Q1.

Susie cooked sausages on a barbecue.

(a) Fat and water in the sausages changed state.

Draw **one** line from each statement to the correct change of state.
Draw only **two** lines.

statement	**change of state**
	liquid to gas
fat melted	gas to liquid
	liquid to solid
water evaporated	solid to liquid
	solid to gas

2 marks

(b) Susie uses charcoal as the fuel for the barbecue.

(i) Which statement is true about all fuels?
Tick the correct box.

All fuels are sources of energy.	☐	All fuels are black.	☐
All fuels are made from wood.	☐	All fuels are solid.	☐

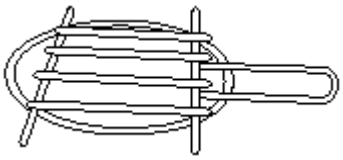
1 mark

(ii) Which gas in the air is needed for fuels to burn?
Tick the correct box.

water vapour	☐	oxygen	☐
nitrogen	☐	carbon dioxide	☐

1 mark

(c) The metal grill of the barbecue is made of steel.



Six properties of steel are given below.

Which properties are needed for the metal grill?
Tick **two** correct boxes.

It conducts electricity.	☐	It is rigid.	☐
It has a very high melting point.	☐	It is magnetic.	☐
It is shiny.	☐	It rusts.	☐

2 marks
maximum 6 marks

Q2.

(a) John attaches a ball to a spring. The diagram below shows what happens.

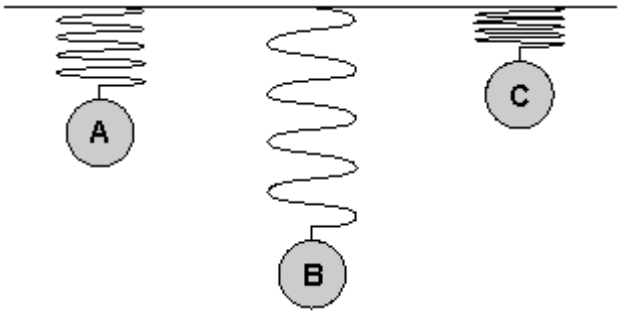
(i) Which arrow shows the direction of the **force of the ball on the spring**?
Tick the correct box.

1 mark

(ii) Which arrow shows the direction of the **force of the spring on the ball**?
Tick the correct box.

1 mark

(b) The diagram below shows three metal balls attached to **identical** springs.



Which ball is the heaviest?
Write the letter.

.....

1 mark

Explain your answer.

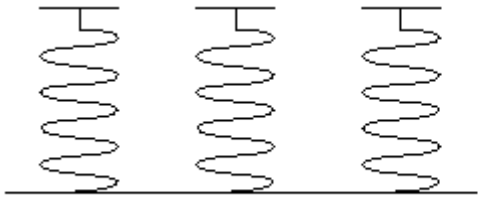
.....

.....

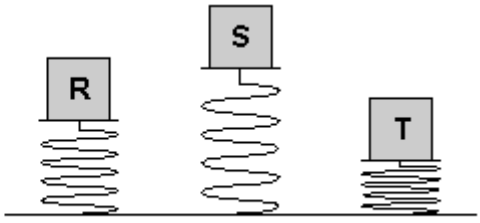
1 mark

(c) John has another three **identical** springs.
He puts a cube on each spring. Each cube has a different mass.

The diagrams below show the springs before and after John added the cubes.



springs **before** adding the cubes



springs **after** adding the cubes

Which cube is the heaviest?
Write the letter.

.....

1 mark

Explain your answer.

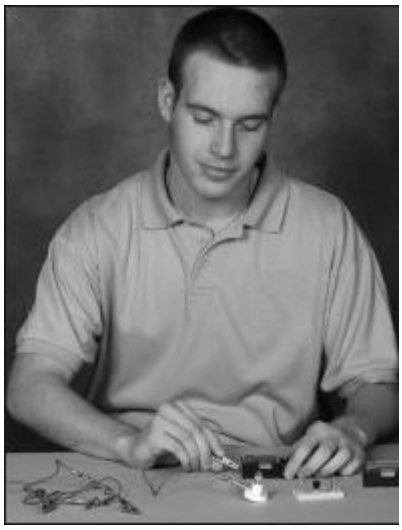
.....

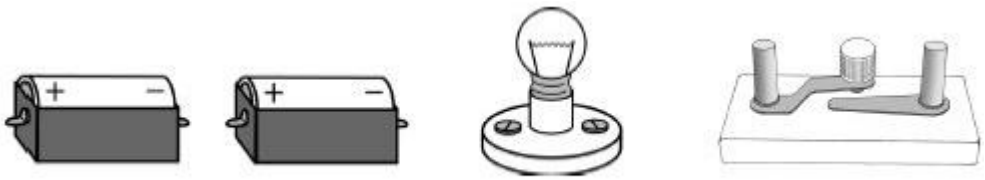
.....

1 mark
maximum 6 marks

Q3.

Ben makes a series circuit using two identical cells, a bulb and a switch to turn the bulb on and off.





cell cell bulb switch

(a) Draw a circuit diagram of Ben's circuit. Use the correct symbols.

The cells have been drawn for you.

3 marks

(b) Which part of the circuit supplies the energy?

.....

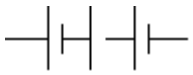
1 mark

(c) Ben adds another identical bulb to the circuit in series.
How does the **brightness** of the first bulb change?

.....

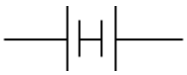
1 mark

(d) How will the **brightness** of the bulbs change when the cells shown below are placed into Ben's circuit?

(i) 

.....

1 mark

(ii) 

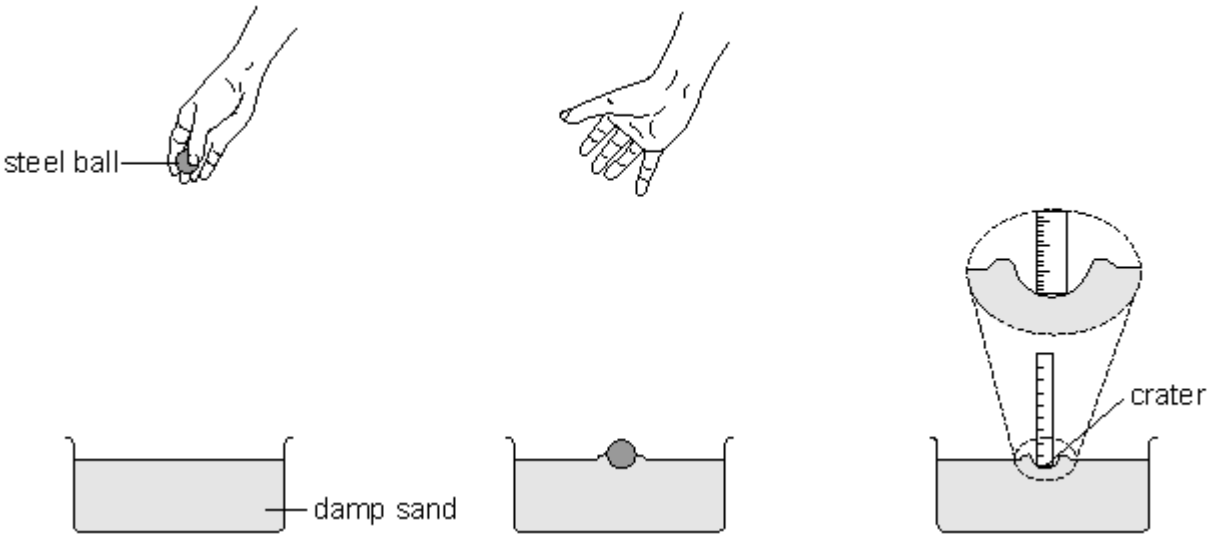
.....

1 mark

maximum 7 marks

Q4.

Jack and Aneesa dropped a steel ball into trays of damp sand.
They measured the depth of the craters made by the steel ball.



not to scale

Their results are shown in the table below.

height the ball was	depth of crater (cm)

dropped from (cm)	Jack's results		Aneesa's results
10	1.1	1.2	0.8
20	1.4	1.5	1.4
30	1.6	1.6	1.5
40	1.8	1.7	1.8
50	2.0	2.1	2.1

(a) Use information in the table to answer the questions below.

(i) What was the independent variable that Jack and Aneesa changed in their investigation?

.....

1 mark

(ii) Why was Jack's investigation better than Aneesa's?

.....

1 mark

(b) Look at the results in the table.
What is the relationship between the height the ball was dropped from and the depth of the crater?

.....

.....

1 mark

(c) Aneesa said that they made sure the investigation was fair.

Suggest **two** variables they must have kept the same to make their investigation fair.

1 .....

2 .....

2 marks

(d) (i) Jack removed the steel ball using his fingers. Then he measured the depth of the crater.
Aneesa said he should use a magnet instead of his fingers.

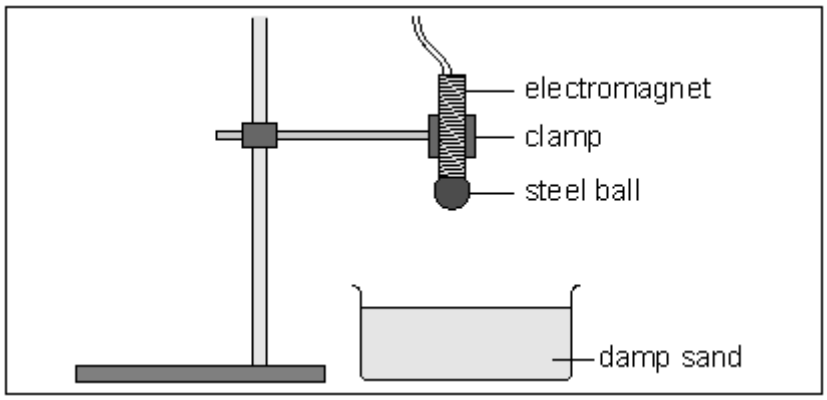
Explain why using a magnet to remove the ball would improve the investigation.

.....

.....

1 mark

(ii) Jack said that the ball could be dropped using an electromagnet instead of dropping it by hand.



Explain why this would improve the investigation.

.....

.....

1 mark
maximum 7 marks

Q5.

A gannet is a type of sea bird.

(a) When a gannet flies at a **constant height** above the sea, there is a downward force of 30N on the gannet.

What is the size of the upward force on the gannet?
Tick the correct box.

less than 30N ☐

exactly 30N ☐

more than 30N ☐

need more information ☐

1 mark

(b) To catch food, the gannet dives down into the sea.
What is the useful energy transfer when the gannet dives?
Choose words from the box below.

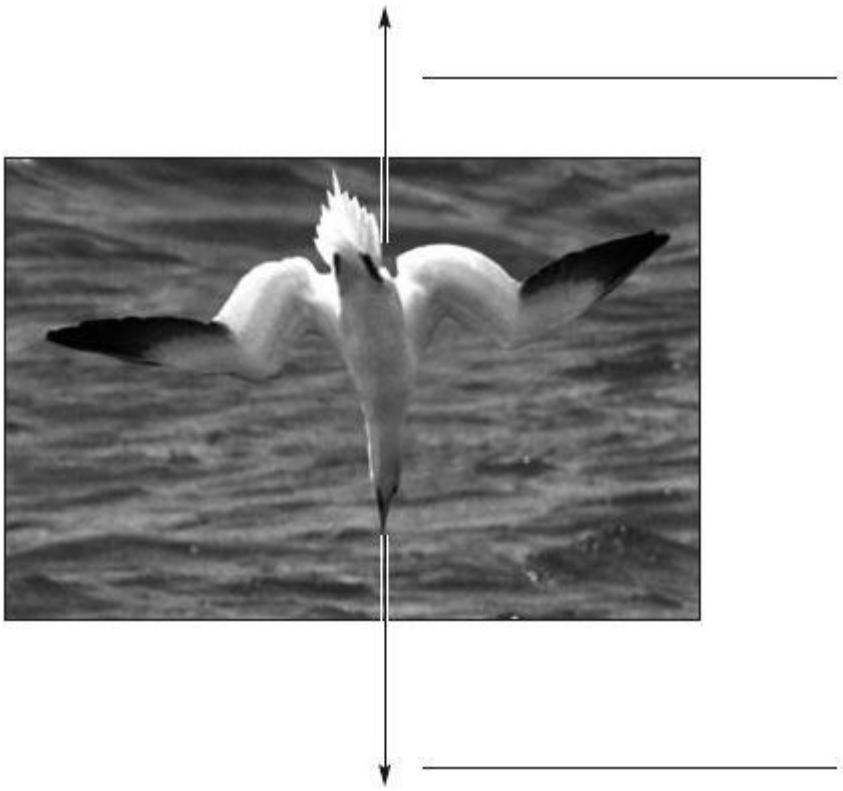
	thermal	**gravitational**	
potential	**sound**	**kinetic**	**light**

When the gannet dives, ... energy is

transferred to ..... energy.

2 marks

(c) Label the arrows to show the **names** of the forces acting on the gannet as it dives.



2 marks

(d) Gannets have pockets of air between their muscles and their skin.
Suggest how this is a good adaptation for gannets when they hit the water at fast speeds.

.....

.....

1 mark

(e) The gannet releases energy through respiration.
An aeroplane also releases energy when fossil fuels burn.

Write **two** other ways that respiration and burning are similar.

1 .....

2 .....

2 marks
maximum 8 marks

Q6.

Josh has a helium-filled balloon.

(a) He wants to calculate the speed of his balloon as it rises to the ceiling.

(i) What **two** measurements should he take to calculate the average speed of his balloon?

1 .....

2 .....

1 mark

(ii) How can he use these measurements to calculate the speed of his balloon?

.....

.....

1 mark

(b) Josh attached different masses to his balloon. For each mass, he calculated the speed of rise of the balloon. His results are shown below.

mass (g)	speed of rise (mm/s)
0	120

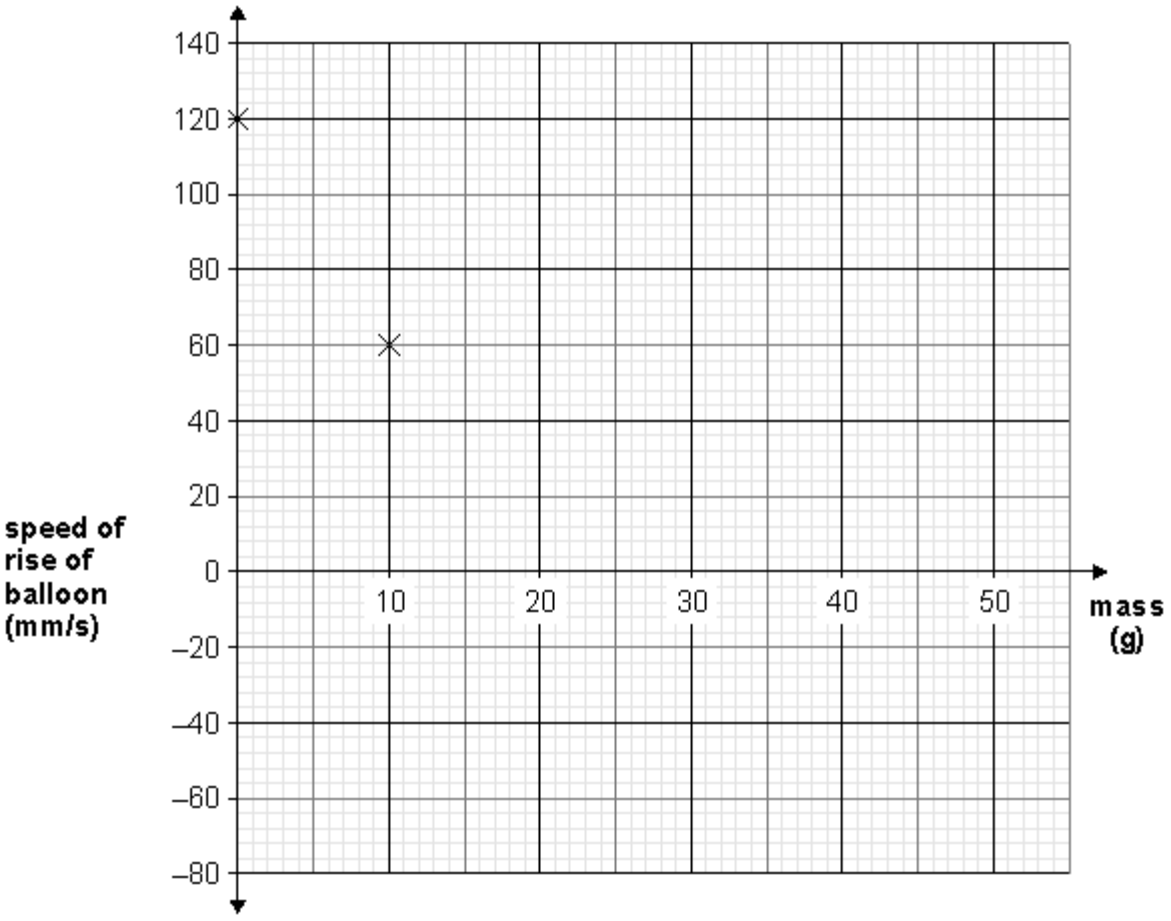
10	60
20	40
30	–20
40	–70

(i) How does the table show that the balloon went downwards?

.....

1 mark

(ii) Josh plotted two points on the graph as shown.
Complete the graph by plotting the missing points **and** draw a line of best fit.



2 marks

(iii) From the graph, find the mass needed to keep the balloon floating in one place.

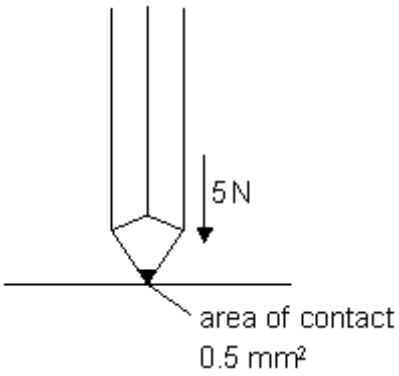
..... g

1 mark
maximum 6 marks

Q7.

Jenny is doing her homework.

(a) When Jenny writes, the pencil exerts a force of 5N on the paper.



not to scale

The area of the pencil in contact with the paper is 0.5 mm^2.

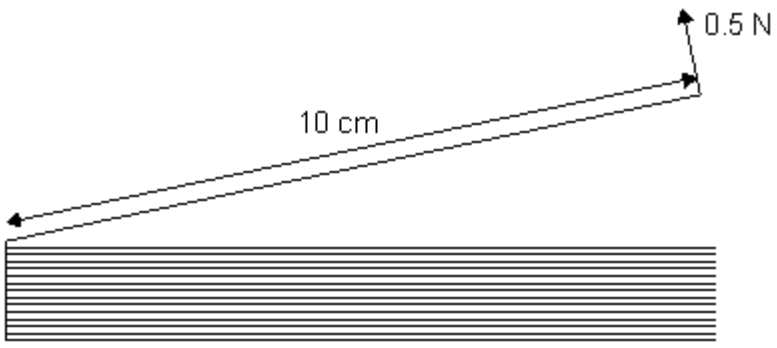
Calculate the pressure of the pencil on the paper.
Give the unit.

.....

.....

2 marks

(b) Jenny puts a book on her desk.
She lifts the cover up with her finger, using a force of 0.5 N.
The cover is 10 cm wide.



Calculate the turning moment on the cover of the book.

Give the unit.

.....

.....

2 marks

(c) Jenny's book has an area of 200 cm^2.
It exerts a pressure of 0.05 N/cm^2 on the desk.

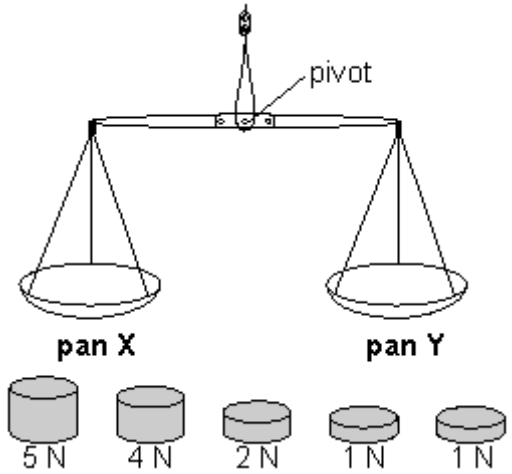
What is the weight of the book?
Use the space below to show your working.

_____ N

2 marks
maximum 6 marks

Q8.

Ellie has a set of scales and some weights as shown below.



Ellie puts two weights in pan X and one weight in pan Y. The scales balance.

(a) Which weights could be in pans X and Y?

pan X: ..... and .....

pan Y: .....

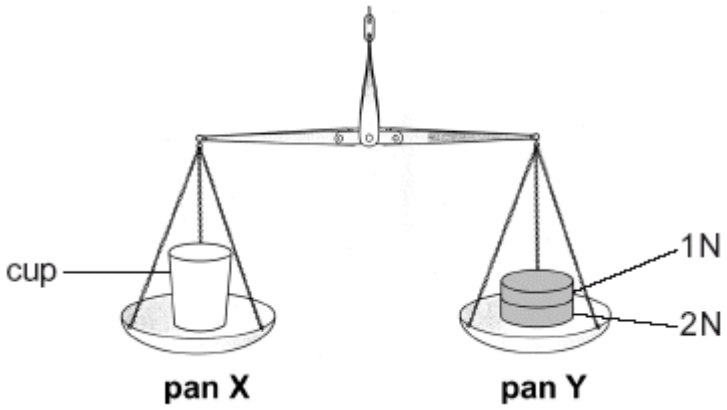
1 mark

(b) Ellie removes all the weights from the scales.
She then puts a cup on pan X.
In which direction will pan Y move?

.....

1 mark

(c) She puts weights into pan Y so the scales balance.

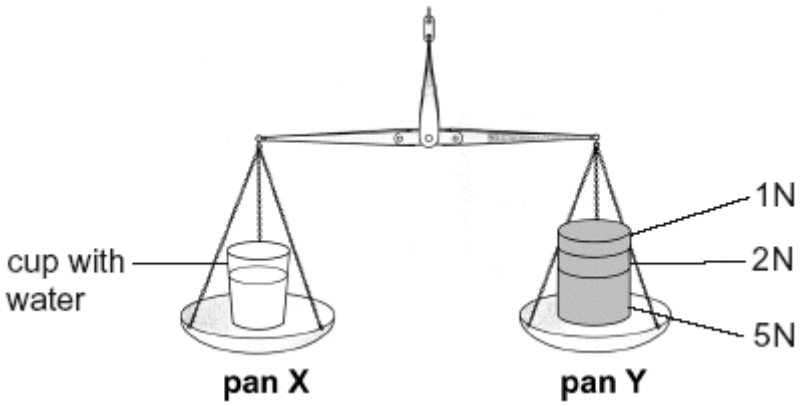


How much does the cup weigh?

..... N

1 mark

(d) Ellie puts some water in the cup.
She then adds some more weights to pan Y to make the scales balance.



(i) How much do the cup **and** water weigh?

..... N

1 mark

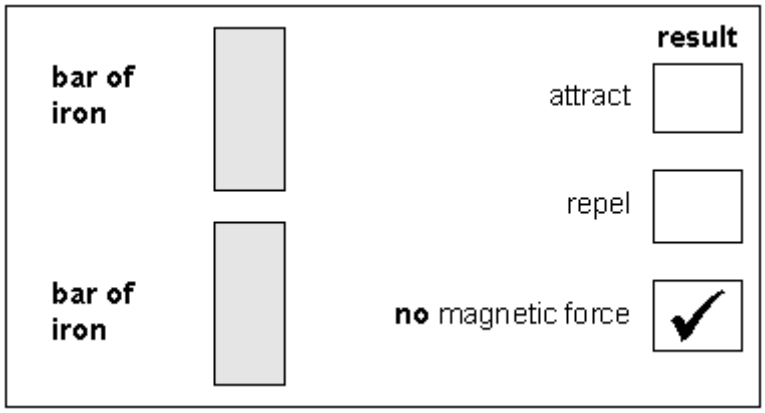
(ii) How much does the water weigh?

..... N

1 mark
maximum 5 marks

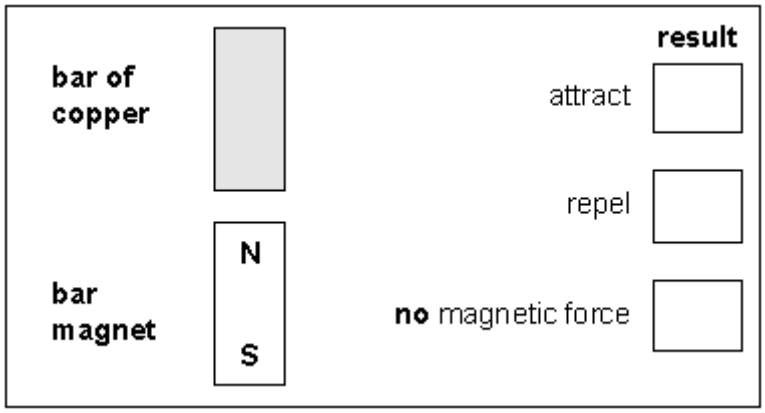
Q9.

David put two bars of iron close to each other.
There was **no** magnetic force between them.
David recorded the result as shown below.



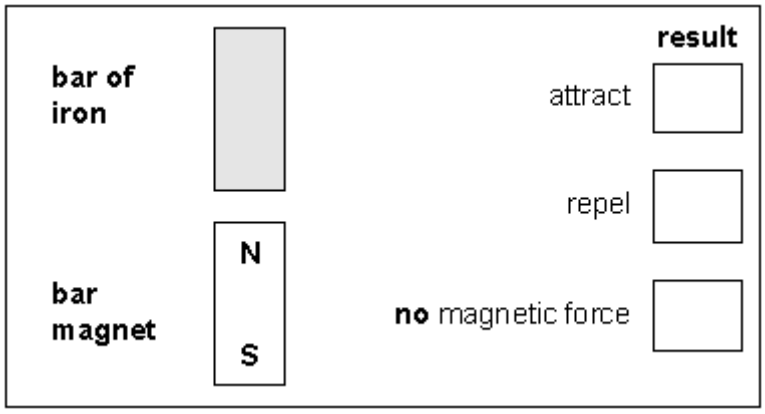
(a) David did three other tests.
Tick the correct box to show the result for each test.

(i)



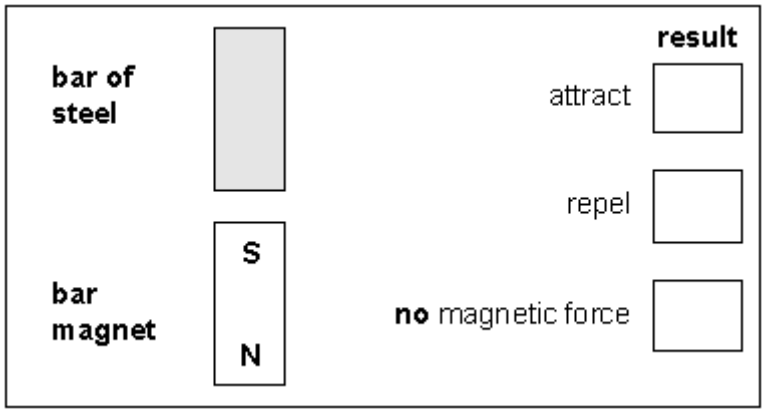
1 mark

(ii)



1 mark

(iii)



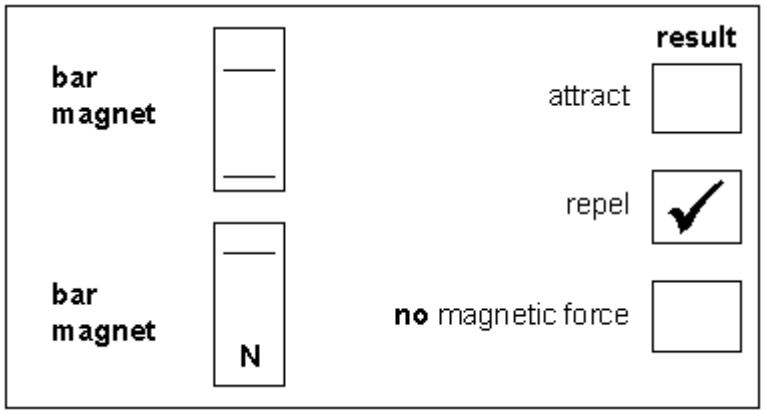
1 mark

(b) David then did two experiments with magnets.

The tick in each box shows David's results in each experiment.

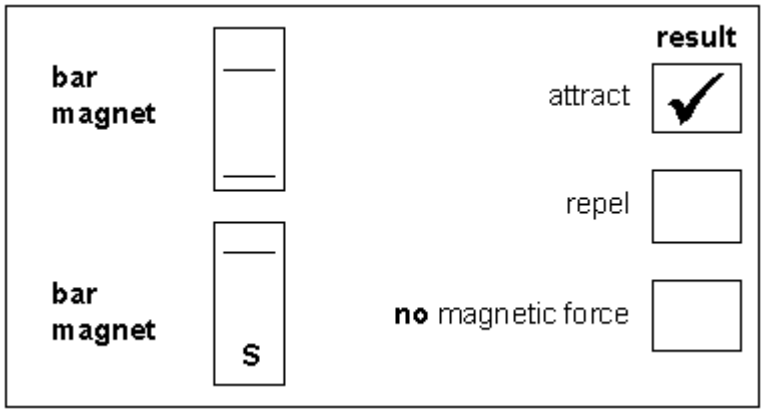
Label the missing poles on **each** magnet to match David's results.

(i)



1 mark

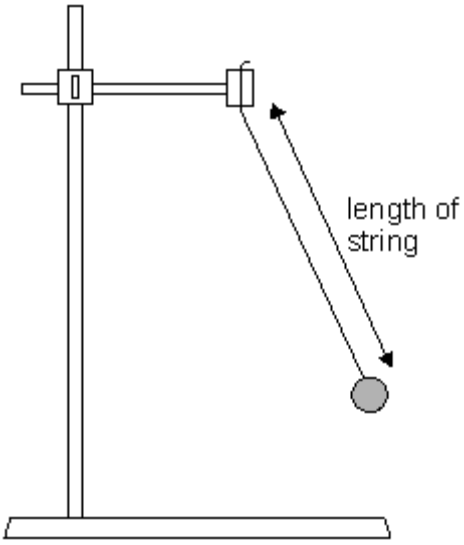
(ii)



1 mark
maximum 5 marks

Q10.

Paula made a pendulum from a ball attached to a piece of string.



She counted the number of swings the ball made in 10 seconds.
She repeated the experiment with different lengths of string.

The table below shows Paula's results.

length of string (cm)	number of swings in 10 seconds
10	16
20	11
30	9
40	8
50	7

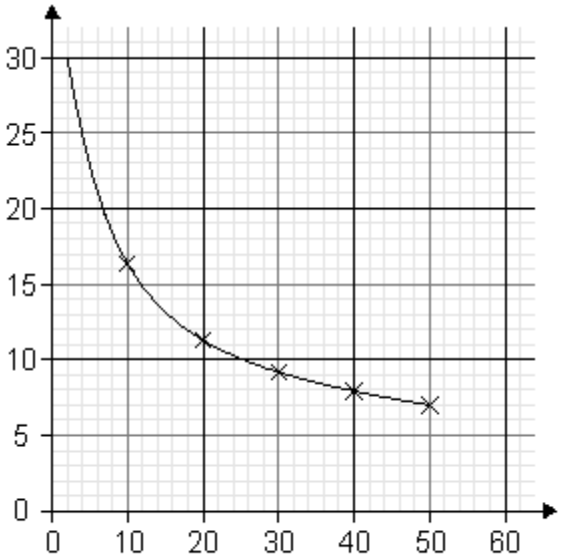
(a) What happens to the number of swings when the string gets longer?

.....

1 mark

(b) Paula drew a graph of her results.

(i) Write the labels on **both axes** of the graph below.
Use the table to help you.



2 marks

(ii) Paula made a pendulum from a piece of string that was 15 cm long.
How many times would this pendulum swing in 10 seconds?
Use the graph to help you.

.....

1 mark

(iii) Paula made a pendulum from a piece of string that was 60 cm long.
Estimate the number of swings the pendulum makes in 10 seconds.
Use the graph.
Tick the best answer.

18 ☐ 12 ☐ 6 ☐ 4 ☐

1 mark

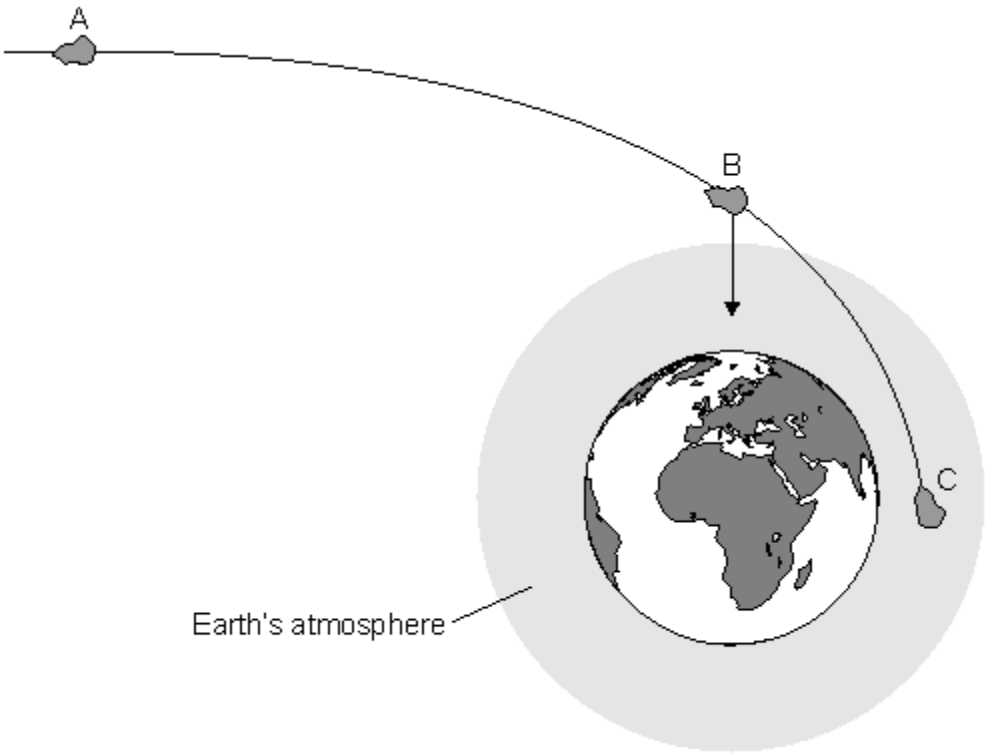
(c) After some time the pendulum stops moving.
What force makes the pendulum stop moving?

.....

1 mark
maximum 6 marks

Q11.

The diagram below shows the path of a meteor as it gets closer to the Earth.
The meteor is shown in three positions: A, B and C.



not to scale

(a) The path of the meteor is affected by the Earth's gravity.
The arrow shows the direction of the force due to gravity acting on the meteor at B.

(i) **On the diagram** draw an arrow to show the direction of the force of gravity on the meteor at A.
Use a ruler.

1 mark

(ii) **On the diagram** draw an arrow to show the direction of the force of gravity on the meteor at C.
Use a ruler.

1 mark

(iii) How does the force of gravity on the meteor change as it travels from A to C?

.....

1 mark

(b) What happens to the speed of the meteor as it travels from A to B?

.....

1 mark

(c) When the meteor enters the Earth's atmosphere, three forces act on the meteor.
Gravity and upthrust are two of these forces.

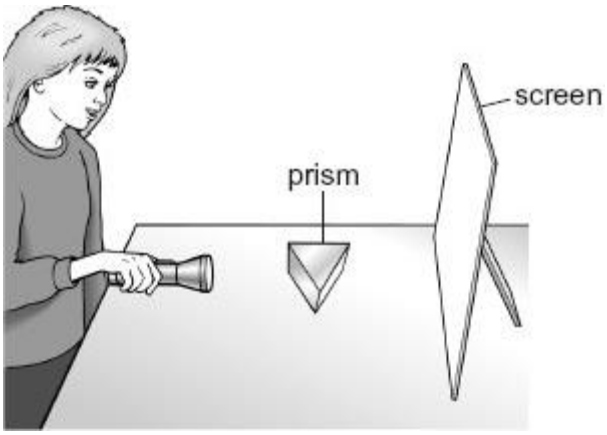
Give the name of the **other** force.

.....

1 mark
maximum 5 marks

Q12.

Ann shines a ray of white light at a glass prism.

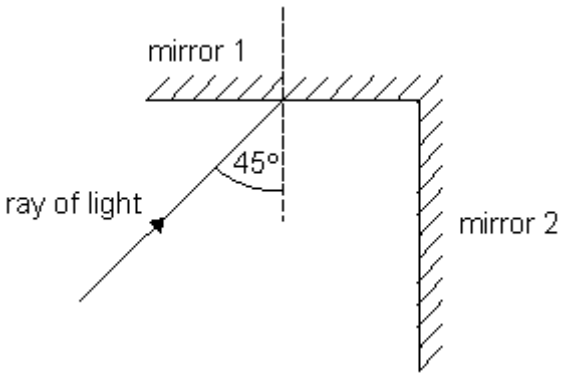


(a) Tick one box in each row to show if each sentence is **true** or **false**.

	true	**false**
The light refracts as it enters the prism.	☐	☐
The light refracts as it travels through the prism.	☐	☐
The light disperses as it leaves the prism.	☐	☐
The light forms a spectrum of colours on the screen.	☐	☐

2 marks

(b) Ann places two mirrors at 90° and shines a ray of light at mirror 1.



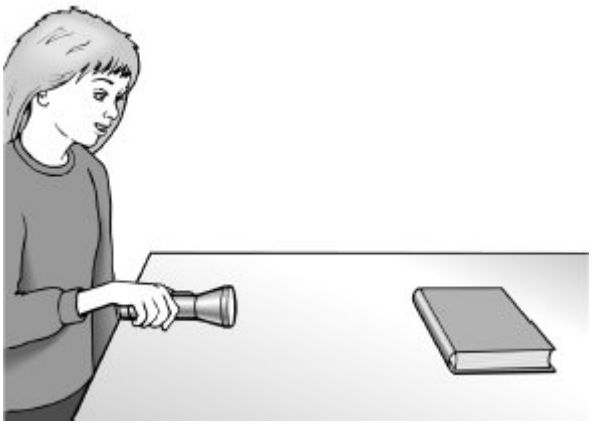
(i) **On the diagram above** continue the ray of light to show how it is reflected by both mirrors. Use a ruler.

2 marks

(ii) **On the diagram above** label the incident ray (i) and the reflected ray (r) for the light striking **mirror 2**.

1 mark

(c) Ann shines the torch at a red book.



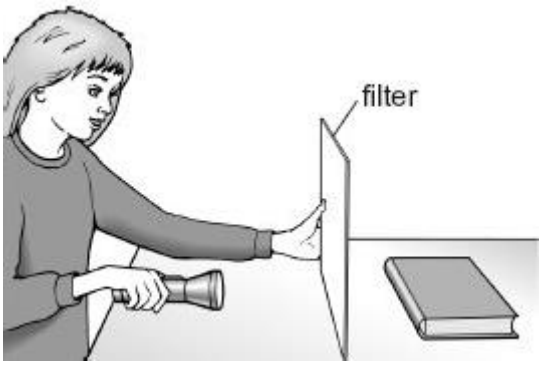
Explain why the object looks red in white light.

.....

.....

2 marks

(d) In a dark room, Ann puts different coloured filters in front of the torch. She records the colour the book appears.



Complete the table below to show the colour that the book would appear. Tick **one** box in each row. The first one has been done for you.

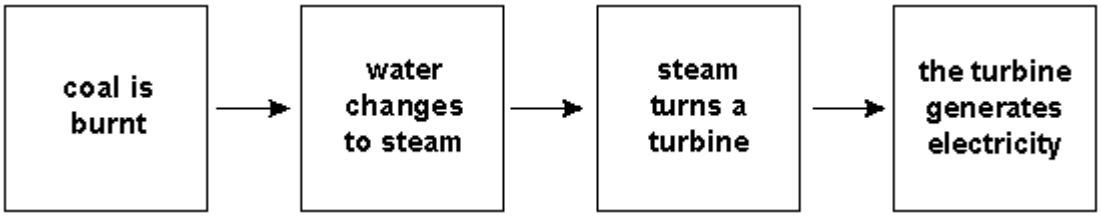
colour of filter	**What colour does the red book appear?**		
	red	**green**	**black**
no filter	✓		
red filter			
green filter			

1 marks

maximum 8 marks

Q13.

In a power station, coal can be used to generate electricity.



(a) Use words from the box to answer the questions below.

chemical	**electrical**	**gravitational potential**
kinetic	**light**	**sound**
	thermal	

1 mark

(i) What is the useful energy transfer when coal is burnt?

..... energy is transferred to ..... energy

1 mark

(ii) Some of the energy stored in coal is wasted when it is burnt.
Give the name of **one** type of energy released that is **not** useful.

.....

1 mark

(b) Wind turbines are also used to generate electricity.
The wind turns the turbine blades and the turbine blades turn a generator.

Use words from the **box opposite**. Complete the sentence to show the useful energy transfer in a wind turbine and generator.

..... energy is transferred to ..... energy

1 mark

(c) Suggest **one** disadvantage of using wind to generate electricity.

.....

.....

1 mark

(d) Sugar cane is a plant.

The sugar from the cane is used to make alcohol.
Alcohol is a fuel.

(i) Which energy source do plants use to produce sugar?

.....

1 mark

(ii) Is sugar cane a renewable **or** non-renewable source of energy?
Tick one box.

renewable source ☐ non-renewable source ☐

Give a reason for your answer.

.....

1 mark
maximum 7 marks

Q14.

Stefan is on holiday in the mountains. It is snowing.

(a) (i) Choose words from the box to complete the sentence below.

solid	**liquid**	**gas**

A snowflake falls on Stefan's nose and melts.
When the snowflake melts, it changes

from a ..... to a ..... .

1 mark

(ii) Snow that falls on the ground melts slowly.
Snow that falls on Stefan's nose melts **very quickly**.
Give a reason for this.

.....

1 mark

(iii) In his hotel, Stefan sees some changes.
Are the changes below reversible?
Write **yes** or **no**.

ice melting .....

wood burning .....

toasting bread .....

1 mark

(b) (i) Stefan is snowboarding. Gravity acts on Stefan.
On the diagram below, draw an arrow to show the direction of the force of gravity.

1 mark

(ii) When Stefan wants to slow down, he pushes one edge of the snowboard into the snow.

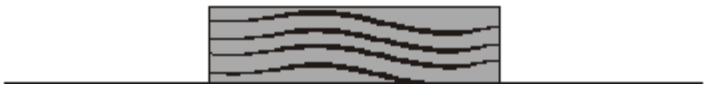
What force between the board and the snow makes him slow down?

.....

1 mark
maximum 5 marks

Q15.

(a) Tasha puts a small block of wood on a smooth surface.

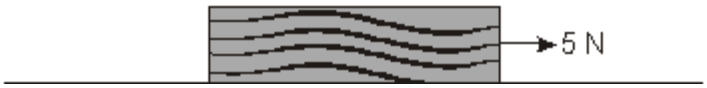


She puts different forces on the block.
The diagrams below show the size and direction of these forces.

Will each block move to the **left**, to the **right** or **stay still**?
Tick the correct box in each row.

block	**forces on**	**moves to the**	**moves to the**	**stays**

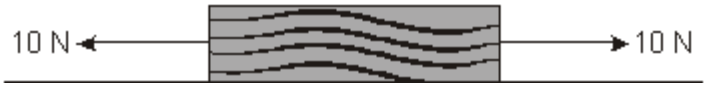
(i)



left ☐ right ☐ still ☐

1 mark

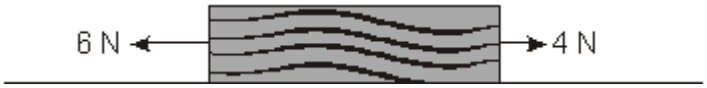
(ii)



☐ ☐ ☐

1 mark

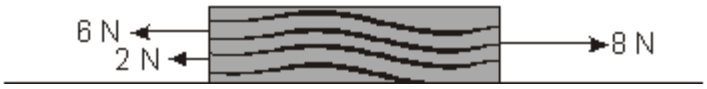
(iii)



☐ ☐ ☐

1 mark

(iv)



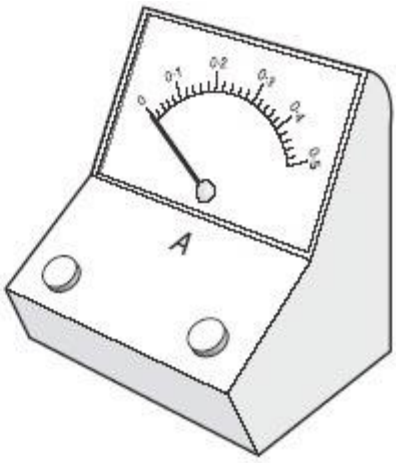
☐ ☐ ☐

1 mark

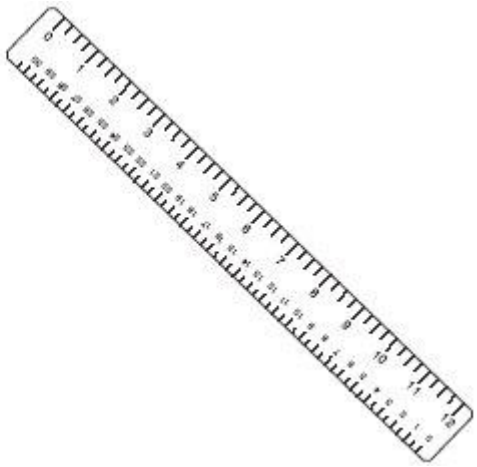
(b) (i) Which piece of equipment should Tasha use to measure the forces on the block?

Tick the correct box.

☐



☐



☐ ☐

1 mark

(ii) Give the name of the equipment used to measure force.

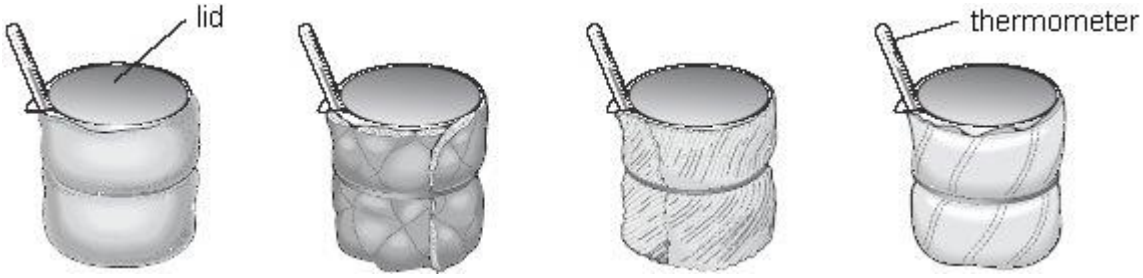
.....

1 mark
maximum 6 marks

Q16.

A company has made a new material called 'Wellwarm'. They want to use 'Wellwarm' to make coats.

(a) A scientist tested 'Wellwarm' to see how well it insulated a beaker of hot water. She tested 'Wellwarm' and three other materials as shown below.



material A **material B** **material C** **material D**

She wrapped each beaker in a different material.
She recorded the temperature at the start and 20 minutes later.

(i) What was the independent variable that the scientist **changed**?

.....

1 mark

(ii) What was the dependent variable that the scientist **measured** during the investigation?

.....

1 mark

(b) The results of the investigation are shown below.

time (minutes)	temperature of water (°C) wrapped in			
	material A	material B	material C	material D
0	60	60	60	60
20	34	40	38	36

(i) The scientist said that the 'Wellwarm' material is the best insulator.
Which material was 'Wellwarm'? Use the results to help you.
Tick the correct box.

A ☐ B ☐ C ☐ D ☐

1 mark

(ii) Use the evidence in the results table to explain your choice.

.....

.....

1 mark

(c) The company made a coat from each of the four materials they tested.

A person tested the different coats by wearing each one in a cold room.
He measured the temperature inside each coat for 30 minutes.

Write down two **other** variables that should be controlled to make this a fair test.

1. .....

1 mark

2. .....

1 mark

(d) Write down one thing the scientists should do to make sure the person testing the coats is safe.

.....

1 mark

(e) Suggest **one** advantage of using a temperature sensor and data logger instead of a thermometer in this experiment.

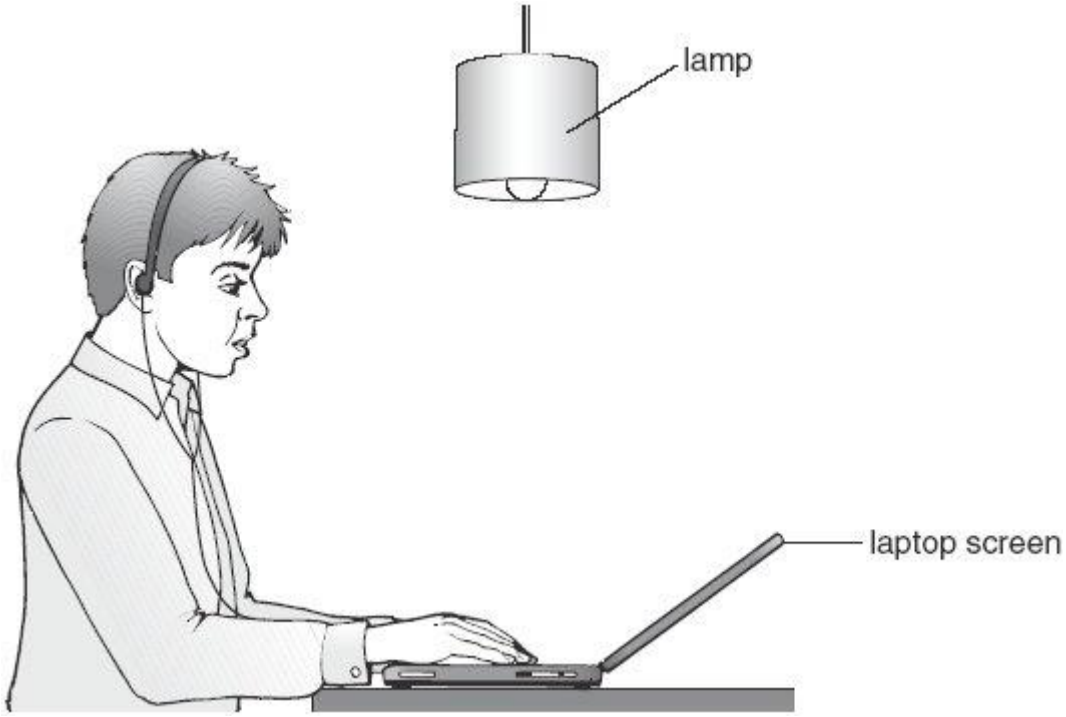
.....

.....

1 mark
maximum 8 marks

Q17.

(a) The diagram below shows George using his laptop.
Light from the lamp is reflected by the laptop screen.

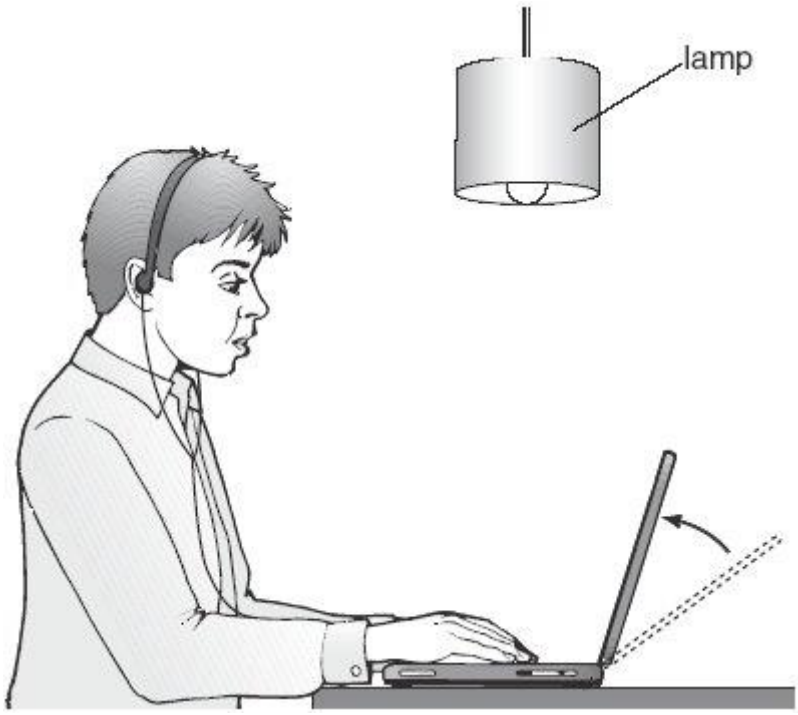


(i) **On the diagram above** draw a ray of light to show how George sees the light from the lamp reflected by the laptop screen. Use a ruler.

Draw arrows to show the direction of light.

3 marks

(ii) With the laptop screen in the position shown in part a(i), George sees an image of the lamp on the screen.
George tilts the screen forwards as shown below.



When the screen is tilted forwards it is easier for George to see the words on the screen.
What happens to the reflected ray of light when the screen is tilted?

.....

.....

1 mark

(b) George listens to music on his headphones.

Complete the sentence below using words from the box.

chemical	**electrical**	**gravitational potential**
sound	**thermal**	

The useful energy change in the headphones is from .....

energy into ..... energy.

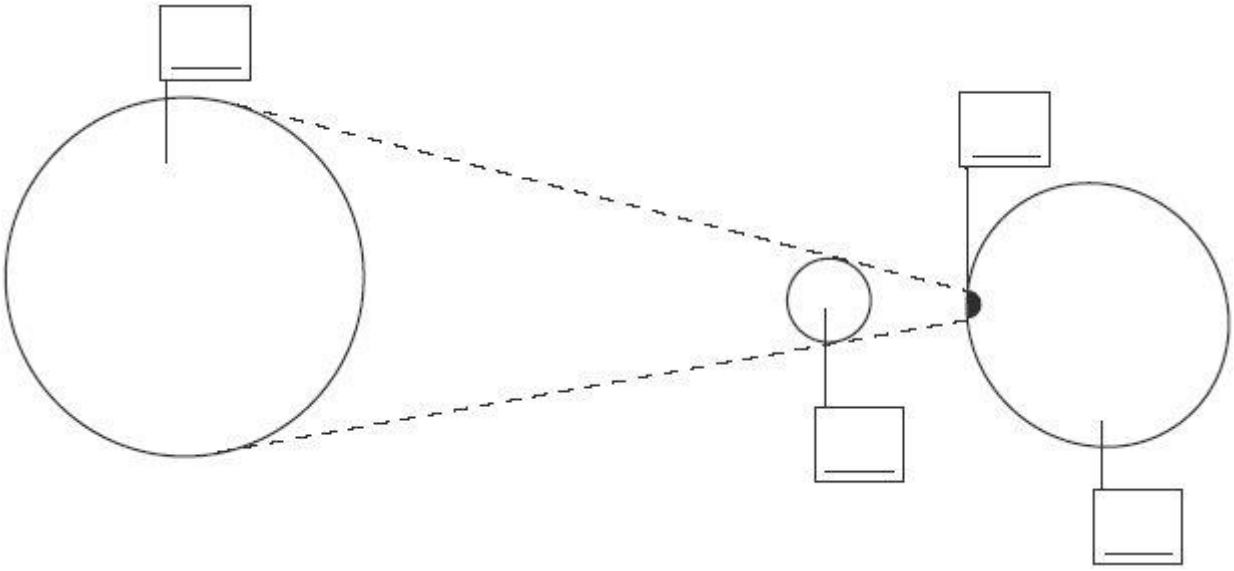
1 mark
maximum 5 marks

Q18.

(a) The diagram below shows the positions of the Sun, Moon and Earth during a solar eclipse.

Write numbers (1–4) on the diagram below to label the features during an eclipse.

1. the Earth
2. the Moon
3. the Sun
4. a region where the total eclipse of the Sun is taking place



not to scale

2 marks

(b) Scientists discovered a regular cycle of eclipses. It is called the Saros cycle.
The table below shows the dates of some eclipses in this cycle.

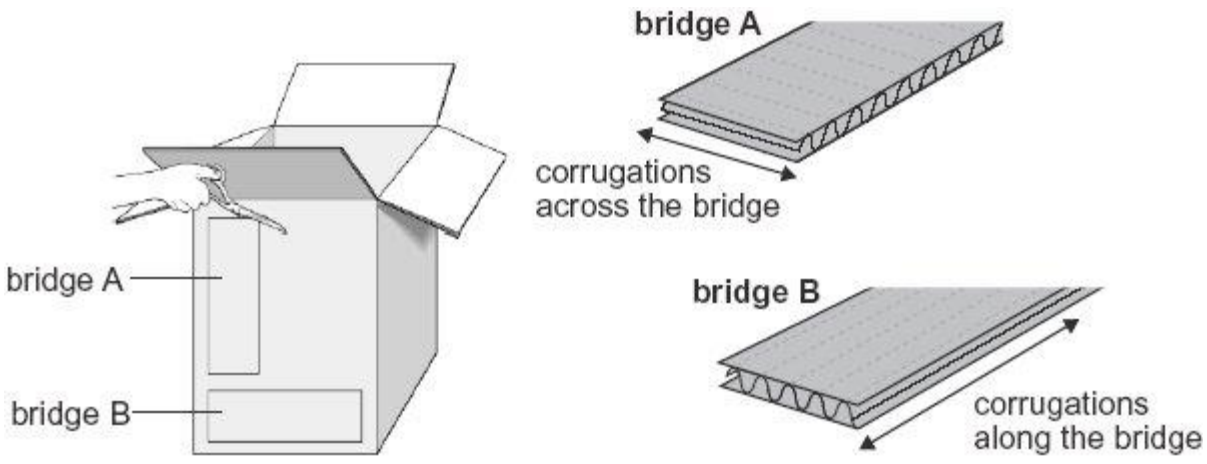
Complete the table by predicting the date of the next eclipse in the Saros cycle.

eclipse	date
eclipse 1	20th July 1963
eclipse 2	31st July 1981
eclipse 3	11th August 1999
eclipse 4	

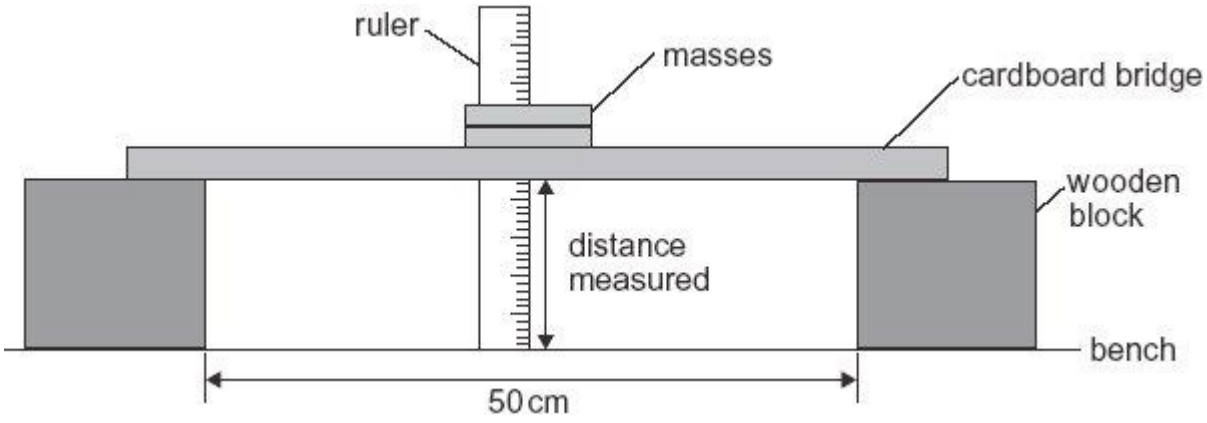
2 marks
maximum 4 marks

Q19.

Joe makes two bridges from strips of cardboard cut as shown.



Joe tests the bridges by adding masses to them. He measures the distance from the bench to the bottom of each bridge for different masses as shown.



(a) Suggest **two** things Joe must do to make his test fair.

1. .....

1 mark

2. .....

1 mark

Here are Joe's results.

mass added to bridge (g)	distance from bench to bottom of bridge (cm)	
	bridge A	bridge B
0	7.2	7.2
100	7.1	7.0
200	7.0	6.5
250	6.8	6.1
300	3.0	5.6
350	0.0	5.0

(b) (i) Joe put 325g on each bridge.
Using the results table, estimate the distance from each bridge to the bench.

bridge A ..... cm bridge B ..... cm

1 mark

(ii) Suggest what happened to **bridge A** when it was loaded with 350g.

.....

1 mark

(c) (i) Which bridge would be better for carrying a **200g** toy car?
Tick the correct box.

bridge A ☐ bridge B ☐

Explain your answer.

.....

.....

1 mark

(ii) Which bridge would be better for carrying a **300g** toy car?
Tick the correct box.

bridge A ☐ bridge B ☐

Explain your answer.

.....

.....

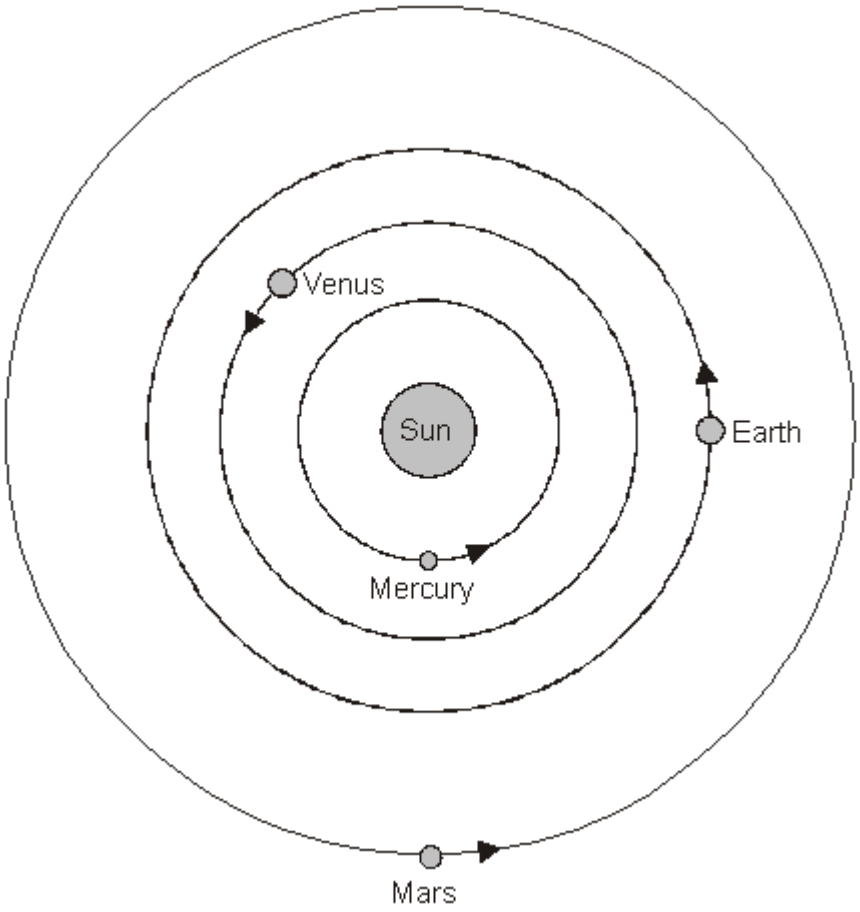
1 mark
maximum 6 marks

Q20.

The table below shows information about four planets.

planet	time taken to orbit the Sun (Earth years)	distance from the Sun (million km)
Mercury	0.25	60
Venus	0.5	108
Earth	1.0	150
Mars	2.0	228

The diagram below shows the orbits of the Earth, Mercury, Venus and Mars, and their position at one particular time.
The arrows show the direction in which the planets move.



not to scale

(a) Show the position of each planet six months later by drawing a letter X on the orbit of each planet.

2 marks

(b) Use the information in the table to calculate the largest and smallest distance between the Earth and Venus.

closest ..... million km

1 mark

furthest ..... million km

1 mark

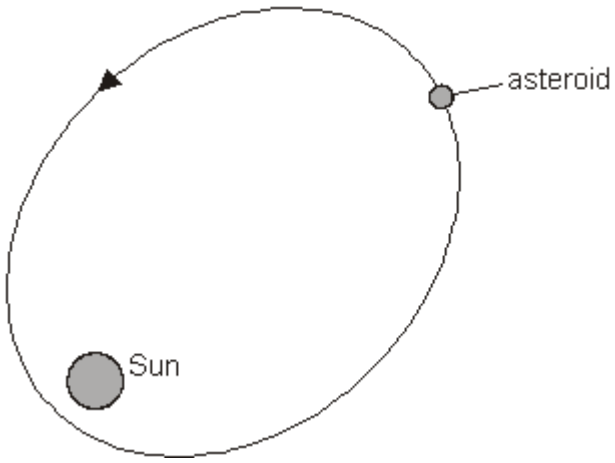
(c) The speed of light is 300 000 km/second.
Calculate how long light takes to reach the Earth from the Sun.

.....

..... s

1 mark

(d) The diagram below shows the path of an asteroid around the Sun.



not to scale

(i) **On the path of the asteroid**, draw a letter S to show the position where the asteroid is travelling the slowest.

On the path of the asteroid, draw a letter F to show the position where the asteroid is travelling the fastest.

1 mark

(ii) Explain why the speed of the asteroid changes.

.....

.....

1 mark
maximum 7 marks

Q21.

(a) The diagrams below show how much heat is lost from different parts of a house every second.

Through which part of the house above is most heat lost?

.....

1 mark

(b) Part of the house is insulated to reduce the loss of heat.
This is shown below.

(i) Which part of the house has been insulated?

.....

1 mark

(ii) Explain your answer.

.....

.....

1 mark

(c) The table below gives information about three fossil fuels that can be used to heat a house.

fuel	physical state	energy released when 1g is burned (J)	Does the fuel produce these substances when burned?	
			water	sulphur dioxide
coal	solid	25000	yes	yes
oil	liquid	42000	yes	yes
methane	gas	55000	yes	no

(i) Which fuel in the table releases the **least** energy when 1 g is burned?

.....

1 mark

(ii) Methane **can** be compressed.
Which information in the table shows that methane can be compressed?

.....

1 mark

(iii) Sulphur dioxide causes acid rain.
Use the table to explain why burning methane does **not** produce acid rain.

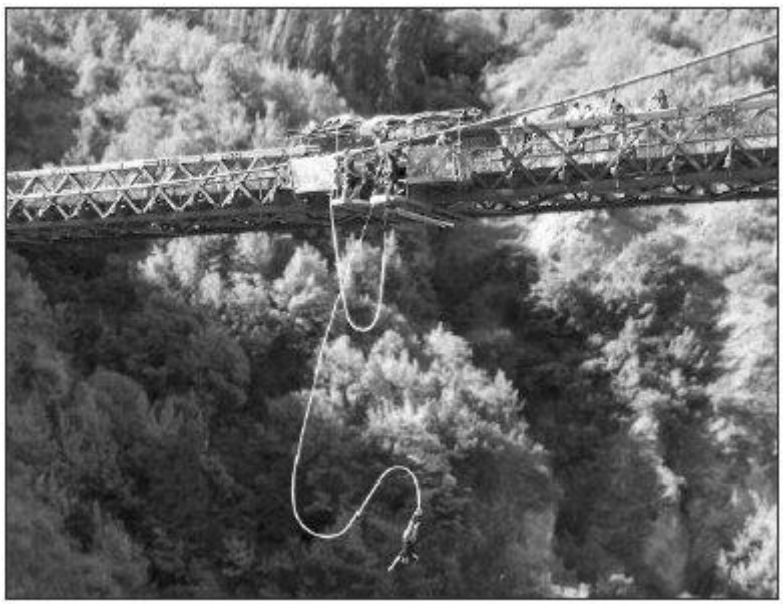
.....

.....

1 mark
maximum 6 marks

Q22.

Tom is doing a bungee jump from a bridge.



He is attached to one end of an elastic rope.
The other end of the rope is attached to the bridge.
Tom jumps from the bridge.

(a) (i) What force makes Tom fall towards the ground?

.....

1 mark

(ii) Tom does **not** hit the river below the bridge.
What makes Tom stop falling before he hits the river?

.....

1 mark

(b) The next person to do a bungee jump is Jill.

Jill weighs less than Tom.
Complete the sentence below using words from the box.

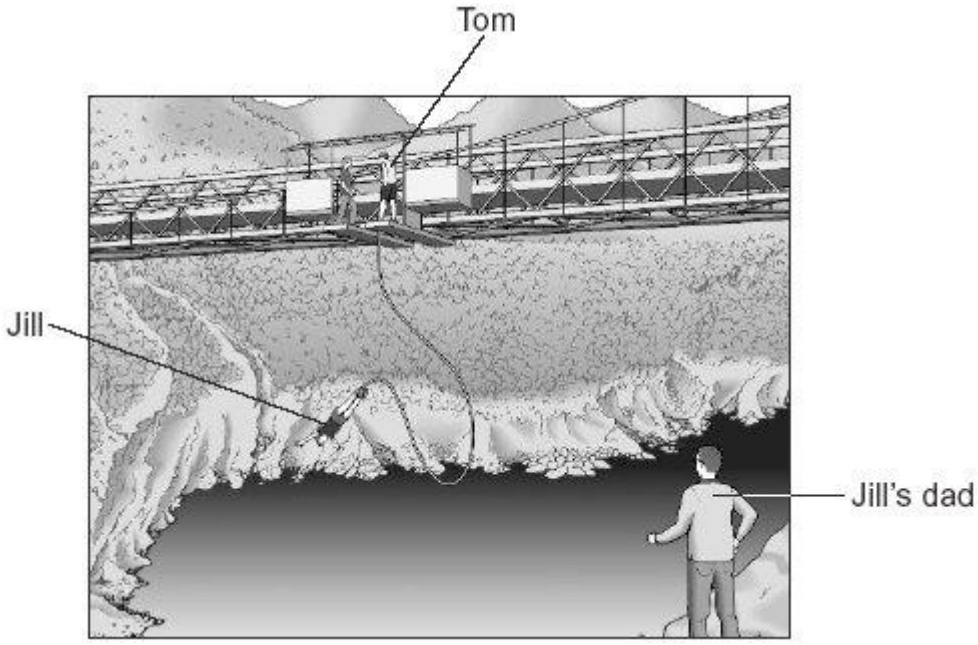
more than	**less than**	**the same as**

When Jill jumps, the rope will stretch .....

it did when Tom jumped.

1 mark

(c) Jill's dad watches her doing the bungee jump.
He is standing a long way from the bridge.
Jill shouts 'bungee' at the same time as she jumps off the bridge.
Jill's dad sees her jump before he hears her shout.



(i) Why does Jill's dad **see** her jump before he **hears** her shout?

.....

.....

1 mark

(ii) Tom is near Jill when she shouts. Her dad is far away.

Complete the sentence to describe how the shout will sound to Tom compared with Jill's dad. Use one word from the box.

louder	**higher**	**lower**	**quieter**

The shout will sound ..... to Tom.

1 mark

(iii) What part of Tom's ear vibrates when he hears Jill shout?

.....

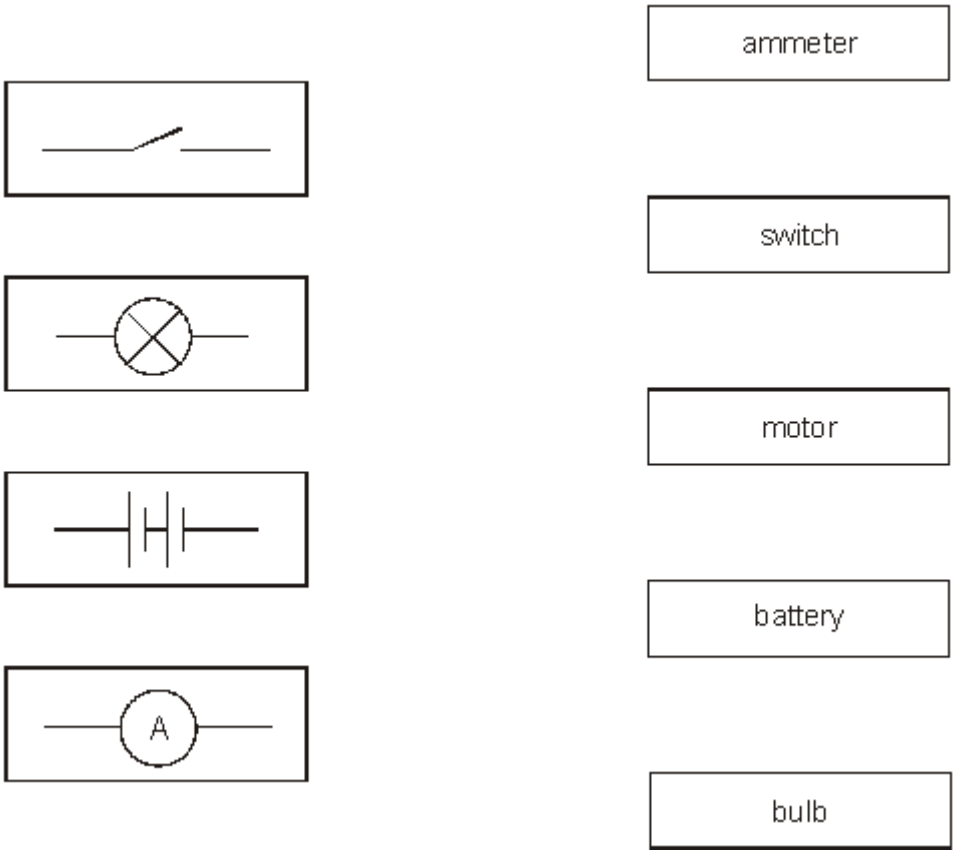
1 mark

maximum 6 marks

Q23.

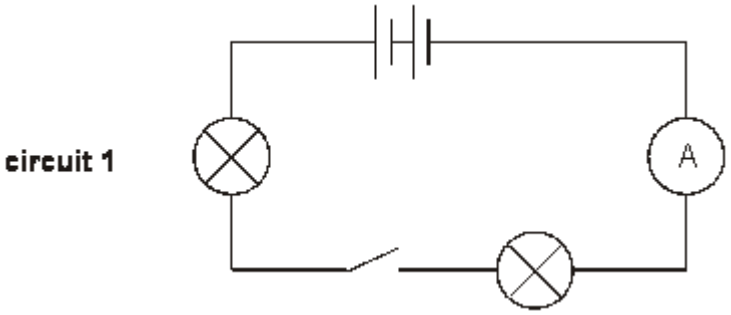
(a) Draw a line from each circuit symbol below to the correct name.
Draw only four lines.

circuit symbol **name**



3 marks

(b) Fred made **circuit 1** as shown below.



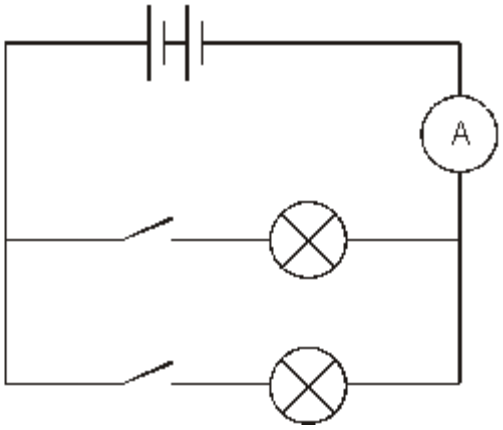
Give the name of the part that is the energy source for the circuit.

.....

1 mark

(c) Fred then made **circuit 2** as shown below.

circuit 2



In the table below, tick a box to show whether **circuit 1** and **circuit 2** are series or parallel circuits.
Tick only **two** boxes.

	series	parallel
circuit 1		
circuit 2		

1 mark

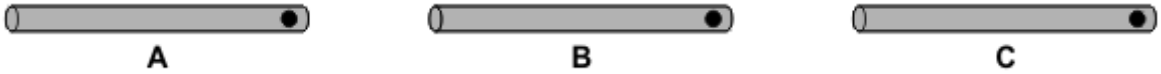
(d) What metal is usually used for wires in electric circuits?

.....

1 mark
maximum 6 marks

Q24.

Hannah has three rods (A, B and C) made from different metals.
One rod is a **magnet**; one is made of **copper**; and one is made of **iron**.
She does not know which rod is which.

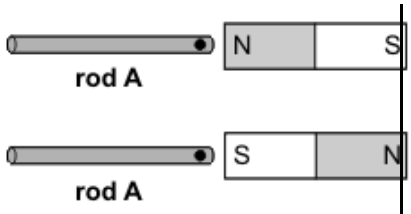
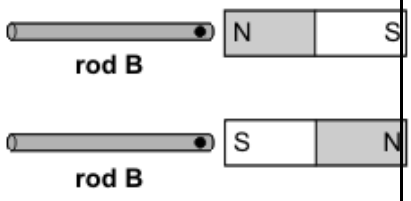
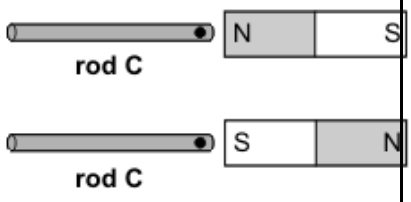


Each rod has a dot at one end.

(a) Hannah uses **only** a bar magnet to identify each rod.
She puts each pole of the bar magnet next to the dotted end of each rod.

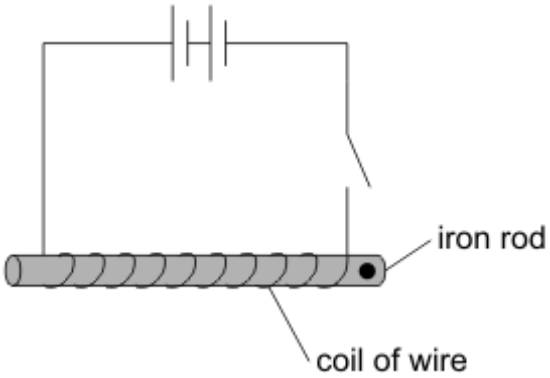
Complete Hannah's observations in the table below.
Write if each rod is **copper**, **iron** or a **magnet**.

test	observations	type of rod

	attract attract	Rod *A* is ..... .
	nothing happens	Rod *B* is ..... .
	attract	Rod *C* is ..... .

3 marks

(b) Hannah uses the iron rod to make an electromagnet.



When the switch is closed the iron rod becomes an electromagnet.
Give **two** ways Hannah could make the electromagnet stronger.

1. .....

1 mark

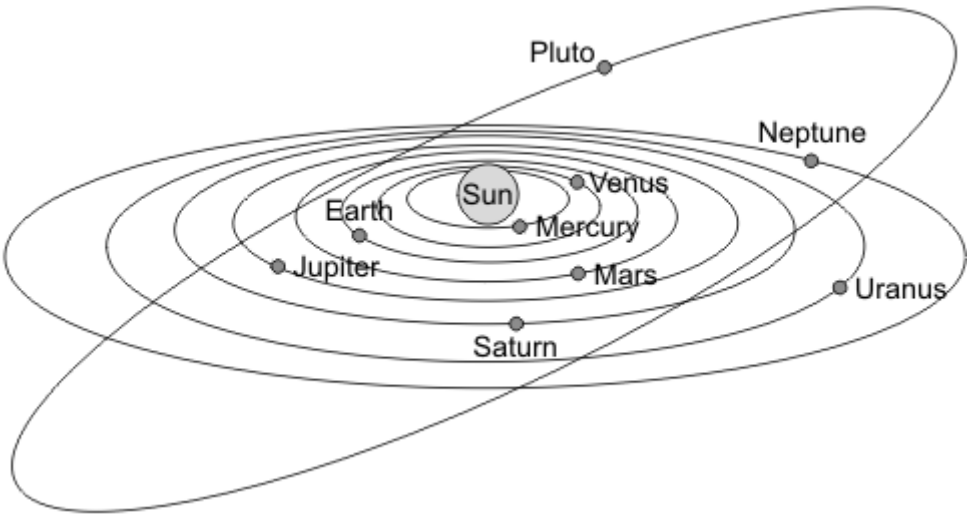
2. .....

1 mark
maximum 5 marks

Q25.

Pluto was discovered in 1930. It was classified as a planet.
In 2006, scientists agreed that Pluto is **not** a planet.

(a) The diagram below shows our solar system.



not to scale

(i) **From the diagram**, what supports the idea that Pluto is a planet?

.....

1 mark

(ii) **From the diagram**, what supports the idea that Pluto is **not** a planet?

.....

1 mark

(b) The table below shows information about planets in our solar system.

planet	diameter (km)
Mercury	4800
Venus	12200
Earth	12800
Mars	6800
Jupiter	142600
Saturn	120200
Uranus	49000
Neptune	50000

Pluto has a diameter of 2 300 km.
How does this information suggest to scientists that Pluto is **not** a planet?

.....

1 mark

(c) An object called Charon orbits Pluto.

How does the presence of Charon support the idea that Pluto is a planet?

.....

1 mark

(d) The table below shows the composition of the atmosphere of some of the objects in our solar system.

object	atmosphere
Mercury	none
Venus	mainly carbon dioxide
Earth	mainly nitrogen and oxygen
Neptune	hydrogen, helium and methane
Earth's moon	none
Titan (a moon)	nitrogen and methane
Pluto	nitrogen and methane

Atmosphere is **not** used to classify objects as moons or planets.
Use the information above to suggest a reason for this.

.....

.....

1 mark

(e) Why do you think scientists found it difficult to decide how Pluto should be classified?

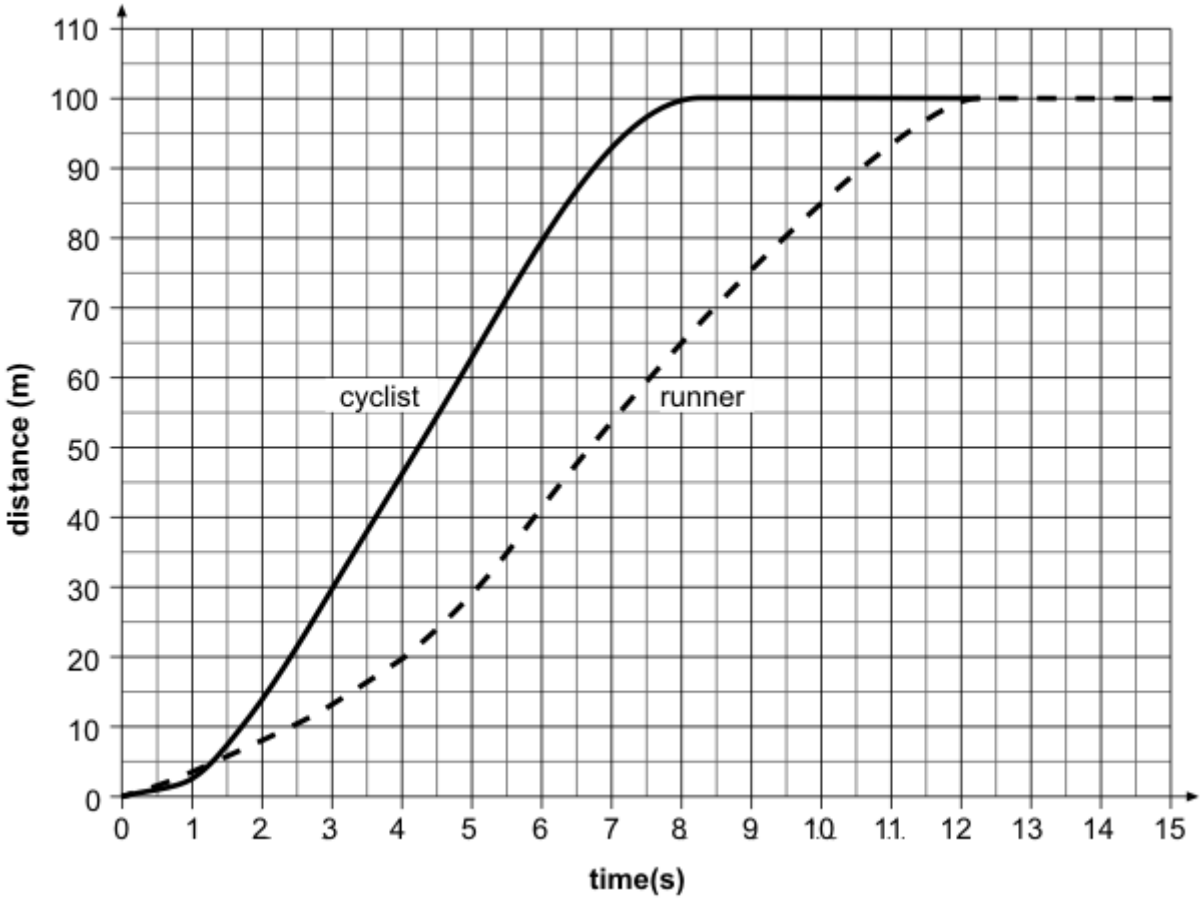
.....

.....

1 mark
maximum 6 marks

Q26.

A cyclist and a runner have a race.
The distance-time graph for the race is shown below.



Use the graph to answer the following questions.

(a) (i) How much time did it take the cyclist to travel 100 m?

..... s

1 mark

(ii) When the cyclist finished the race how far behind was the runner?

..... m

1 mark

(iii) How much more time did the runner take compared with the cyclist to complete the race?

..... s

1 mark

(b) The cyclist is travelling at a constant speed between 3 seconds and 6 seconds.

How does the graph show this?

.....

.....

1 mark

(c) (i) When the race started, a walker set off at a steady speed of 2m/s.

Draw a line on the graph on the opposite page to show the distance covered

by the walker in the first 15 seconds. Use a ruler.

1 mark

(ii) Calculate how much time it will take for the walker to walk 100m.

.....

..... s

1 mark

maximum 6 marks

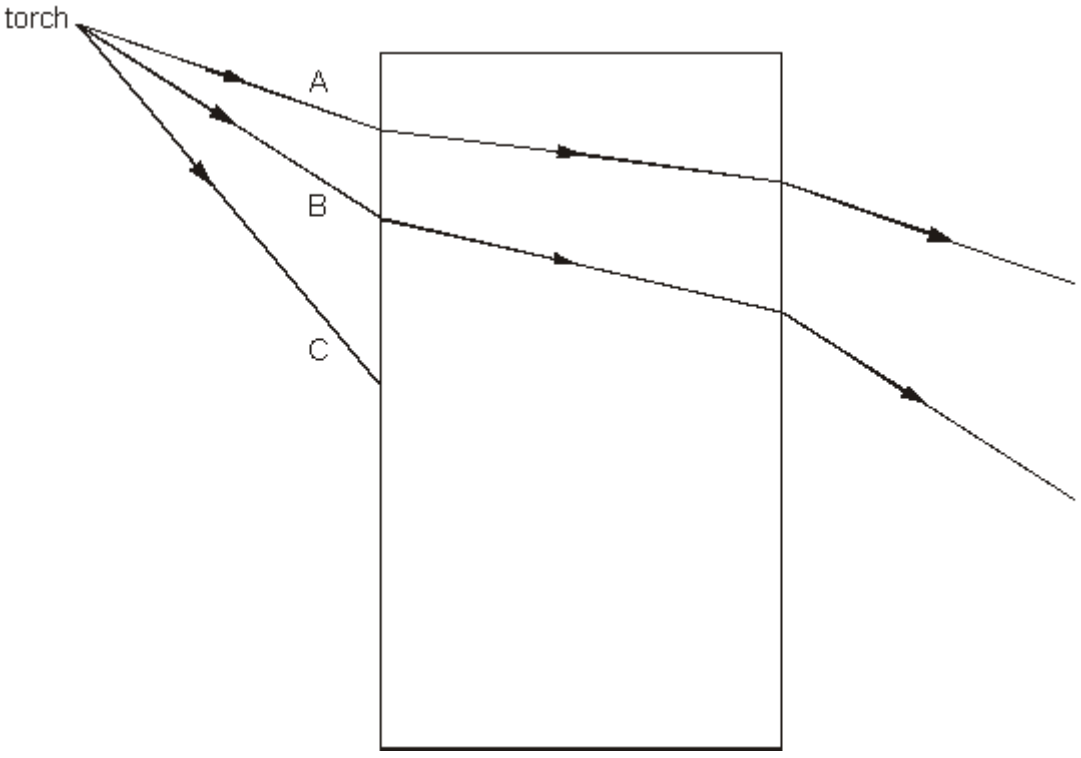
Q27.

(a) When light travels from air to glass, it changes direction.
What is the name of this effect?

.....

1 mark

(b) The diagram below shows three rays of light A, B and C striking a glass block.



The paths of A and B have been drawn.

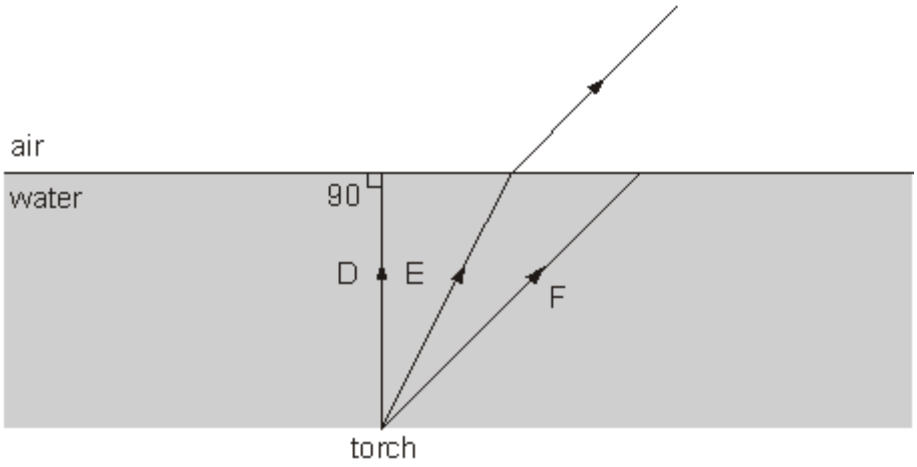
Continue ray C to show its path through the block and out the other side.
Use a ruler.

2 marks

(c) The diagram below shows three rays of light, D, E and F, from a torch placed under water.

The path of ray E is shown as it leaves the water and enters the air.

Continue the paths of D and F as they pass through the air.
Use a ruler.

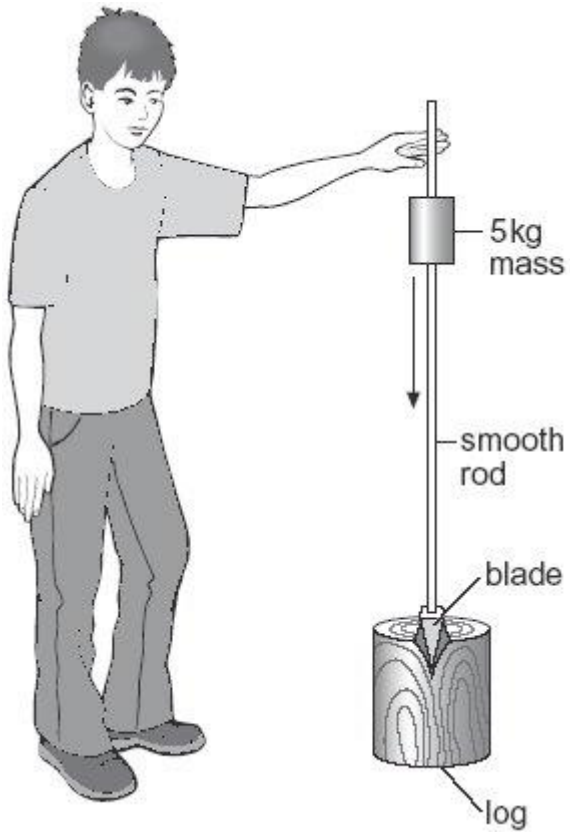


2 marks
maximum 5 marks

Q28.

David uses a falling mass to split wooden logs.

The 5 kg mass slides down the rod and hits the metal blade.
The force on the blade splits the log.



(a) To lift the mass David uses energy stored in his muscles.

What energy transfer occurs when David's muscles lift the mass?

from ..... energy in his muscles to

gravitational potential energy of the mass

1 mark

(b) David lifts the mass. The mass gains 50 J of gravitational potential energy. The falling mass changes this energy into kinetic energy.

(i) As it falls, what is the maximum amount of energy the mass can change from gravitational potential energy to kinetic energy?

..... J

1 mark

(ii) Not all the gravitational potential energy is transferred to kinetic energy as the mass falls.
Give one reason for this.

.....

.....

1 mark

(c) Give **two** ways David can increase the kinetic energy of the mass just before it hits the blade.

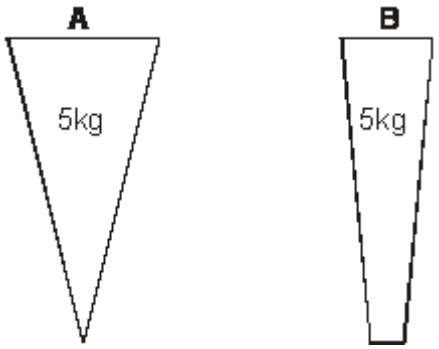
1. .....

1 mark

2. .....

1 mark

(d) David can use a different blade to split the logs.
The diagram below shows two different blades **A** and **B**.



The formula for pressure is: $\text{pressure} = \frac{\text{force}}{\text{area}}$

Which blade puts more pressure on the log?
Write the letter.

.....

Explain your answer in terms of area. Use the formula to help you.

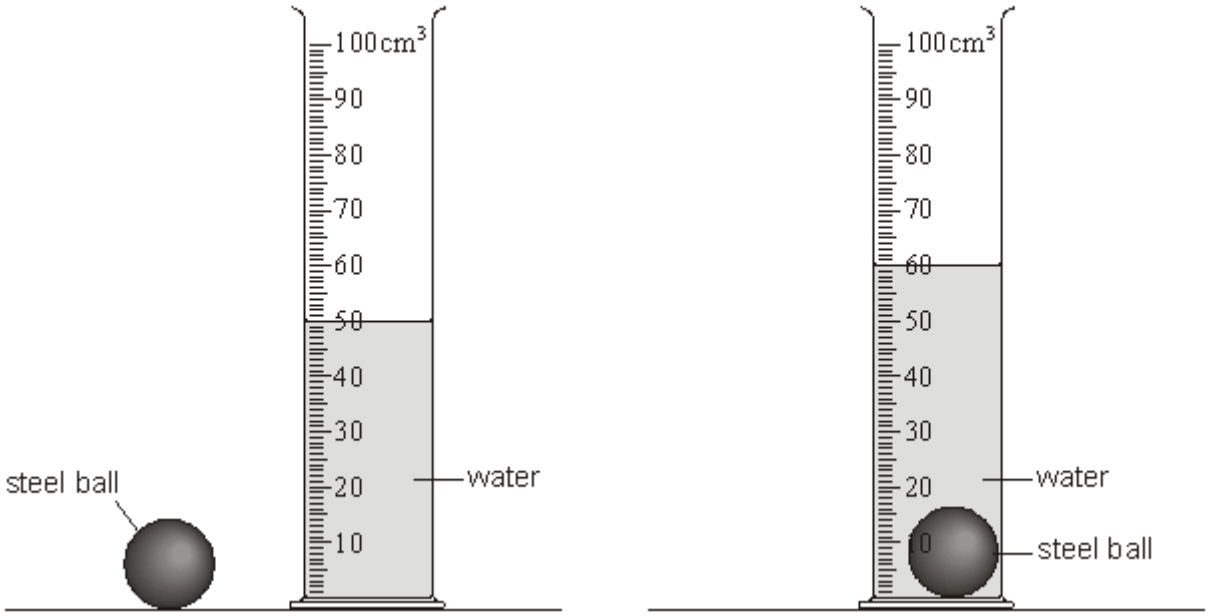
.....

.....

1 mark
maximum 6 marks

Q29.

(a) Gary poured 50 cm^3 of water into a measuring cylinder.
He then put a steel ball into the measuring cylinder.



(i) What is the new reading on the measuring cylinder?

..... cm^3

1 mark

(ii) What is the volume of the steel ball?

..... cm^3

1 mark

(b) The table below shows the mass and volume of four objects.

object	mass (g)	volume (cm^3)
aluminium figure	230	85
lead weight	800	70
steel block	200	25
wood puzzle	400	500

(i) Which object is the heaviest? .....

1 mark

(ii) Which object takes up the most space? .....

1 mark

(c) The frame of a bike is made of aluminium.

(i) Give **one** reason why aluminium is a suitable material for the frame.

.....

.....

1 mark

(ii) A force between the tyres and the road stops the bike skidding.

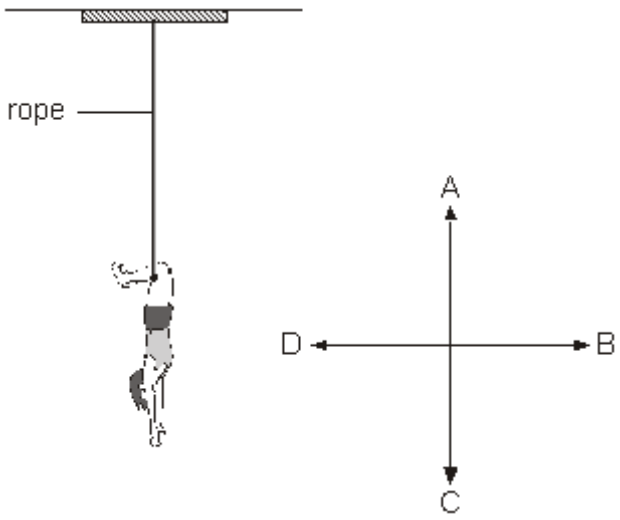
What is the name of this force?

.....

1 mark
maximum 6 marks

Q30.

The diagram below shows Jo hanging on a trapeze (swing) in a circus.



(a) (i) Which arrow, A, B, C or D, shows the direction of Jo's weight?

.....

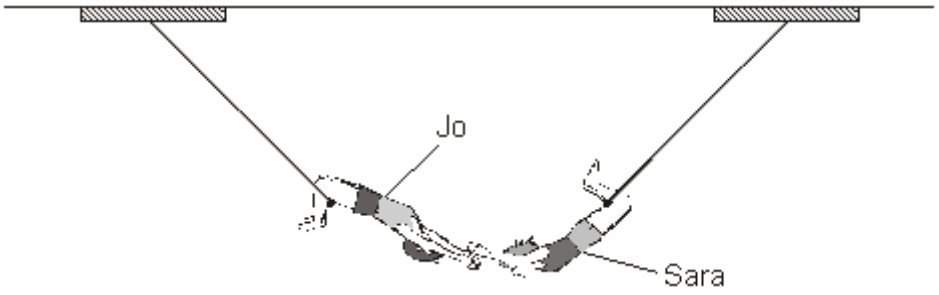
1 mark

(ii) Which arrow, A, B, C or D, shows the direction of the force of the rope on Jo?

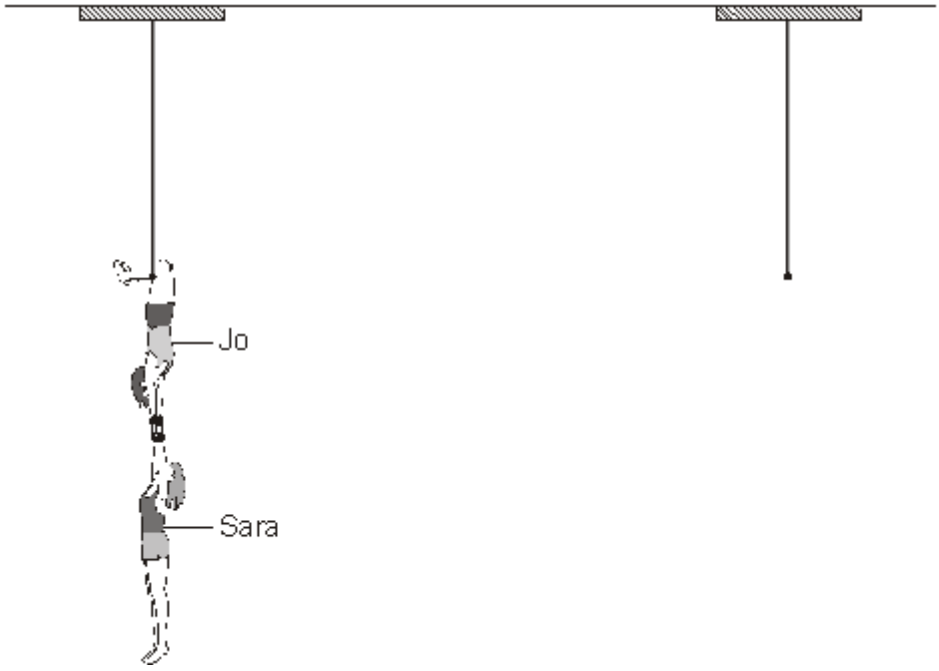
.....

1 mark

(b) Sara swings towards Jo.



Sara lets go of her trapeze and Jo catches her.



(i) What happens to the downward force on the rope of Jo's trapeze?
Tick the correct box.

increases	decreases	stays the same	there is **no** force
☐	☐	☐	☐

1 mark

(ii) Explain your answer.

.....

1 mark

(c) Jo lets go of the trapeze and both Sara and Jo fall into a safety net below them.

What happens to the downward force on the rope when Jo lets go?

.....

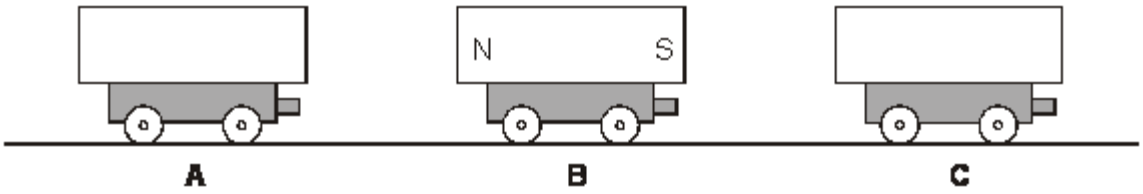
1 mark
maximum 5 marks

Q31.

The diagram below shows three trolleys.
Peter put a bar magnet on each trolley.

(a) He pushed trolleys A, B and C together.

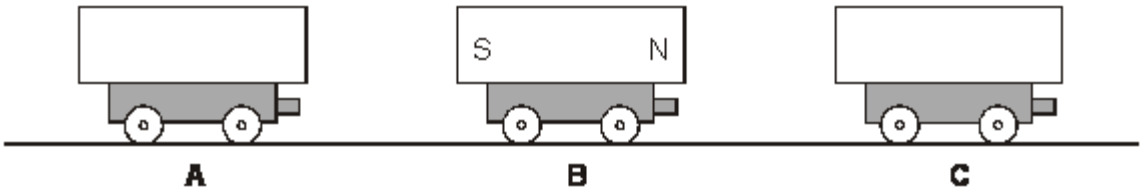
- Magnet B **attracted** magnet A.
- Magnet B **repelled** magnet C.



On the diagram above, label the north and south poles of magnets A and C.
Use the letters N and S.

2 marks

(b) Peter turned trolley B around. Trolleys A and C were **not** turned around.



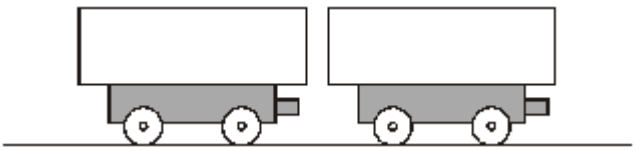
What would happen now when Peter pushed them all together?
Use either **attract** or **repel** to complete each sentence below.

Magnet B would ..... magnet A.

Magnet B would ..... magnet C.

1 mark

(c) Peter held two trolleys close together and then let go.



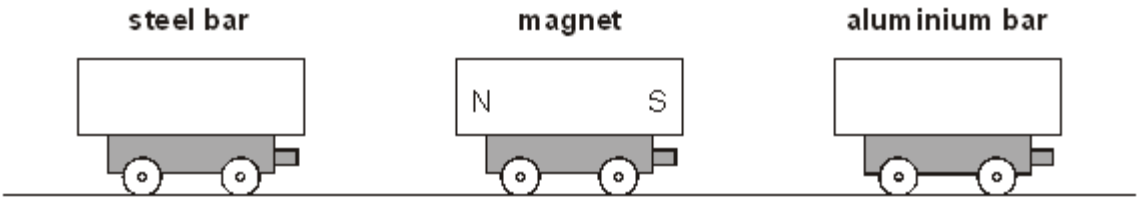
The magnets repelled each other.

Draw an arrow on both magnets to show which way they would move.

1 mark

(d) Peter took a magnet, a steel bar and an aluminium bar.

He put them on three trolleys as shown below.



(i) What happens to the steel bar as he moves it closer to the magnet?

.....

1 mark

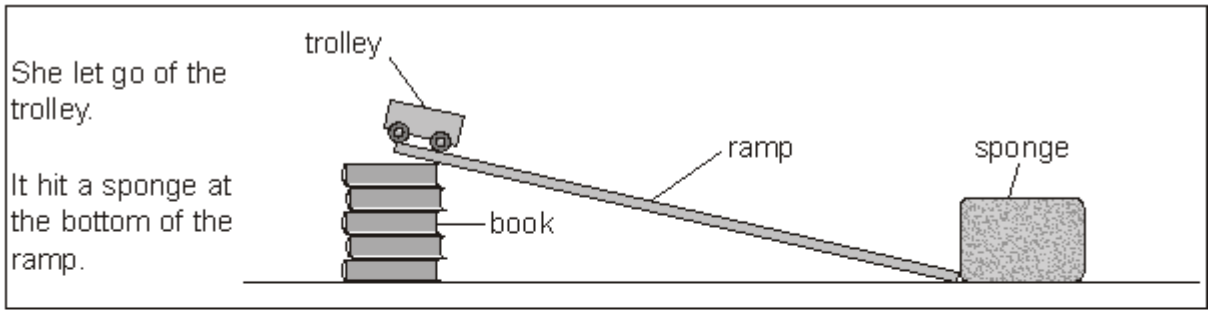
(ii) What happens to the aluminium bar as he moves it closer to the magnet?

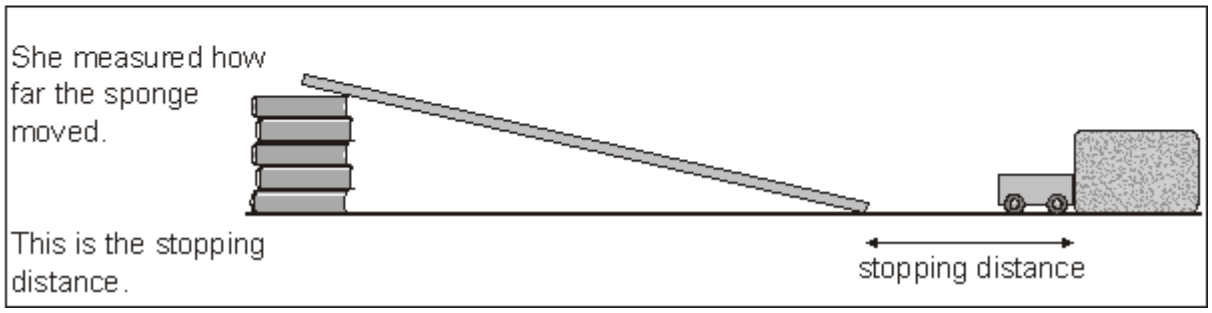
.....

1 mark
maximum 6 marks

Q32.

Yasmin investigated the stopping distance of a trolley.





(a) Yasmin did the investigation five times.
She changed the steepness of the ramp each time.

(i) How could she make this ramp steeper?

.....

.....

1 mark

(ii) Yasmin's results are shown in the table.

steepness	stopping distance

of ramp	(cm)
A	10
B	16
C	16
D	28
E	34

She predicted, 'The steeper the ramp, the greater the stopping distance'.
If Yasmin was correct, which ramp was the steepest? Write the letter.

.....

1 mark

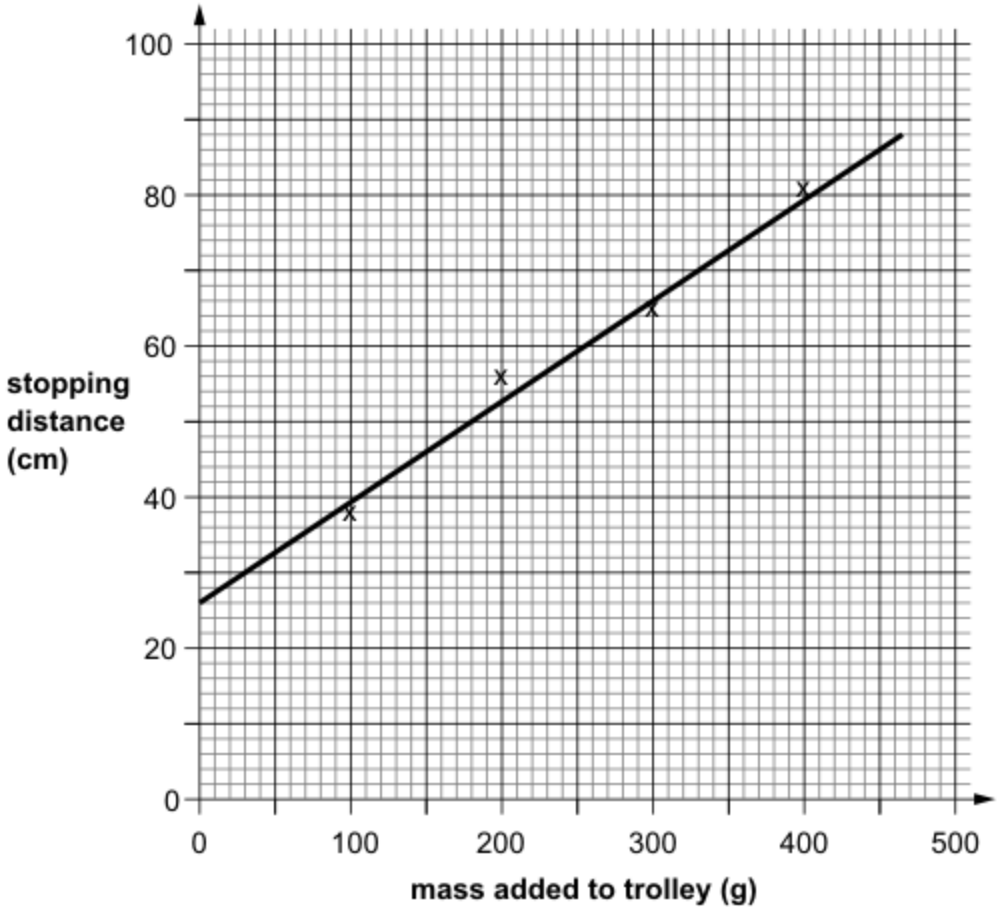
(iii) Yasmin looked at her results and decided she should repeat her investigation.
Look at Yasmin's results.

Suggest why she decided to repeat her investigation.

.....

1 mark

(b) Yasmin then investigated the stopping distance of a trolley with different masses on it.
The graph shows her results.



(i) What would be the stopping distance if 0 g were on the trolley?

..... cm

1 mark

(ii) Complete the sentence with **decreases**, **increases** or **stays the same**.

As the mass added to the trolley increases,

the stopping distance ..... .

1 mark

maximum 5 marks