

Name of the Student: _____

Max. Marks : 18 Marks

Time : 18 Minutes

Q1.

Figure 3 shows a toy used to launch a ball.

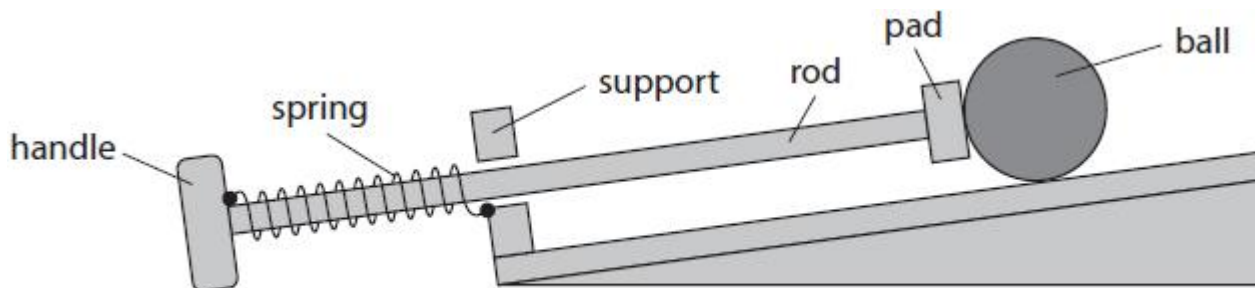


Figure 3

One end of the spring is fixed to the handle.

The other end of the spring is fixed to the support.

The child pulls the handle until the pad is against the support as shown in Figure 5.

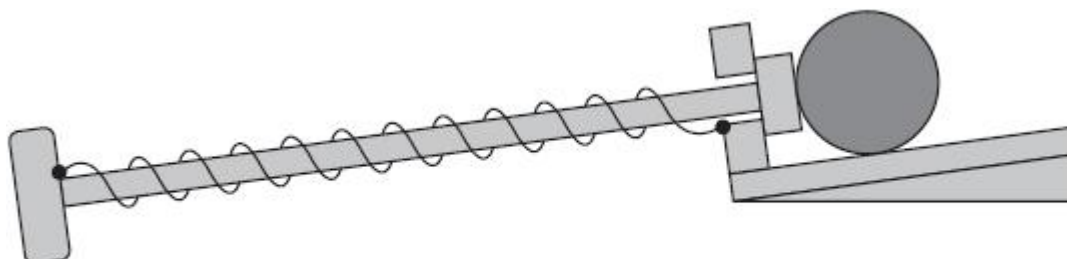


Figure 5

(i) The extension of the spring is 0.09 m.

The spring constant (k) is 20 N/m.

Calculate the work done in extending the spring by 0.09 m.

Use the equation

$$\text{work done} = \frac{1}{2} \times k \times (\text{extension})^2$$

(2)

work done = ... J

(ii) The child lets go of the handle.

The ball starts to move.

The spring returns to its original length.

Describe the energy transfer that takes place when the ball starts to move.

(2)

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(iii) The child can only stretch the spring until the pad is pressing against the support.

Explain how the design of the toy prevents the spring from becoming damaged.

(2)

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(Total for question = 6 marks)

Q2.

Figure 13 shows a tank for holding water.

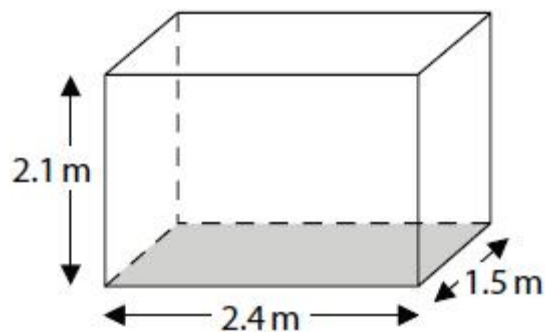


Figure 13

The tank has sides of 2.4 m, 2.1 m and 1.5 m.

The pressure at the bottom of the tank is 12 kPa.

(i) State the equation relating pressure, force and area.

(1)

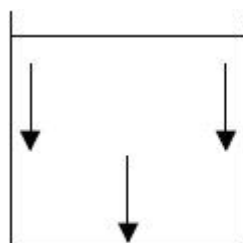
(ii) Calculate the weight of water in the tank.

(4)

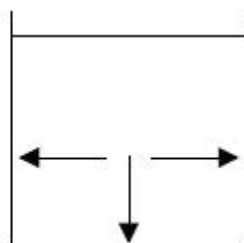
weight = ... N

(iii) Which diagram shows the direction of the forces from the water on the inside of the tank?

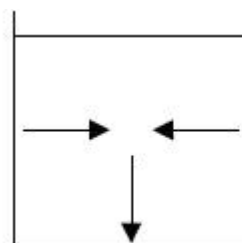
(1)



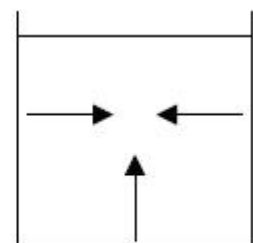
☐ A



☐ B



☐ C



☐ D

(Total for question = 6 marks)

Q3.

A student carries out an investigation to show how pressure varies with depth in water.

A pressure sensor is attached to a rule.

The rule and pressure sensor are lowered into the water in a tank, as shown in Figure 25.

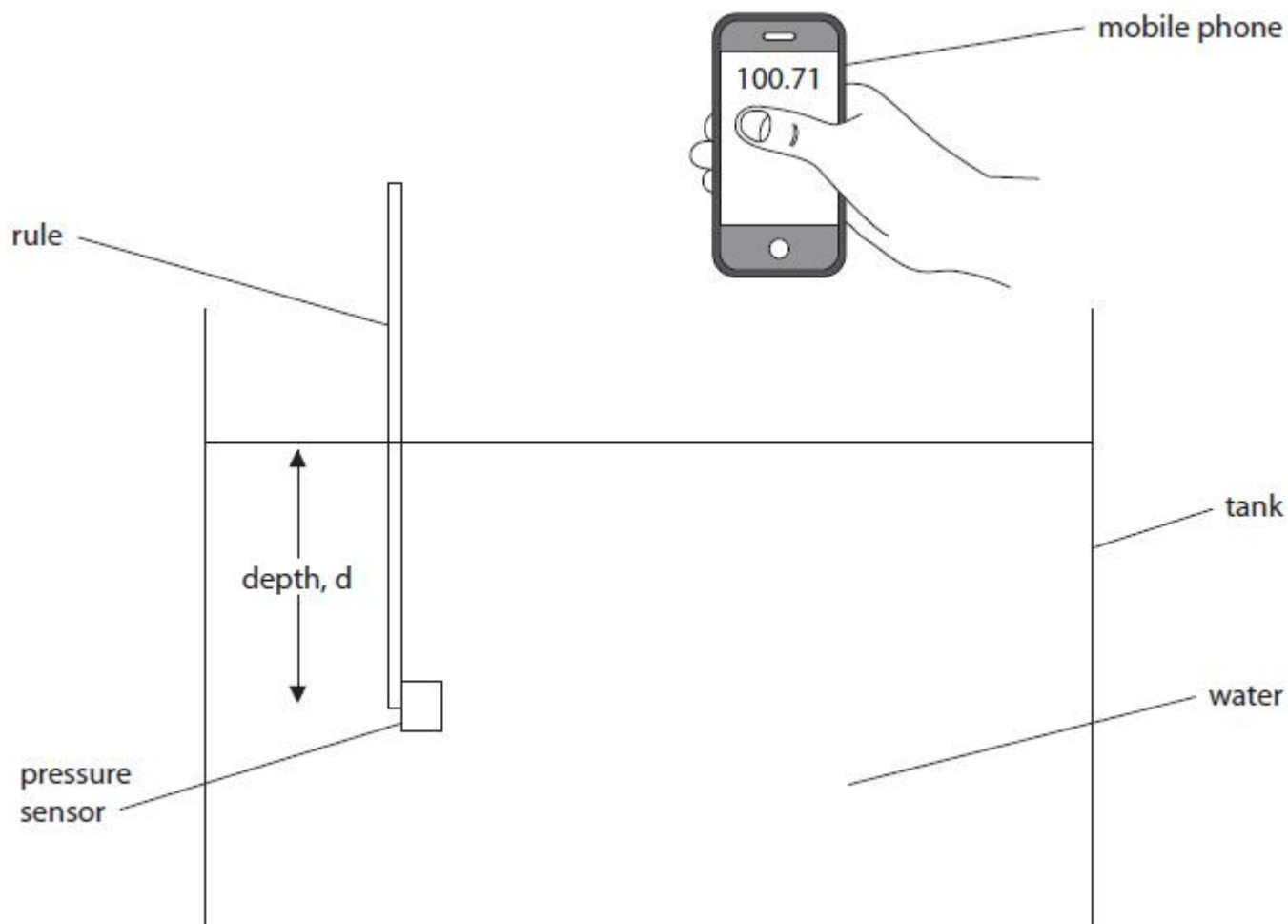


Figure 25

The depth of the pressure sensor below the surface of the water is read from the scale on the rule.

The pressure is displayed on the student's mobile phone which receives a signal from the pressure sensor.

Figure 26 gives some of the readings.

depth in m	pressure in kPa
0.050	99.15
0.100	99.70
0.150	100.15
0.200	100.70
0.250	101.15
0.300	101.70

Figure 26

Figure 27 shows a graph with some of the results plotted, but two of the points are missing.

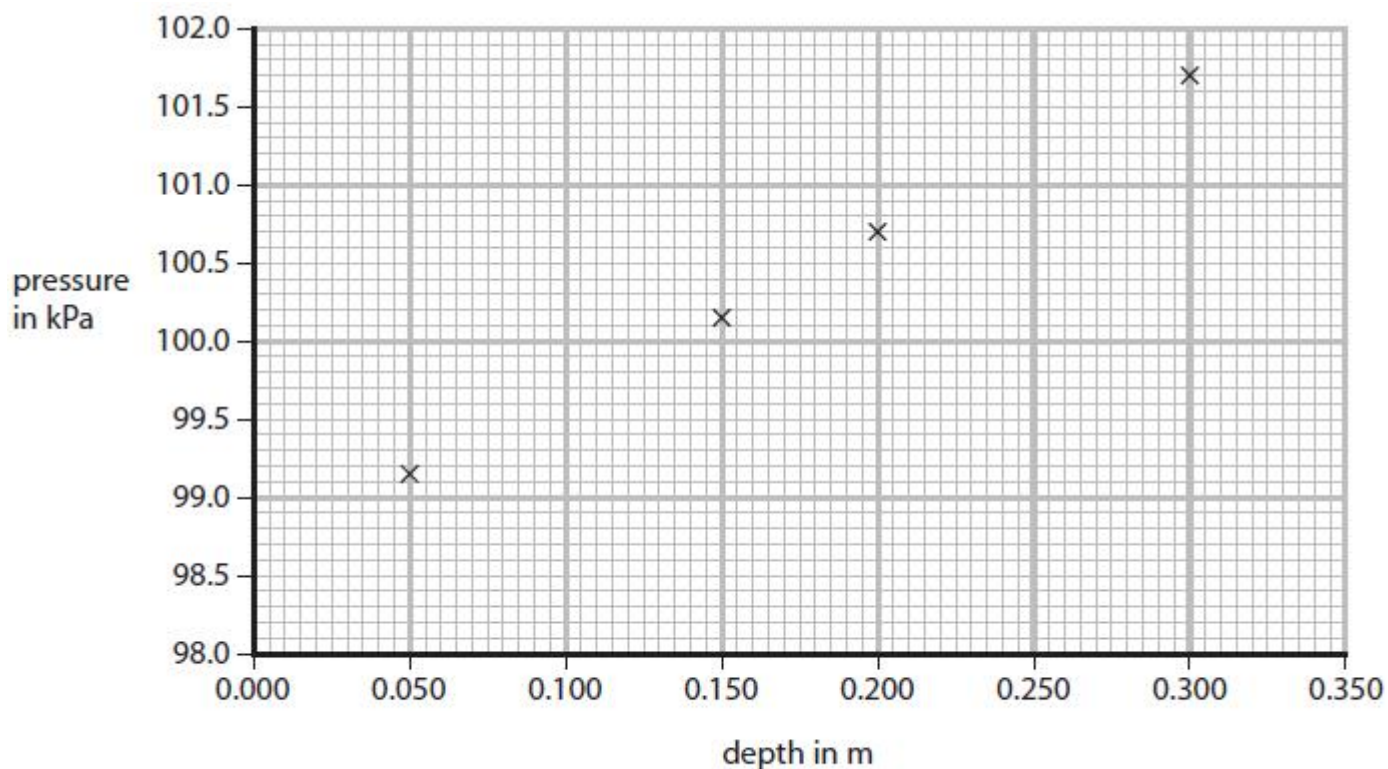


Figure 27

The student repeats the investigation using seawater and draws a graph of the results.

The seawater is more dense than the water used previously.

Compare the graph for seawater with the graph in Figure 27.

(2)

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(Total for question = 2 marks)

Q4.

Figure 9 shows a 10 N weight hanging from a spring.

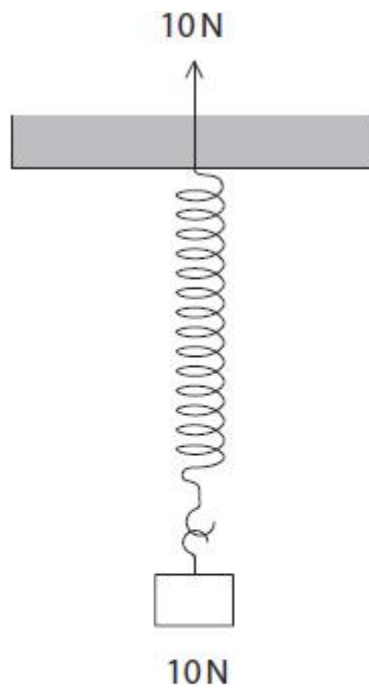


Figure 9

One of the forces acting to stretch the spring is shown in Figure 9.

Complete Figure 9 by adding an arrow to show the other force acting to stretch the spring.

(2)

(Total for question = 2 marks)

Q5.

Figure 4 shows a 10 N weight hanging from a spring.

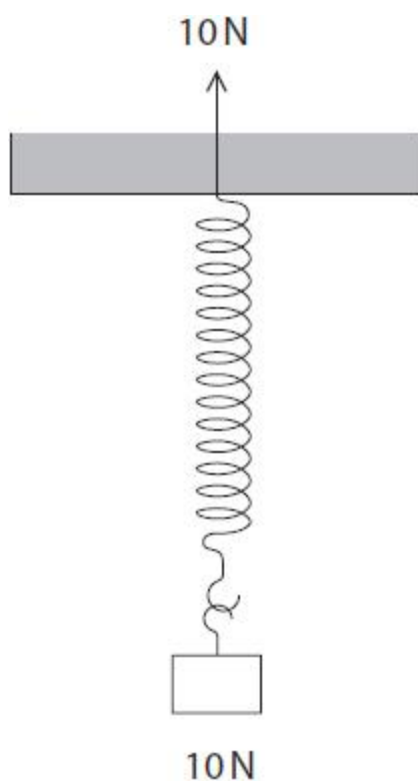


Figure 4

One of the forces acting to stretch the spring is shown in Figure 4.

Complete Figure 4 by adding an arrow to show the other force acting to stretch the spring.

(Total for question = 2 marks)