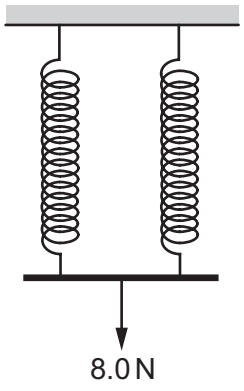
19 A metal wire, of cross-sectional area A and unstretched length l, is subjected to stress σ. As a result it has strain ε.

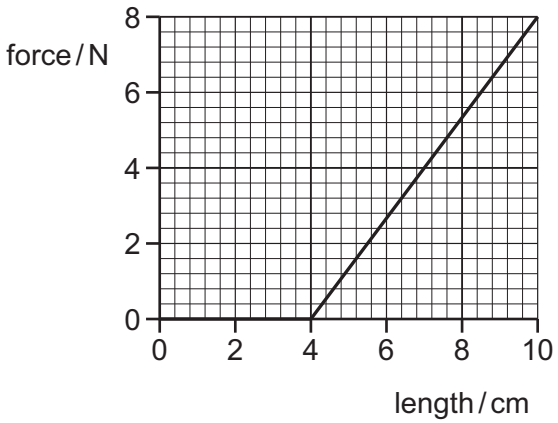
Which expression gives the Young modulus of the metal?

A $\frac{\varepsilon}{\sigma}$ **B** $\frac{\varepsilon A}{\sigma l}$ **C** $\frac{\sigma}{\varepsilon}$ **D** $\frac{\sigma l}{\varepsilon A}$

20 Two identical springs are connected in parallel.

A weight of 8.0 N is hung from the combination, as shown.





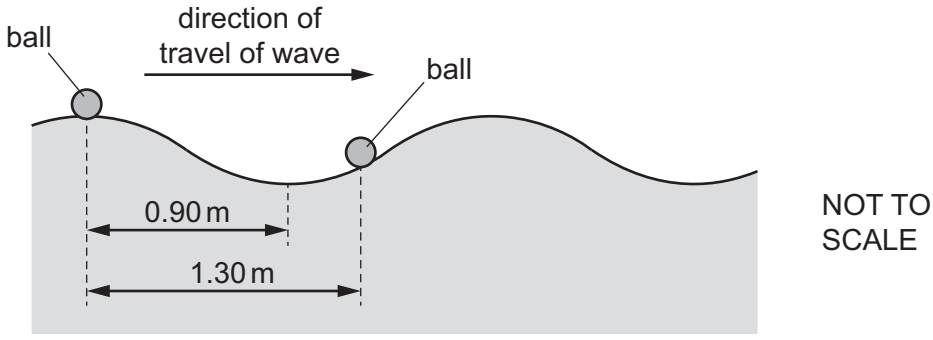
The graph shows the variation with length of the force applied to **one** of the springs.

What is the strain energy in **one** of the springs?

A 0.060 J **B** 0.12 J **C** 0.14 J **D** 0.24 J

21 Two balls float on the surface of the sea. The balls are separated by a distance of 1.30 m.

A wave travels on the surface of the sea so that the balls move vertically up and down.



The distance between a crest and an adjacent trough of the wave is 0.90 m.

What is the phase difference between the two balls?

A 55° **B** 110° **C** 160° **D** 260°