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# GCSE Physics B (Twenty First Century Science)

**J259/01** Breadth in Physics (Foundation Tier)

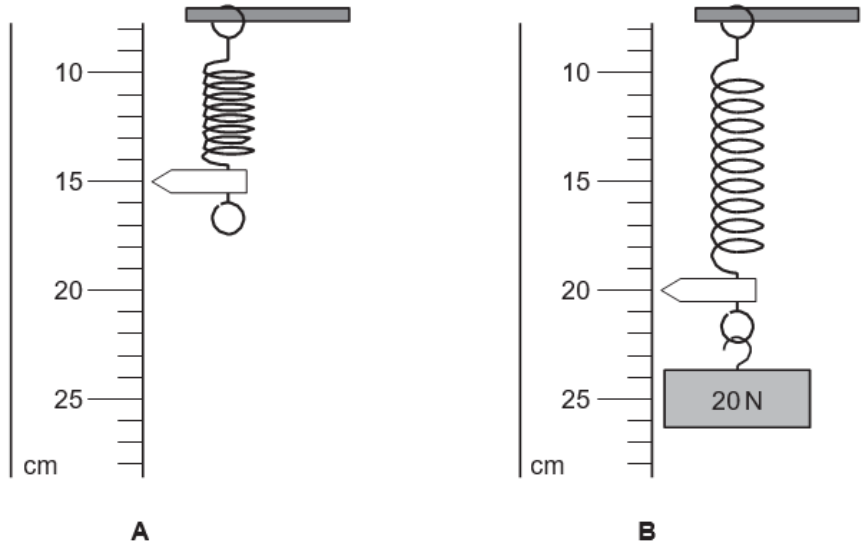
## Question Set 7

Multiple Choice Questions

**1** Ali hangs a spring next to a ruler with a centimetre scale, as shown in the diagram **A**.

He attaches a 20 newton (N) weight to the bottom of the spring.

The spring stretches as shown in **B**.




**(a)** **(i)** What is the correct extension (in **metres**) of the spring in diagram **B**?

Put a ring around the correct answer.

**0.05 m** **0.15 m** **0.25 m** **0.35 m**

**[1]**

**(ii)** Show that the spring constant is 400 N/m.

$F = ke \; so \; k = \frac{F}{e} = \frac{20}{0.05} = 400 N/m$

**[3]**

**(b)** Calculate the **energy stored** in the spring when it is stretched as in **(a)**.

$E = \frac{1}{2} Fe = \frac{1}{2} \times 20 \times 0.05 = 0.5 J$

Energy stored = 0.5 J

**[3]**

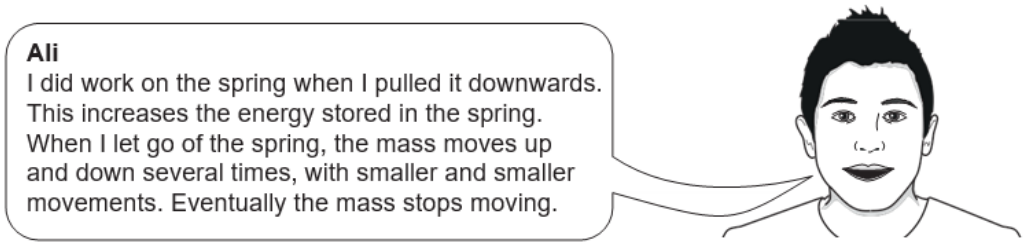
**(c)** When Ali adds another 20 N weight, the extension doubles.

Describe the relationship between force and extension.

Force and extension are directly proportional

**[1]**

**(d)** Ali pulls the spring in diagram **B** downwards a further 2 cm and then lets go.




Describe what happens to the energy stored in the spring when Ali lets go. **[3]**

The elastic potential energy in the spring is converted to kinetic energy and gravitational potential energy as well as some energy lost as heat to the surroundings

## Total Marks for Question Set 7: 11

# Resource Materials

Question Set No: 7

## Equations in Physics

change in internal energy = mass × specific heat capacity × change in temperature

energy to cause a change in state = mass × specific latent heat

for gases: pressure × volume = constant
(for a given mass of gas and at a constant temperature)

$(\text{final speed})^2 - (\text{initial speed})^2 = 2 \times \text{acceleration} \times \text{distance}$

energy stored in a stretched spring = ½ × spring constant × $(\text{extension})^2$

potential difference across primary coil × current in primary coil =
potential difference across secondary coil × current in secondary coil

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