B3   Uniform Accelerated Motion in One Dimension

Assume that any dropped or thrown object accelerates downwards at $9.8\,\mathrm{m\,s^{-2}}$. If a question says that an object is 'dropped', this means that its velocity is zero at the beginning of the motion.

If asked for a velocity or displacement, your answer MUST contain a direction in order to be marked as correct.

B3.1   How far does a dropped pencil case fall in 0.25 s?

B3.2   What is the velocity of a rugby ball 3.0 s after it is kicked upwards with a speed of $16\ \mathrm{m\ s^{-1}}$?

B3.3   How much time does

    a) a dropped weight take to fall 120 m down a cliff?

    b) the weight take if it were thrown downwards at $2.5\ \mathrm{m\ s^{-1}}$?

B3.4   A high performance car can travel from rest to $25\ \mathrm{m\ s^{-1}}$ in 5.0 s.

    a) What is its acceleration?

    b) How far does the car travel while accelerating?

B3.5   An aeroplane cannot take off until it is travelling at $80\ \mathrm{m\ s^{-1}}$. If its acceleration is $2.5\ \mathrm{m\ s^{-2}}$, how much distance does it travel while accelerating from rest to its take-off speed?

B3.6   The brakes on a car can stop it from a speed of $31\ \mathrm{m\ s^{-1}}$ (70 mph) in a distance of 70 m. Calculate the acceleration of the car as it slows down.

B3.7   The Dodonpa roller coaster accelerates from rest to $48\ \mathrm{m\ s^{-1}}$ (107 mph) with an acceleration of $26.5\ \mathrm{m\ s^{-2}}$. How much time does it take?

B3.8   A tennis ball is fired upwards at a speed of $60\ \mathrm{m\ s^{-1}}$ from the top of a tall cliff. Where is it in relation to the starting point after 12.0 s?

B3.9   You want to fire a ball vertically into the air so that it reaches a maximum height of 100 m. How fast must you fire it?