

爱德思
Mechanics 1
分类真题
2014-2022 册

A Level Clouds 出品

目录

Chapter 1 Constant Acceleration	1
Chapter 2 Vectors in Mechanics	80
Chapter 3 Dynamics	153
Chapter 4 Limiting Equilibrium and Statics	224
Chapter 5 Momentum and Impulse	278
Chapter 6 Moments	329

Chapter 1

Constant Acceleration

5. A racing car is moving along a straight horizontal track with constant acceleration. There are three checkpoints, P , Q and R , on the track, where $PQ = 48$ m and $QR = 200$ m. The car takes 3 s to travel from P to Q and 5 s to travel from Q to R . Find

- (i) the acceleration of the car,
- (ii) the speed of the car as it passes P .

(7)

Leave
blank

8. Two trains, *A* and *B*, start together from rest, at time $t = 0$, at a station and move along parallel straight horizontal tracks. Both trains come to rest at the next station after 180 s.

Train *A* moves with constant acceleration $\frac{2}{3} \text{ m s}^{-2}$ for 30 s, then moves at constant speed

for 120 s and then moves with constant deceleration for the final 30 s. Train *B* moves with constant acceleration for 90 s and then moves with constant deceleration for the final 90 s.

- (a) Sketch, on the same axes, the speed–time graphs for the motion of the two trains between the two stations. (3)

- (b) Find the acceleration of train *B* for the first half of its journey. (5)

- (c) Find the times when the two trains are moving at the same speed. (4)

- (d) Find the distance between the trains 96 s after they start. (5)

Leave
blank

2. A ball is thrown vertically upwards with speed 20 m s^{-1} from a point A , which is h metres above the ground. The ball moves freely under gravity until it hits the ground 5 s later.

(a) Find the value of h .

(3)

A second ball is thrown vertically downwards with speed $w \text{ m s}^{-1}$ from A and moves freely under gravity until it hits the ground.

The first ball hits the ground with speed $V \text{ m s}^{-1}$ and the second ball hits the ground with speed $\frac{3}{4}V \text{ m s}^{-1}$.

(b) Find the value of w .

(5)

Leave
blank

6. A car starts from rest at a point A and moves along a straight horizontal road. The car moves with constant acceleration 1.5 m s^{-2} for the first 8 s. The car then moves with constant acceleration 0.8 m s^{-2} for the next 20 s. It then moves with constant speed for T seconds before slowing down with constant deceleration 2.8 m s^{-2} until it stops at a point B .

(a) Find the speed of the car 28 s after leaving A . (3)

(b) Sketch, in the space provided, a speed–time graph to illustrate the motion of the car as it travels from A to B . (2)

(c) Find the distance travelled by the car during the first 28 s of its journey from A . (4)

The distance from A to B is 2 km.

(d) Find the value of T . (4)

Leave
blank

4. The points P and Q are at the same height h metres above horizontal ground. A small stone is dropped from rest from P . Half a second later a second small stone is thrown vertically downwards from Q with speed 7.35 m s^{-1} . Given that the stones hit the ground at the same time, find the value of h .

(7)