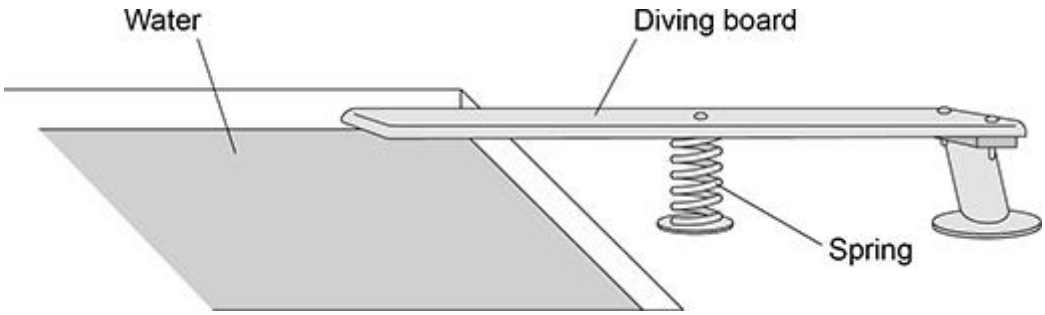
Questions are for both separate science and combined science students

Q1.

Figure 2 shows a diving board at the side of the swimming pool.

Figure 2



(a) The original length of the spring is 0.84 m.

When the child stands on the diving board, the length of the spring decreases by 0.21 m.

Calculate the percentage change in the length of the spring.

_____

_____

_____

Percentage change in length = _____ %

(2)

Use the Physics Equations Sheet to answer parts (f) and (g).

(b) Write down the equation which links extension (*e*), force applied to a spring (*F*) and spring constant (*k*).

_____

(1)

(c) The force applied to the spring by the weight of the child is 336 N.

The change in length of the spring is 0.21 m.

Calculate the spring constant of the spring.

_____

_____

_____

_____

_____

Spring constant = _____ N/m

(3)

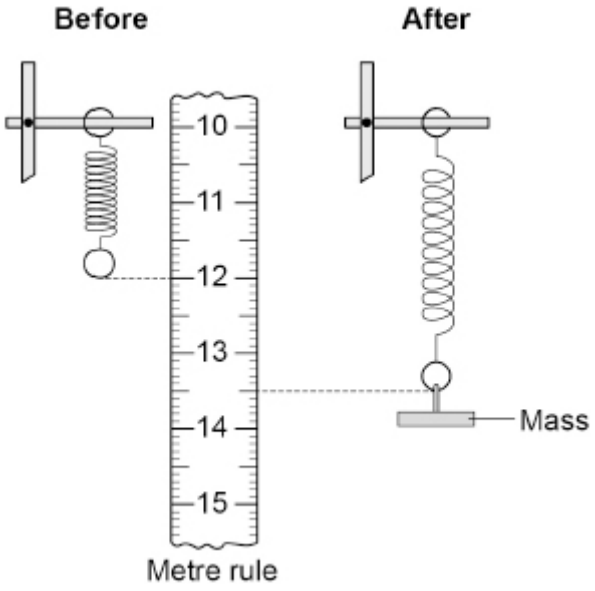
(Total 6 marks)

Q2.

A student carried out an investigation to determine the spring constant of a spring.

Figure 1 shows the spring before and after a mass was hung from the end of the spring.

Figure 1



(a) What is the extension of the spring in **Figure 1**?

Tick (✓) **one** box.

1.5 cm ☐

3.5 cm ☐

13.5 cm ☐

(1)

(b) Give **one** safety precaution the student should have taken during this investigation.

_____

_____

(1)

(c) The student hung a mass of 0.050 kg from the spring.

gravitational field strength = 9.8 N/kg

Calculate the weight of the 0.050 kg mass.

Use the equation:

weight = mass × gravitational field strength

_____

_____

Weight = _____ N

(2)

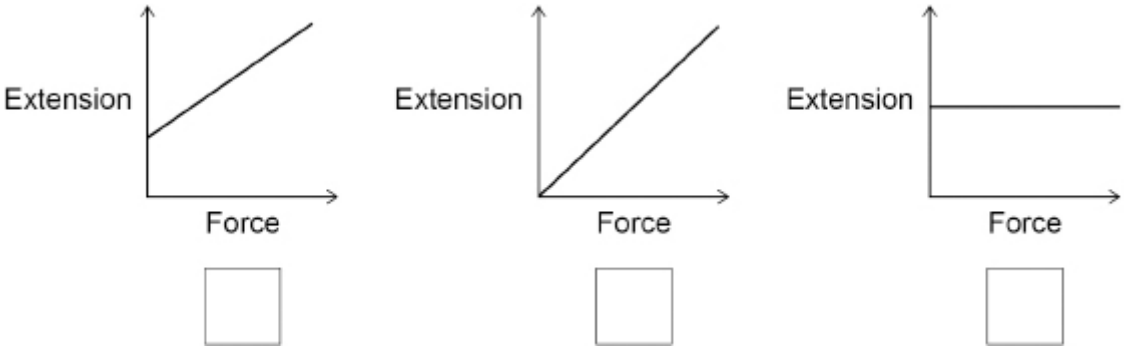
(d) The weight of the mass applies a force to the spring.

The student added more masses and recorded the extension of the spring.

Which graph in **Figure 2** shows the relationship between the force applied to the spring and the extension of the spring?

Tick (✓) **one** box.

Figure 2



(1)

(e) A force of 2.0 N was applied to a different spring.

The extension of the spring was 0.080 m.

Calculate the spring constant of the spring.

Use the equation:

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

Spring constant = _____ N/m

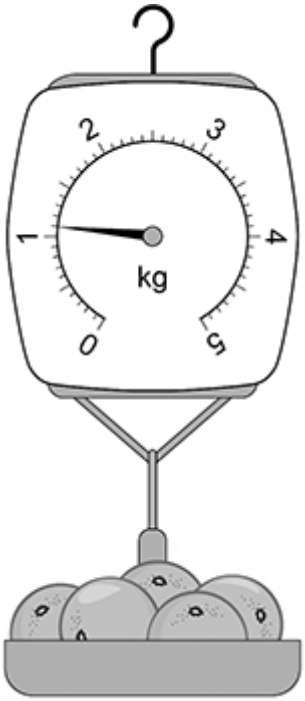
(2)

(Total 7 marks)

Q3.

Figure 2 shows a balance used to measure the mass of 5 oranges.

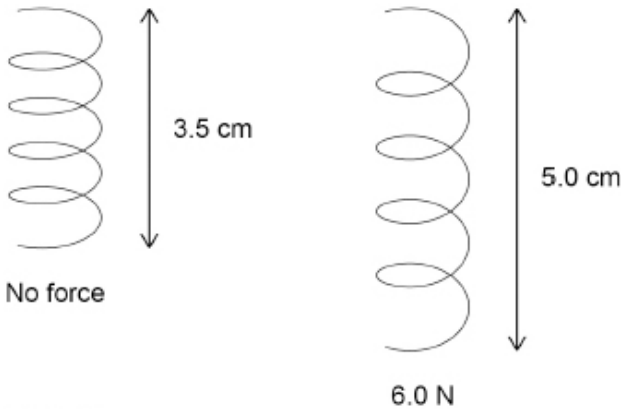
Figure 2



The balance shown in **Figure 2** contains a spring.

Figure 3 shows the spring with no force acting on it and with a force of 6.0 N acting on it.

Figure 3



(a) What is the extension of the spring when a force of 6.0 N acts on it?

Tick (✓) **one** box.

0.015 m ☐

0.035 m ☐

0.050 m ☐

0.085 m ☐

(1)

(b) Calculate the spring constant of the spring.

Use the equation:

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

_____

_____

_____

Spring constant = _____ N/m

(2)

(c) What will happen to the spring when the force is removed?

_____

_____

(1)

(Total 4 marks)