The First Constant-Acceleration Formulae

Specification: AQA 7357: P1, Q1, Q3 · Edexcel 9MA0: 6.1, 7.1, 7.3

HOMEWORK Consolidation

1 A particle moving in a straight line has initial velocity 7 m s^{-1} and constant acceleration 0.6 m s^{-2}. Find its velocity after 20 s.

AQA Q3 · Edexcel 7.3

2 A car moving at 24 m s^{-1} brakes and stops with constant deceleration in 6 s.

(a) Find its deceleration.

(b) Find its stopping distance.

AQA Q3 · Edexcel 7.3

3 A car moves with constant acceleration. It passes two signposts 400 m apart in 16 s. Its velocity at the second signpost is 30 m s^{-1}.

(a) Find its velocity at the first signpost.

(b) Find its acceleration.

AQA Q3 · Edexcel 7.3

4 A train slows down uniformly from 108 km h^{-1} to 36 km h^{-1} in 40 s.

(a) Find its deceleration.

(b) Find the distance it travels in this time.

AQA P1, Q3 · Edexcel 6.1, 7.3

5 A particle accelerates uniformly at 0.5 m s^{-2} from 3 m s^{-1} to 12 m s^{-1}.

(a) How long does this take?

(b) How far does it travel?

AQA Q3 · Edexcel 7.3

6 A particle starts from rest and accelerates uniformly at 2.4 m s^{-2} for 5 s.

(a) Find its final velocity.

(b) Find the distance it travels.

AQA Q3 · Edexcel 7.3

7 A train starts from rest and accelerates uniformly to 25 m s^{-1} in 1.5 minutes.

(a) Find its acceleration.

(b) Find the distance it travels, in km.

AQA P1, Q3 · Edexcel 6.1, 7.3

8 A particle passes O moving in the positive direction at 15 m s^{-1}. Its acceleration is a constant -2.5 m s^{-2}.

(a) Find its velocity when $t = 8$, and describe its motion.

(b) Find its displacement from O when $t = 8$.

(c) Find the distance it travels in the 8 seconds.

AQA Q1, Q3 · Edexcel 7.1, 7.3

9 A particle moves along a straight line with constant acceleration. It passes A with velocity 2 m s^{-1} and B, 6 s later, with velocity 14 m s^{-1}. It reaches C 4 s after passing B.

(a) Find its acceleration.

(b) Find its velocity at C.

(c) Find the distance AC.

AQA Q3 · Edexcel 7.3

10 A car's speed increases uniformly from u m s^{-1} to $2u$ m s^{-1} while it travels d metres in T seconds.

(a) Show that $T = \dfrac{2d}{3u}$.

(b) Find its acceleration in terms of u and d.

AQA Q3 · Edexcel 7.3

11 *AQA-style*. A car is travelling along a straight horizontal road at 90 km h^{-1}. The driver sees a hazard. During her reaction time of 0.8 s the car keeps the same speed. She then brakes, and the car decelerates uniformly and stops 4 s after the brakes are applied.

(a) Show that the car's initial speed is 25 m s^{-1}. [1 mark]

(b) Find the deceleration of the car. [2 marks]

(c) Find the total distance the car travels from the moment the driver sees the hazard until it stops. [3 marks]

(d) State one modelling assumption you have made. [1 mark]

AQA P1, Q3 · Edexcel 6.1, 7.3 · AQA-style

12 *Edexcel-style*. A particle moves in a straight line from a point A to a point B with constant deceleration 1.5 m s^{-2}. Its speed at A is 12 m s^{-1} and it takes 6 s to move from A to B.

(a) Find the speed of the particle at B. (2)

(b) Find the distance AB. (2)

The particle continues to move with the same deceleration.

(c) Find the time, from leaving A, at which it comes to instantaneous rest. (2)

AQA Q3 · Edexcel 7.3 · Edexcel-style