Name:

A-Level Physics: **s23 13**

5 Which equation, representing uniformly accelerated motion in a straight line, can be determined using **only** the definition of acceleration?

A $s = ut + \frac{1}{2}at^2$

B $s = \frac{1}{2}(u+v)t$

C $v = u + at$

D $v^2 = u^2 + 2as$

A-Level Physics: **s24 11**

4 An object is moving with initial velocity u. The object then moves with uniform acceleration a for time t until it reaches final velocity v.

Which equation describes the motion of the object?

A $u = v - 2at$ **B** $u = v - at$ **C** $v = u + at^2$ **D** $v = u + 2at^2$

A-Level Physics: **m22 12**

6 A sprinter takes a time of 11.0 s to run a 100 m race. She first accelerates uniformly from rest, reaching a speed of 10 m s^{-1}. She then runs at a constant speed of 10 m s^{-1} until the finish line.

What is the uniform acceleration of the sprinter for the first part of the race?

A 0.5 m s^{-2} **B** 0.91 m s^{-2} **C** 1.7 m s^{-2} **D** 5.0 m s^{-2}

A-Level Physics: **s21 11**

7 A train, initially at rest at a station, has a uniform acceleration of 0.20 m s^{-2} until it reaches a speed of 20 m s^{-1}. It travels for a time at this constant speed and then has a uniform deceleration of 0.40 m s^{-2} until it comes to rest at the next station. The distance between the two stations is 3000 m.

What is the time taken by the train to travel between the two stations?

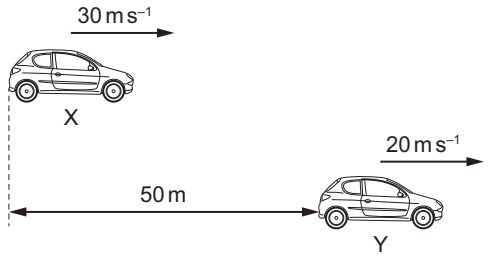
A 75 s **B** 150 s **C** 230 s **D** 300 s

A-Level Physics: **w21 11**

7 Two cars X and Y are positioned as shown at time $t = 0$.

They are travelling in the same direction.

X is 50 m behind Y and has a constant velocity of 30 m s^{-1}. Y has a constant velocity of 20 m s^{-1}.

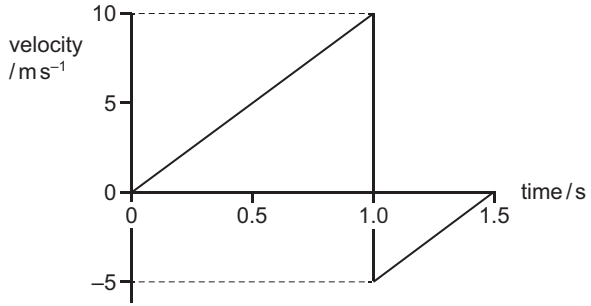


What is the value of t when X is level with Y?

A 1.0 s **B** 1.7 s **C** 2.5 s **D** 5.0 s

A-Level Physics: **m24 12**

6 A ball is released from rest at position X at time zero. At 1.0 s, it bounces inelastically from a horizontal surface and rebounds, reaching the top of its first bounce at 1.5 s.



What is the total displacement of the ball from its original position X at 1.5 s?

A 1.25 m **B** 3.75 m **C** 5.00 m **D** 6.25 m

2 A ball is thrown vertically downwards to the ground, as illustrated in Fig. 2.1.

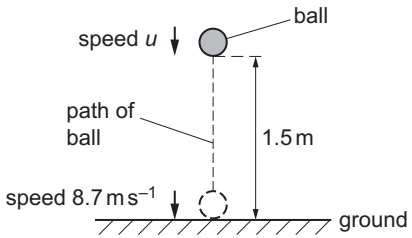


Fig. 2.1

The ball is thrown with speed u from a height of 1.5 m. The ball then hits the ground with speed 8.7 m s^{-1}. Assume that air resistance is negligible.

(a) Calculate speed u.

u = ... m s^{-1} [2]

(ii) Determine the magnitude of the average resultant force that acts on the ball during the collision.

average resultant force = ... N [1]

(iii) Use your answer in **(c)(ii)** to calculate the magnitude of the average force exerted by the ground on the ball during the collision.

average force = ... N [2]

(d) The ball was thrown downwards at time $t = 0$ and hits the ground at time $t = T$.

On Fig. 2.2, sketch a graph to show the variation of the speed of the ball with time t from $t = 0$ to $t = T$. Numerical values are not required.

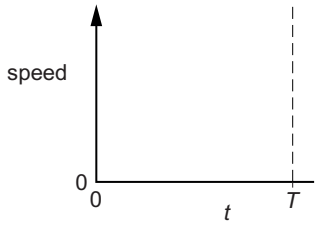


Fig. 2.2

[1]