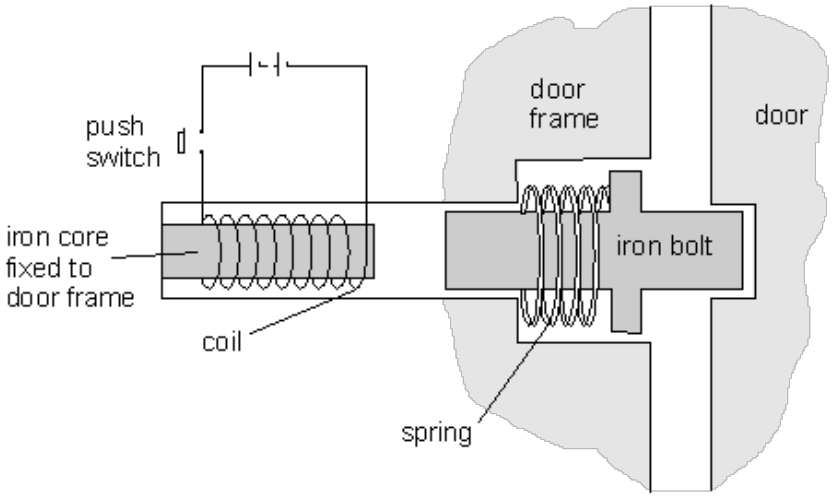
7.3.4 Forces

121 minutes

166 marks

Q1. The diagram shows an electromagnet used in a door lock.



(a) The push switch is closed and the door unlocks. Explain in detail how this happens.

.....

.....

.....

.....

.....

3 marks

(b) The switch is released and the door locks. Explain in detail how this happens.

.....

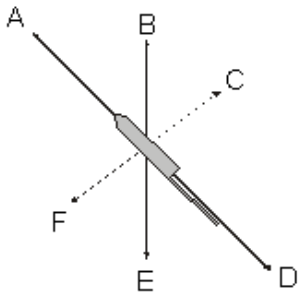
.....

.....

2 marks

Maximum 5 marks

Q2. The diagram shows a firework rocket.



(a) Three forces act as the rocket flies through the air.
Which arrows show the directions of these three forces?

....

3 marks

(b) When there is no fuel left, the rocket falls to the ground.

(i) Give the name of the force which pulls it down.

.....

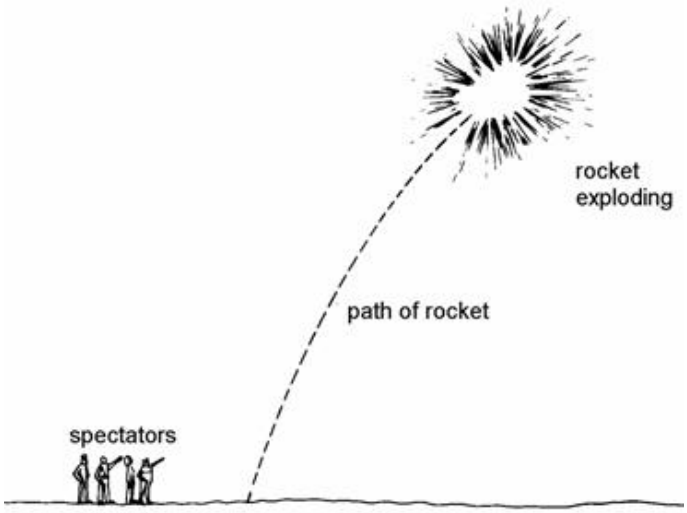
1 mark

(ii) Give the name of the force which acts against the motion of the rocket.

.....

1 mark

(c) Another rocket was sent high into the air. It exploded with a loud bang and a bright flash of light.



Put a tick in the box by the correct statement.

the bright flash of light was seen first	☐
the loud bang was heard first	☐
the flash of light was seen and the bang was heard at the same time	☐

1 mark

Give a reason for your answer.

.....

.....

1 mark
Maximum 7 marks

Q3. The footballer is just going to kick the ball.

(a) When his boot hits the ball, how does the shape of the ball change?

.....

.....

1 mark

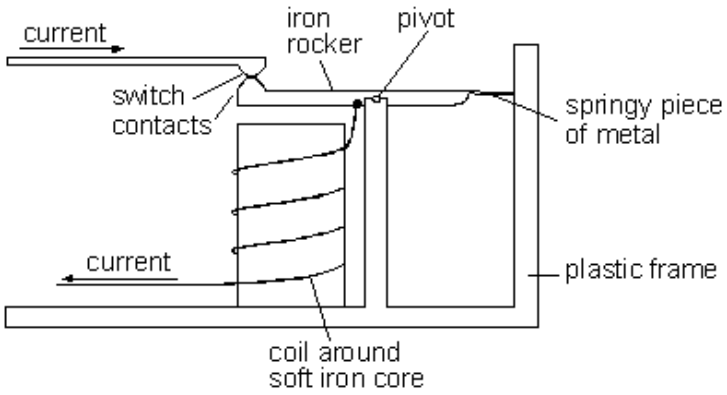
After he has kicked it the ball flies off high into the air.

(b) Tick boxes to describe the shape and movement of the ball after he has kicked it and it is high in the air.

	the same as the picture	**different from the picture**
The shape of the ball is		
The movement of the ball is		

2 marks
Maximum 3 marks

Q4. Circuit breakers are switches which open when the current becomes too large. The diagram shows a simple circuit breaker. The springy piece of metal pushes down on the iron rocker, and this holds the switch contacts together.



(a) (i) There is a current in the coil in the circuit breaker. What is the purpose of the coil?

.....

.....

1 mark

(ii) What is the purpose of the soft iron core in the coil?

.....

.....

1 mark

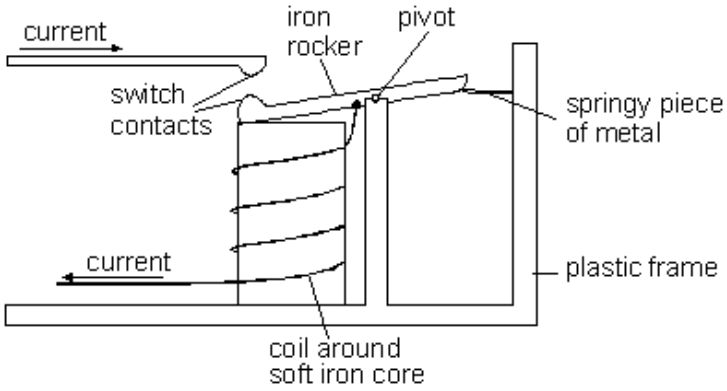
(b) Give **two** properties of iron which make it a good choice of material for the **rocker**.

1. .....

2. .....

2 marks

(c) The diagram below shows the circuit breaker with the switch contacts open.



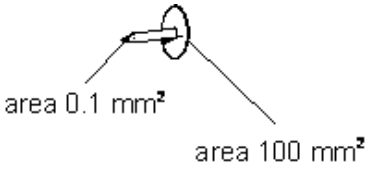
Why do the switch contacts separate when the current becomes too large?

.....

.....

1 mark
Maximum 5 marks

Q5. A drawing pin is pressed into a notice board.



The pin is pressed into the notice board with a force of 20 N.
The head of the drawing pin has an area of 100 mm^2.
The point of the pin has an area of 0.1 mm^2.

(a) What is the size of the force exerted by the **point** of the pin on the notice board?

..... N

1 mark

(b) Calculate the pressure exerted by the **point** of the drawing pin.
Give the unit.

.....

.....

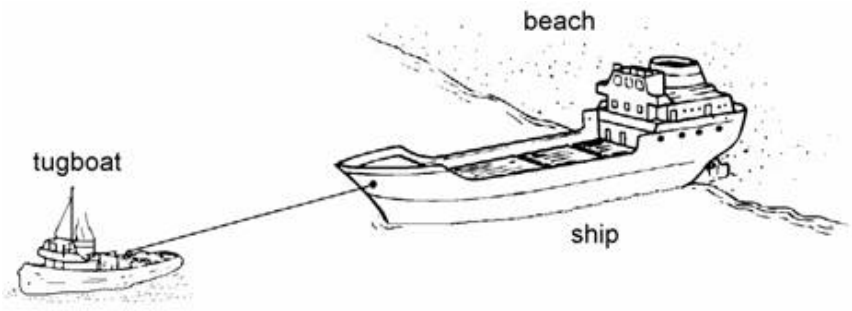
.....

.....

2 marks
Maximum 3 marks

##

In a storm, a small ship was blown onto a beach. Now it is calm and there is no wind. A tugboat is trying to pull the ship off the beach.



(a) The tugboat pulls the ship with a force of 25 000 N.

The ship does not move because of the force of friction acting on it.

(i) Tick **one** box to show the size of the frictional force acting on the ship.

zero	☐
more than zero but less than 25 000 N	☐
25 000 N	☐
more than 25 000 N	☐

1 mark

(ii) Add an arrow to the drawing to show the direction of the frictional force acting on the ship.

1 mark

(b) When the tide is higher, the tugboat again pulls the ship with a steady force of 25 000 N. The ship begins to move.

Once the ship is off the beach, the tugboat continues to pull the ship with a force of 25 000 N.
A frictional force due to the water acts on the ship.

(i) At first, the speed of the ship increases.

Tick **one** box to describe the frictional force acting on the ship while its speed is increasing.

- zero ☐
- more than zero but less than 25 000 N ☐
- 25 000 N ☐
- more than 25 000 N ☐

1 mark

(ii) After a short while, the ship reaches a steady speed. The tugboat continues to pull with a force of 25 000 N.

Tick **one** box to describe the frictional force acting on the ship while it is going at a steady speed.

- zero ☐
- more than zero but less than 25 000 N ☐
- 25 000 N ☐
- more than 25 000 N ☐

1 mark

(iii) The ship is towed to the north. What is the direction of the frictional force acting on the ship?

.....

1 mark
Maximum 5 marks

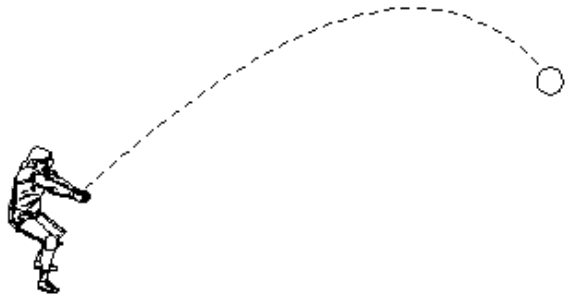
Q7. (a) Some of the statements in the list describe forces, and some do not.

Tick the boxes by the **three** forces.

the movement of a car travelling along a road	☐
the push of a jet engine on an aeroplane.	☐
the flow of electricity through a light bulb.	☐
the weight of a book on a table.	☐
the pull of a horse pulling a cart.	☐
the speed of a hockey ball flying through the air.	☐

3 marks

(b) A girl throws a ball. The diagram shows the path of the ball after she has thrown it.



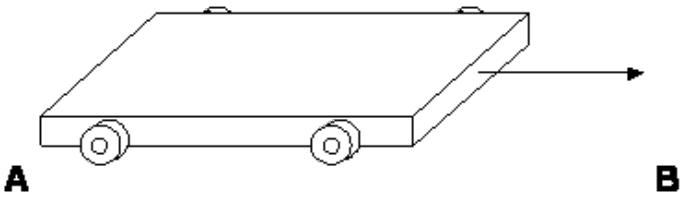
How can you tell from the **path** of the ball that there is a force acting on the ball?

.....

.....

1 mark

(c)



The drawing shows a trolley rolling along a table from **A** to **B**.
Then another force acts on the trolley. This is shown by the arrow on the drawing.

What effect does this force have?

Tick the correct box.

It makes the trolley go faster. ☐

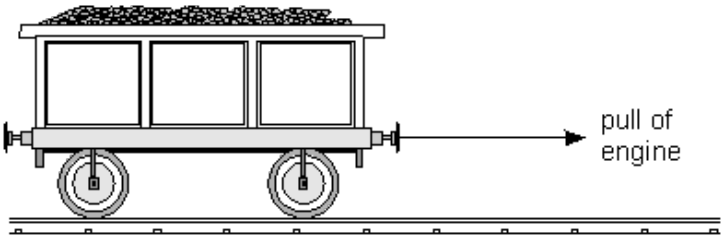
It makes the trolley go slower. ☐

It makes the trolley change direction. ☐

It has no effect. ☐

1 mark
Maximum 5 marks

Q8.



(a) A railway engine is being used to try to pull a wagon along a level track. The wagon's brakes are on, and the wagon does not move.

(i) Draw **one** arrow on the diagram to show the direction of the force which prevents the wagon from moving.

1 mark

(ii) Is the force which prevents the wagon from moving **greater than**, **equal to** or **less than** the pull of the engine?

.....

1 mark

(b) (i) When the wagon's brakes are off, the engine pulls the wagon forwards. A frictional force also acts on the wagon. In what direction does the frictional force act?

1 mark

(ii) The pull of the engine is 5000 N. When the wagon's speed is increasing, how large is the frictional force?
Tick the correct box.

zero ☐

between 0 and 5000 N ☐

5000 N ☐

more than 5000 N ☐

1 mark

(c) After a while, the wagon travels at a steady speed. The engine is still pulling with a force of 5000 N.

How large is the frictional force now?
Tick the correct box.

zero ☐

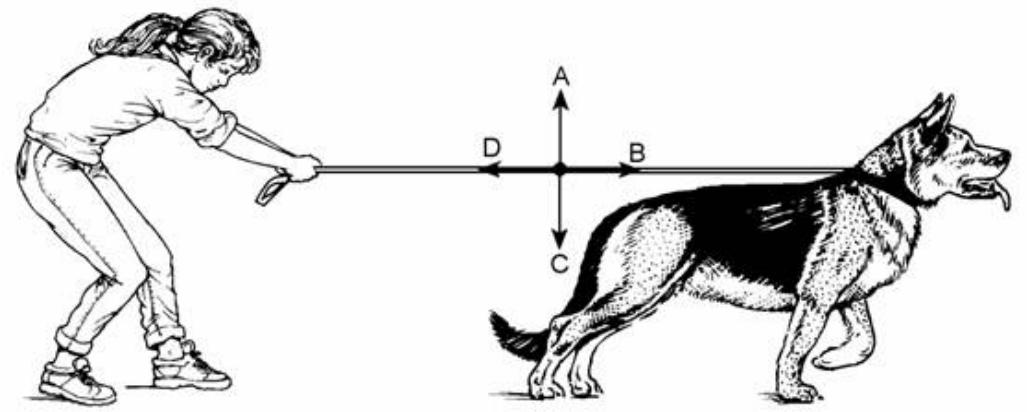
between 0 and 5000 N ☐

5000 N ☐

more than 5000 N ☐

1 mark
Maximum 5 marks

Q9.



(a) Megan's dog is pulling on his lead.
Which arrow, A, B, C or D, shows the direction of this force?
Give the letter.

.....

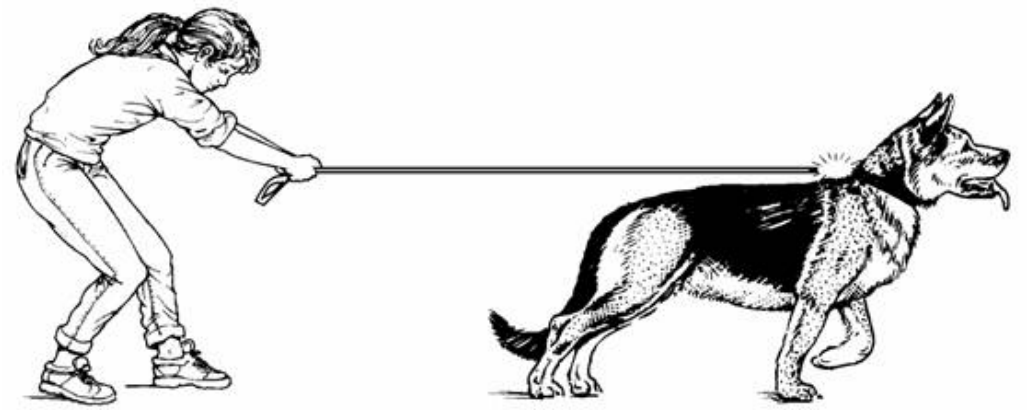
1 mark

(b) Megan has to pull to keep the dog still.
Which arrow shows the direction of this force? Give the letter.

.....

1 mark

(c) Suddenly the dog's collar breaks.



(i) When the collar breaks, the lead moves.
Draw an arrow on the diagram to show which way the lead starts to move.

1 mark

(ii) Why does the lead move when the collar breaks?

.....

.....

1 mark
Maximum 4 marks

Q10. (a) The diagram shows two bar magnets.

The north pole and south pole are shown on magnet A. The poles are not shown on magnet B.

Describe an experiment you could do, using magnet A, to find which end of magnet B is the north pole **and** which is the south pole.

.....

.....

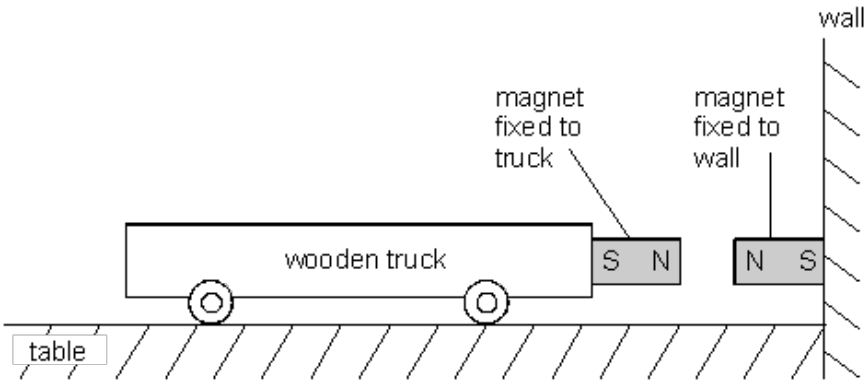
.....

.....

.....

3 marks

(b) The diagram shows a wooden truck near a wall. There is a strong magnet fixed to the wall and a strong magnet fixed to the front of the wooden truck.



James holds the wooden truck so that it does not move.
Then he lets go of the wooden truck. In which direction will it move?

.....

1 mark

(c) James removes the magnet from the wooden truck. He gives the truck a push so that it rolls along the table.

What effect will friction have on the speed of the truck as it rolls along?

.....

.....

1 mark
Maximum 5 marks

Q11. The drawing shows a man moving a wheelbarrow full of bricks.

(a) Tick the boxes by **two** forces on the wheelbarrow.

the weight of the bricks	☐
the speed of the wheelbarrow	☐
the size of the wheel	☐
the energy of the wheelbarrow	☐
the push of the man's hands on the handles	☐
the weight of the man	☐

2 marks

(b) The man lets go of the handles and the wheelbarrow hits the ground while it is still moving. The wheelbarrow soon stops moving forward.

Give the name of the force which makes the wheelbarrow stop moving forward.

.....

1 mark

(c) One brick drops off the wheelbarrow.

What effect does the force of gravity have on the speed of the brick as it falls?

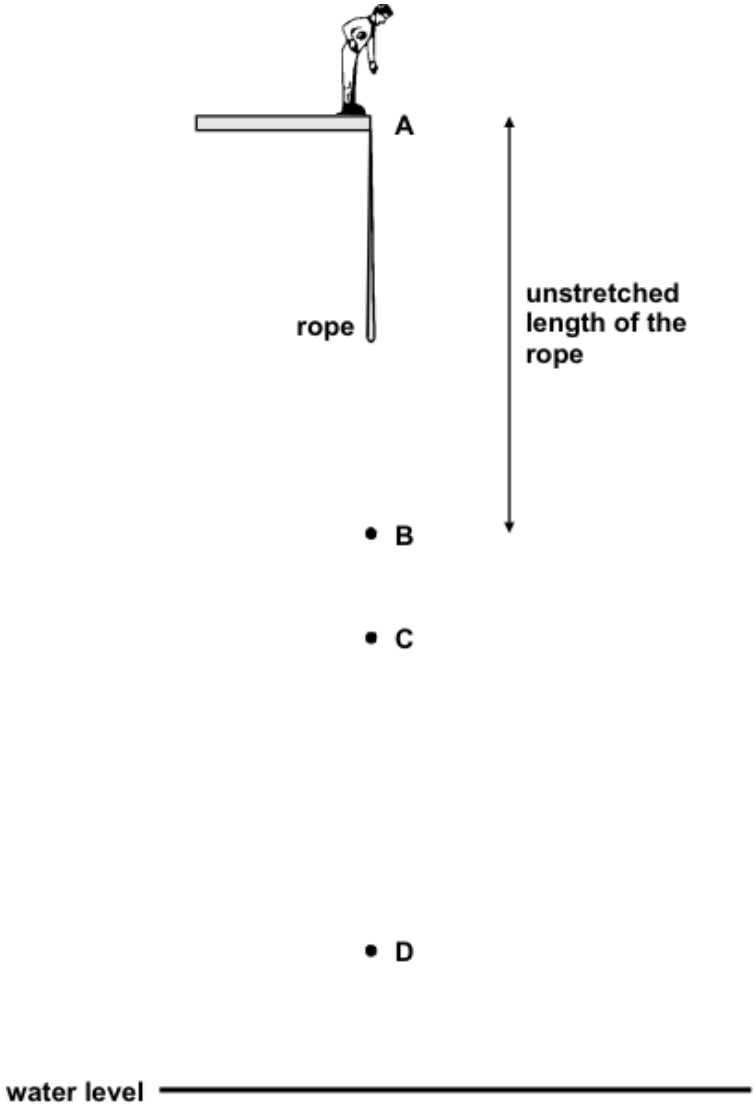
.....

.....

1 mark
Maximum 4 marks

##

A man does a 'bungee jump' over a lake. He jumps from point A with an elasticated rope tied to his ankles. The rope reaches down to point B when it is not being stretched.



The man falls past B, and the rope begins to stretch. He falls past point C to point D, which is the lowest point he reaches. Then he begins to move upwards again. Eventually he comes to rest at point C.

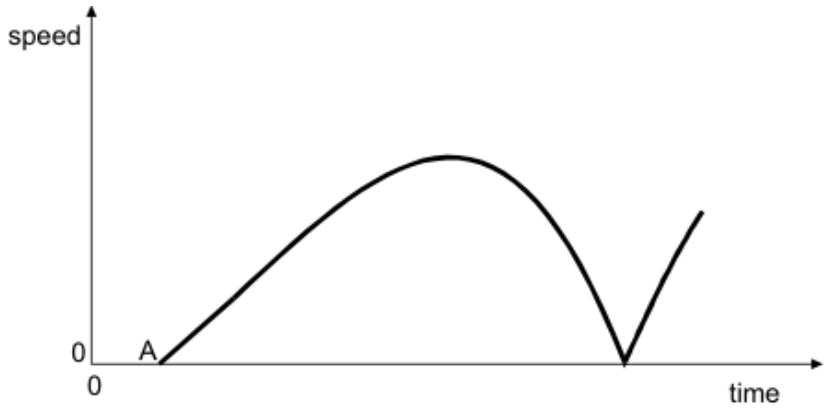
(a) (i) At which point, A, B, C or D, is the man when the tension in the rope is greater than his weight? .....

1 mark

(ii) At which point, A, B, C or D, is the man when the tension in the rope is equal to his weight? .....

1 mark

(b) The graph shows how the man's speed varies with time as he falls from point A to point D and bounces back upwards.



The point when the man jumped from A has been labelled on the curve.
Label the points on the curve when the man was at points B, C and D as he fell.

3 marks

(c) The total energy of the man and the rope includes the man's potential energy, his kinetic energy, and the elastic (strain) energy stored in the stretched rope.

Describe how the elastic (strain) energy in the rope changes as the man falls from point A to point D.

.....

.....

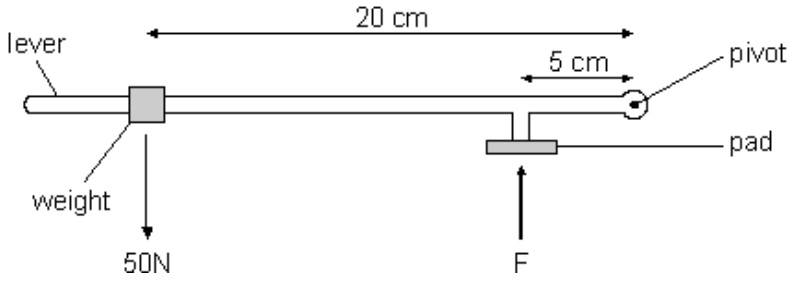
.....

.....

2 marks
Maximum 7 marks

##

The diagram shows a lever. A weight is near the end of the lever. A force, F, pushes up on the pad and balances the lever.



(a) The 50 N weight is pulling the lever anticlockwise around the pivot.
Calculate the moment (turning effect) of the 50 N weight about the pivot.
Give the units.

.....

.....

2 marks

(b) The force F is just big enough to keep the lever balanced.

(i) What is the moment of force F about the pivot?

.....

1 mark

(ii) What is the size of force F?

.....

..... N

1 mark

(c) (i) The force F becomes smaller. How should the 50 N weight be moved to keep the lever arm horizontal?

.....

1 mark

(ii) The size of force F on the pad is 100 N. The area of the pad is 2 cm^2.
Calculate the pressure of this force on the pad. Give the units.

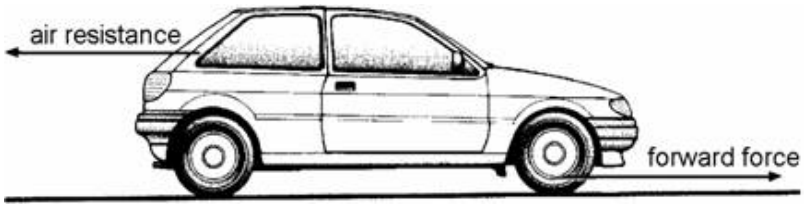
.....

.....

2 marks

Maximum 7 marks

Q14. When a car is being driven along, two horizontal forces affect its motion. One is air resistance and the other is the forward force.



(a) (i) Explain how molecules in the air cause air resistance.

.....

.....

1 mark

(ii) Explain why air resistance is larger when the car is travelling faster.

.....

.....

1 mark

(b) (i) Compare the sizes of the forward force and the air resistance when the car is speeding up.

The forward force is .....

.....

1 mark

(ii) Compare the sizes of the two forces while the car is moving at a steady 30 miles per hour.

The forward force is .....

.....

1 mark

(c) The forward force has to be larger when the car is travelling at a steady 60 mph than when it is travelling at a steady 30 mph. Why is this?

.....

.....

1 mark

(d) The forward force is the result of the tyres **not** being able to spin on the road surface. What is the name of the force that stops the tyres spinning?

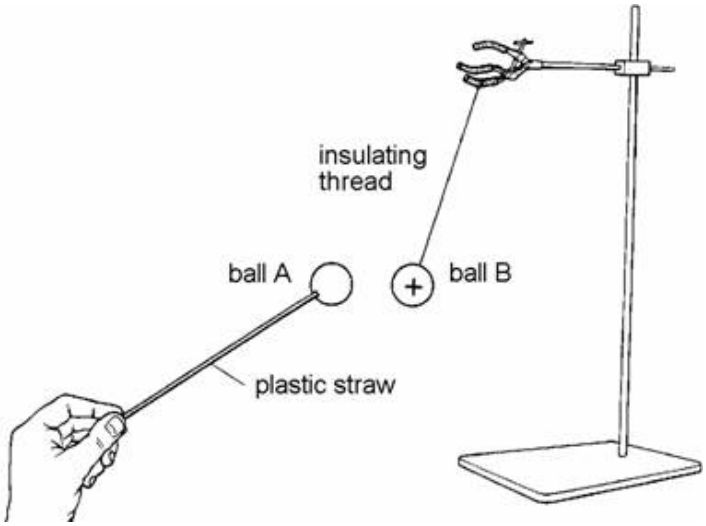
.....

1 mark

Maximum 6 marks

##

Two polystyrene balls, A and B, are shown below. Both balls are charged. Ball B is positively charged. The diagram shows what happens when ball A is brought near ball B.



(a) Ball A is charged. Describe **one** method by which ball A could have been charged.

.....

.....

1 mark

(b) Is ball A positively or negatively charged? Explain your answer.

.....

.....

1 mark

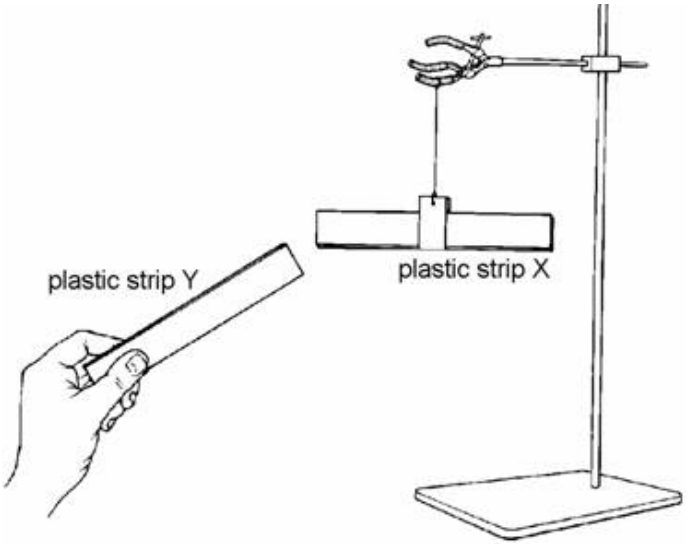
(c) Ball A is moved a little closer to ball B. Which way does ball B move?

.....

.....

1 mark

(d) Kevin rubs the whole surface of two strips of the same plastic with a cloth. He hangs strip X on a nylon thread. Then he brings strip Y near one end of strip X.



Describe what will happen to strip X and explain your answer.

.....

.....

.....

2 marks

(e) Describe what will happen if Kevin brings strip Y near the **other** end of strip X and explain your answer.

.....

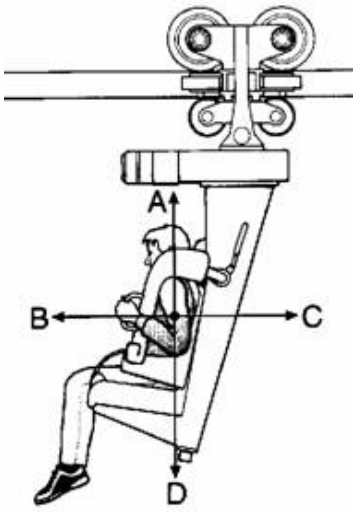
.....

.....

2 marks

Maximum 7 marks

Q16. (a) The diagram shows Alan sitting on a ride at a theme park.



(i) Which arrow shows Alan's weight?

Give the correct letter. .....

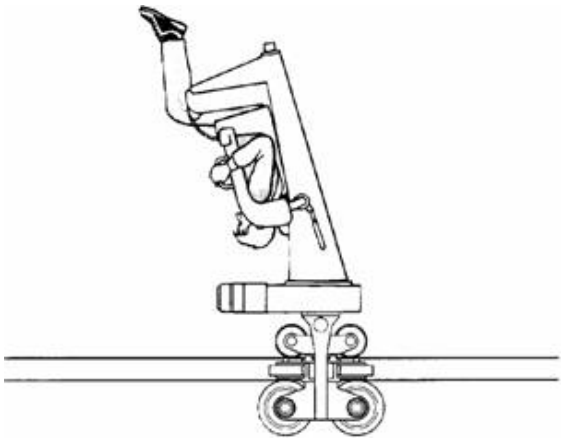
1 mark

(ii) Alan begins to move forwards. Which arrow shows the force which makes Alan move faster?

Give the correct letter. .....

1 mark

(b) During the ride, Alan is upside down.



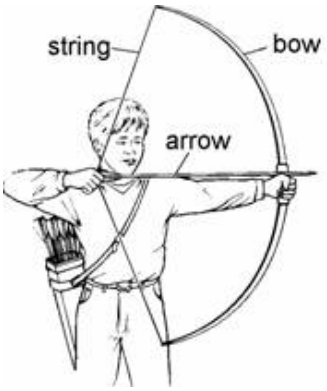
Draw an arrow on the diagram to show the direction of Alan's weight while he is upside down.

1 mark

Maximum 3 marks

##

The drawing shows a boy with a bow and arrow. He is holding the **arrow** and pulling it back.



(a) Two horizontal forces act on the arrow. These are the force exerted by the boy's hand and the force exerted by the string. The arrow is **not** moving.

The boy pulls the arrow with a force of 150 N. What is the size of the force exerted by the string on the arrow?

..... N

1 mark

(b) When the boy lets go of the arrow, it starts to move forward.

Explain why it starts to move.

.....

.....

1 mark

(c) The arrow flies across a field and hits a target.

Two forces act on the arrow while it is in the air. Air resistance acts in the opposite direction to the movement, and gravity acts downwards. These two forces **cannot** balance each other, even when they are the same size. Why is this?

.....

.....

1 mark

(d) The arrow has a sharp pointed end. When the arrow hits the target, the sharp point exerts a very large pressure on the target.

Why does a sharp pointed end exert a larger pressure than a blunt end?

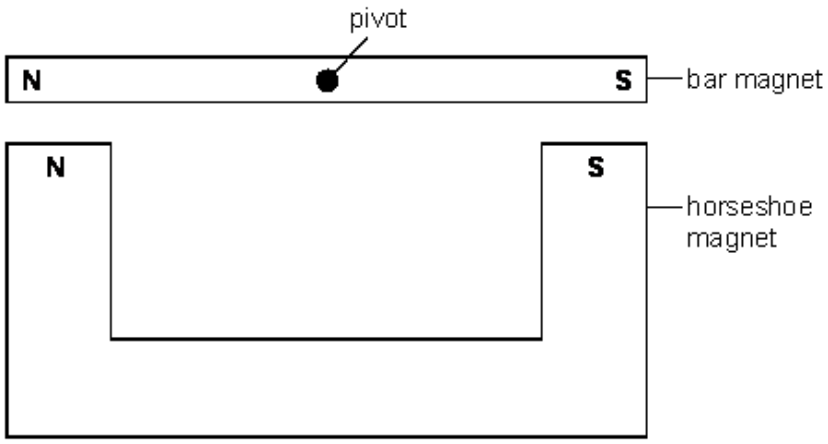
.....

.....

1 mark

Maximum 4 marks

Q18. Anita has arranged a horseshoe magnet with a long bar magnet pivoted above it.



(a) Whenever Anita tips the bar magnet, it always moves back to the position shown in the diagram. Explain why this happens.

……

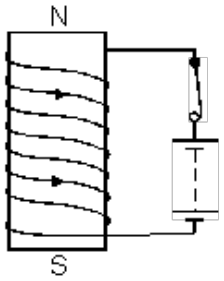
……

……

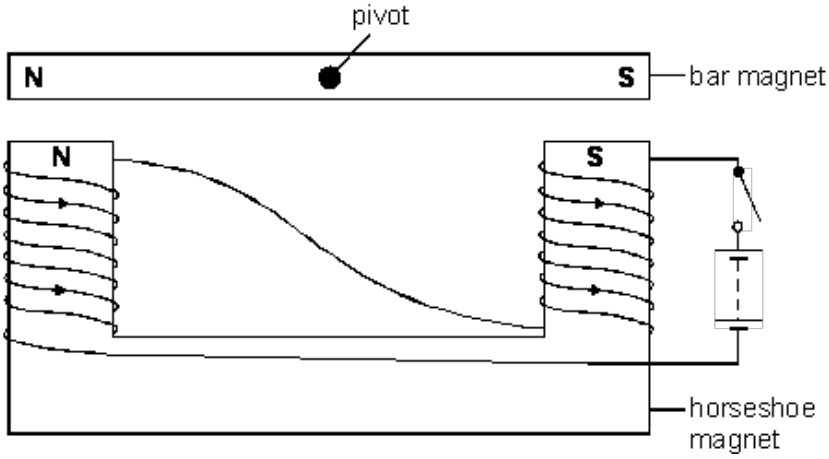
……

2 marks

(b) When a current is passed through a coil, it produces magnetic poles as shown in the diagram below.



Anita winds a coil around each end of the horseshoe magnet as shown below.



(i) Describe what will happen to the bar magnet when she closes the switch. Explain your answer.

……

……

……

……

……

……

3 marks

(ii) Anita reverses the battery. Suggest what happens to the bar magnet.

……

……

1 mark

(iii) Anita replaces the battery with a power supply which changes the direction of the current every second. Suggest what happens to the bar magnet.

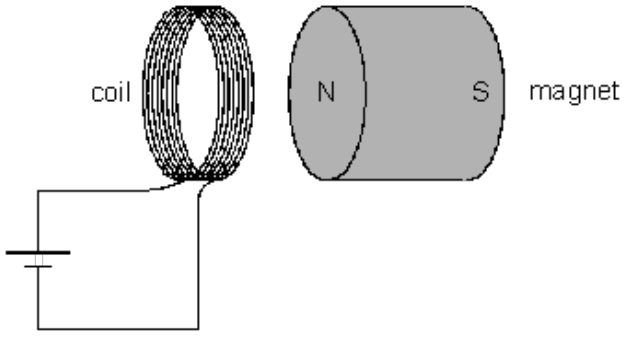
……

……

1 mark

Maximum 7 marks

Q19. (a) A pupil makes a small coil of copper wire and passes an electric current through it. The pupil places a small magnet near the coil.



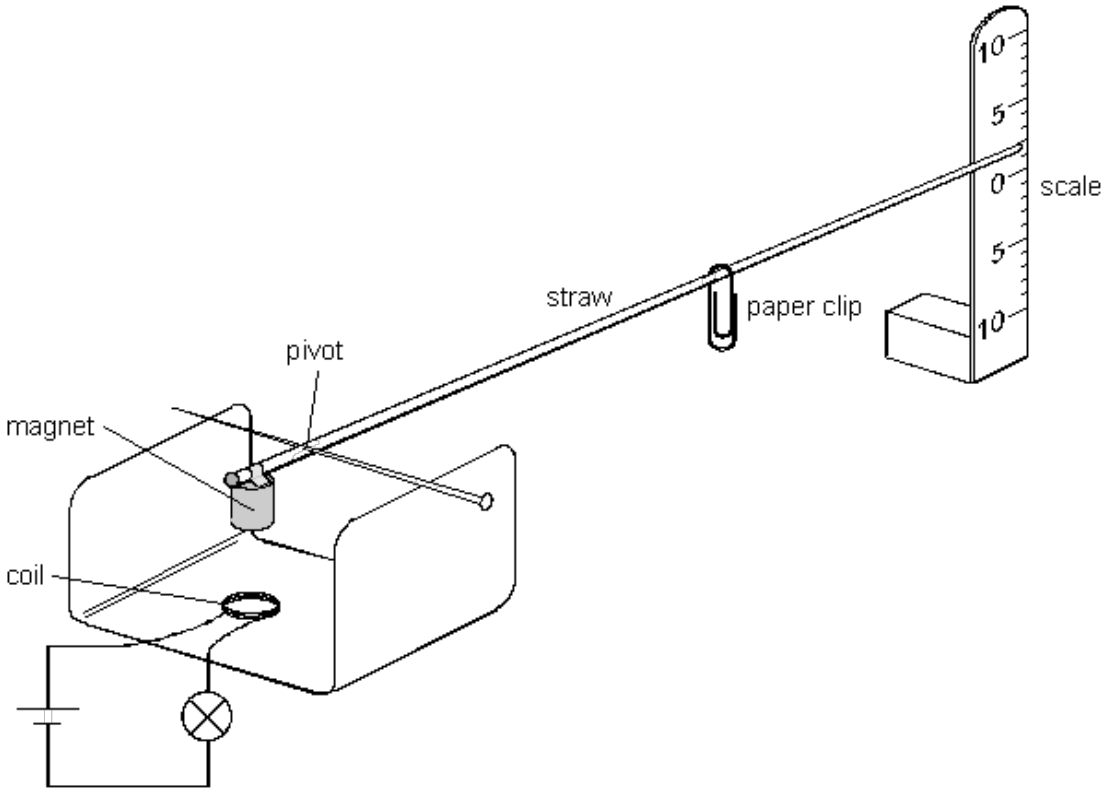
The magnet is attracted towards the coil. The pupil turns the magnet around so that the South pole is nearest the coil.
What effect, if any, will this have?

……

……

1 mark

(b) The pupil uses the coil and the magnet to make a simple ammeter to measure the current through a bulb.



not to scale

(i) The paper clip is used to balance the weight of the magnet.
Why is the paper clip further away from the pivot than the magnet is?

……

……

1 mark

(ii) Explain how a current in the coil makes the straw pointer move.

……

……

……

2 marks

(iii) The pupil places a piece of soft iron in the middle of the coil.
Describe and explain how this will affect the reading on the scale when the same current flows through the coil.

……

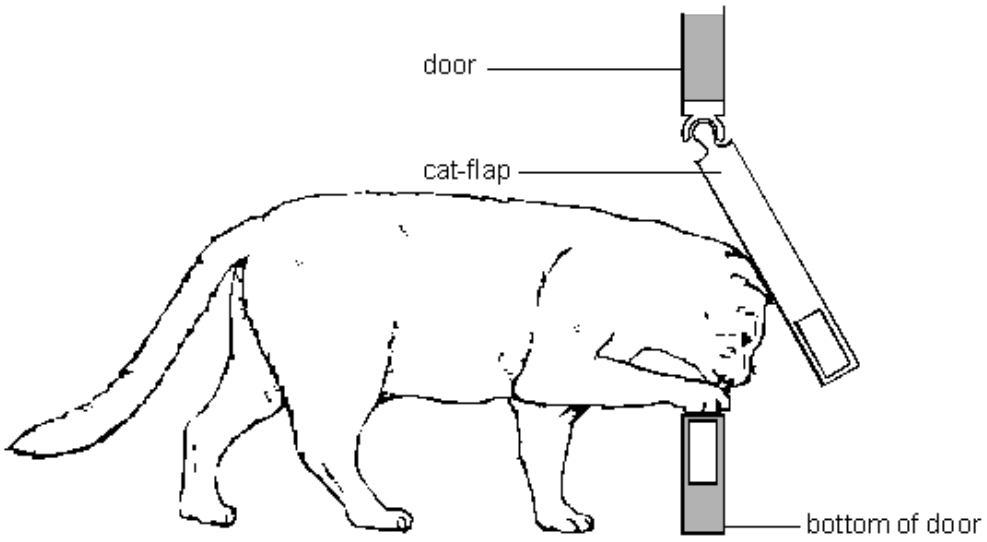
……

……

……

2 marks
Maximum 6 marks

Q20. Ali made a cat-flap to fit into a door.



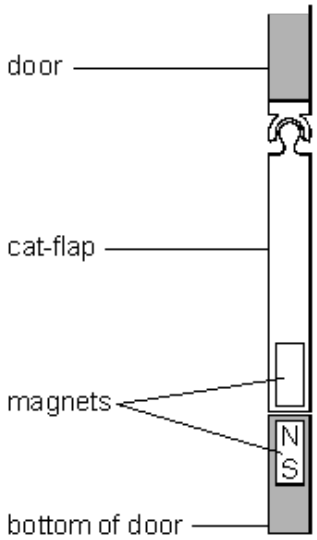
(a) (i) On the diagram above, draw an arrow to show the direction of the force of the cat's head on the cat-flap.

1 mark

(ii) Add a label to the diagram to show the pivot of the cat-flap.
Label it P.

1 mark

When the cat has gone through the cat-flap, the weight of the cat-flap makes the flap close.



(b) Ali used two bar magnets to keep the cat-flap closed, so that it does **not** blow open in the wind.

On the diagram above, label **both** the North and South poles on the magnet in the cat-flap.

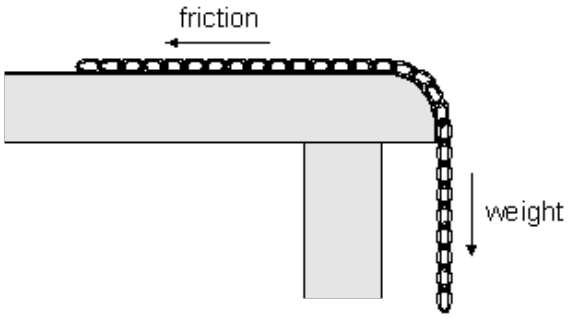
1 mark

(c) Friction at the pivot made the cat-flap squeak. What could Ali put on the pivot to make the friction less?

……

1 mark
Maximum 4 marks

Q21. The diagram shows a chain hanging down over the edge of a table.



Two of the forces on the chain are:

- the weight of the part of the chain which is hanging over the edge;
- friction between the chain and the table.

(a) The chain is **not** moving. What does this tell you about these two forces acting on the chain?

1 mark

(b) The chain is moved slightly to the right. It begins to slide off the table.

(i) What does this tell you about these two forces now?

……

1 mark

(ii) Describe how the size of each force changes as the chain slides off the table.

- weight of the part of the chain hanging over the edge ……

……

- friction between the chain and the table ……

……

2 marks

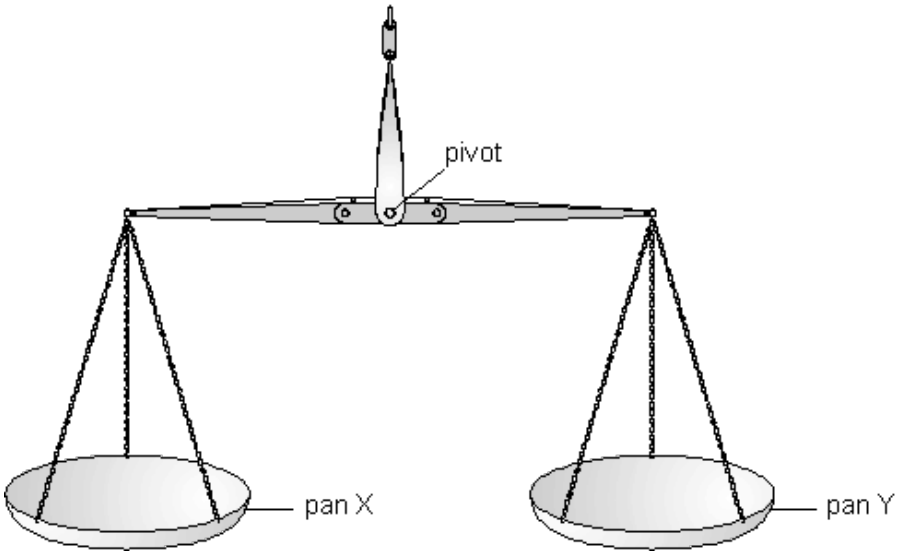
(iii) How does the speed of the chain change as it slides off the table?

……

……

1 mark
Maximum 5 marks

Q22. The drawing shows a very old set of scales. It can be used to check the weights of silver coins.



(a) Rema puts a silver coin in pan X. There is nothing in pan Y.
In which direction does pan X move?

……

1 mark

(b) The table shows the weights of five silver coins.

Silver coin	weight in mN
A	106
B	112
C	98
D	112
E	120

Rema puts one coin in each pan of the scales. Which **two** coins will make the scales balance? Give the letters.

……. and …….

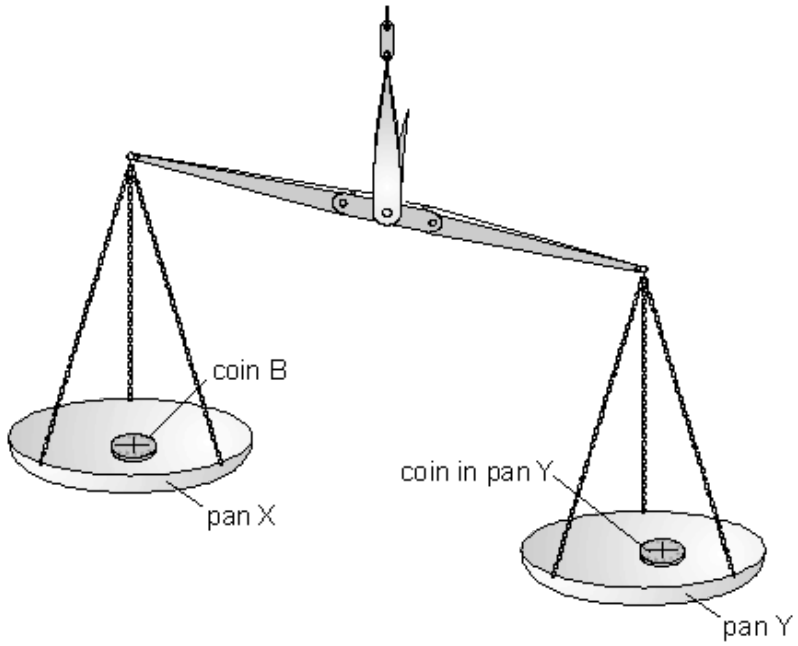
1 mark

(c) Coin A is placed in pan X, and coin C is placed in pan Y.
In which direction does pan X move?

……...

1 mark

(d) In another experiment, coin B is placed in pan X, and one of the other coins is placed in pan Y. Pan X goes **up**.



Which coin is in pan Y? Give the letter.

……

1 mark

(e) Rema knows the weights of the five silver coins in the table. She also has a gold coin. Explain how she could use the coins and the scales to find the approximate weight of the gold coin.

……

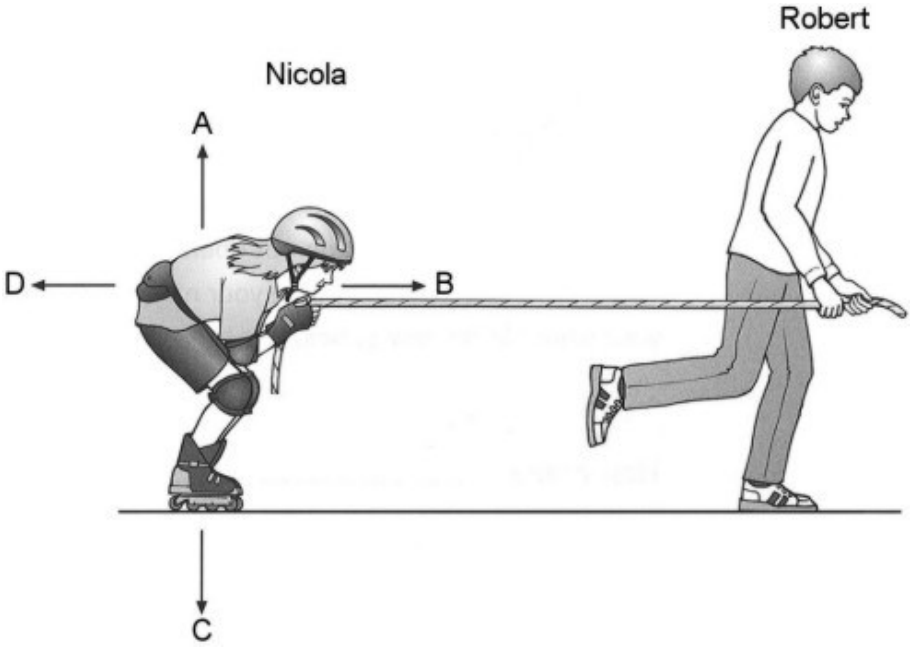
……

……

……

2 marks
Maximum 6 marks

Q23. (a) Nicola is trying out her new roller blades. Robert is pulling her along with a rope. Arrows A, B, C and D show the directions of four forces acting on Nicola.



(i) Which arrow shows the direction of the force of **gravity** on Nicola? Give the letter.

.....

1 mark

(ii) Which arrow shows the direction of the force of the **rope** on Nicola? Give the letter.

.....

1 mark

(b) Robert pulls Nicola at a steady speed of 2 metres per second. How far will Nicola travel in 10 seconds?

..... metres

1 mark

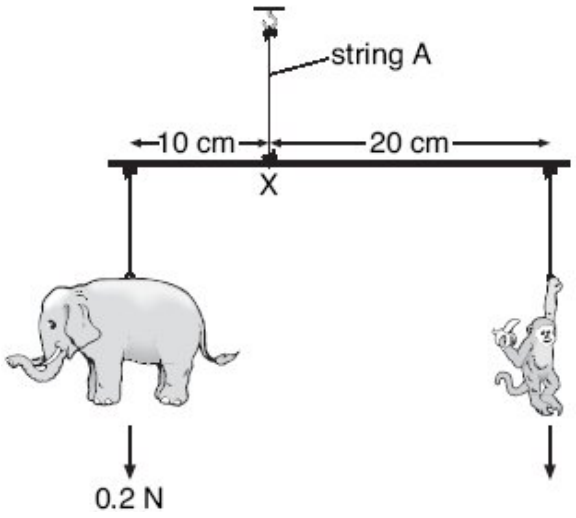
(c) Nicola lets go of the rope and she slows down. Gravity still acts on Nicola.

Give the name of **one** other force still acting on Nicola after she lets go of the rope.

.....

1 mark
maximum 4 marks

Q24. A father makes a simple mobile for his young son. He uses plastic animals as shown below.



(a) (i) The elephant weighs 0.2 N.

What is the turning moment produced by the elephant about point X?
Give the unit.

.....

.....

2 marks

(ii) What is the turning moment produced by the monkey about point X?

.....

.....

1 mark

(iii) What is the weight of the monkey?

..... N

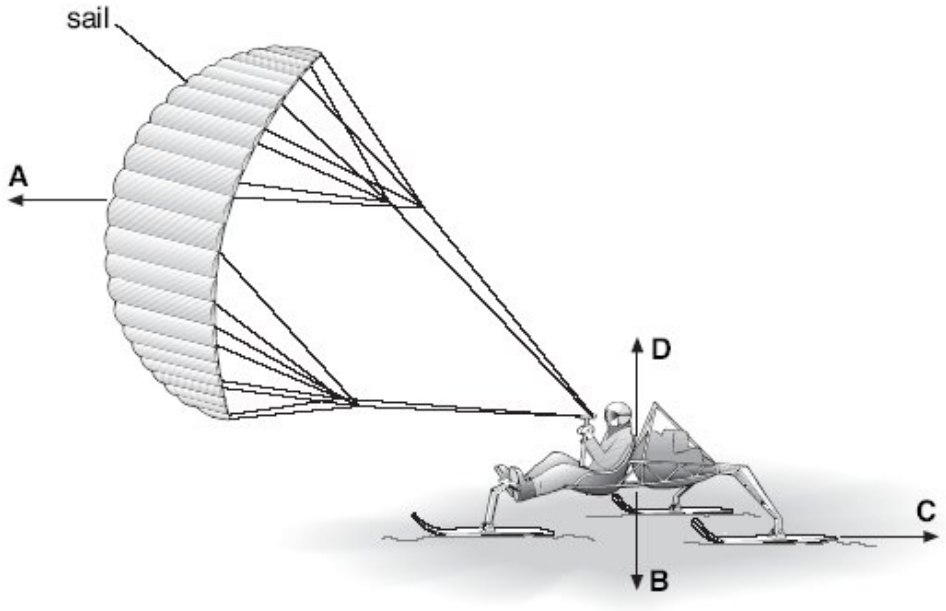
1 mark

(b) What is the size of the tension (force) in string A?

..... N

1 mark
maximum 5 marks

Q25. The drawing shows a snow-buggy being pulled by a sail.
The buggy rests on three skis on the snow.



(a) The drawing shows four forces that act when the snow-buggy is moving.

Draw a line from each force in the list below to the correct letter from the diagram.
Draw only **three** lines.

force	letter
the weight of the buggy	A
the force pulling the buggy along	B
the friction between the skis and the snow	C
	D

3 marks

(b) A scientist travelled 80 kilometres (km) each day in the buggy.

How many kilometres did he travel in 10 days?

..... km

1 mark

(c) The buggy carried the scientist, food and equipment for the journey.
The table shows how the total mass changed.

	total mass at start of journey (kg)	**total mass at end of journey (kg)**
mass of buggy, scientist, food and equipment	295	130

The buggy sank deeper into the snow at the start of the journey than at the end.

Why did it sink deeper at the start? Use the table to help you.

.....

.....

1 mark

(d) The buggy rests on three skis instead of three wheels.

Why are skis better than wheels for travelling on snow?

.....

.....

1 mark

(e) When a bigger sail is used, the buggy goes faster.

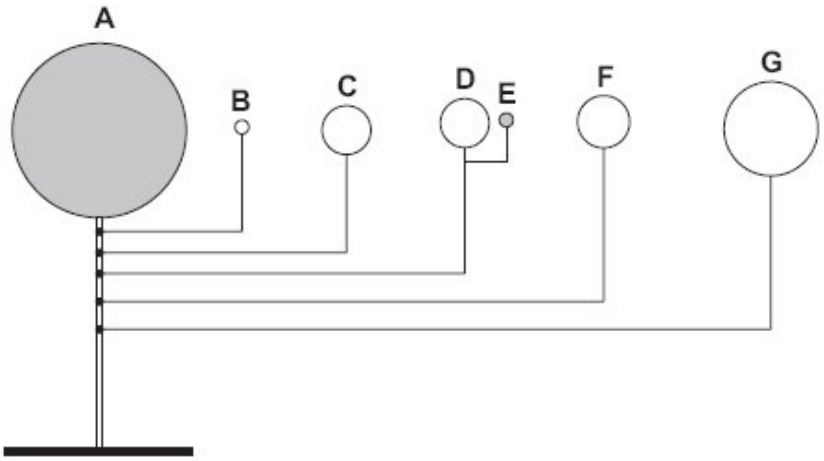
How does a bigger sail help the buggy to go faster?

.....

.....

1 mark
maximum 7 marks

Q26. (a) Alfie made a model of part of the solar system.
He used metal balls for the Sun, the Moon and the planets.



- E goes around D.
- B, C, D, F and G go around A.

Give the letter that is used to label:

(i) the model Sun;

.....

1 mark

(ii) the model Earth;

.....

1 mark

(iii) the model Moon;

.....

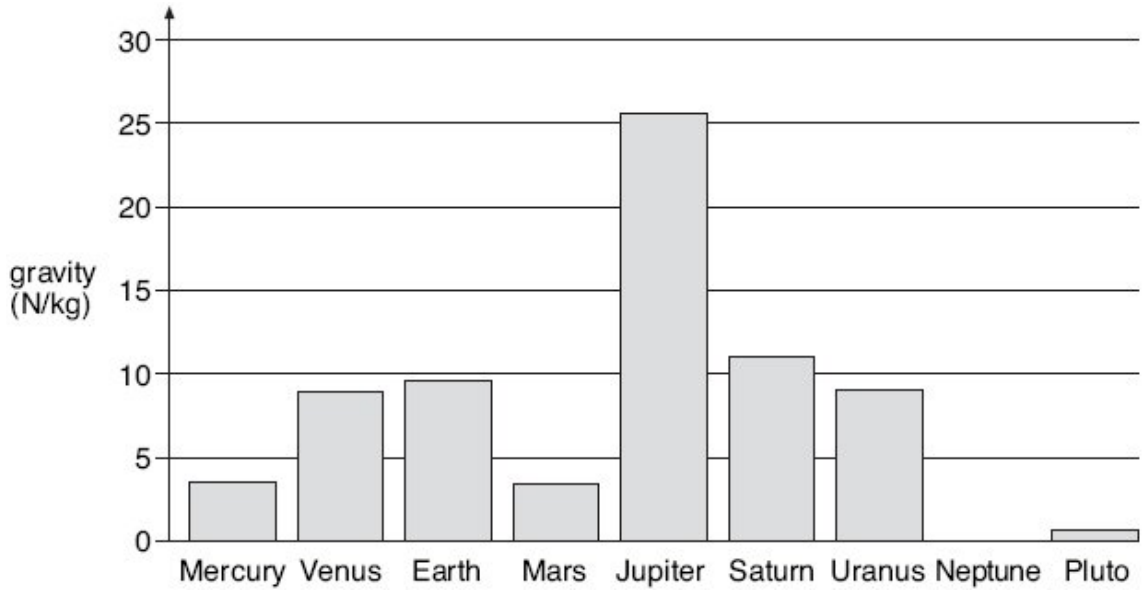
1 mark

(iv) the model planet with the largest orbit.

.....

1 mark

(b) The bar chart shows the force of gravity on eight of the planets.



(i) The gravity on Neptune is 12 N/kg.

On the chart above, draw a bar for the planet Neptune.
Use a ruler.

1 mark

(ii) Give the name of a planet where you would weigh more than you weigh on Earth.

.....

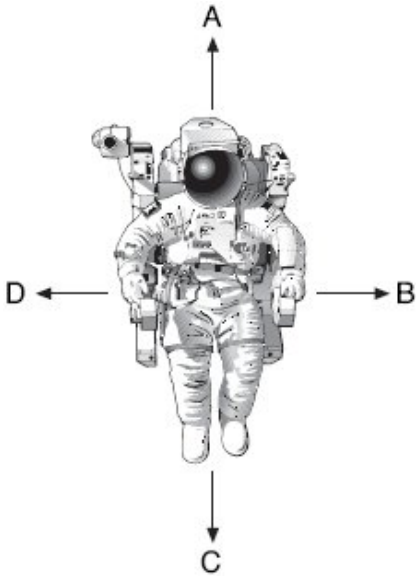
1 mark

(iii) On which planet would a spaceship need the largest force to take off?

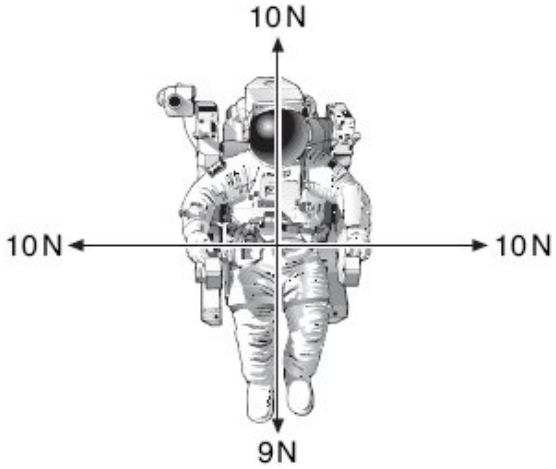
.....

1 mark
maximum 7 marks

Q27. The drawing below shows an astronaut in space.
He has four small jets attached to his space suit.
These jets produce forces on the **astronaut** in the directions A, B, C and D.



(a) The drawing below shows the size and direction of four forces acting on the astronaut.



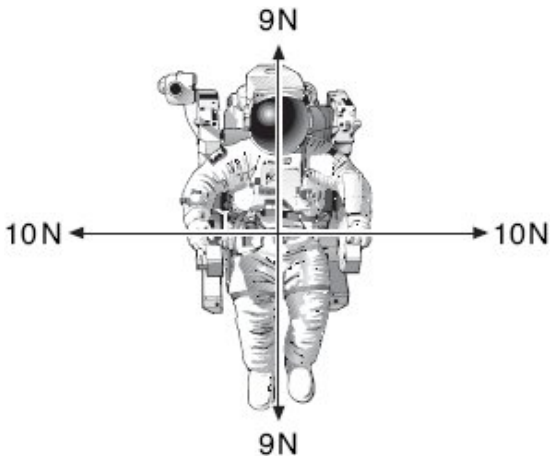
In which direction, A, B, C or D, will the astronaut move?

Give the letter.

.....

1 mark

(b) The drawing below shows the size and direction of four different forces acting on the astronaut.



What will happen to the astronaut when the jets produce these four forces?

.....

1 mark

Explain your answer.

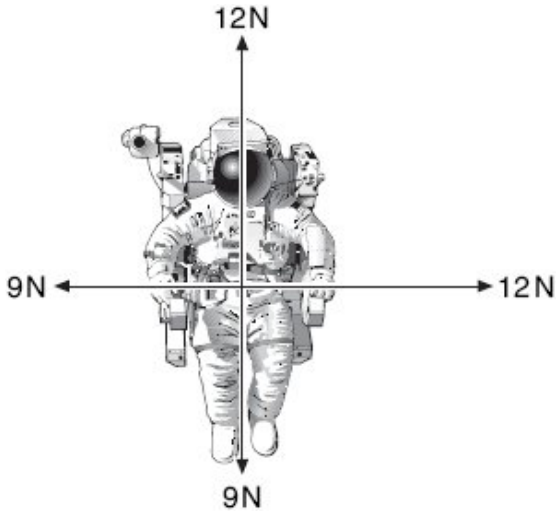
.....

.....

1 mark

(c) The drawing below shows the size and direction of four different forces acting on the astronaut.

Draw an arrow on the diagram below to show the direction in which he will move.

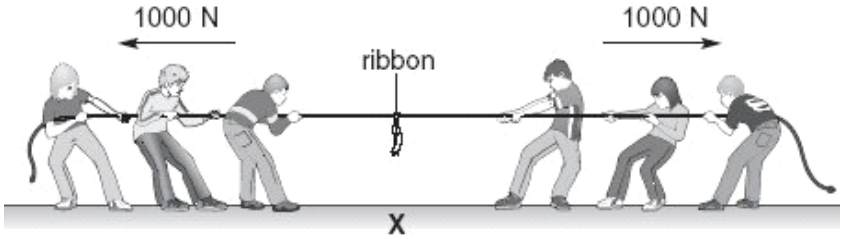


1 mark

maximum 4 marks

Q28. The drawings in parts (a), (b) and (c) show two teams of pupils in a tug-of-war. There is a ribbon tied to the middle of the rope.

(a) The sizes and directions of the forces of each team are shown.



team A **team B**

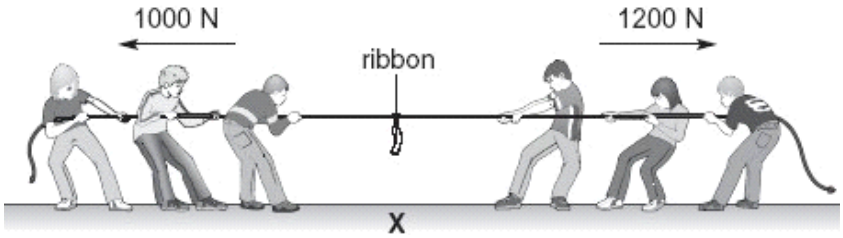
The ribbon stays above point X on the ground.
Give the reason for this.

.....

.....

1 mark

(b) The teams then pull with the forces shown below.

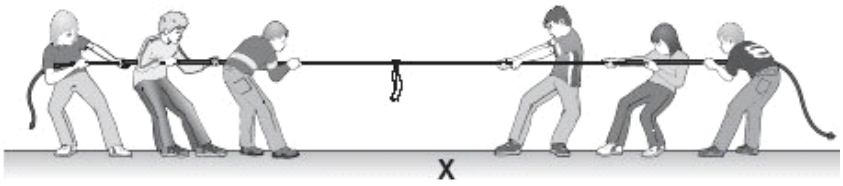


team A **team B**

Draw an arrow on the rope to show the direction in which the ribbon will move.

1 mark

(c) Later, the ribbon was to the left of point X as shown below.



team A **team B**

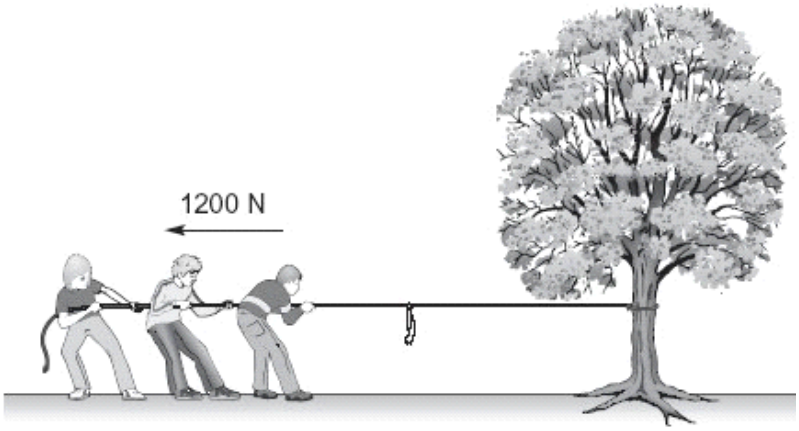
Why did the ribbon move towards the left?

.....

.....

1 mark

(d) Team A practises by pulling a rope tied to a tree.



The team pulls with a force of 1200 N but the tree does **not** move.

What is the force of the tree on the rope?
Tick the correct box.

zero ☐ less than 1200 N ☐ 1200 N ☐ more than 1200 N ☐

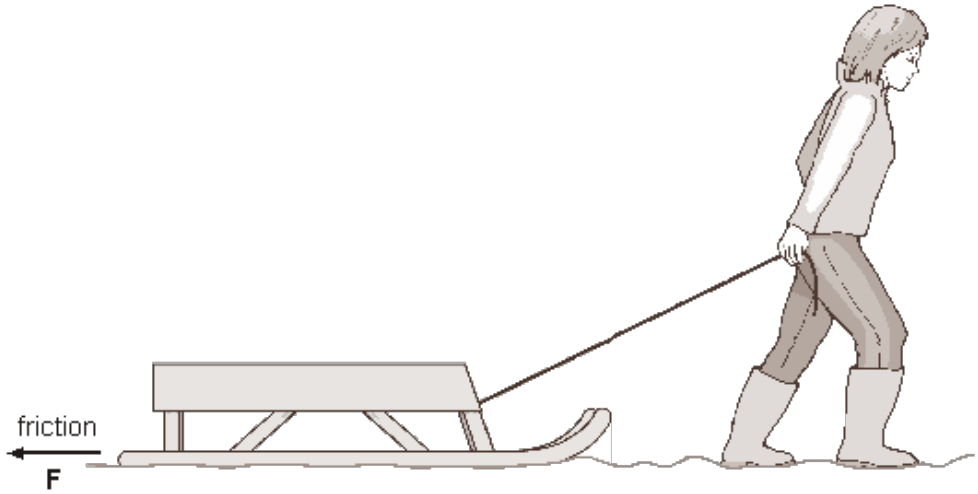
1 mark

(e) The pupils do **not** slip because there is a force between their shoes and the ground. What is the name of this force?

.....

1 mark
maximum 5 marks

Q29. Sally pulls a sledge in the snow.



(a) (i) Draw an arrow on the rope to show the direction of the force of the rope on the sledge.

Label the arrow **R**.

(ii) Draw an arrow on the diagram to show the direction of the force of gravity on the sledge.

Label the arrow **G**.

2 marks

(b) Force **F** is the friction between the sledge and the snow.
Sally then pulled the sledge over a concrete path.

Friction is less on snow than on concrete.
Give the reason for this.

.....

1 mark
maximum 3 marks

Q30. Oliver clamped a wooden plank to a desk. There was a 40 cm overhang as shown in diagram 1.

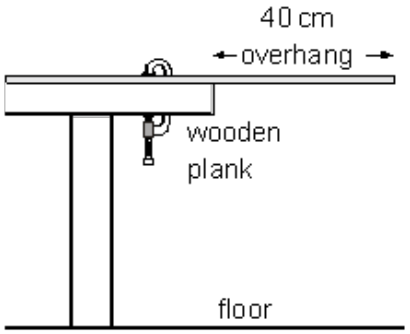


diagram 1

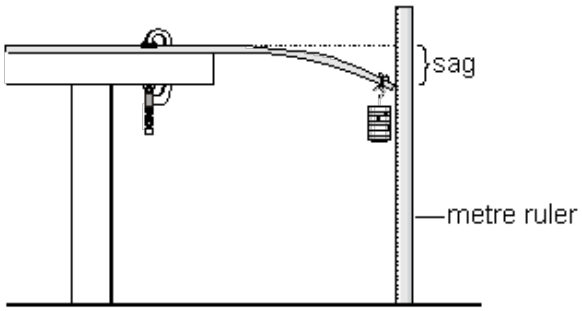
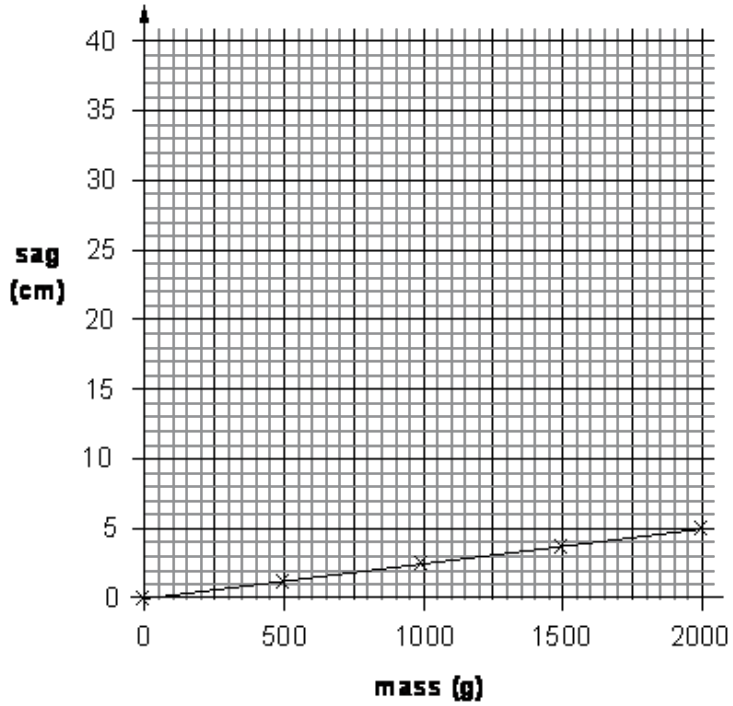


diagram 2

Oliver added masses to the end of the wooden plank as shown in diagram 2.
He measured the sag.
The graph below shows his results.



(a) What measurements would Oliver need to take to work out the sag?

.....

.....

1 mark

(b) Oliver repeated his test with a new plank with an 80 cm overhang. His results are shown below.

mass (g)	sag (cm)
0	1.0
500	15.0
1000	25.0
1500	31.0
2000	35.0

(i) Plot the results from Oliver's second test on the grid above.
Use the points to draw a line of best fit.

2 marks

(ii) In the second test the plank sagged with **no** mass added to it.
Explain what caused this sag.

.....

1 mark

(c) Compare the results of Oliver's two tests.

(i) How are the results **similar** for each test?

.....

.....

1 mark

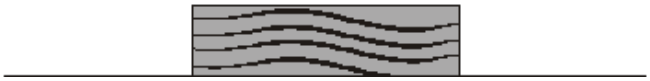
(ii) How are the results **different** in the second test?

.....

.....

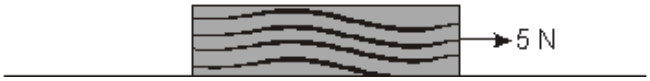
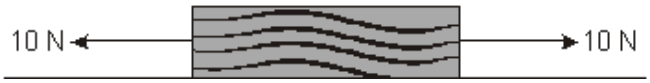
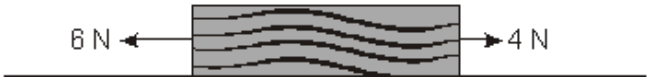
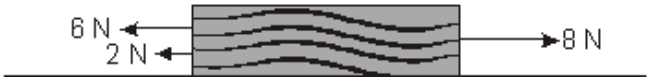
1 mark
maximum 6 marks

Q31. (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.

forces on block	moves to the left ←	moves to the right →	stays still
(i) 	☐	☐	☐
(ii) 	☐	☐	☐
(iii) 	☐	☐	☐
(iv) 	☐	☐	☐

1 mark

1 mark

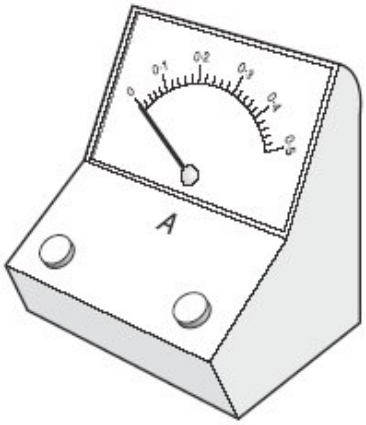
1 mark

1 mark

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

Tick the correct box.

☐



☐

☐

☐

1 mark

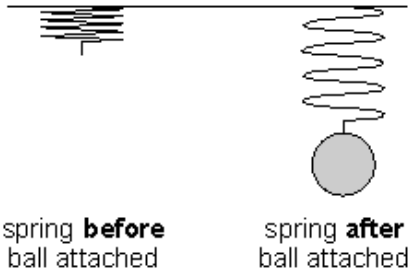
(ii) Give the name of the equipment used to measure force.

.....

1 mark

maximum 6 marks

Q32. (a) John attaches a ball to a spring. The diagram below shows what happens.



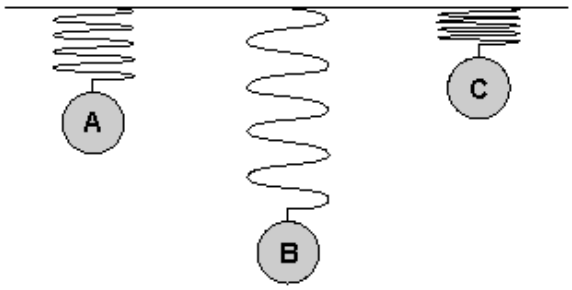
(i) Which arrow shows the direction of the **force of the ball on the spring**?
Tick the correct box.

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.

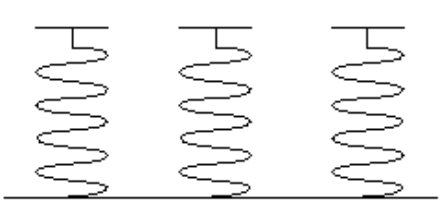
.....

.....

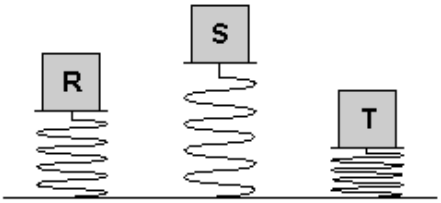
1 mark

(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