

- 10 An astronaut of mass  $m$  in a spacecraft experiences a gravitational force  $F = mg$  when stationary on the launchpad.

What is the gravitational force on the astronaut when the spacecraft is launched vertically upwards with an acceleration of  $0.2g$ ?

- A**  $1.2mg$       **B**  $mg$       **C**  $0.8mg$       **D**  $0$

- 11 A beam of  $\alpha$ -particles collides with a lead sheet. Each  $\alpha$ -particle in the beam has a mass of  $6.6 \times 10^{-27} \text{ kg}$  and a speed of  $1.5 \times 10^7 \text{ m s}^{-1}$ .

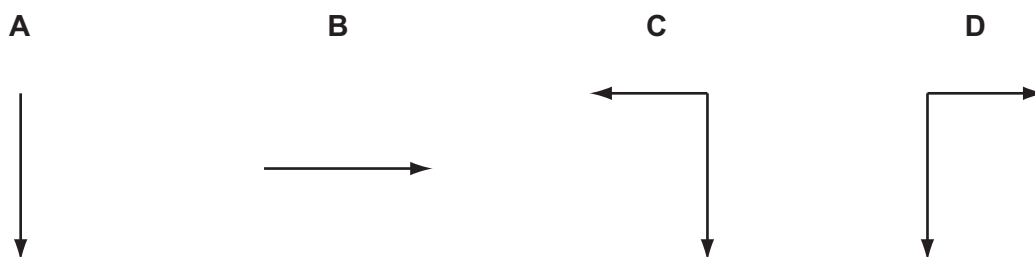
$5.0 \times 10^4$   $\alpha$ -particles per second collide with an area of  $1.0 \text{ cm}^2$  of lead. Almost all of the  $\alpha$ -particles are absorbed by the lead so that they have zero speed after collision.

What is an estimate of the average pressure exerted on the lead by the  $\alpha$ -particles?

- A**  $5.0 \times 10^{-15} \text{ Pa}$   
**B**  $5.0 \times 10^{-13} \text{ Pa}$   
**C**  $5.0 \times 10^{-11} \text{ Pa}$   
**D**  $5.0 \times 10^{-9} \text{ Pa}$

- 12 An object in air is thrown upwards and towards the left.

Which diagram shows the force(s) acting on the body when it is at its highest point?



**Space for working**