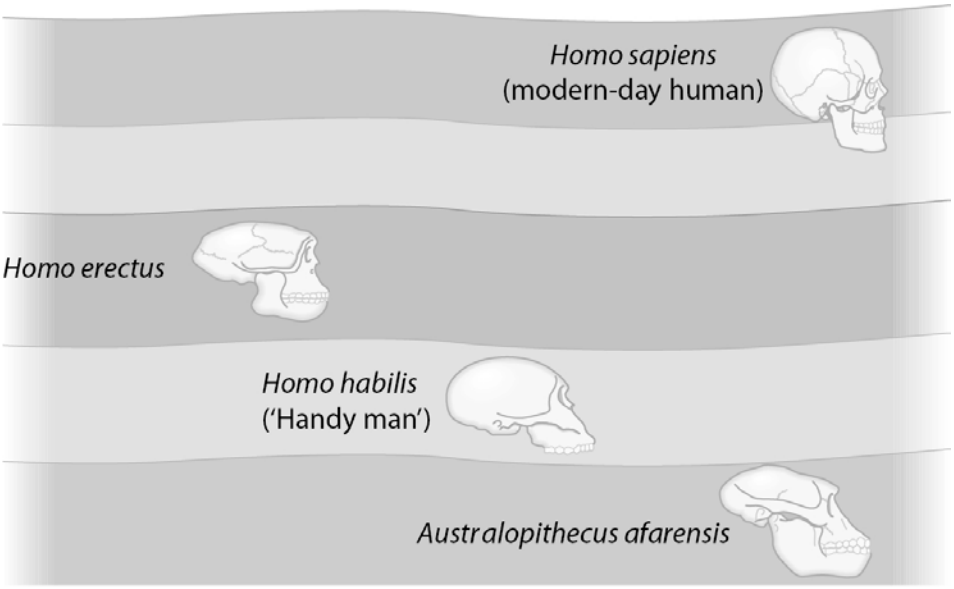
   B Natural selection

   C Variation

   D Chromosomes

15 Human evolution

The diagram shows changes in some human skulls over millions of years.



Australopithecus →	*Homo habilis*	bigger brain case, smaller teeth and jaws
Homo habilis →	*Homo erectus*	flatter jaw, high forehead, intermediate brain case
Homo erectus →	*Homo sapiens*	very large brain case, flat face

Describe what has happened to the skulls over time as humans have evolved.

The skull became _____

_____

The changes in these fossils give evidence for a process. What is this process called?

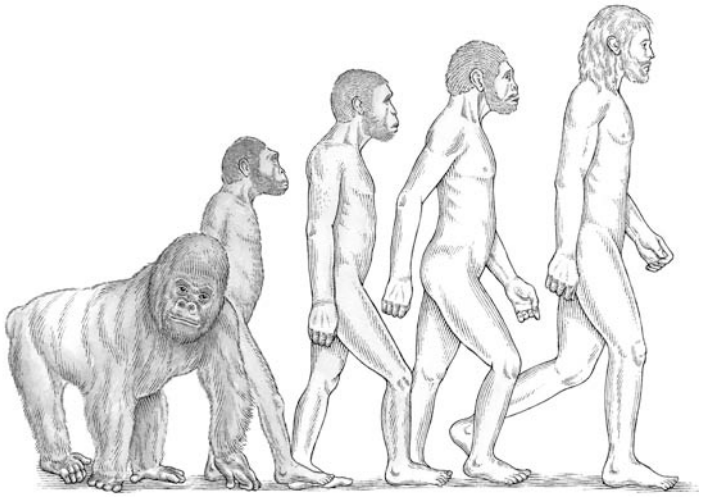
Circle your answer.

A evolution **B** extinction **C** growth **D** reproduction

Living things have evolved over time. This means that living things have become more complicated over time.

CLASSIFICATION AND VARIATION

Look at the diagram showing how humans have evolved over millions of years.



List four differences between the most ancient human ancestor, and the most recent humans.

_____

_____

_____

_____

Give three ways in which humans today might be able to survive more easily than the first humans.

_____

_____

_____