**1** Which list shows increasing lengths from beginning to end?

**A** 1 cm 1 nm 1 mm 1 μm

**B** 1 μm 1 mm 1 nm 1 cm

**C** 1 nm 1 μm 1 mm 1 cm

**D** 1 mm 1 cm 1 μm 1 nm

**2** Which equation contains only scalar quantities?

**A** $\text{acceleration} = \dfrac{\text{force}}{\text{mass}}$

**B** $\text{power} = \dfrac{\text{work}}{\text{time}}$

**C** $\text{pressure} = \dfrac{\text{force}}{\text{area}}$

**D** $\text{velocity} = \dfrac{\text{displacement}}{\text{time}}$

**3** The time $T$ taken for a satellite to orbit the Earth on a circular path is given by the equation

$$T^2 = \frac{kr^3}{M}$$

where $r$ is the radius of the orbit, $M$ is the mass of the Earth and $k$ is a constant.

What are the SI base units of $k$?

**A** $\text{kg}^{-1}\,\text{m}^{-3}\,\text{s}^2$ **B** $\text{kg}^{-1}\,\text{m}^3\,\text{s}^2$ **C** $\text{kg}\,\text{m}^{-3}\,\text{s}^2$ **D** $\text{kg}\,\text{m}^3\,\text{s}^2$

**4** Which row gives reasonable estimates for the mass and the speed of an adult running?

| | mass / kg | speed / m s$^{-1}$ |
|---|---|---|
| **A** | $6 \times 10^0$ | $5 \times 10^1$ |
| **B** | $6 \times 10^1$ | $5 \times 10^0$ |
| **C** | $6 \times 10^1$ | $5 \times 10^1$ |
| **D** | $6 \times 10^2$ | $5 \times 10^0$ |