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

Q1.

A weight of 4.0 N is used to extend a spring.
The extension of the spring is 0.06 m.

(i) Calculate the spring constant, *k*, of the spring.

Use the equation

$$F = k \times x$$

(3)

spring constant = ... N/m

(ii) State what measurements should be made to determine the extension of the spring produced by the 4.0 N weight.

(2)

.....

.....

.....

.....

(Total for question = 5 marks)

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Q2.

A weight of 4.0 N is used to extend a spring.
The extension of the spring is 0.06 m.

(i) Calculate the spring constant, *k*, of the spring.

Use the equation

$$F = k \times x$$

(3)

spring constant = ... N/m

State what measurements should be made to determine the extension of the spring produced by the 4.0 N weight.

(2)

.....

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(Total for question = 5 marks)

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Q3.

Another spring has a spring constant of 250 N/m.

Calculate the work done in stretching the spring by 0.30 m.

State the unit.

Use the equation

$$E = ½ \times k \times x^2$$

(3)

work done in stretching the spring = ... unit .....

(Total for question = 3 marks)

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Q4.

Another spring has a spring constant of 250 N/m.

Calculate the work done in stretching the spring by 0.30 m.

State the unit.

Use the equation

$$E = \frac{1}{2} \times k \times x^2$$

(3)

work done in stretching the spring = ... unit .....

(Total for question = 3 marks)

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Q5.

Figure 10 shows a toy used to launch a ball.

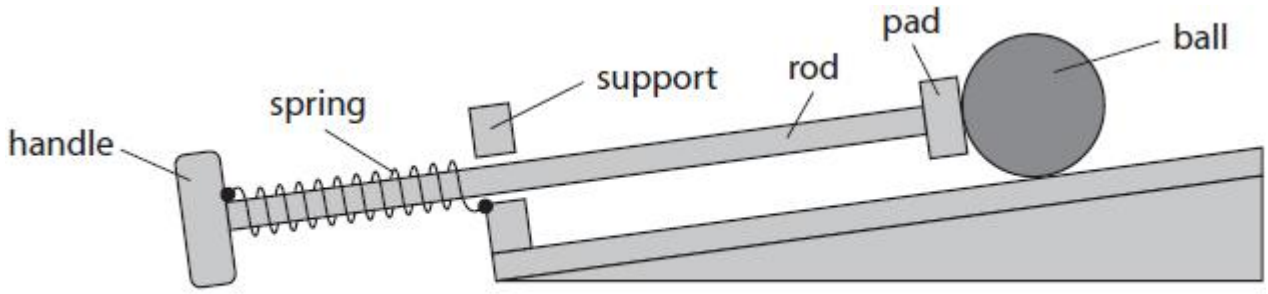

Figure 10

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 12.

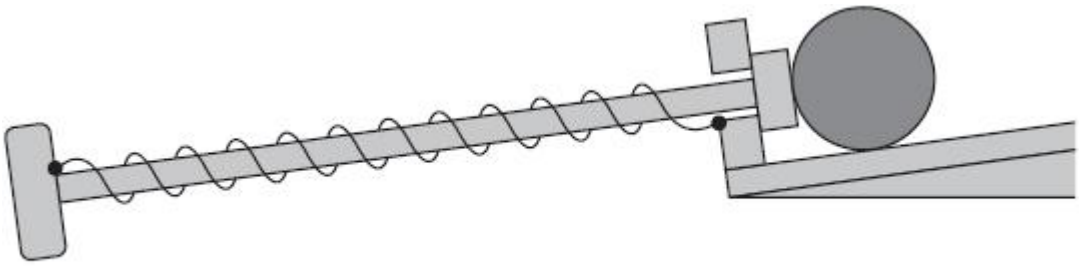

Figure 12

(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

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

(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)

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