

- 12** A rocket has a weight of W and an initial acceleration of a as the rocket leaves the ground vertically. The acceleration of free fall is g .

Which expression gives the initial upward force exerted on the rocket due to the engine?

- A** $\frac{Wa}{g} + W$ **B** $\frac{Wa}{g}$ **C** $\frac{Wa}{g} - W$ **D** $Wa + W$

A-Level Physics: **s25 12**

- 7** A solid object of mass 1.0 kg falls vertically downwards in a vacuum.

When the speed of the object is 60 m s^{-1} , an additional constant force of 50 N suddenly starts to act vertically upwards on the object.

What is the speed of the object 2.0 s after the additional force starts to act?

- A** 20 m s^{-1} **B** 40 m s^{-1} **C** 80 m s^{-1} **D** 100 m s^{-1}

- 9** A rocket engine ejects 90 kg of exhaust gas per second at a velocity of 190 m s^{-1} relative to the rocket.

What is the force acting on the rocket due to the ejected gas?

- A** 2.1 kN **B** 17 kN **C** 18 kN **D** 162 kN

A-Level Physics: **m25 12**

- 8** 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