KS3 Science

Forces

Question Paper

Time available: 28 minutes
Marks available: 38 marks

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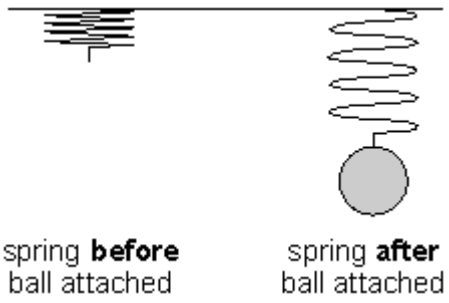
1. (a) John attaches a ball to a spring. The diagram below shows what happens.



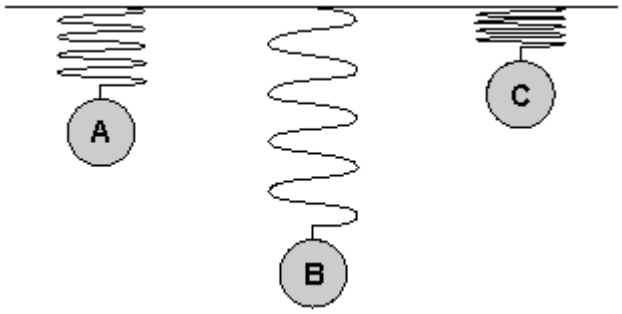
(i) Which arrow shows the direction of the **force of the ball on the spring**?
Tick the correct box.

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.

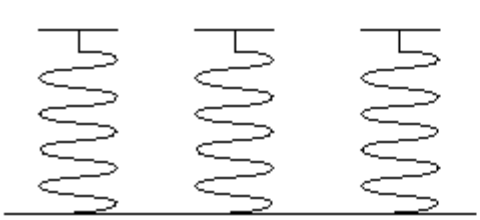
.....

.....

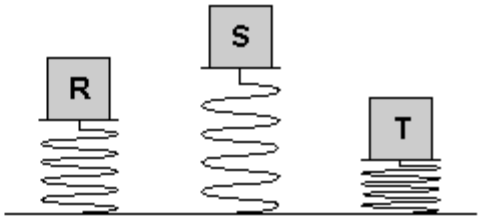
1 mark

(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

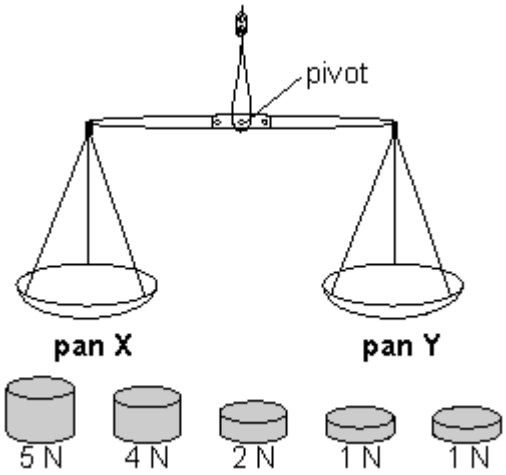
Explain your answer.

.....

.....

1 mark
maximum 6 marks

2. 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: .....

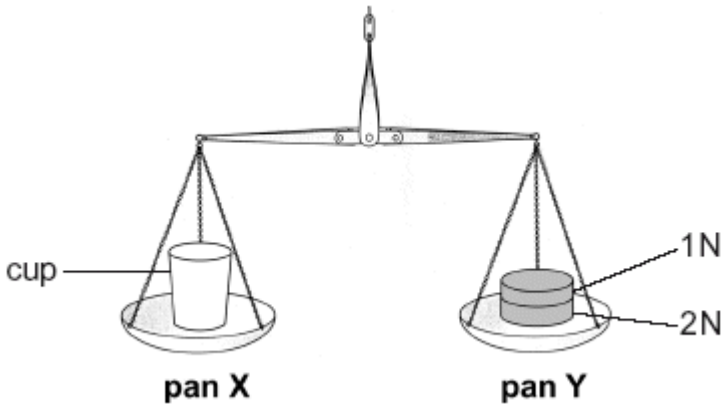
1 mark

(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.

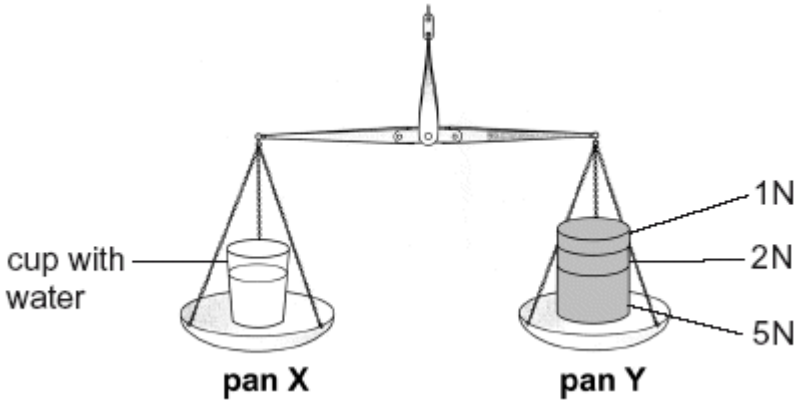


How much does the cup weigh?

..... 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

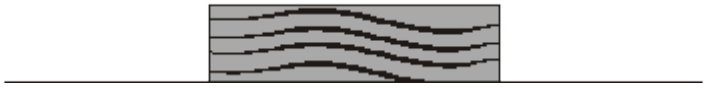
1 mark

(ii) How much does the water weigh?

..... N

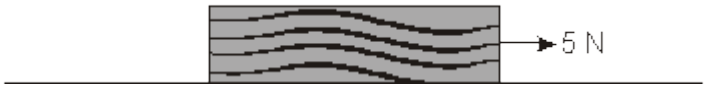
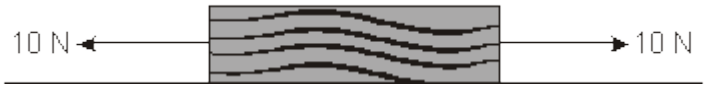
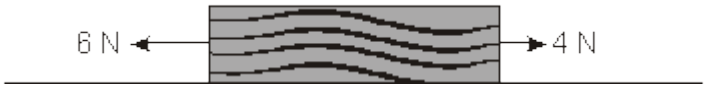
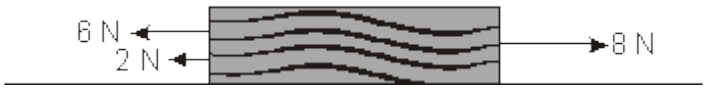
1 mark
maximum 5 marks

3. (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

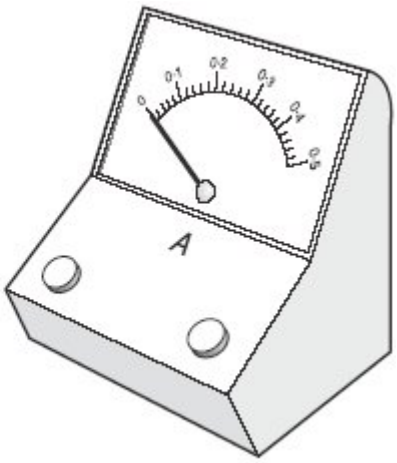
1 mark

1 mark

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

Tick the correct box.

☐



☐

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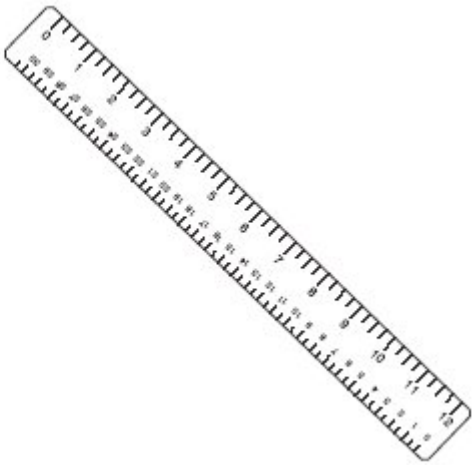


☐

1 mark

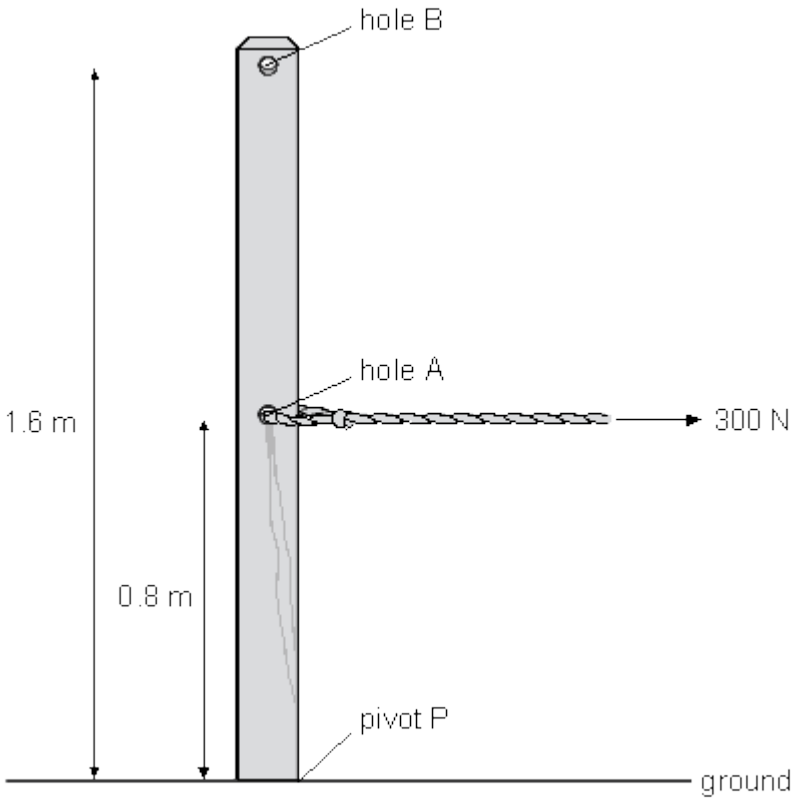
(ii) Give the name of the equipment used to measure force.

.....

1 mark

maximum 6 marks

4. A builder tried to remove a wooden post from the ground by pulling with a rope.



(a) (i) The builder attached a rope to hole A, 0.8 m above the ground.
He pulled with a horizontal force of 300 N.

Calculate the turning moment about the pivot P.
Give the unit.

.....

.....

2 marks

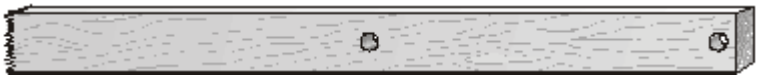
(ii) He then attached a rope to hole B, 1.6 m above the ground.
He pulled with a horizontal force.

What force would produce the same turning moment as before?

..... N

1 mark

(b) The post breaks off and falls on the ground as shown.



The weight of the broken post is 120 N.
The area in contact with the ground is 0.2 m^2.

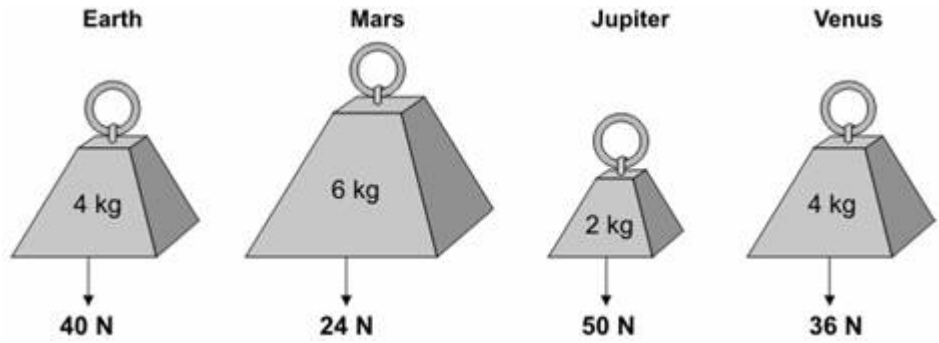
Calculate the pressure of the broken post on the ground.
Give the unit.

.....

.....

2 marks
maximum 5 marks

5. The drawings show the mass and weight of four objects on different planets.



(a) On which of the four planets is the object with the largest mass?

.....

1 mark

(b) How can you tell, from the drawings, that gravity is greater on Earth than on Venus?

.....

.....

1 mark

(c) Gravity is less on the Moon than on the Earth.

Complete the sentences below to compare the weight and mass of an astronaut on the Moon and on the Earth.

The **weight** of an astronaut on the Moon is ..... the **weight** of an astronaut on the Earth.

1 mark

The **mass** of an astronaut on the Moon is ..... the **mass** of the astronaut on the Earth.

1 mark

(d) The table below gives information about five planets.

planet	distance from the Sun (million km)	time for planet to orbit the Sun (Earth-years)
Venus	110	0.6
Earth	150	1.0
Mars	230	
Jupiter	780	12.0
Saturn	1400	30.0

(i) Look at the information in the table.

How does the time for a planet to orbit the Sun change with its distance from the Sun?

.....

.....

1 mark

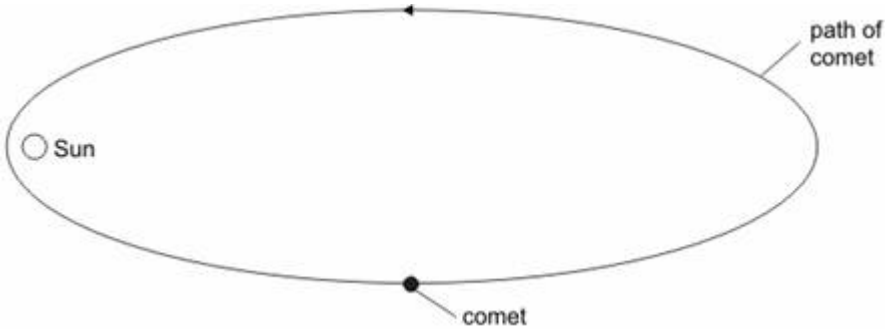
(ii) Use information in the table to estimate the time for Mars to orbit the Sun.

..... Earth-years

1 mark

(e) The diagram below shows the path of a comet around the Sun.

On the path of the comet below, place a letter X to show the position where the comet is travelling the fastest.

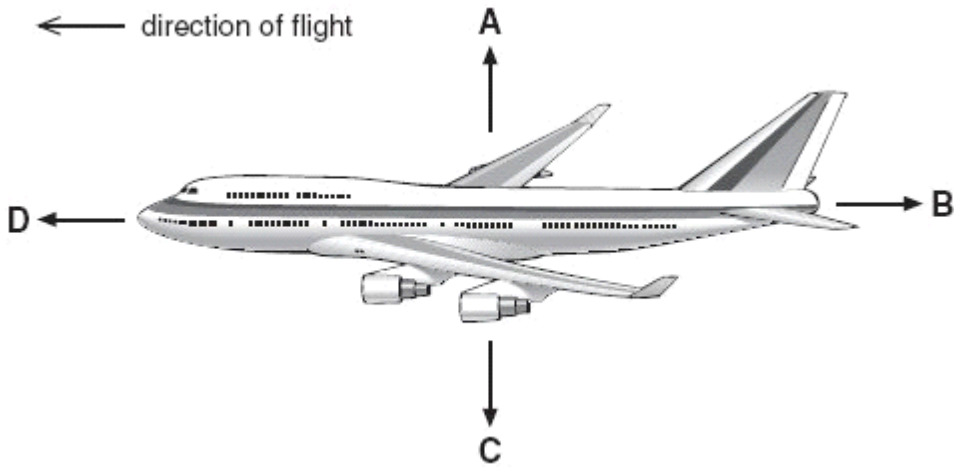


not to scale

1 mark

maximum 7 marks

6. The diagram shows four forces acting on a plane in flight.



(a) Which arrow represents air resistance?
Give the letter.

.....

1 mark

(b) (i) When the plane is flying at a constant height, which **two** forces must be balanced?
Give the letters.

..... and .....

1 mark

(ii) When the plane is flying at a constant speed in the direction shown, which **two** forces must be balanced?
Give the letters.

..... and .....

1 mark

(c) (i) Just before take-off, the plane is speeding up along the ground.

Which statement is true?
Tick the correct box.

Force B is zero. ☐

Force B is greater than force D. ☐

Force D is equal to force B. ☐

Force D is greater than force B. ☐

1 mark

(ii) Which statement is true about the plane just as it leaves the ground?
Tick the correct box.

Force C is zero. ☐

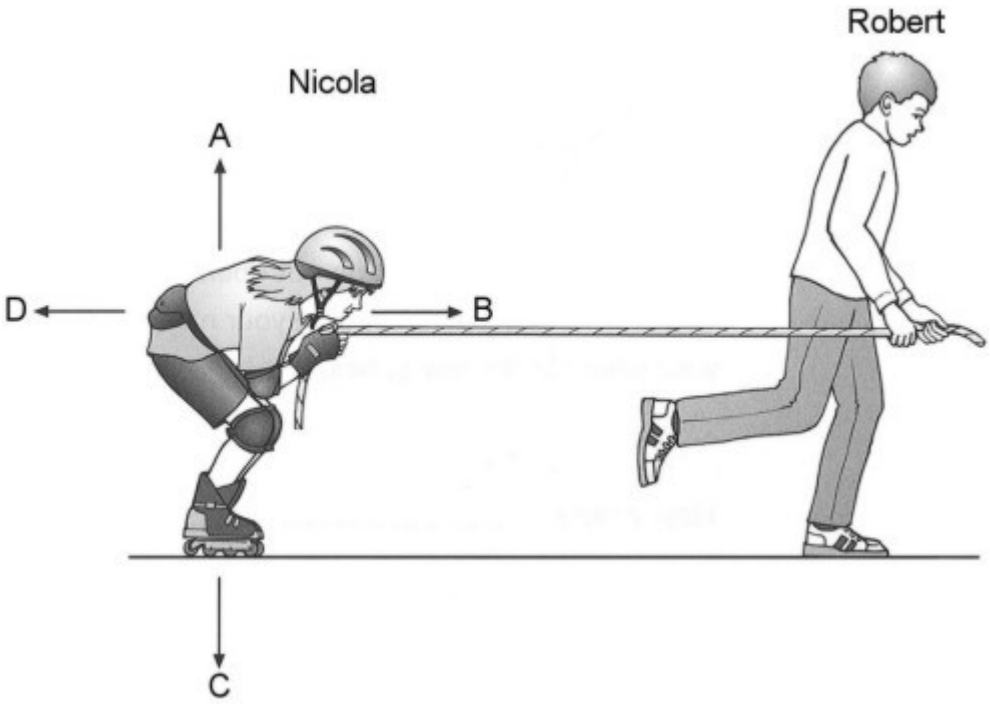
Force C is greater than force A. ☐

Force A is equal to force C. ☐

Force A is greater than force C. ☐

1 mark
maximum 5 marks

7. (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