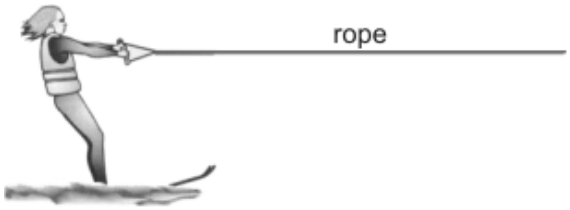
Q1. The drawing shows Amy water-skiing.



(a) (i) The rope is pulling Amy. Draw an arrow on the rope to show the direction of this force.
Label the arrow A.

1 mark

(ii) Draw an arrow to show the direction of Amy's weight.
Label the arrow B.

1 mark

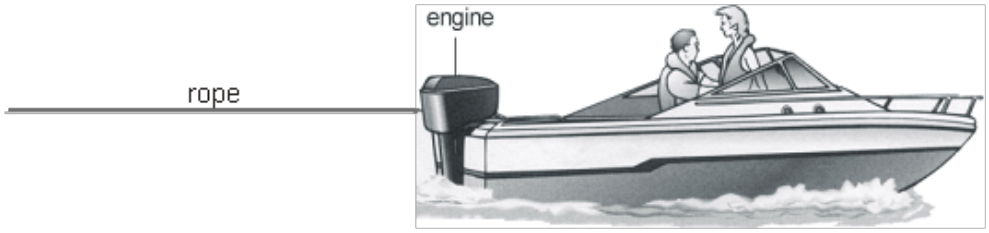
(b) Give the names of **two** other forces which act on Amy or on her skis.

1. .....

2. .....

2 marks

The drawing below shows the speed boat which is pulling Amy along.



(c) The rope which pulls Amy also exerts a force on the boat.
Draw an arrow on the rope to show the direction of this force.
Label the arrow C.

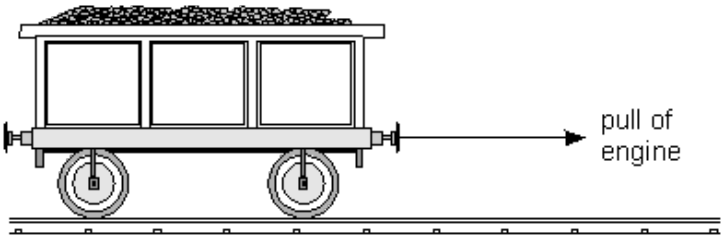
1 mark

(d) The force of the engine on the boat is increased.
What effect will this have on the speed of the boat?

……

1 mark
Maximum 6 marks

Q2.



(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

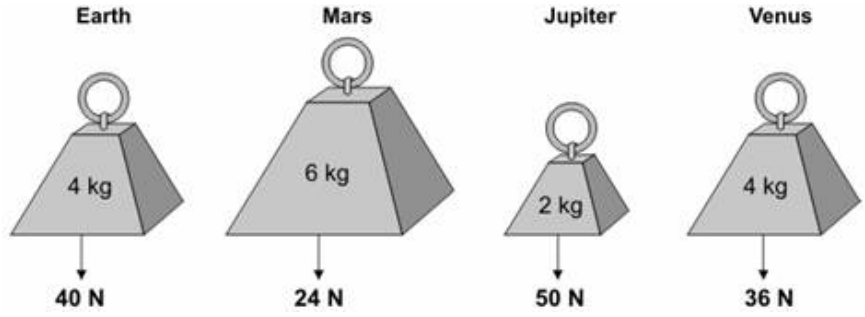
(c) After a while, the wagon travels at a steady speed. The engine is still pulling with a force of 5000 N.

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

Q3. 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

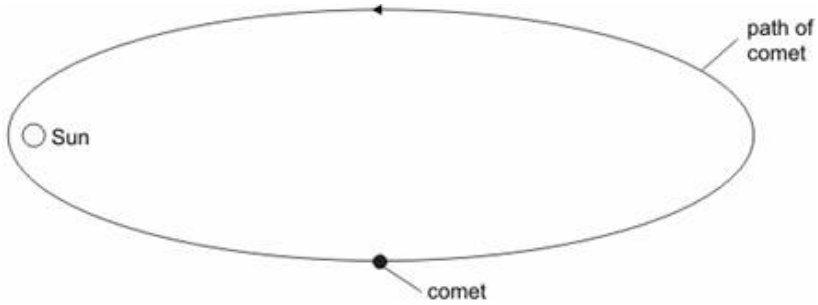
(ii) Use information in the table to estimate the time for Mars to orbit the Sun.

..... 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

Q4. Russell investigated the relationship between mass and weight.
He weighed five different masses using a force meter.

His results are shown in the table.

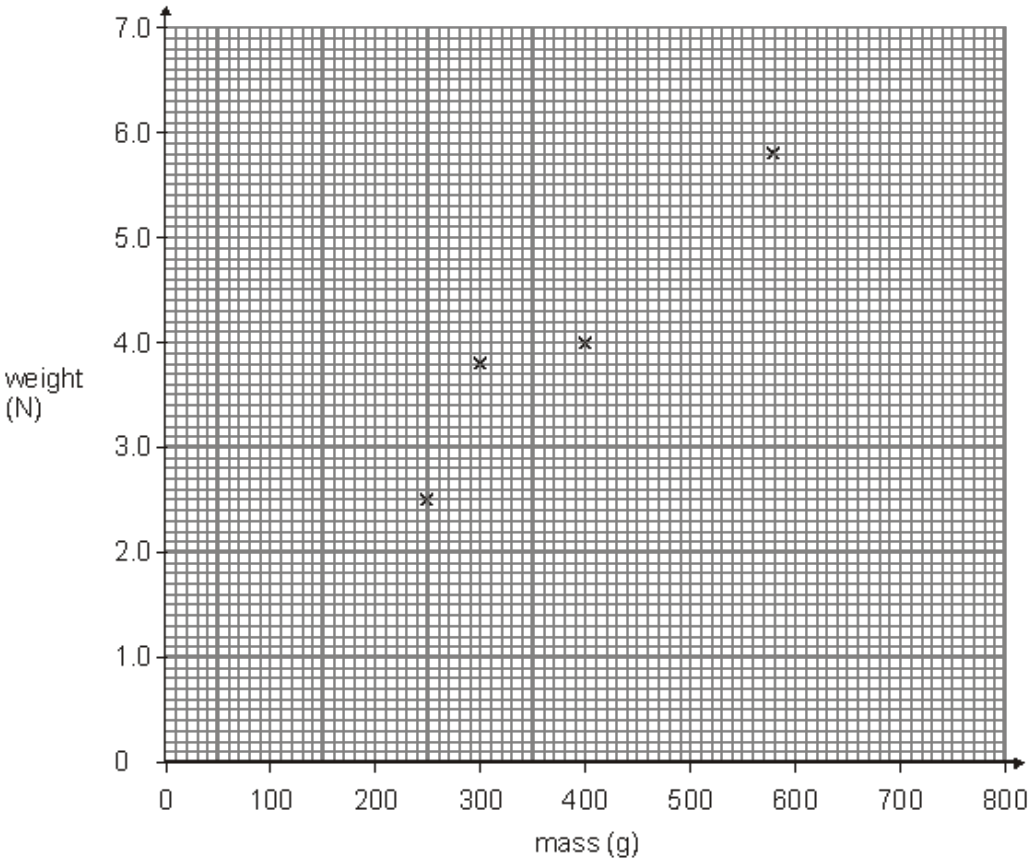
mass (g)	weight (N)
150	1.5
250	2.5
300	3.8
400	4.0
580	5.8

(a) He plotted four of his results on a grid as shown below,

(i) Plot the point for the 150 g mass on the graph.

1 mark

(ii) Draw a line of best fit.



1 mark

(b) One of the points Russell plotted does **not** fit the pattern.

Circle this point on the graph.

1 mark

(c) Use your graph to predict:

(i) the mass of an object weighing 6.5 N;

..... g

1 mark

(ii) the weight of an object of mass 50 g.

..... N

1 mark

(d) Give **one** reason why it is more useful to present the results as a line graph rather than a table.

.....

.....

1 mark
maximum 6 marks

Q5. Oliver clamped a wooden plank to a desk. There was a 40 cm overhang as shown in diagram 1.

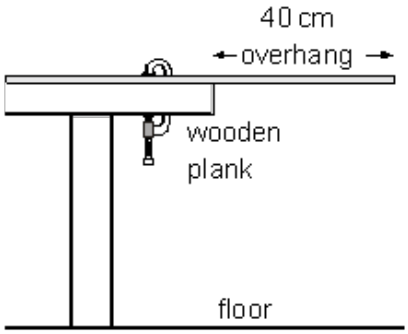


diagram 1

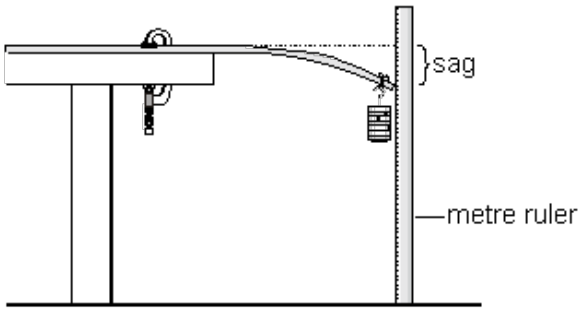
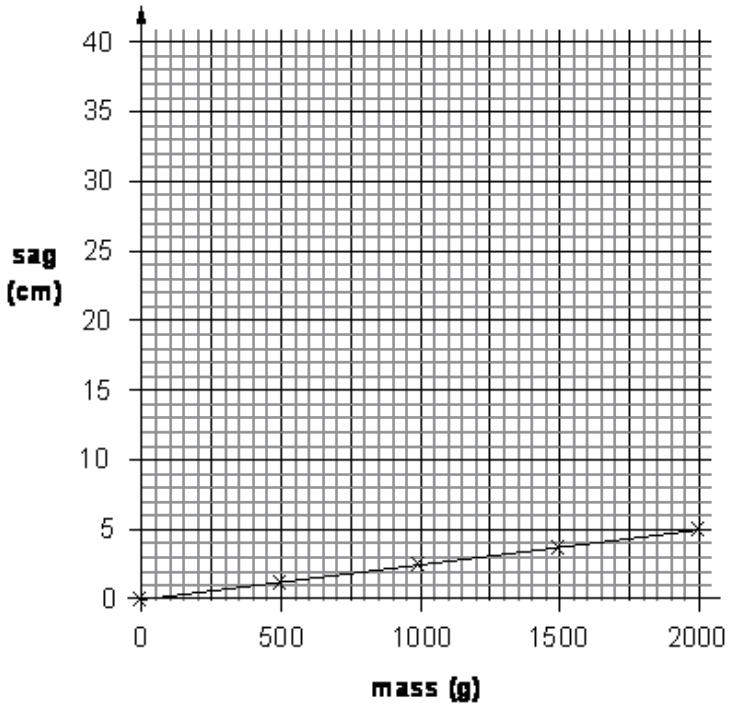


diagram 2

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