1 Body balance

Inside our bodies we control several factors.

This is George. Name the factors inside his body that he keeps constant.
Fill in the boxes and then write the factors in the sentence below the picture.




The factors George keeps constant are _____, _____ and _____.

George drinks different amounts of water each day. He loses water in urine, in breathing out and when he sweats. His body makes sure that the water in it stays the same:

water in = water out

George drinks 2000 cm^3 of water in a day.
You are going to calculate how much water he loses when he is watching TV and when he is playing football.

1. Look at the values in the table below. Calculate how much water he loses as urine when he is not active. Write your answer in the table.

Water in (cm^3)	Water out (cm^3)
2000	Sweat: 25
	Urine: _____
	Breathing out: 50

2 Calculate how much water he loses as sweat when he is active. Write your answer in the table.

Water in (cm^3)	Water out (cm^3)
2000	Sweat: _____
	Urine: 1800
	Breathing out: 65

3 Why is there less water in his urine when he exercises?

_____

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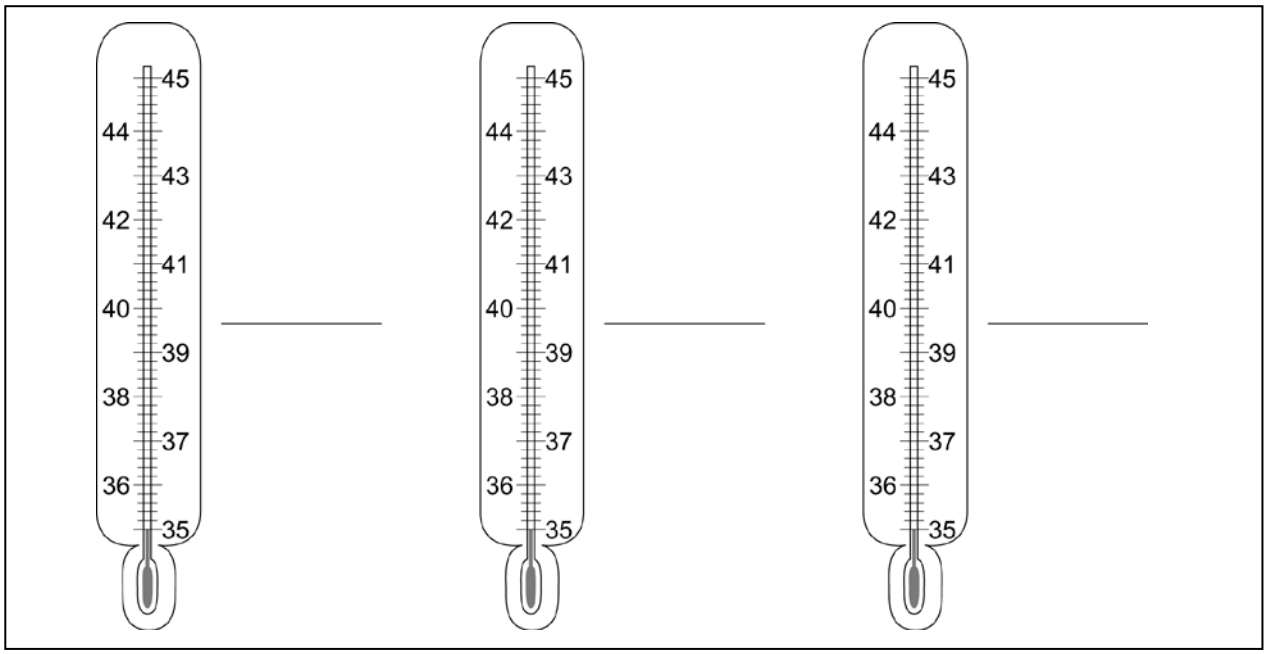
2 Body balance – temperature

The temperature inside our bodies is kept at a steady temperature of 37°C. Write the temperature shown on each thermometer below.



Measuring body temperature.

Equipment needed:

Strip thermometer or clinical thermometer.

Measure the temperature of three different people and write the values in the table below.

Calculate the average body temperature.

Person	Body temperature (°C)
1	
2	
3	
Total	
Average	

Measuring the temperature of the three different beakers of water.

Equipment needed:

a iced water.
b warm water.
c hot water from tap.
d 100 cm^3 beakers
e thermometers or temperature probes.

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In the table below write down why each piece of equipment is needed.

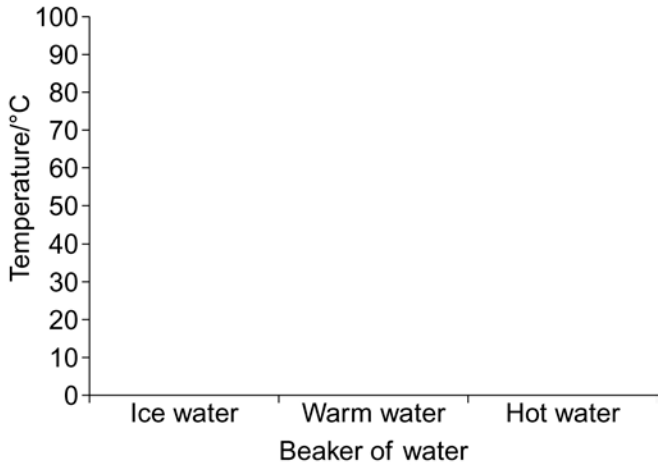
Equipment	Why it is needed

Write a method describing how you will measure the temperature of the water.

Results table

Beaker of water	Temperature/°C				
	1	2	3	Total	Average
iced water					
warm water					
hot water					

Now draw a bar chart of your average results using the axes below.



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3 Body balance – sweating

The water in sweat uses heat from your body to evaporate.

This cools your body down.

Do we sweat more when it is hot or cold?

Equipment list:

Equipment	Why is it needed?
boss, clamp and stand	
2× boiling tubes	
kitchen towel	
elastic bands	
water	
measuring cylinder	
hair dryer	
thermometer	
stopwatch	

Method:

1. Collect the equipment.
2. Set up the clamp stand as shown by your teacher.
3. Wrap the two boiling tubes in equal amounts of kitchen roll, securing with an elastic band.
4. Fill the beaker with cold water from the tap.
5. Dip the boiling tube in this water so that the kitchen roll is damp.
6. Support the boiling tube using the clamp.
7. Pour 15 cm^3 of warm water (at approx 50 °C) from the hot water tap into the boiling tube, and measure the temperature of the water.
8. Using the cold button on the hairdryer, blow cold air onto the boiling tube for 5 minutes.
9. Record the temperature of the water inside the boiling tube every minute and record this in the table.
10. Feel the boiling tube and record how damp the kitchen towel feels.
11. Repeat stages 6–11 using the hot button on the hairdryer.

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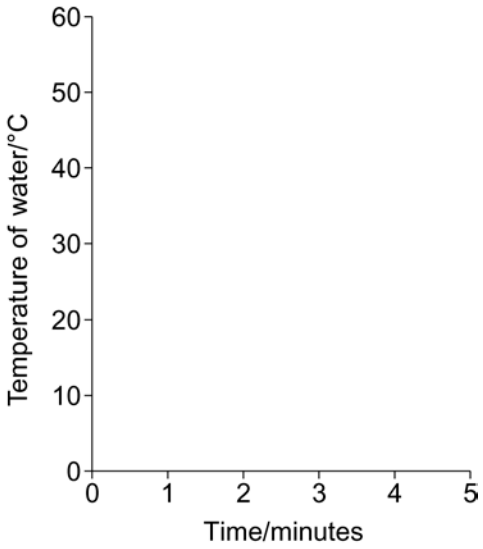
Results table:

	Temperature of water (°C)	
Time (minutes)	**Cold air**	**Hot air**
0 (Start)		
1		
2		
3		
4		
5		
How damp is the kitchen towel?		

Graph:

Draw a graph of your results, using the axes below. Draw the hot air line in red. Draw the cold air line in blue.



Draw the hot air line in red, the cold air line in blue.

Complete the sentences below to write a conclusion for your investigation.

1. What happened to the temperature of the **water** in the boiling tubes?

   The boiling tube which had cold air blown onto it

   _____

   _____

   The boiling tube which had hot air blown onto it

   _____

   _____

   This means that when it is hot our body temperature would _____

   When it is cold our body temperature would _____

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2. What happened to the **kitchen towel on the outside** of the boiling tube?

   The kitchen towel on the boiling tube which had cold air blown onto it

   _____

   The kitchen towel on the boiling tube which had hot air blown onto it

   _____

   This means that if it is cold our body would sweat _____

   If it is hot our body would sweat _____

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4 Body balance – summary

Draw lines to join each key word to its definition (meaning).

37 °C	This rises when we are ill to kill microbes.
Body hairs	Water evaporates to cool our body.
Shivering	These become erect to give our skin a layer of insulating air.
Sweating	Normal body temperature
Temperature	Moves muscles to warm the body up.

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5 Chemical messengers

Chemicals in our bodies called HORMONES control some processes in our bodies. These include controlling the sugar levels in blood.

Choose words from the box below to fill in the blanks in the sentences below.

Chemical messengers called _____ are made in an organ in our

_____.

These messages are carried in our _____ to a different organ called the

_____ organ.

Insulin	hormones	bodies	pancreas	target	blood

Controlling blood sugar levels.

Factfile

When we eat the quantity of sugar in our blood increases.

If there is too much sugar in our blood and we are healthy the hormone **insulin** helps us to store the sugar. It can then be used when we need it.

Diabetics do not make enough insulin to store sugar so they cannot control their blood sugar levels.

There are two types of diabetes.

One type can be controlled by insulin.

The second type can be linked to obesity and can be controlled by diet and exercise.

Doctors can tell if someone is a diabetic by testing urine for sugar with clinistix.

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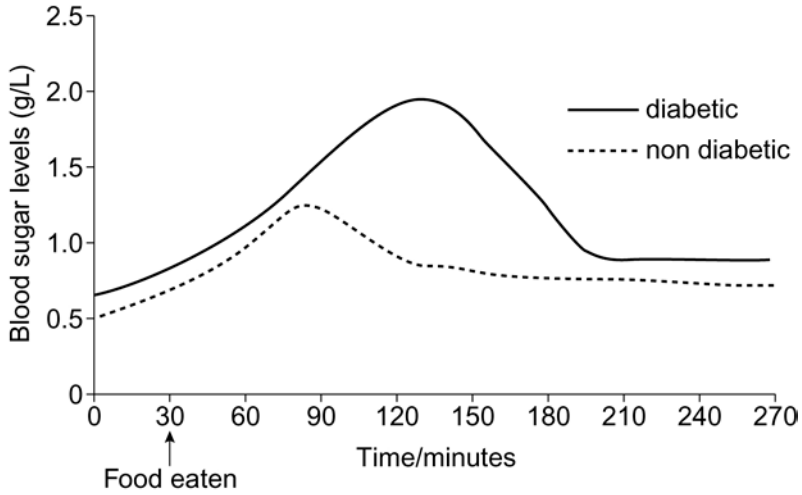
Insulin is made in an organ called the **pancreas**.

Here is a graph to show the blood sugar levels of a diabetic person and a non-diabetic person.



Use the information and the graph to answer these questions.

1. How is insulin carried around the body? _____
2. Name the organ which makes insulin. _____
3. What can be used to test sugar in the urine?_____
4. Hormones are called chemical _____ because they carry information from one place in the body to another.
5. What time is the blood sugar level at its highest?
   a In the diabetic person _____
   b In the non-diabetic person _____
6. How long does it take for the blood sugar level to get back to normal in the diabetic person? _____
7. Write a short report about what your day would be like if you were diabetic.

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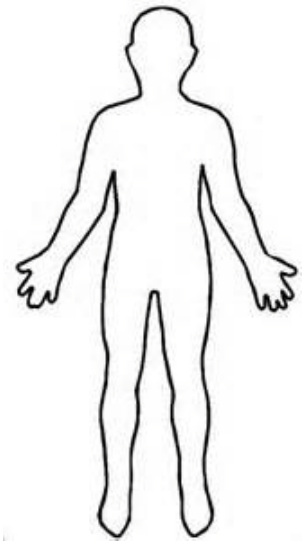
6 Nerve impulses



Label these sense organs on the diagram. You will need to draw some of them yourself.

eye ear nose tongue skin.

Complete this table using the words in the box below.

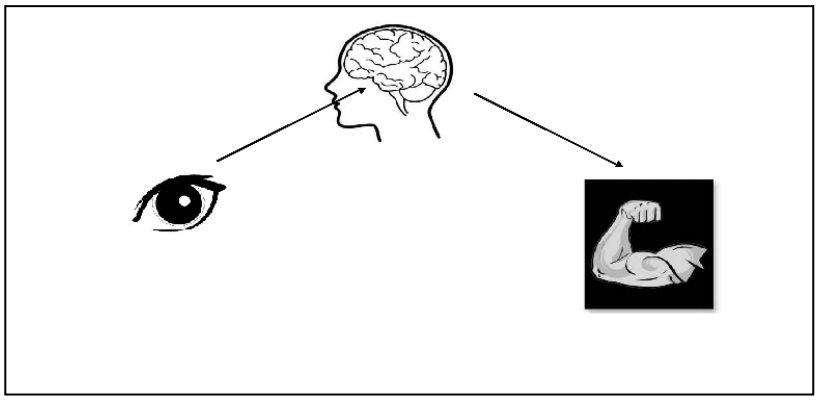
light	**sound**	**smell**	**taste**	**temperature**	**pressure**

Sense organ	**Information/stimulus it receives**
Eye	
Ear	
Nose	
Tongue	
Skin	

Nerve cells carry messages from sense organs to the brain. They also carry messages to the muscles.

Add these labels to the diagram below:

sense organ brain muscle



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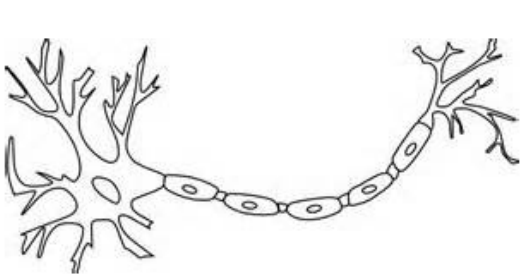
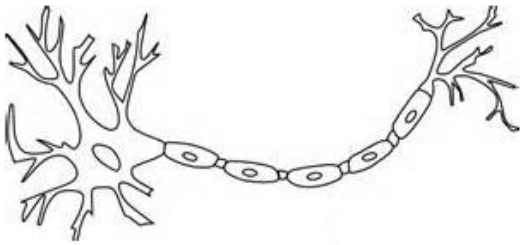
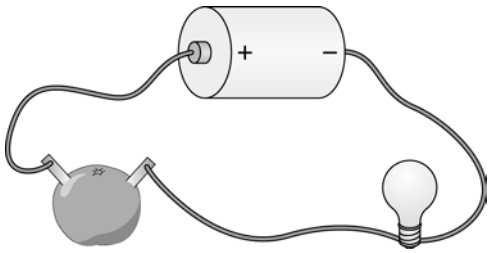
7 Junctions





This is a nerve cell. Nerve cells have gaps between them call **junctions**.
Chemicals help the messages jump the gap.

Set up this circuit – your teacher will show you how.



The wires are the nerve cells.

The orange is the junction between nerve cells.

What happened to the bulb when you put the metal strips into the orange?

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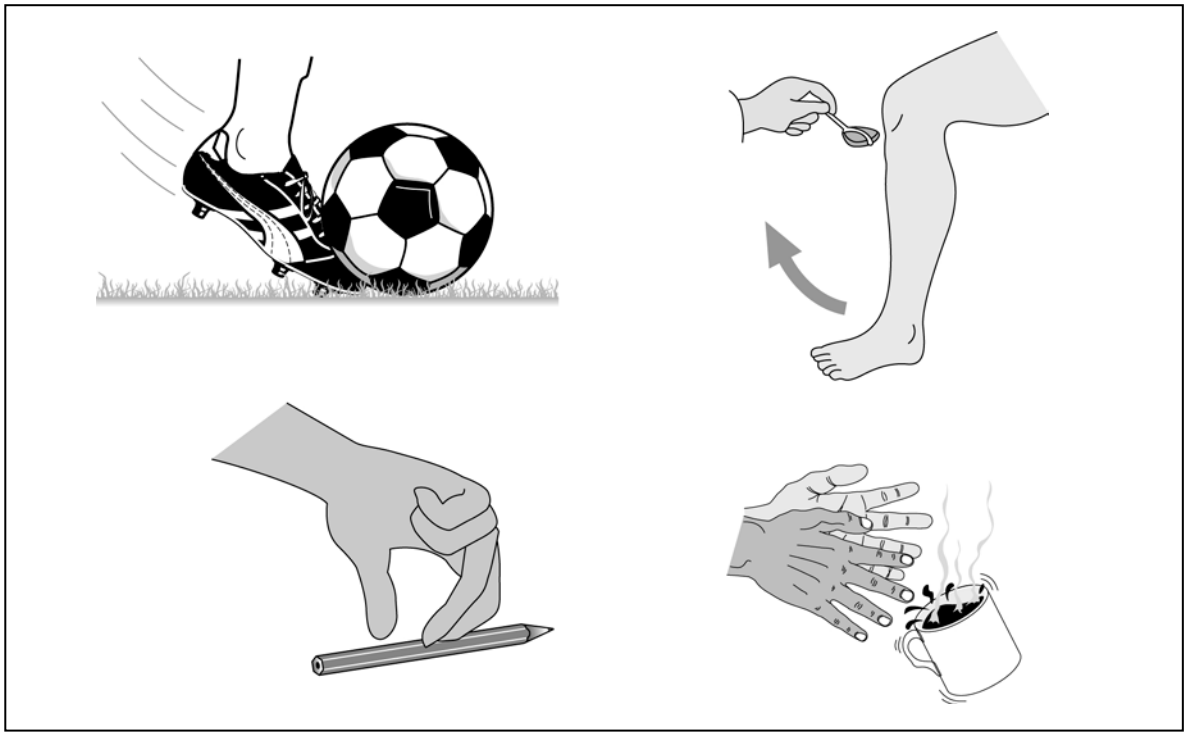
8 Reflex actions

In the box below are two pairs of pictures. In each pair of pictures, one of them = shows an action that we **choose** to do. Circle each of these actions.



Sometimes our bodies react to changes without conscious control. (This means that the brain is not involved.) This is called a **reflex action**. Look at the two pictures you have not circled. Each shows an action that we do not have to think about. These are examples of a reflex action.

Working in pairs:

1 Sit facing each other.

2 One person closes their eyes for a minute.

3 Watch carefully what happens to the pupil (dark circle) when they open their eyes.

4 Repeat with the other person.

5 Draw what you see in the boxes below.

Eye just opened	Eye after 10 seconds

The eye muscles work by themselves. This means they work without conscious control. This shows an example of a reflex action working.

Try to think of another reflex action. (*Hint: there is another one involving the eyes*).

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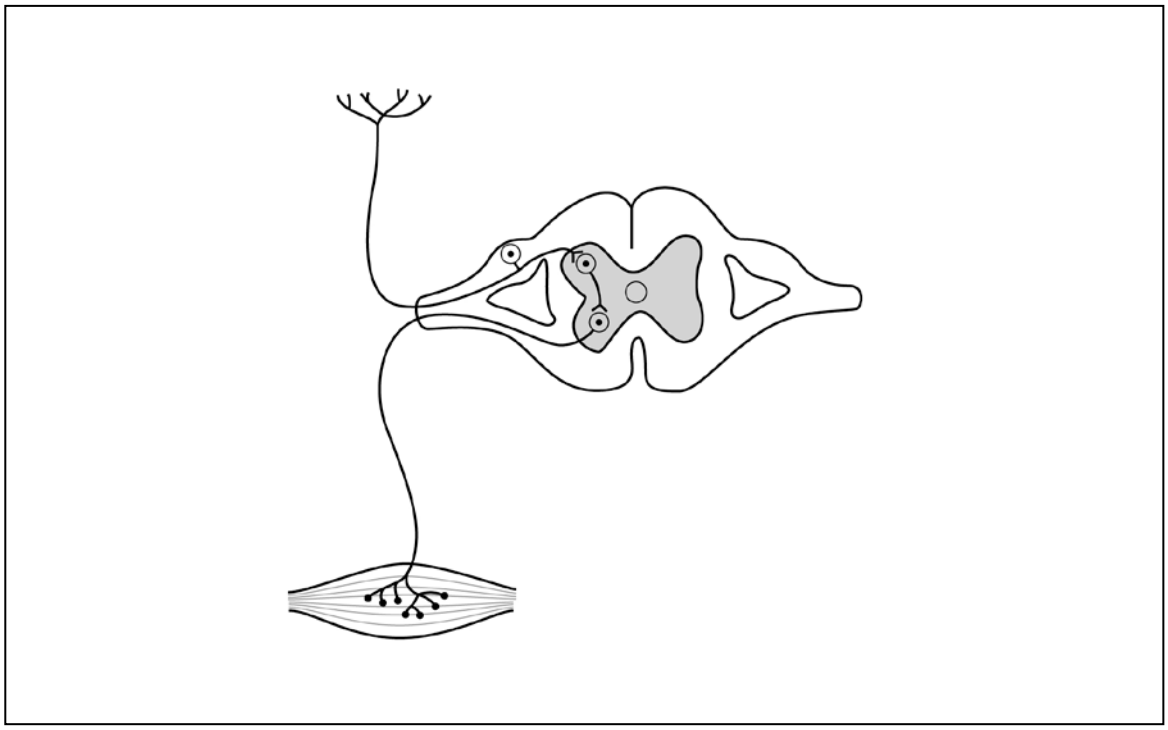
8A Structure of a reflex action

Here is a diagram of the structures involved in a reflex action.



Use the words from the box to label the diagram above.

effector (muscle)	**motor neurone**	**relay neurone**
sense organ	**sensory neurone**	**stimulus**

- Colour the sensory neurone **green**.
- Colour the relay neurone **blue**.
- Colour the motor neurone **red**.

Complete this route for the pathway of the reflex action.

Stimulus, _____ _____, relay neurone, _____

_____, effector (muscle).

The message travels along the neurone as an _____ impulse and

uses a _____ to jump across the junction.

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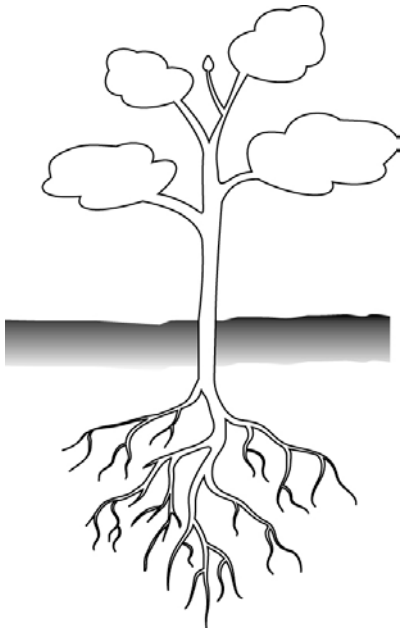
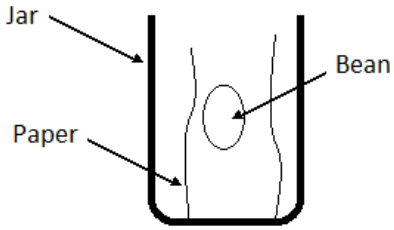
9 Plant growth



1. Add these labels to the diagram above: **root** **shoot** **leaves**
2. On the diagram draw the Sun where it would be during the day.

You are going to investigate how gravity affects roots and shoots.

Set up a broad bean in a small jar as shown below. Wash hands after handling the seeds.



1. Make sure you keep the paper moist throughout the experiment.
2. Leave the broad beans to grow until the shoot is showing a bit of growth.
3. Draw your plant in box 1.
4. Use plasticine to make a stand for your jar so you can lay it on its side.
5. Put your jar on the stand sideways.
6. Leave the jar for several days.
7. Draw your plant in the next box.
8. Turn the jar 90°.
9. Repeat steps 6–8 twice. Remember to draw your plant in the next box each time.

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Box 1	Box 2
Box 3	Box 4

What happened to the direction of shoot growth each time you turned the jar?

_____

_____

What happened to the direction of root growth each time you turned the jar?

_____

_____

Circle the correct words below.

Shoots always grow **up / down**. Roots always grow **up** / **down**.

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10 Plant growth in cress

Do plant shoots grow towards the light?

Equipment:

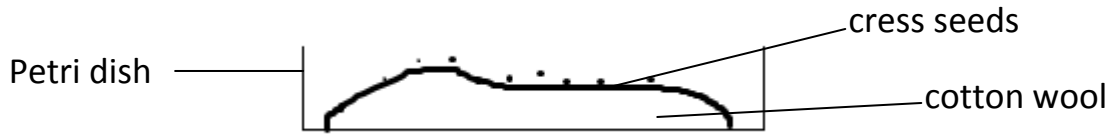
- template for the two card houses
- two small petri dishes
- cotton wool
- cress seeds
- water
- 10 cm^3 measuring cylinder

1. Cut out each of the card houses, and make the hole for the light in each one. Glue each house together using the tabs provided.

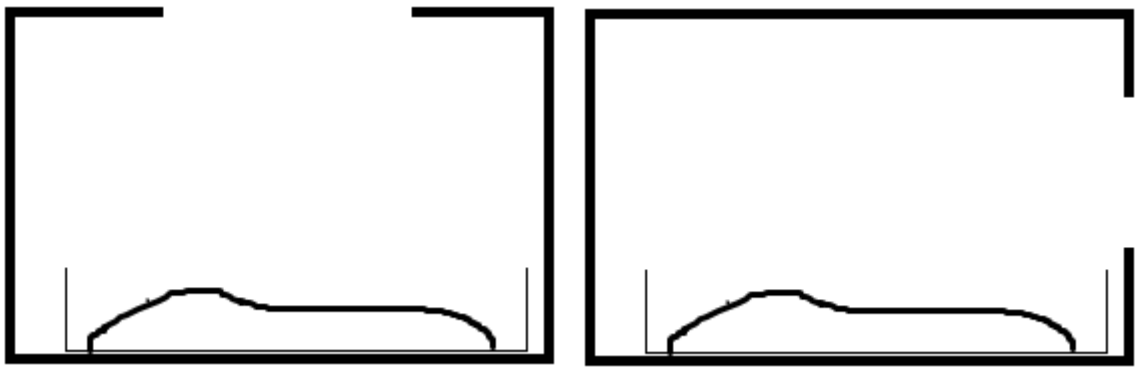
   HOUSE A – hole in the top

   HOUSE B – hole in one side

2. Set up the equipment as shown in the diagram below:



3. Pour 7.5 cm^3 water over the cotton wool.
4. Count 50 seeds and sprinkle them evenly over the wet cotton wool.
5. Set up a second dish in exactly the same way.
6. Put both Petri dish onto a window sill.
7. Put a house over each Petri dish. For House B, the hole in the side must face towards the window.
8. Leave for several days but keep the cotton wool moist.
9. Draw what the cress looks like in the diagrams below. Use colour.



House A House B

Now circle the correct word in the sentence below:

This experiment showed that cress shoots grow **towards / away** from light.

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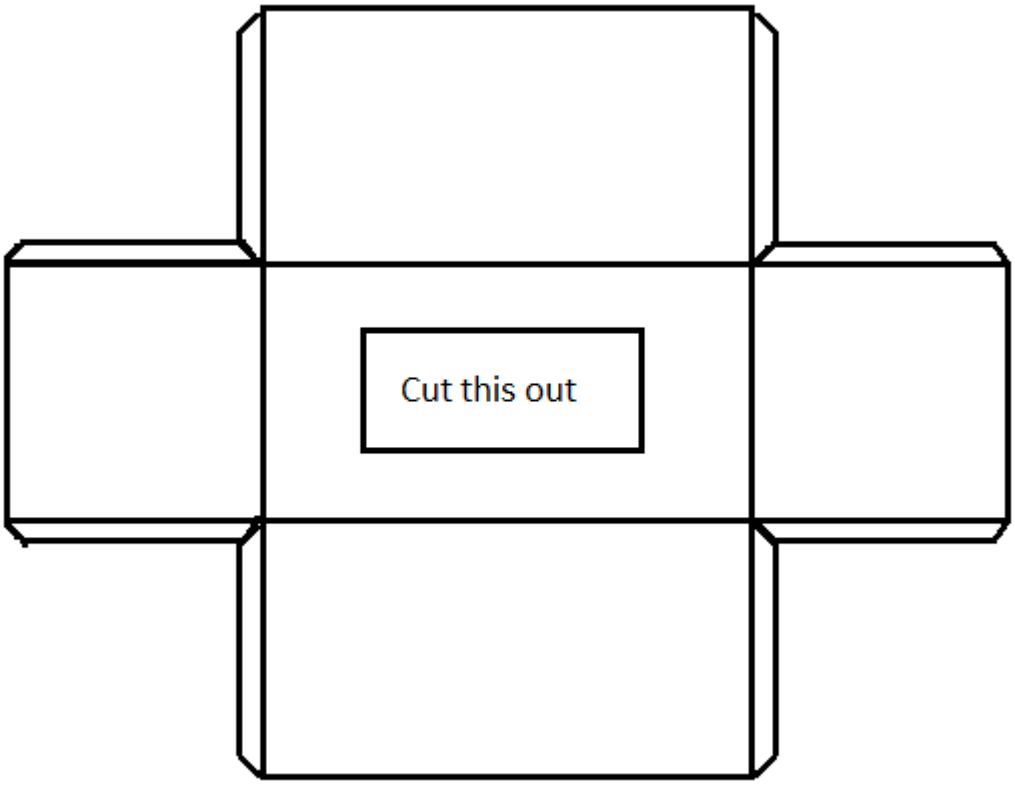
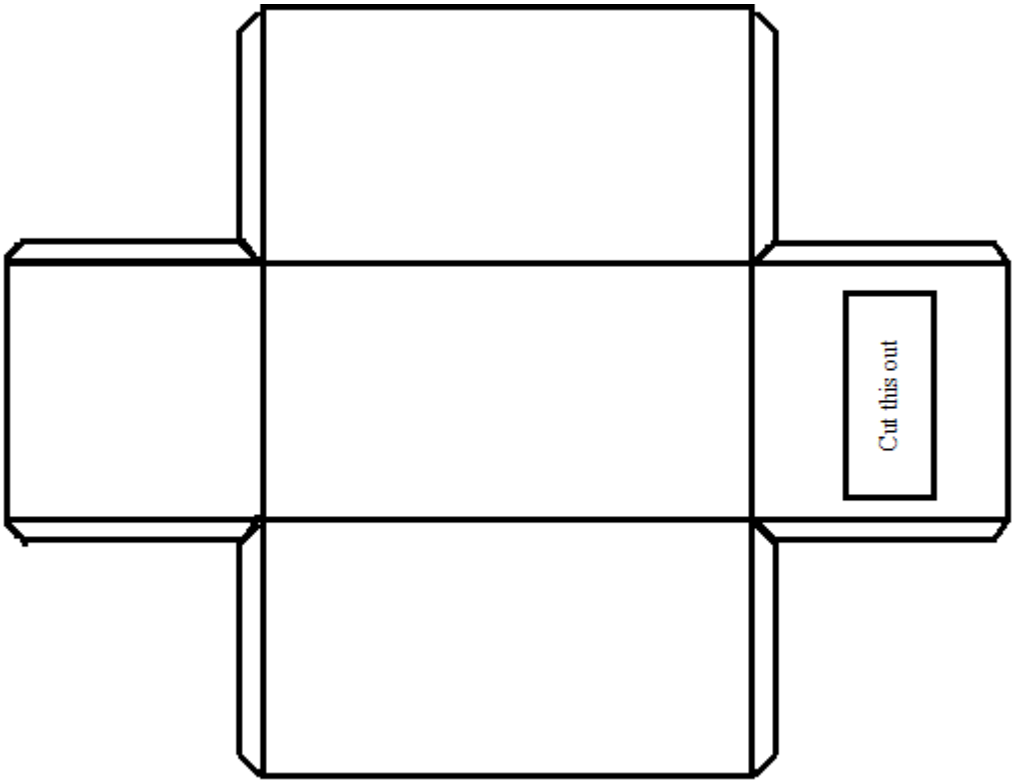
10A Plant Growth in cress templates

House A: hole in the top



House B: hole in one side



Print on A3 card

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