

Name of the Student: _____

Max. Marks : 20 Marks

Time : 20 Minutes

Q1.

The student measures the extension of the spring as he adds different loads (loading).

He then measures the extension of the spring as he takes the loads off (unloading).

He then repeats the investigation using a rubber band instead of the spring.

The tables in Figure 4 show his results.

spring			rubber band		
load in N	extension in mm	extension in mm	load in N	extension in mm	extension in mm
	loading	unloading		loading	unloading
0	0	0	0	0	0
1	20	20	1	14	25
2	40	40	2	33	42
3	60	60	3	60	60

Figure 4

State **two** similarities and **two** differences between the results for the spring and the results for the rubber band.

(4)

Similarity 1

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Similarity 2

.....

Difference 1

.....

Difference 2

.....

Q2.

Answer the question with a cross in the box you think is correct . If you change your mind about an answer, put a line through the box and then mark your new answer with a cross .

Figure 3 shows a toy used to launch a ball.

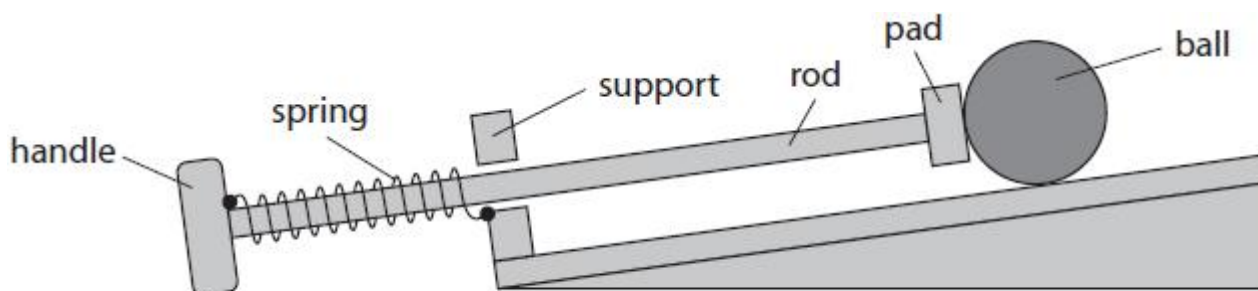


Figure 3

One end of the spring is fixed to the handle.

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

A child pulls the handle, stretching the spring.

Figure 4 shows the toy with the spring stretched.

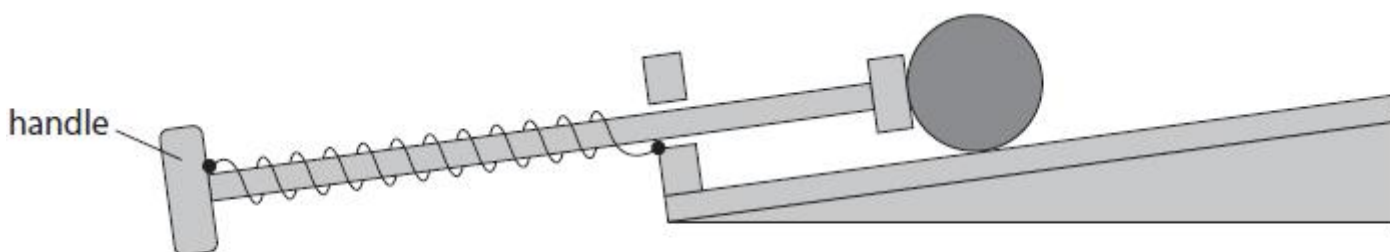


Figure 4

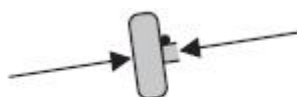
(i) Which of these shows the forces acting on the handle when the child keeps the spring stretched?
Ignore the force due to gravity.



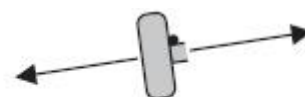
A



B



C



D

(1)

(ii) In Figure 4, the extension of the spring is 0.070 m.

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

Calculate the force used to extend the spring.

Use the equation

$$\text{force} = k \times \text{extension}$$

(2)

force = N

(Total for question = 3 marks)

Q3.

A student uses a digital calliper to measure the length of a spring, as shown in Figure 20.

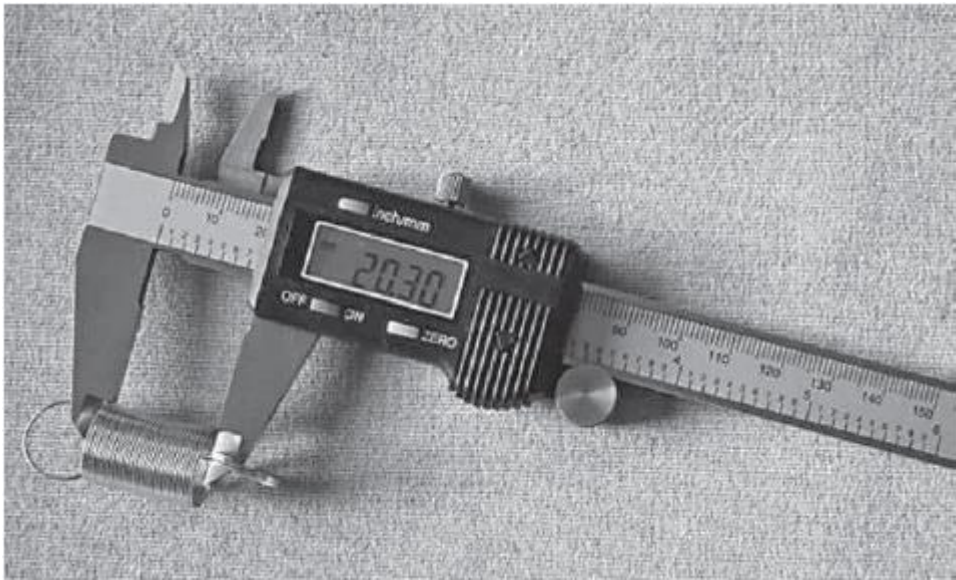


Figure 20

The spring is bendy and difficult to measure.

The student takes the six readings shown in Figure 21.



Figure 21

(a) Calculate the average length of the spring.

(2)

average length = mm

(b) The student investigates the stretching of a spring with the equipment shown in Figure 22.

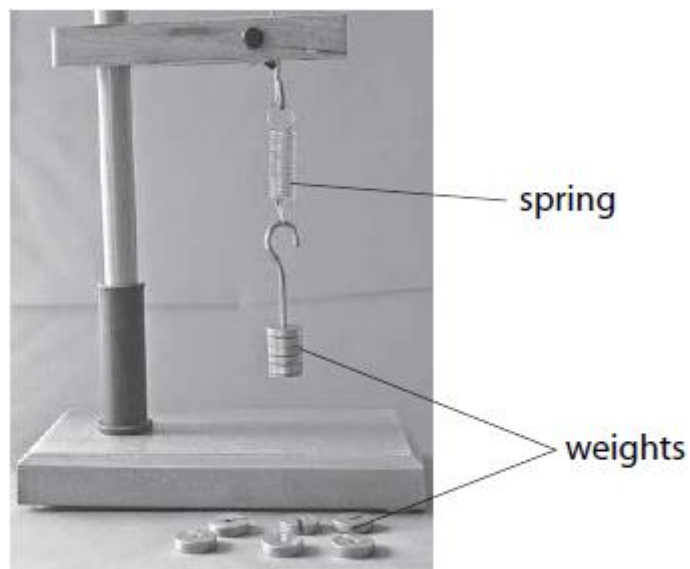


Figure 22

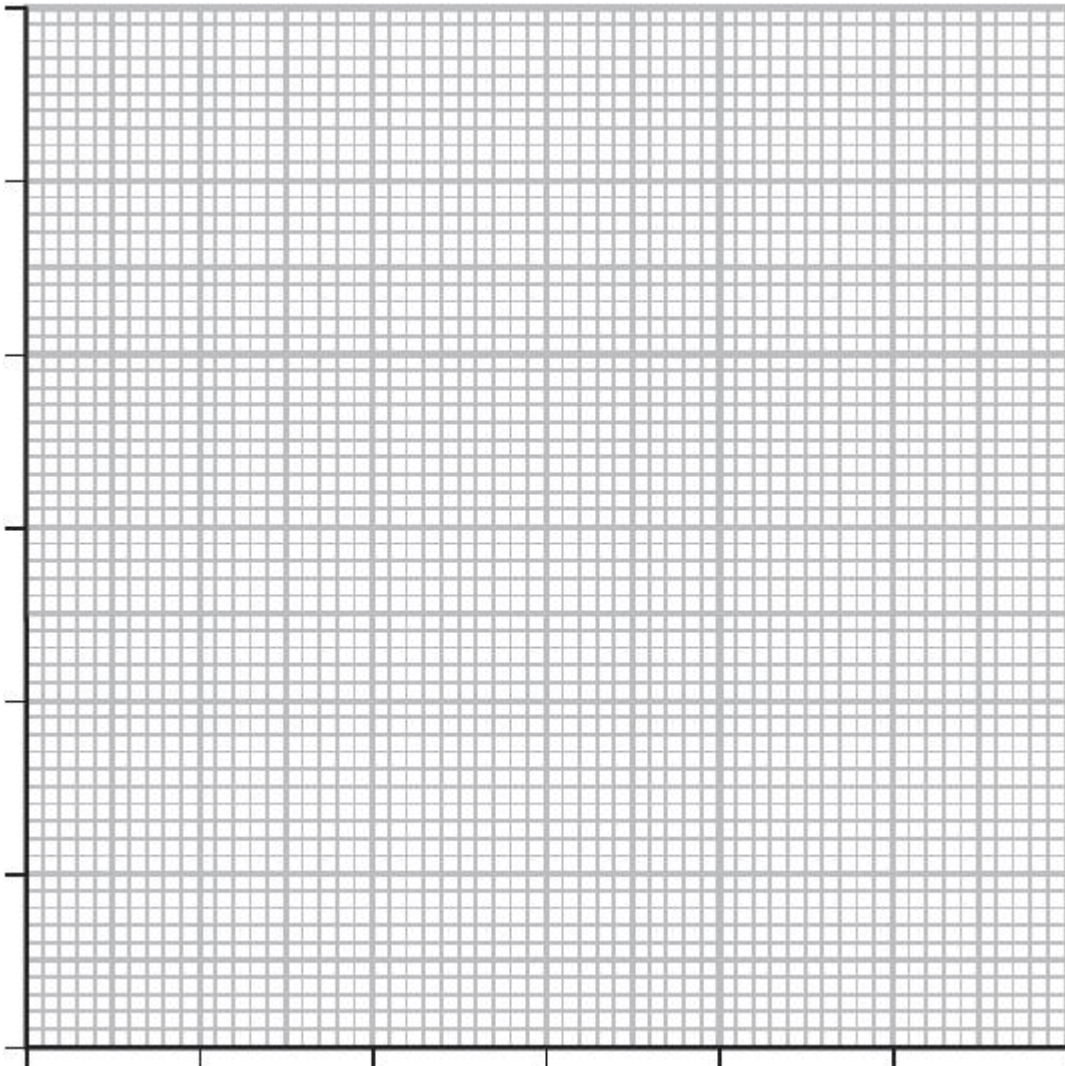
The student investigates the extension of the spring using six different weights. The results are shown in Figure 23.

weight (N)	extension (mm)
0.20	4.0
0.40	8.0
0.60	12.0
0.80	16.0
1.00	20.0
1.20	24.0

Figure 23

(i) Draw a graph for the readings, using the grid shown.

(3)



(ii) The student writes this conclusion:

'The extension of the spring is directly proportional to the weight stretching the spring.'

Comment on the student's conclusion.

(3)

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(Total for question = 8 marks)

Q4.

A student uses the apparatus shown in Figure 3 to investigate the extension of a spring.

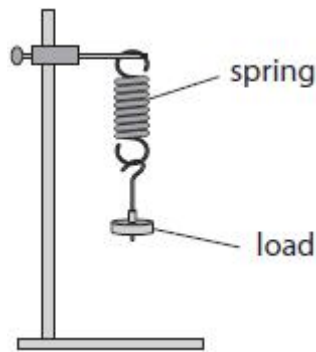


Figure 3

(i) Describe how the student could measure the extension of the spring when a load is added.

(3)

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.....

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(ii) The extension of the spring for a load of 1.5 N is 30 mm.

Calculate the spring constant for the spring.

Use the equation

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

(2)

spring constant = N/mm

(Total for question = 5 marks)