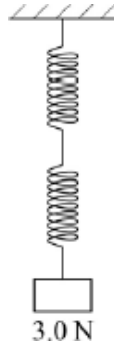**Q1.** A load of 3.0 N is attached to a spring of negligible mass and spring constant 15 N m^{-1}.
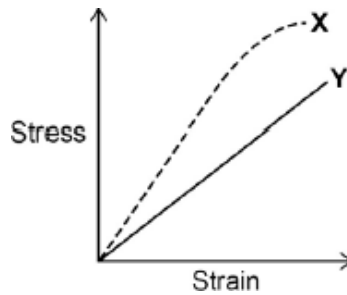

3.0 N

What is the energy stored in the spring?

A   0.3 J

B   0.6 J

C   0.9 J

D   1.2 J

(Total 1 mark)

Q2. The diagram shows how the stress varies with strain for metal specimens X and Y which are different. Both specimens were stretched until they broke.
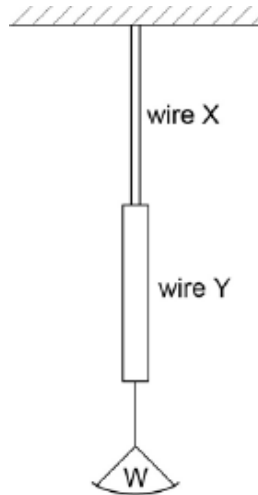

Which of the following is incorrect?

A   X is stiffer than Y

B   X has a higher value of the Young modulus

C   X is more brittle than Y

D   Y has a lower maximum tensile stress than X

(Total 1 mark)

Q3. Two vertical copper wires X and Y of equal length are joined as shown. Y has a greater diameter than X. A weight W is hung from the lower end of Y.
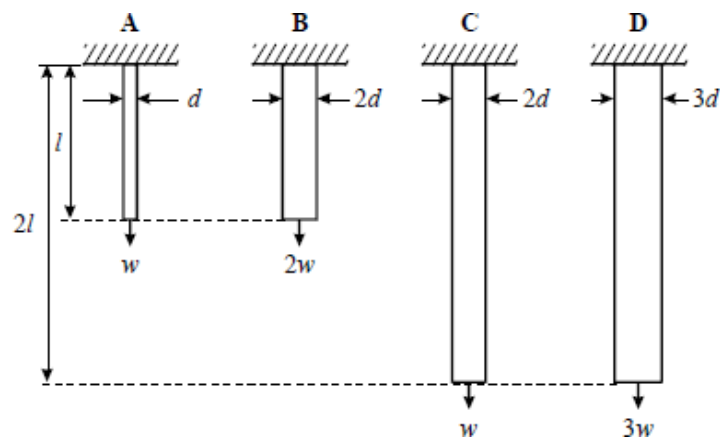

Which of the following is correct?

A   The strain in X is the same as that in Y.   ▭

B   The stress in Y is greater than that in X.   ▭

C   The tension in Y is the same as that in X.   ▭

D   The elastic energy stored in X is less than that stored in Y.   ▭
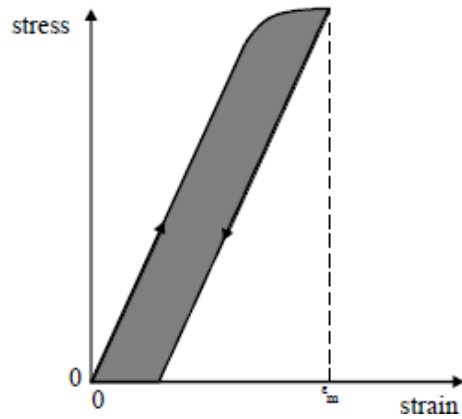
(Total 1 mark)

Q4. The four bars **A**, **B**, **C** and **D** have diameters, lengths and loads as shown. They are all made of the same material.

Which bar has the greatest extension?

(Total 1 mark)

Q5. The graph shows the variation of stress with strain for a ductile alloy when a specimen is slowly stretched to a maximum strain of ε_m and the stress is then slowly reduced to zero.


The shaded area

A   represents the work done per unit volume when stretching the specimen

B   represents the energy per unit volume recovered when the stress is removed

C   represents the energy per unit volume which cannot be recovered

D   has units of J m⁻¹

(Total 1 mark)

Q6. The force on a sample of a material is gradually increased and then decreased. The graph of force against extension is shown in the diagram.
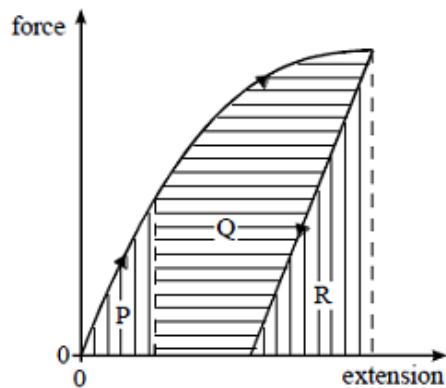
The increase in thermal energy in the sample is represented by area

A R

B $P + Q$

C $P + Q + R$

D $P + Q - R$

(Total 1 mark)

Q7. A stone is projected horizontally by a catapult consisting of two rubber cords. The cords, which obey Hooke's law, are stretched and released. When each cord is extended by x, the stone is projected with a speed v. Assuming that all the strain energy in the rubber is transferred to the stone, what is the speed of the stone when each cord is extended by $2x$?

A v

B $\sqrt{2v}$

C $2v$

D $4v$

(Total 1 mark)

M1. A

[1]

M2. C

[1]

M3. C

[1]

M4. A

[1]

M5. C

[1]

M6. B

[1]

M7. C

[1]