5 How can the acceleration of an object be determined?

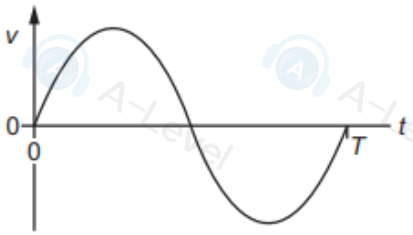
A from the area under a displacement–time graph

B from the area under a velocity–time graph

C from the gradient of a displacement–time graph

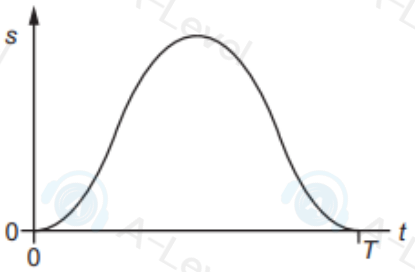
D from the gradient of a velocity–time graph

6 The graph shows how the velocity v of an object moving in a straight line varies with time t from $t = 0$ to $t = T$.

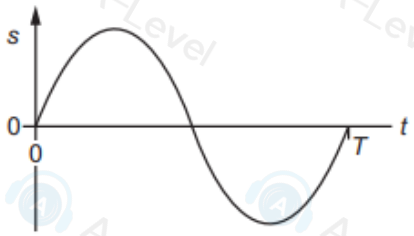


Which graph could represent the displacement s of the object from time $t = 0$ to $t = T$?

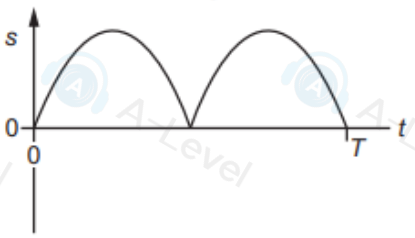
A



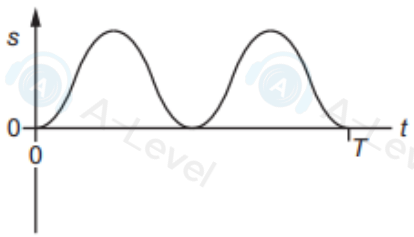
B



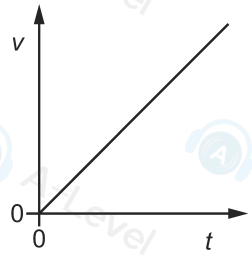
C



D

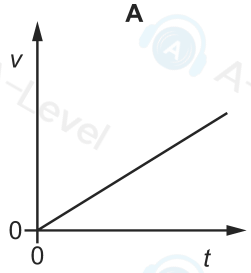


9 An object falls freely from rest in a vacuum. The graph shows the variation with time t of the velocity v of the object.

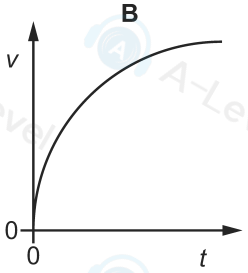


Which graph, **using the same scales**, represents the object falling in air?

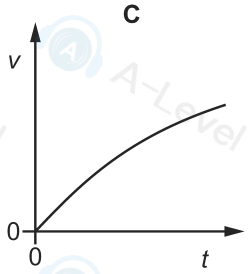
A



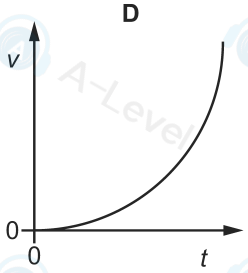
B



C



D



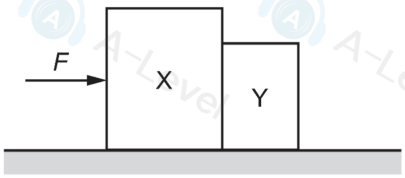
6 The water surface in a deep well is 78.0 m below the top of the well. A person at the top of the well drops a heavy stone down the well.

Air resistance is negligible. The speed of sound in the air is 330 $m\,s^{-1}$.

What is the time interval between the person dropping the stone and hearing it hitting the water?

A 3.75 s **B** 3.99 s **C** 4.19 s **D** 4.22 s

7 A single horizontal force F is applied to a block X which is in contact with a separate block Y, as shown.



The blocks remain in contact as they accelerate along a horizontal frictionless surface. Air resistance is negligible. X has a greater mass than Y.

Which statement is correct?

A The acceleration of X is equal to force F divided by the mass of X.

B The force that X exerts on Y is equal to F.

C The force that X exerts on Y is less than F.

D The force that X exerts on Y is less than the force that Y exerts on X.

7 A goods train passes through a station at a steady speed of 10 $m\,s^{-1}$ at time $t = 0$. An express train is at rest at the station. The express train leaves the station with a uniform acceleration of 0.5 $m\,s^{-2}$ just as the goods train goes past. Both trains move in the same direction on straight, parallel tracks.

At which time t does the express train overtake the goods train?

A 6 s **B** 10 s **C** 20 s **D** 40 s