

- 9 A sprinter runs a 100 m race in a straight line. He accelerates from the starting block at a constant acceleration of  $2.5 \text{ m s}^{-2}$  to reach his maximum speed of  $10 \text{ m s}^{-1}$ . He maintains this speed until he crosses the finish line.

Which time does it take the sprinter to run the race?

- A** 4 s                      **B** 10 s                      **C** 12 s                      **D** 20 s

- 10 A firework rocket is fired vertically upwards. The fuel burns and produces a constant upwards force on the rocket. After 5 seconds there is no fuel left. Air resistance is negligible.

What is the acceleration before and after 5 seconds?

	before 5 seconds	after 5 seconds
<b>A</b>	constant	constant
<b>B</b>	constant	zero
<b>C</b>	increasing	constant
<b>D</b>	increasing	zero

- 11 Trolley X, moving along a horizontal frictionless track, collides with a stationary trolley Y. The two trolleys become attached and move off together.

Which statement about this interaction is correct?

- A** Some of the kinetic energy of trolley X is changed to momentum in the collision.  
**B** Some of the momentum of trolley X is changed to kinetic energy in the collision.  
**C** Trolley X loses some of its momentum as heat in the collision.  
**D** Trolley X shares its momentum with trolley Y but some of its kinetic energy is lost.

- 12 An astronaut throws a stone with a horizontal velocity near to the Moon's surface.

Which row describes the horizontal and vertical forces acting on the stone after release?

	horizontal force	vertical force
<b>A</b>	constant	constant
<b>B</b>	constant	decreasing
<b>C</b>	zero	constant
<b>D</b>	zero	decreasing