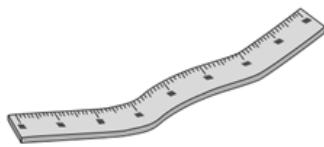


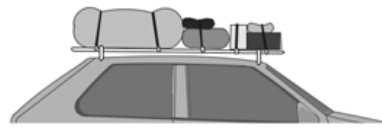
# FORCES AND ELASTICITY 1

1 (a) The pictures show four objects. Each object has had its shape changed.



Bent metal ruler

**A**



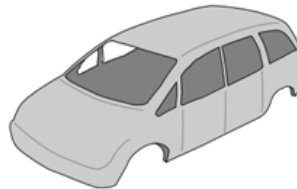
Stretched bungee cords

**B**



Springs on a playground ride

**C**



Moulded plastic model car body

**D**

Which of the objects are storing elastic potential energy?

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Explain the reason for your choice or choices.

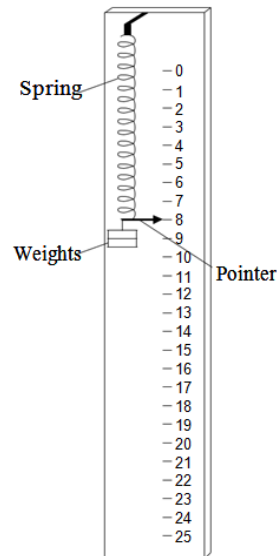
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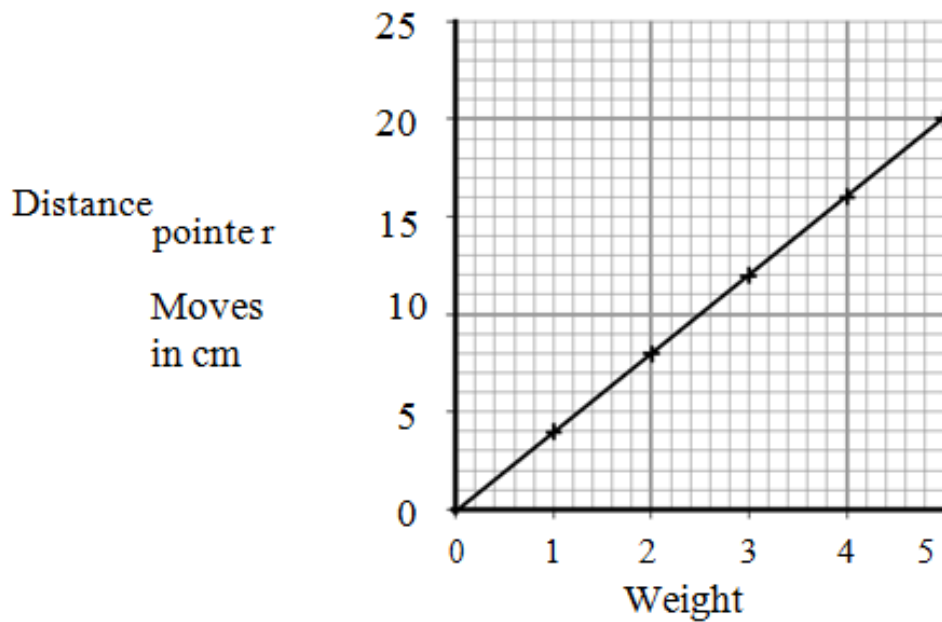
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(3 marks)

(b) A student makes a simple spring balance. To make a scale, the student uses a range of weights. Each weight is put onto the spring and the position of the pointer marked.



The graph below shows how increasing the weight made the pointer move further.



(i) Which one of the following is the unit of weight? Draw a ring around your answer.

Joule    kilogram    newton watt

(1 mark)

(ii) What range of weights did the student use?

\_\_\_\_\_

(1 mark)

(iii) How far does the pointer move when 4 units of weight are on the spring?

\_\_\_\_\_

(1 mark)

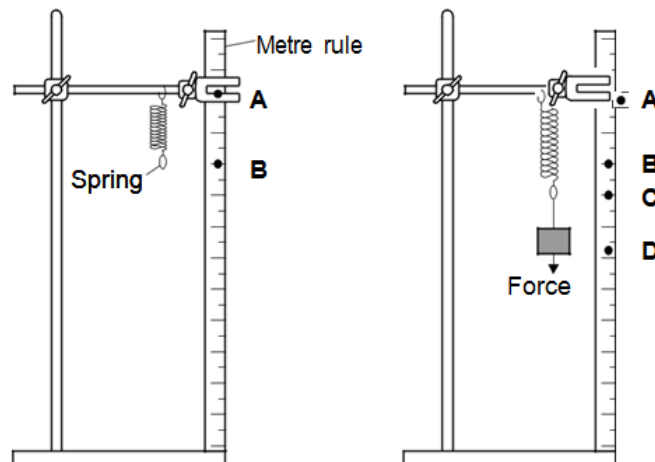
(iv) The student ties a stone to the spring. The spring stretches 10 cm. What is the weight of the stone?

\_\_\_\_\_

(1 mark)

**Q:2** A student investigated how the extension of a spring depends on the force applied to the spring.

The diagram shows the spring before and after a force had been applied.



**(a) (i)** Complete the following sentence using letters, A, B, C or D, from the diagram.

The extension of the spring is the distance between the positions labelled \_\_\_\_\_  
and \_\_\_\_\_ on the metre rule.

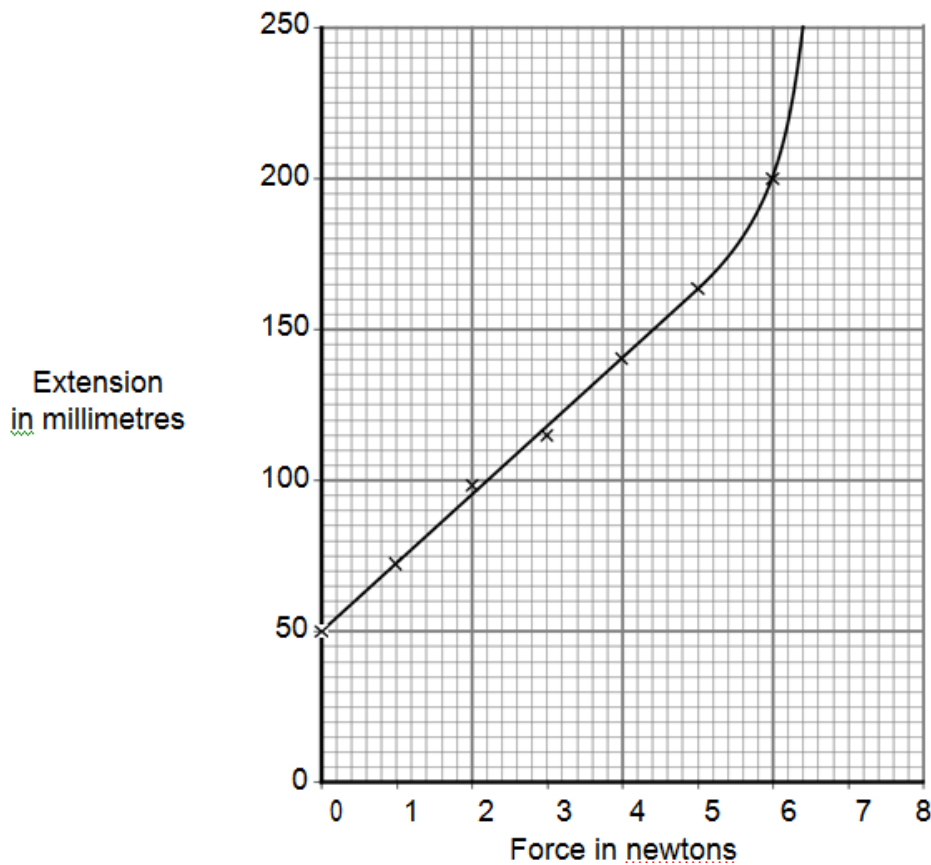
(1 mark)

**(a) (ii)** What form of energy is stored in the stretched spring?

\_\_\_\_\_

(1 mark)

**(b)** The results from the investigation are plotted on the following graph.



**(b) (i)** The graph shows that the student has made an error throughout the investigation.

What error has the student made?

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Give the reason for your answer.

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(2 marks)

**(b) (ii)** The student has loaded the spring beyond its limit of proportionality.

Mark on the graph line the limit of proportionality of the spring. Label the point P.

Give the reason for choosing your point P.

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(2 marks)

**(c)** The student uses a different spring as a spring balance. When the student hangs a stone from this spring, its extension is 72 mm. The spring does not go past the limit of proportionality. Calculate the force exerted by the stone on the spring.

spring constant = 25 N/m

Use the correct equation from the Physics Equations Sheet.

Show clearly how you work out your answer.

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Force = \_\_\_\_\_ N

(2 marks)

**Q:3 (a)** When a force is applied to a spring, the spring extends by 0.12 m. The spring has a spring constant of 25 N/m. Calculate the force applied to the spring.

Use the correct equation from the Physics Equations Sheet.

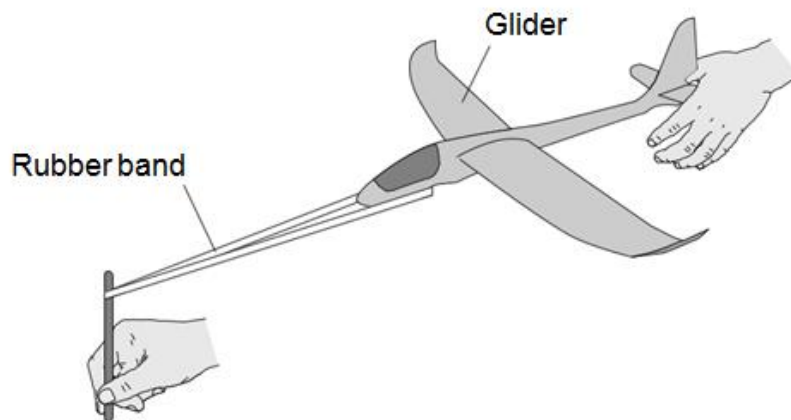
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Force = \_\_\_\_\_ . N

(2 marks)

**(b)** Figure 2 shows a toy glider. To launch the glider into the air, the rubber band and glider are pulled back and then the glider is released.



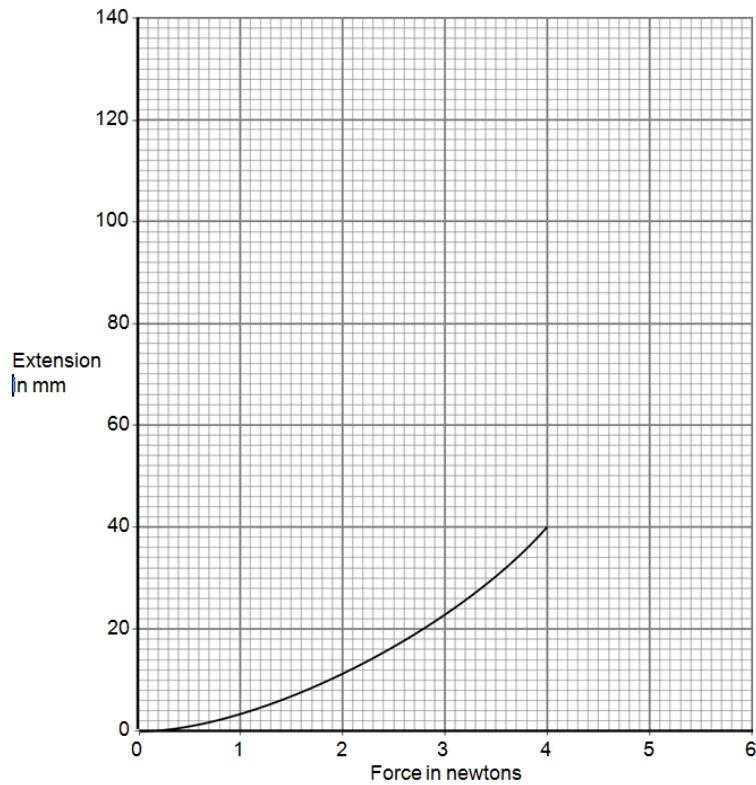
**(b) (i)** Use the correct answers from the box to complete the sentence.

chemical      elastic potential      kinetic      thermal

When the glider is released, the \_\_\_\_\_ energy stored in the rubber band decreases and the glider gains \_\_\_\_\_ energy.

(2 marks)

(b) (ii) Figure 3 shows how the extension of the rubber band varies with the force applied to the rubber band.



What can you conclude, from Figure 3, would happen to the extension of the rubber band if the force applied to the rubber band was increased to 6 N?

The rubber band does not break.

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(2 marks)

**TOTAL MARKS=21**