

- 17** A man of mass 75 kg runs up a staircase consisting of 30 steps. Each step is 20 cm high.
- The man takes a time of 7.0 s to run from the bottom of the staircase to the top.

What is the average rate of increase of gravitational potential energy of the man?

- A** 64 W                      **B** 450 W                      **C** 630 W                      **D** 4400 W

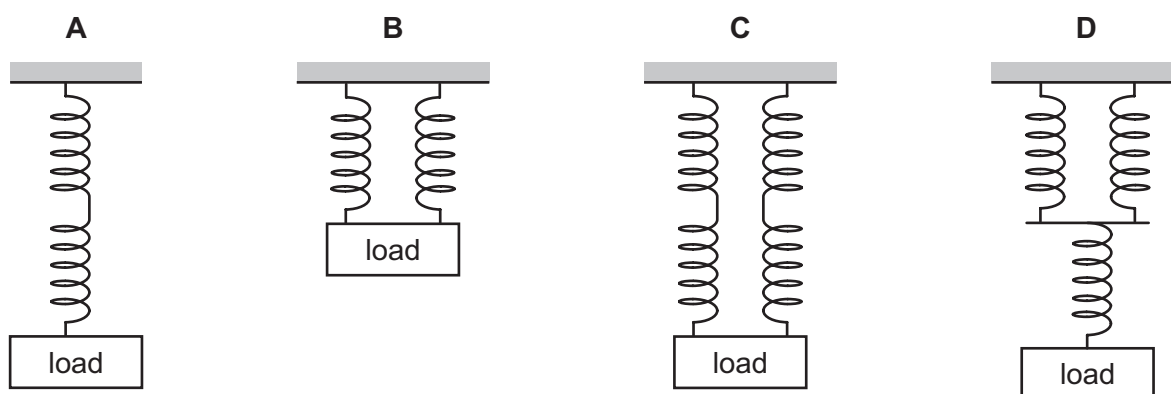
- 18** An alpha-particle has  $2.2 \times 10^{-13}$  J of kinetic energy.

What is the speed of the alpha-particle?

- A**  $4.1 \times 10^6 \text{ m s}^{-1}$   
**B**  $5.8 \times 10^6 \text{ m s}^{-1}$   
**C**  $8.1 \times 10^6 \text{ m s}^{-1}$   
**D**  $1.2 \times 10^7 \text{ m s}^{-1}$

- 19** Identical springs are joined in four arrangements.

Which arrangement has the same spring constant as a single spring?



- 20** An unstretched spring has a length of 2.0 cm.

The spring is then stretched within its limit of proportionality by a tensile force of 1.5 N so that the elastic potential energy stored in the spring is 0.045 J.

What is the stretched length of the spring?

- A** 3.0 cm                      **B** 5.0 cm                      **C** 6.0 cm                      **D** 8.0 cm