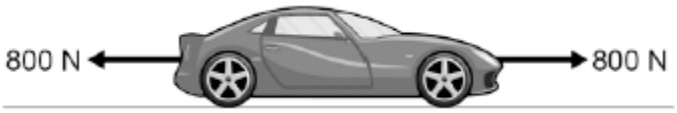
**Name of the Student**:_____

**Max. Marks : 23 Marks** **Time : 23 Minutes**

## Q1.

The figure below shows the horizontal forces acting on a car.




(a) Which **one** of the statements describes the motion of the car?

Tick **one** box.

It will be slowing down. ☐

It will be stationary. ☐

It will have a constant speed. ☐

It will be speeding up. ☐

**(1)**

(b) During part of the journey the car is driven at a constant speed for five minutes.

Which one of the equations links distance travelled, speed and time?

Tick **one** box.

distance travelled = speed + time ☐

distance travelled = speed × time ☐

distance travelled = speed − time ☐

distance travelled = speed ÷ time ☐

**(1)**

(c) During a different part of the journey the car accelerates from 9 m/s to 18 m/s in 6 s.

Use the following equation to calculate the acceleration of the car.

$$\text{acceleration} = \frac{\text{change in velociy}}{\text{time taken}}$$

_____

_____

acceleration = _____ $m/s^2$

**(2)**

(d) Which equation links acceleration, mass and resultant force?

Tick **one** box.

resultant force = mass + acceleration ☐

resultant force = mass × acceleration ☐

resultant force = mass − acceleration ☐

resultant force = mass ÷ acceleration ☐

**(1)**

(e) The mass of the car is 1120 kg. The mass of the driver is 80 kg.

Calculate the resultant force acting on the car and driver while accelerating.

_____

_____

Resultant force = _____ N

**(2)**

(f) Calculate the distance travelled while the car is accelerating.

Use the correct equation from the Physics Equation Sheet.

_____

_____

_____

Distance = _____ m

**(3)**

(g) A car driver sees a fallen tree lying across the road ahead and makes an emergency stop.

The braking distance of the car depends on the speed of the car.

For the same braking force, explain what happens to the braking distance if the speed doubles.

You should refer to kinetic energy in your answer.

_____

_____

_____

_____

_____

_____

_____

_____

**(4)**

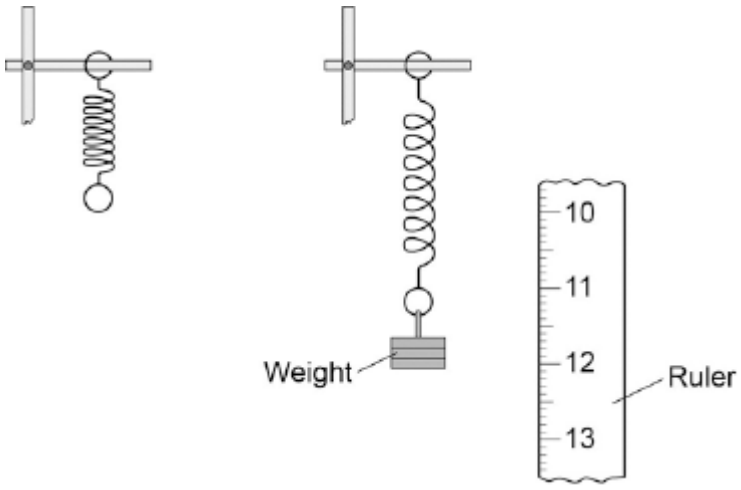
**(Total 14 marks)**

## Q2.

A student suspended a spring from a laboratory stand and then hung a weight from the spring.

**Figure 1** shows the spring before and after the weight is added.

**Figure 1**




(a) Measure the extension of the spring shown in **Figure 1**.

Extension = _____ mm

**(1)**

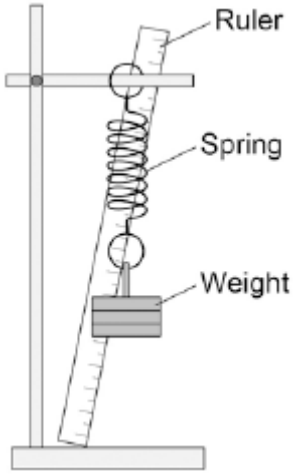
(b) The student used the spring, a set of weights and a ruler to investigate how the extension of the spring depended on the weight hanging from the spring.

Before starting the investigation the student wrote the following prediction:

The extension of the spring will be directly proportional to the weight hanging from the spring.

**Figure 2** shows how the student arranged the apparatus.

**Figure 2**




Before taking any measurements, the student adjusted the ruler to make it vertical.

Explain why adjusting the ruler was important.

_____

_____

_____

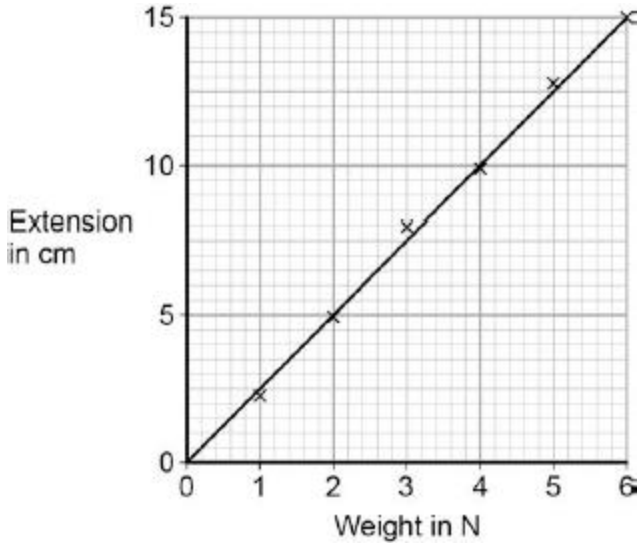
_____

**(2)**

(c) The student measured the extension of the spring using a range of weights.

The student's data is shown plotted as a graph in **Figure 3**.

**Figure 3**




What range of weight did the student use?

_____

**(1)**

(d) Why does the data plotted in **Figure 3** support the student's prediction?

_____

_____

**(1)**

(e) Describe **one** technique that you could have used to improve the accuracy of the measurements taken by the student.

_____

_____

_____

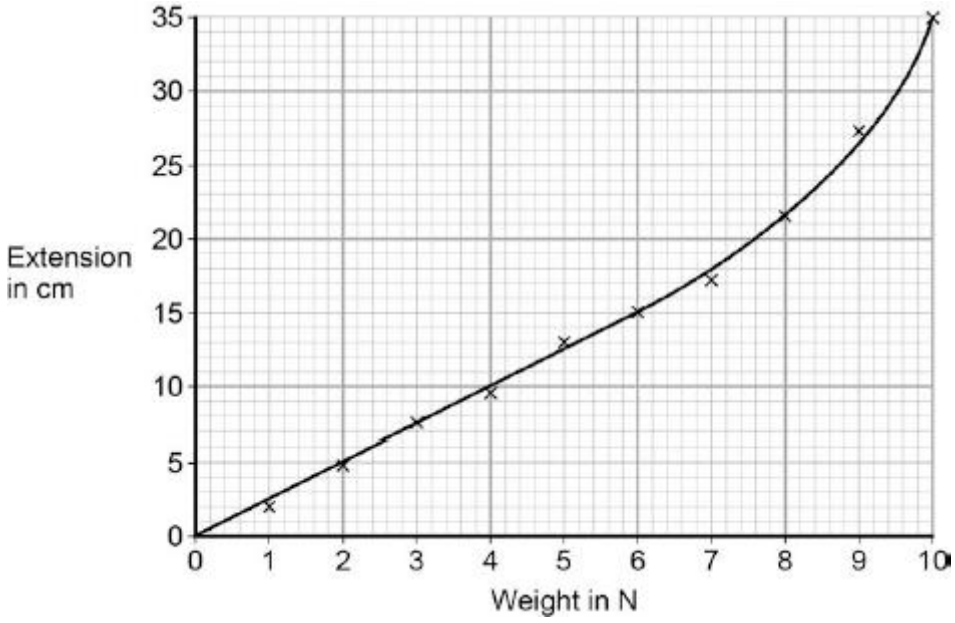
_____

**(2)**

(f) The student continued the investigation by increasing the range of weights added to the spring.

All of the data is shown plotted as a graph in **Figure 4**.

**Figure 4**




At the end of the investigation, all of the weights were removed from the spring.

What can you conclude from **Figure 4** about the deformation of the spring?

_____

_____

Give the reason for your conclusion.

_____

_____

**(2)**

**(Total 9 marks)**