Forces – 2019 Nov IGCSE

1. 0625/31/O/N/19/No.3

Fig. 3.1 shows a spring with no load attached. Fig. 3.2 shows the same spring with a load attached.

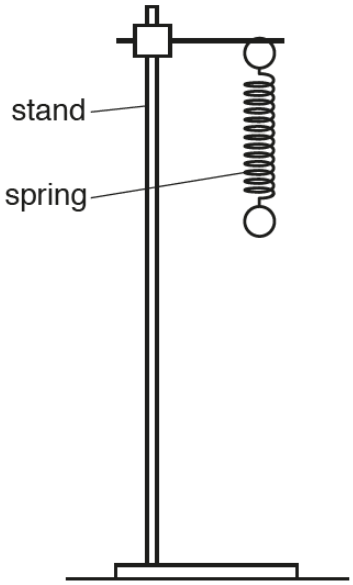

Fig. 3.1

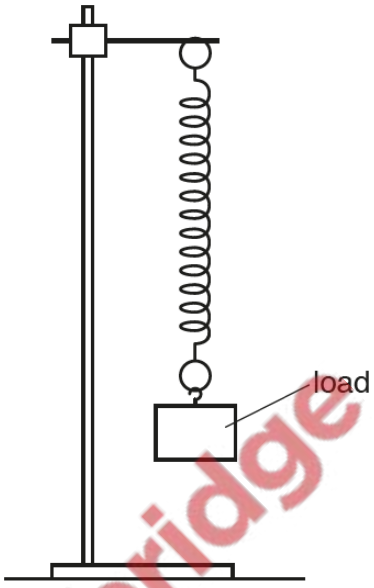

Fig. 3.2

(a) Describe how a student can determine the extension of the spring. You may draw on Fig. 3.1 and Fig. 3.2 as part of your answer.

.....

.....

.....

.....

..... [3]

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(b) The student plots a graph of load against extension, as shown in Fig. 3.3.

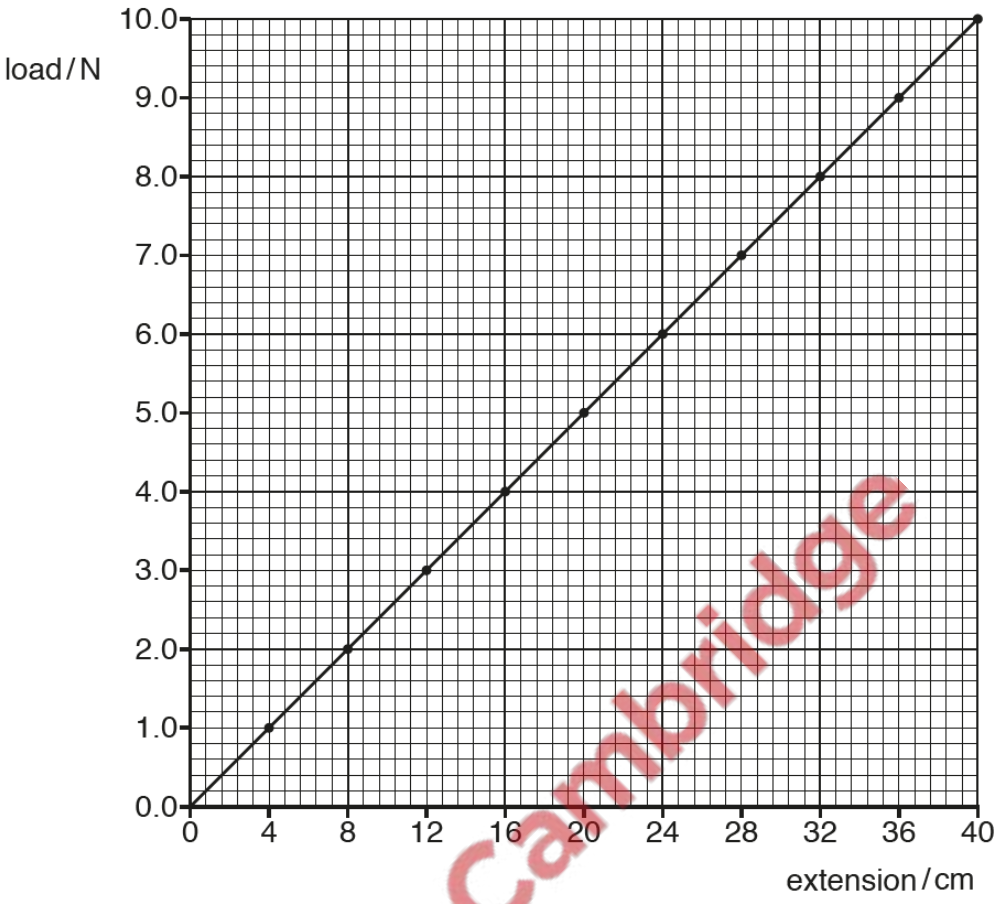

Fig. 3.3

(i) Determine the extension produced by a load of 7.5 N.

extension = ... cm [1]

(ii) Determine the load that would produce an extension of 10.0 cm.

load = ... N [1]

(c) Calculate the mass that has a weight of 6.0 N.

mass = ... kg [3]

[Total: 8]

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2. 0625/32/O/N/19/No.3

(a) Fig. 3.1 shows the horizontal forces acting on a swimmer.

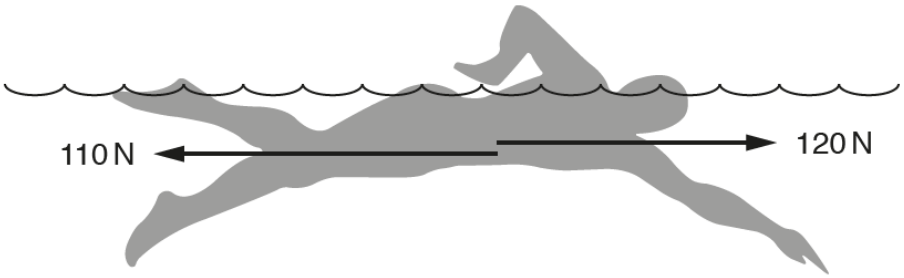

Fig. 3.1

(i) Calculate the size and direction of the resultant horizontal force on the swimmer.

size of resultant horizontal force = ... N

direction of resultant horizontal force = ...

[1]

(ii) State the name of the 110 N force on the swimmer.

..... [1]

(iii) Fig. 3.2 shows the horizontal forces acting on the swimmer as he moves forwards a short time later.

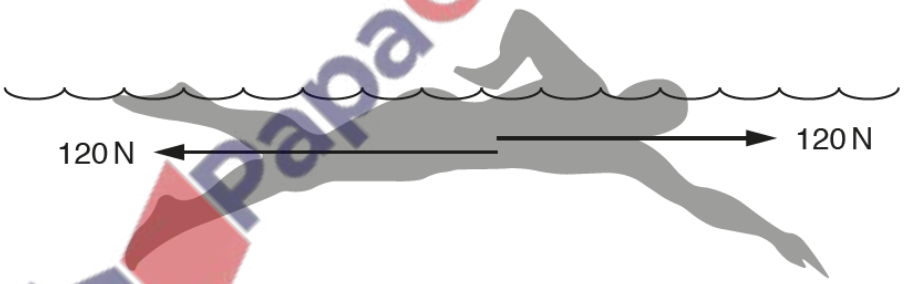

Fig. 3.2

Describe and explain the motion of the swimmer.

.....

..... [2]

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(b) Another swimmer weighs 700 N. He stands on a diving board, as shown in Fig. 3.3.

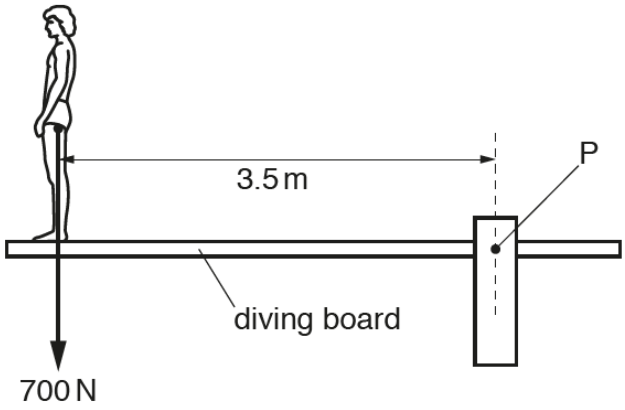

Fig. 3.3

Calculate the moment of the swimmer's weight about point P.

moment = ... N m [3]

[Total: 7]

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3. 0625/33/O/N/19/No.3

A model aircraft is flying through air. Fig. 3.1 shows the forces acting on the model aircraft. The weight of the model aircraft is 15.0 N.

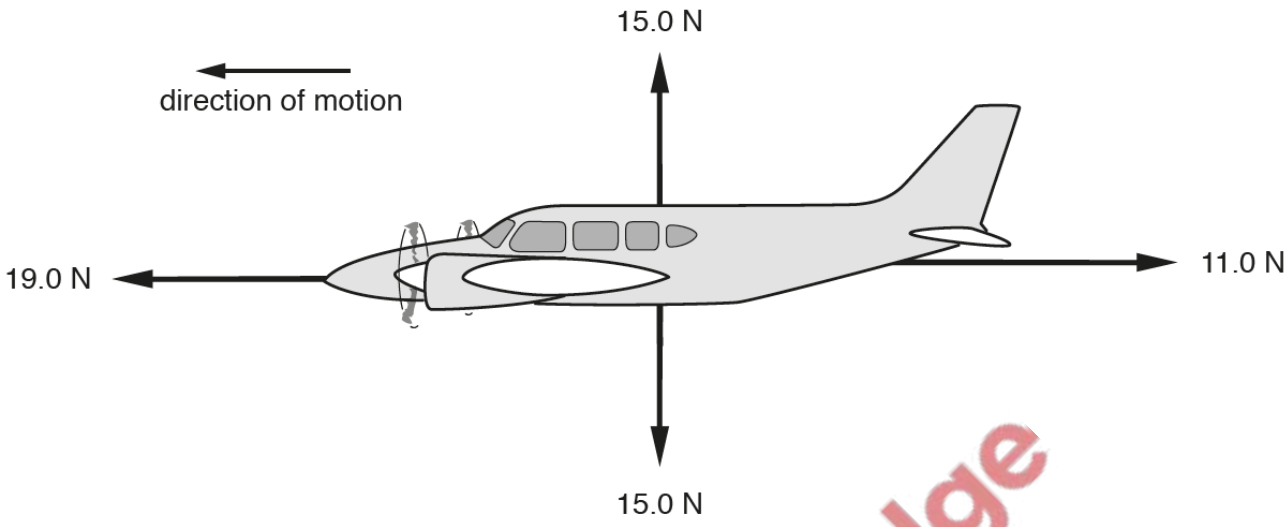

Fig. 3.1

(a) **(i)** Determine the size and direction of the resultant **horizontal** force acting on the model aircraft.

size of resultant horizontal force = ... N

direction of resultant horizontal force = ...

[1]

(ii) Describe the change in the motion of the model aircraft.

.....

..... [2]

(b) The horizontal forces acting on the model aircraft become balanced.

Suggest how the horizontal forces acting on the model aircraft have changed.

.....

..... [1]

[Total: 4]

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4. 0625/41/O/N/19/No.2

(a) State **two** properties of an object that may be changed by the action of forces.

1. .....

2. .....

[2]

(b) A chest expander is a piece of equipment used by athletes in a gym. Fig. 2.1 shows a chest expander that consists of five identical springs connected in parallel between two handles.

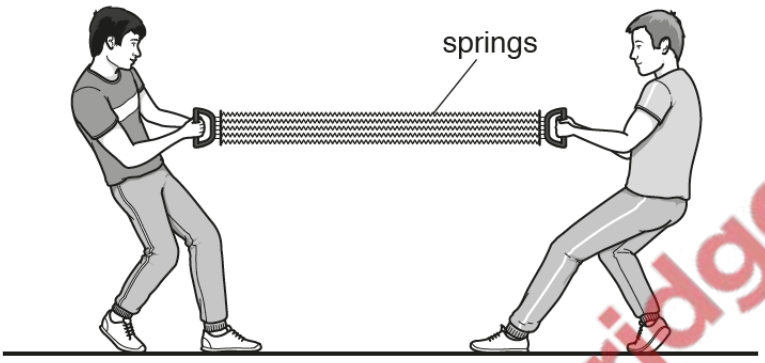

Fig. 2.1

Each spring has an unstretched length of 0.63 m.

Two athletes are stretching the chest expander by pulling on the two handles in opposite directions.

(i) The springs obey Hooke's law.

Explain what is meant by this statement.

.....

.....

..... [2]

(ii) Each athlete pulls the handle towards himself with a force of 1300 N.

1. State the tension in each spring.

tension = ... [1]

2. The chest expander stretches and each spring is now 0.94 m long.

Calculate the spring constant k of each spring.

k = ... [2]

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(iii) State the energy changes taking place as the two athletes use their muscles to stretch the chest expander.

.....

.....

..... [2]

[Total: 9]

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