Forces – 2021 IGCSE 0625

1. Nov/2021/QPaper_21,22&23/No.6

A spring, which obeys Hooke's law, has an unstretched length of 10 cm.

A load of 20 N is suspended from the spring.

The new length of the spring is 36 cm.

What is the spring constant *k* of the spring?

A 0.56 N / cm **B** 0.77 N / cm **C** 1.3 N / cm **D** 1.8 N / cm

2. Nov/2021/QPaper_32/No.3

Fig. 3.1 shows the vertical forces acting on a toy rocket as it leaves the ground.

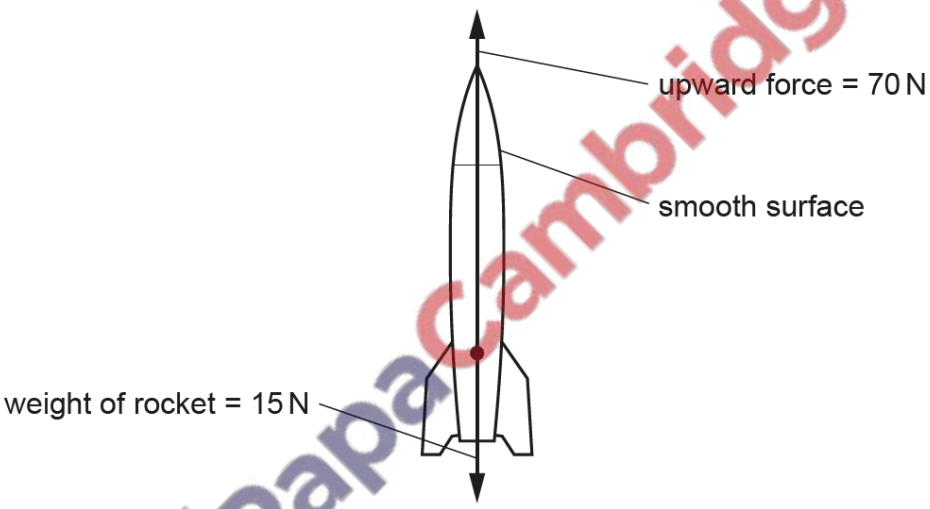

Fig. 3.1

(a) Calculate the size of the resultant vertical force on the rocket.

resultant force = ... N [2]

(b) Explain why the top of the rocket is pointed and has a smooth surface.

.....

..... [2]

[Total: 4]

3. Nov/2021/QPaper_33/No.3

Fig. 3.1 shows the horizontal forces acting on a skateboarder.

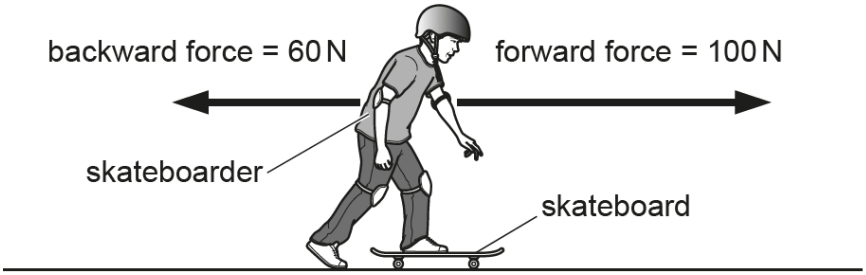

Fig. 3.1

(a) Calculate the resultant force acting on the skateboarder.

resultant force = ... N

direction = ...

[2]

(b) Describe the effect of the resultant force in **(a)** on the motion of the skateboarder.

..... [1]

(c) The skateboarder is moving along a horizontal path.

The backward force is 100 N. The forward force is 100 N.

Describe the motion of the skateboarder.

..... [1]

[Total: 4]

4. Nov/2021/QPaper_41/No.1

Some physical quantities are scalars and other physical quantities are vectors.

(a) State how a vector quantity differs from a scalar quantity.

.....

..... [1]

(b) Circle the vector quantities in the list.

acceleration energy mass momentum temperature time speed velocity

[2]

(c) A microphone in a recording studio has a mass of 0.55 kg and a weight *W*.

(i) Calculate *W*.

W = ... [1]

(ii) The microphone is suspended from the ceiling by a cord attached to a small ring. Fig. 1.1 shows the microphone pulled to one side and kept stationary by a horizontal thread.

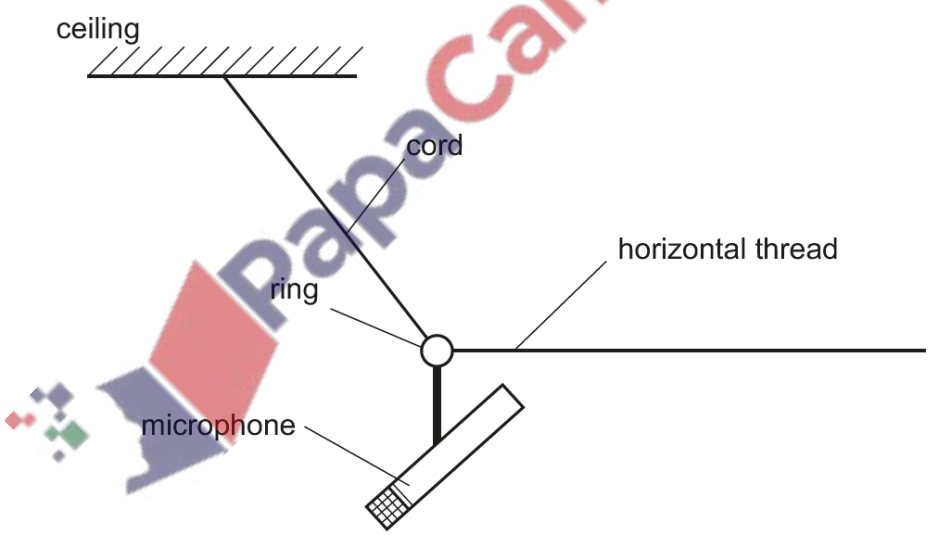

Fig. 1.1 (not to scale)

The tension T in the horizontal thread is 8.1 N.

Determine graphically the magnitude and the direction, relative to the vertical, of the resultant of W and T. Use a scale of 1.0 cm to 1.0 N or greater.

magnitude of resultant = ...

direction of resultant = ... relative to vertical

[3]

(iii) State and explain how the magnitude and direction of the resultant in **(c)(ii)** compares with the force on the ring due to the tension in the cord.

.....

.....

..... [2]

[Total: 9]

5. Nov/2021/QPaper_42/No.2

(a) State Hooke's law.

.....

..... [1]

(b) Fig. 2.1 shows the extension–load graph for a spring.

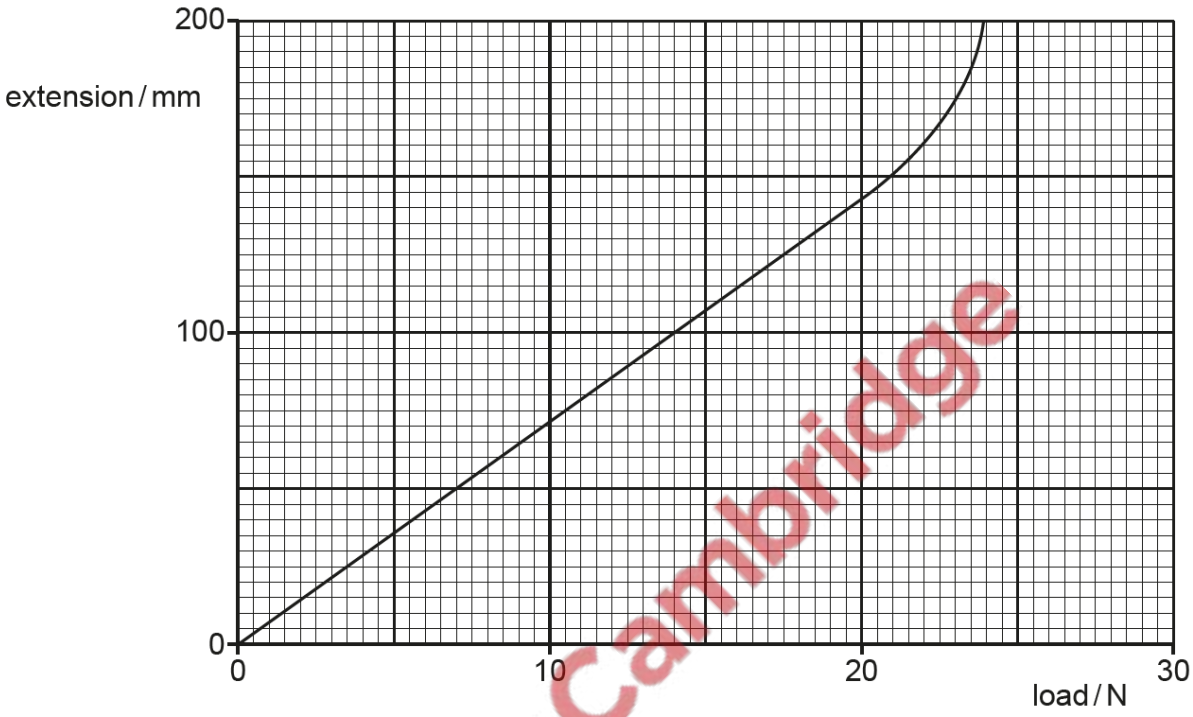

Fig. 2.1

(i) On Fig. 2.1, mark and label the region where the spring obeys Hooke's law. [1]

(ii) Calculate the spring constant *k*.

k = ... [2]

(iii) The original length of the spring is 120 mm.

Calculate the length of the spring when a load of 8.5 N is applied to the spring.

length = ... [2]

(c) The weight of an object is 4.0 N on a planet where the acceleration of free fall is 8.7 m/s^2.

Calculate the mass of the object.

mass = ... [2]

[Total: 8]