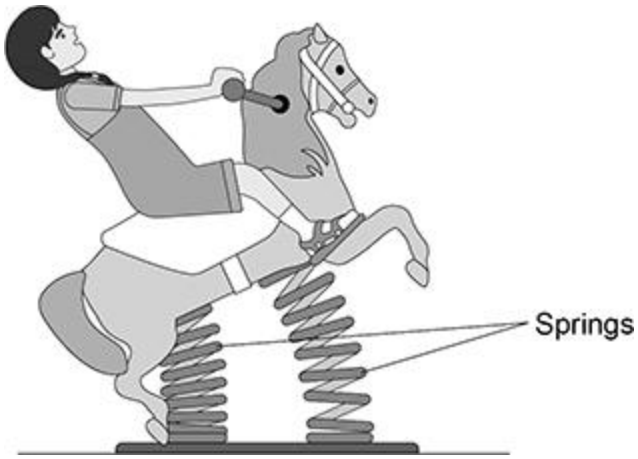
Name of the Student:_____
Max. Marks : 17 Marks **Time : 17 Minutes**

Q1.

Figure 1 below shows a child on a playground toy.

Figure 1



(a) The springs have been elastically deformed.

Explain what is meant by 'elastically deformed'.

_____

_____

_____

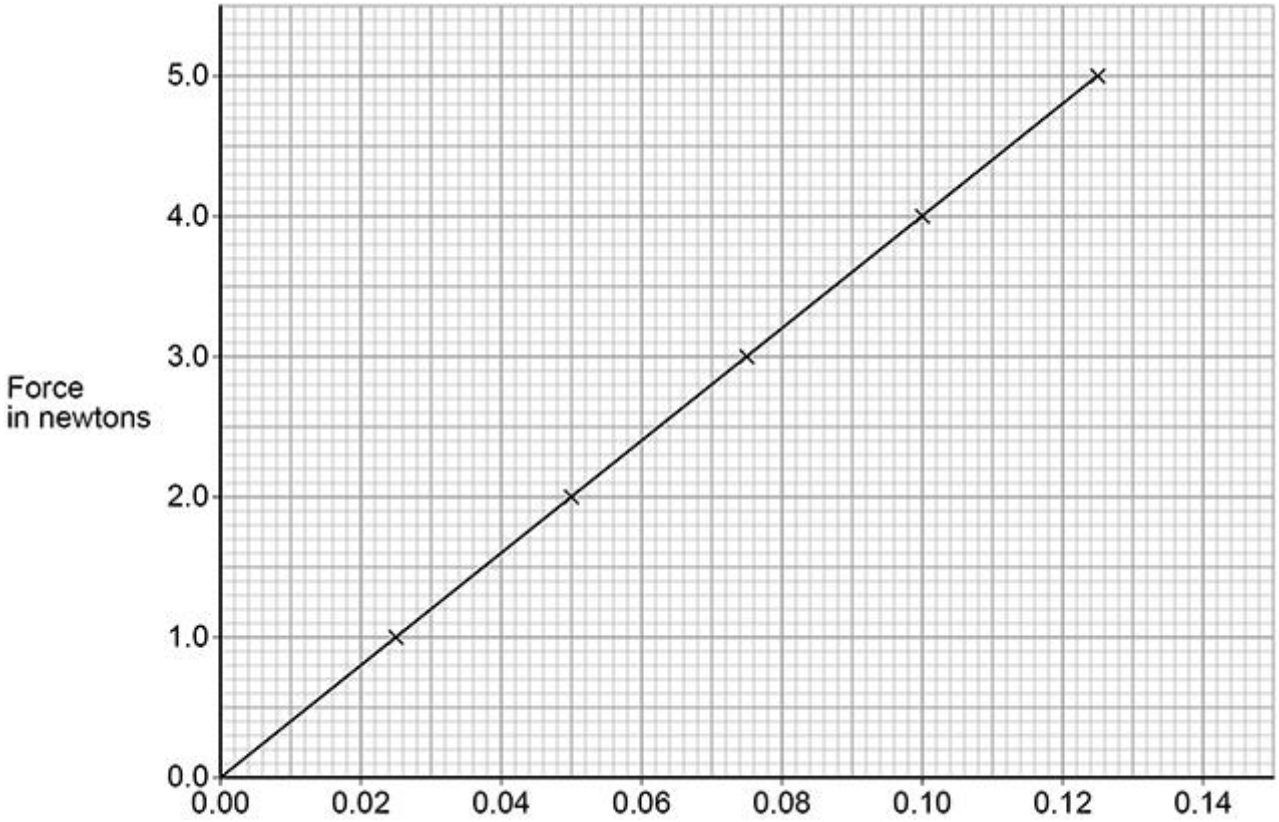
_____

(2)

A student investigated the relationship between the force applied to a spring and the extension of the spring.

Figure 2 below shows the results.

Figure 2



(b) Describe a method the student could use to obtain the results given in **Figure 2**.

You should include a risk assessment for **one** hazard in the investigation.

Your answer may include a diagram.

_____

_____

_____

_____

(6)

(c) Which equation links extension (*e*), force (*F*) and spring constant (*k*).

Tick (✓) **one** box.

force = spring constant × (extension)^2 ☐

force = spring constant × extension ☐

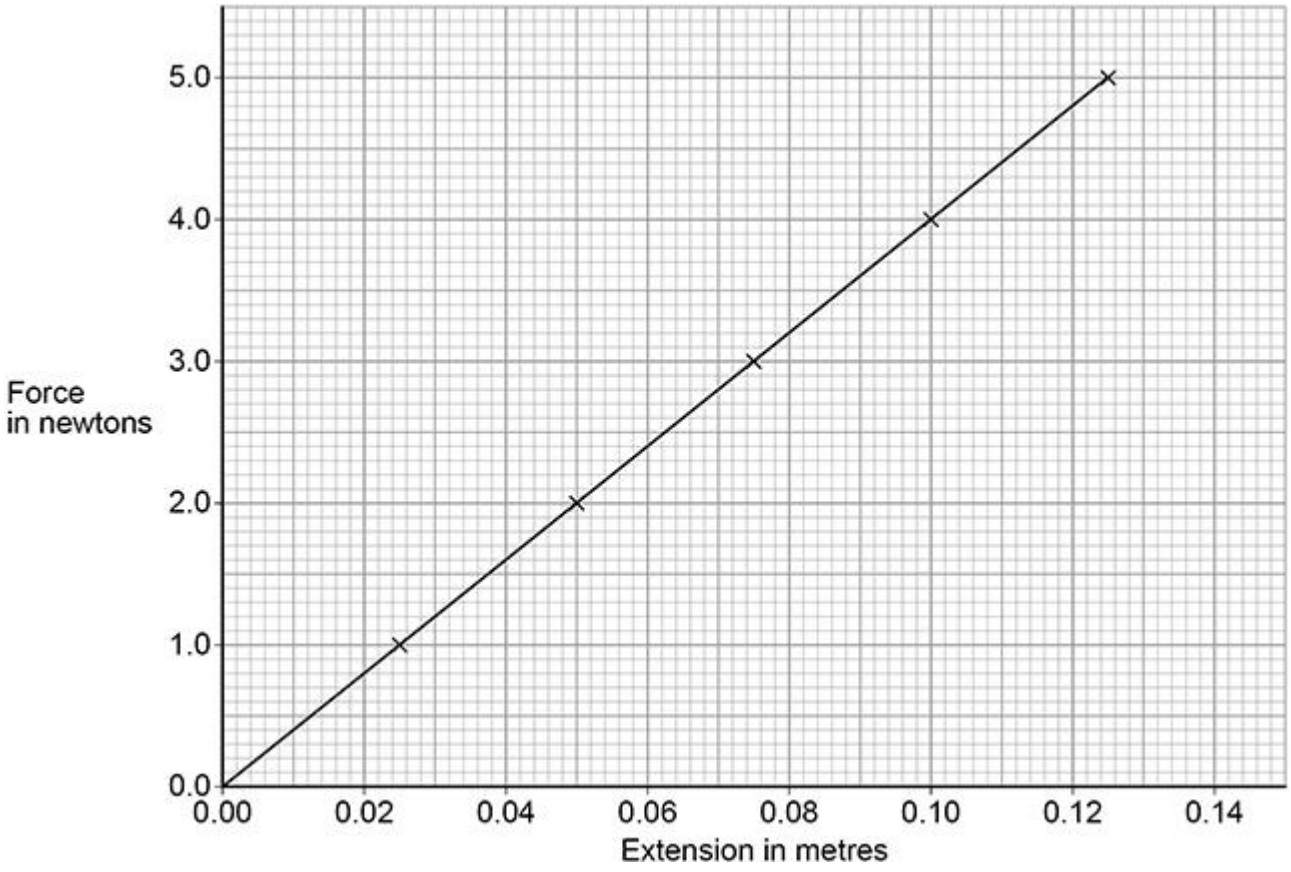
$\text{force} = \frac{\text{extension}}{\text{spring constant}}$ ☐

$\text{force} = \frac{\text{spring constant}}{\text{extension}}$ ☐

(1)

Figure 2 is repeated below.

Figure 2



(d) Determine the spring constant of the spring.

Use **Figure 2**.

Spring constant = _____ N/m

(3)

(e) The student concluded:

'The extension of the spring is directly proportional to the force applied to the spring.'

Describe how **Figure 2** supports the student's conclusion.

(2)

(f) The student repeated the investigation using a different spring with a spring constant of 13 N/m.

Calculate the elastic potential energy of the spring when the extension of the spring was 20 cm.

Use the Physics Equations Sheet.

Elastic potential energy = _____ J

(3)

(Total 17 marks)