Practice Question Set For GCSE
Subject : Physics
Paper-2 Topic: Forces (High Demand Questions)

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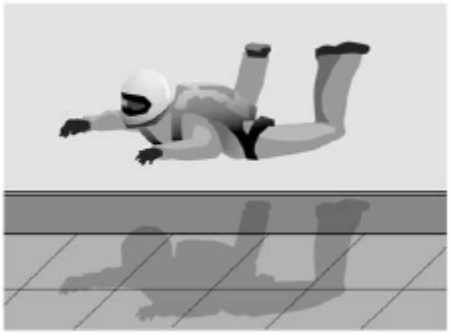
Name of the Student:_____
Max. Marks : 22 Marks **Time : 22 Minutes**

Q1.

Figure 1 shows a skydiver training in an indoor wind tunnel.

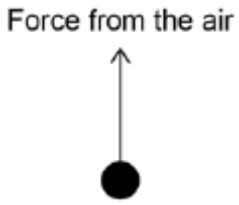
Large fans below the skydiver blow air upwards.

Figure 1



(a) The skydiver is in a stationary position.

Complete the free body diagram for the skydiver.



(2)

(b) The skydiver now straightens his legs to increase his surface area.

This causes the skydiver to accelerate upwards.

Explain why straightening his legs cause the skydiver to accelerate upwards.

_____

_____

_____

_____

(2)

(c) A small aeroplane used for skydiving moves along a runway.

The aeroplane accelerates at 2 m / s^2 from a velocity of 8 m / s.

After a distance of 209 m it reaches its take-off velocity.

Calculate the take-off velocity of the aeroplane.

_____

_____

_____

Take-off velocity = _____ m / s

(3)

(d) A skydiver jumps from an aeroplane.

There is a resultant vertical force of 300 N on the skydiver.

There is a horizontal force from the wind of 60 N.

Draw a vector diagram on **Figure 2** to determine the magnitude and direction of the resultant force on the skydiver.

Figure 2

Magnitude of resultant force = _____ N

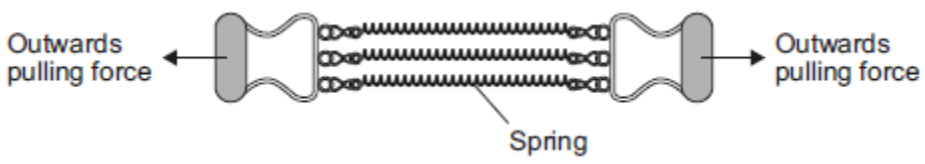
(5)

(Total 12 marks)

Q2.

Figure 1 shows an exercise device called a chest expander. The three springs are identical.

Figure 1



A person pulls outwards on the handles and does work to stretch the springs.

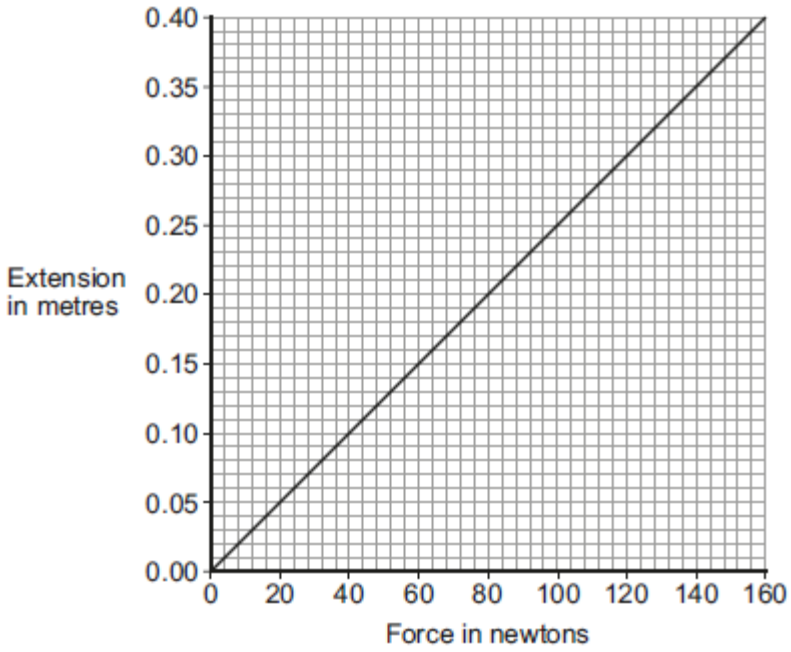
(a) Complete the following sentence.

When the springs are stretched _____ _____ energy is stored in the springs.

(1)

(b) **Figure 2** shows how the extension of a single spring from the chest expander depends on the force acting on the spring.

Figure 2



(i) How can you tell, from **Figure 2**, that the limit of proportionality of the spring has not been exceeded?

_____

_____

(1)

(ii) Use data from **Figure 2** to calculate the spring constant of the spring.
Give the unit.

_____

_____

_____

Spring constant = _____ Unit _____

(3)

(iii) Three identical resistors joined in parallel in an electrical circuit share the total current in the circuit.

In a similar way, the three springs in the chest expander share the total force exerted.

By considering this similarity, use **Figure 2** to determine the total force exerted on the chest expander when each spring is stretched by 0.25 m.

_____

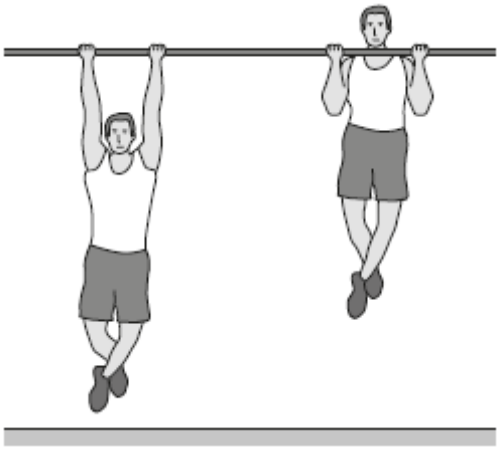
_____

Total force = _____ N

(2)

(c) The student in **Figure 3** is doing an exercise called a chin-up.

Figure 3



Each time the student does one chin-up he lifts his body 0.40 m vertically upwards.
The mass of the student is 65 kg.
The student is able to do 12 chin-ups in 60 seconds.

Calculate the power developed by the student.

Gravitational field strength = 10 N/kg

_____

_____

_____

_____

_____

Power = _____ W

(3)

(Total 10 marks)