

CIE
Mechanics
分类真题
2020-2022 册

A Level Clouds 出品

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Chapter 1

Velocity and Acceleration

Q1: 9709/42/M20

- 4 A cyclist travels along a straight road with constant acceleration. He passes through points *A*, *B* and *C*. The cyclist takes 2 seconds to travel along each of the sections *AB* and *BC* and passes through *B* with speed 4.5 m s^{-1} . The distance *AB* is $\frac{4}{5}$ of the distance *BC*.

- (a) Find the acceleration of the cyclist.

[5]

(b) Find AC .

[2]

Q2: 9709/41/S20

- 3** A particle P is projected vertically upwards with speed 5 m s^{-1} from a point A which is 2.8 m above horizontal ground.

- (a) Find the greatest height above the ground reached by P .

[3]

- (b) Find the length of time for which P is at a height of more than 3.6 m above the ground. [4]

[4]

Q3: 9709/42/S20

- 1 A tram starts from rest and moves with uniform acceleration for 20 s. The tram then travels at a constant speed, $V \text{ m s}^{-1}$, for 170 s before being brought to rest with a uniform deceleration of magnitude twice that of the acceleration. The total distance travelled by the tram is 2.775 km.

- (a) Sketch a velocity-time graph for the motion, stating the total time for which the tram is moving. [2]

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- (b) Find V . [2]

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- (c) Find the magnitude of the acceleration. [2]

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Q4: 9709/43/S20

- 4** A car starts from rest and moves in a straight line with constant acceleration $a \text{ m s}^{-2}$ for a distance of 50 m. The car then travels with constant velocity for 500 m for a period of 25 s, before decelerating to rest. The magnitude of this deceleration is $2a \text{ m s}^{-2}$.

- (a) Sketch the velocity-time graph for the motion of the car.

[1]

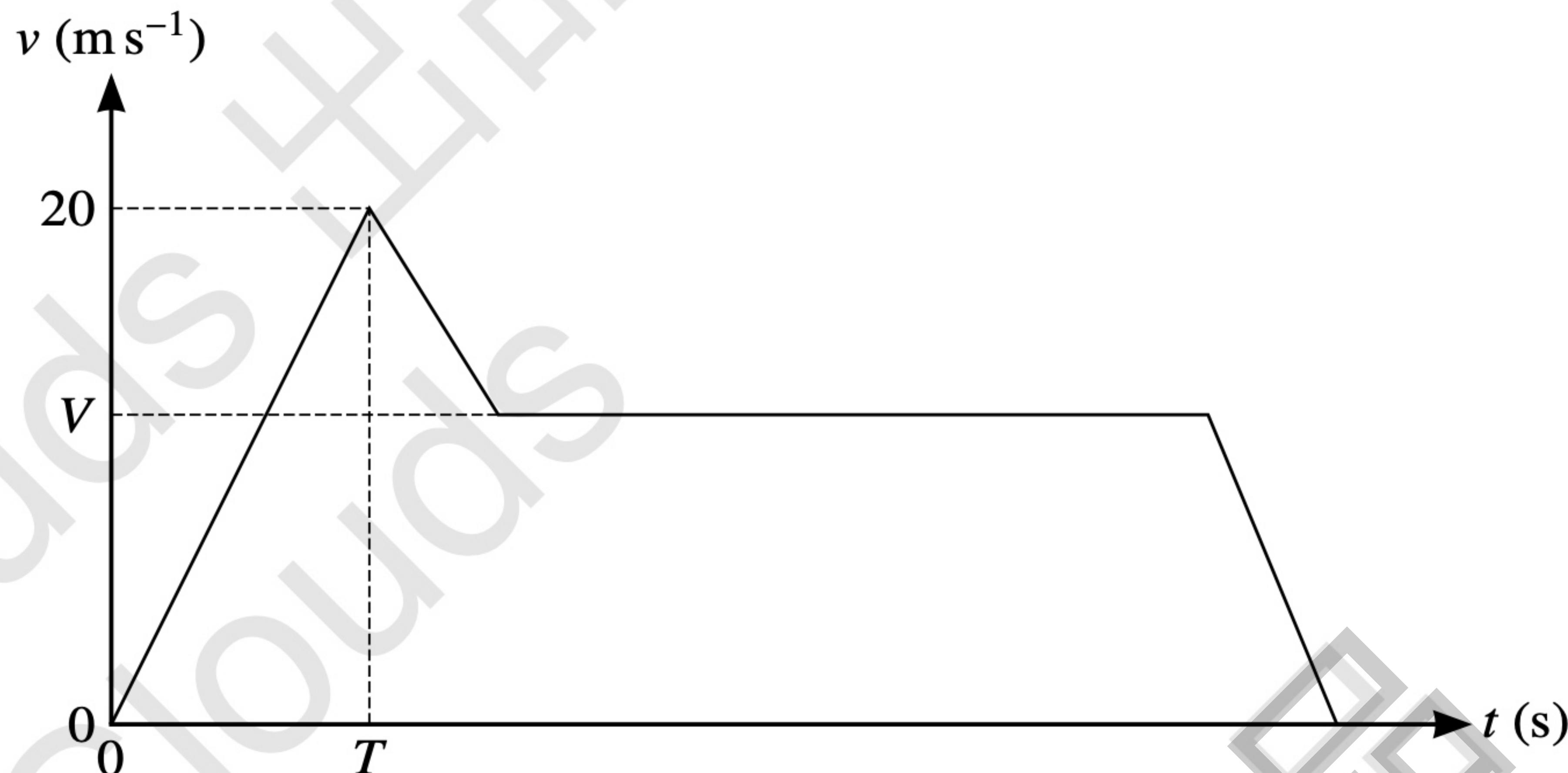


- (b) Find the value of a .

[3]

- (c) Find the total time for which the car is in motion.

[3]



The diagram shows a velocity-time graph which models the motion of a car. The graph consists of four straight line segments. The car accelerates at a constant rate of 2 m s^{-2} from rest to a speed of 20 m s^{-1} over a period of T s. It then decelerates at a constant rate for 5 seconds before travelling at a constant speed of $V \text{ m s}^{-1}$ for 27.5 s. The car then decelerates to rest at a constant rate over a period of 5 s.

- (a) Find T .

[1]

- (b) Given that the distance travelled up to the point at which the car begins to move with constant speed is one third of the total distance travelled, find V . [4]

Q6: 9709/42/W20

- 5 A particle is projected vertically upwards with speed 40 m s^{-1} alongside a building of height $h \text{ m}$.

- (a) Given that the particle is above the level of the top of the building for 4 s, find h . [4]

- (b) One second after the first particle is projected, a second particle is projected vertically upwards from the top of the building with speed 20 m s^{-1} .

Denoting the time after projection of the first particle by t s, find the value of t for which the two particles are at the same height above the ground. [4]