5 A projectile is fired at an angle of 45° upwards from horizontal ground. Air resistance is negligible.

Which row describes the horizontal motion and the vertical motion of the projectile after it is fired until immediately before it reaches the ground again?

	horizontal motion	vertical motion
A	constant velocity	constant acceleration
B	constant velocity	varying acceleration
C	varying velocity	constant acceleration
D	varying velocity	varying acceleration

6 An aircraft on a runway accelerates uniformly from rest to its take-off speed of $58\,m\,s^{-1}$.

The acceleration of the aircraft is $4.2\,m\,s^{-2}$, and the aircraft uses 74% of the length of the runway to reach its take-off speed.

What is the length of the runway?

A 300 m **B** 540 m **C** 590 m **D** 800 m

7 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

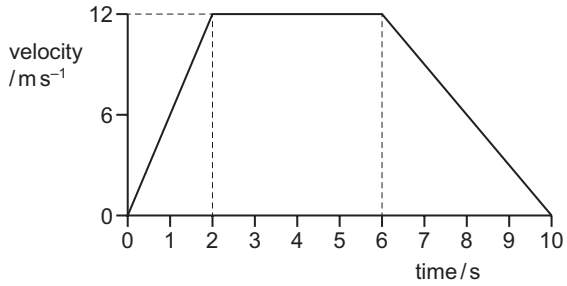
D from the gradient of a velocity–time graph

5 A ball is projected vertically downwards with an initial velocity of $20\,m\,s^{-1}$. Air resistance is negligible.

What is the displacement from its initial position of the ball after a time of 1.5 s?

A 11 m **B** 19 m **C** 37 m **D** 41 m

6 The graph shows the variation with time of the velocity of a car.



Which statement is correct?

A The car accelerates for 2 s, then stops for 4 s and then reverses.

B The car accelerates at $12\,m\,s^{-2}$ for 2 s.

C The car travels a distance of 36 m in the first 4 s.

D The car travels a distance of 48 m in the last 4 s.

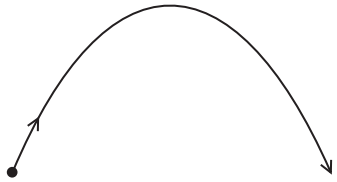
7 A solid object of mass 1.0 kg falls vertically downwards in a vacuum.

When the speed of the object is $60\,m\,s^{-1}$, an additional constant force of 50 N suddenly starts to act vertically upwards on the object.

What is the speed of the object 2.0 s after the additional force starts to act?

A $20\,m\,s^{-1}$ **B** $40\,m\,s^{-1}$ **C** $80\,m\,s^{-1}$ **D** $100\,m\,s^{-1}$

8 A stone is thrown upwards and follows a curved path.



Air resistance is negligible.

Why does the path have this shape?

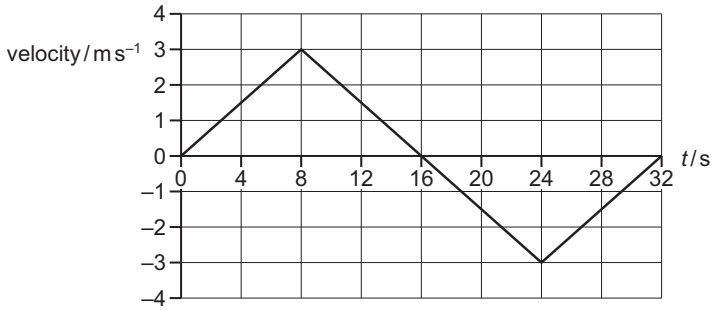
A The stone has a constant horizontal acceleration and constant vertical velocity.

B The stone has a constant horizontal velocity and constant vertical acceleration.

C The stone has a constant upward acceleration followed by a constant downward acceleration.

D The stone has a constant upward velocity followed by a constant downward velocity.

5 The graph shows the variation of velocity with time t of an object moving in a straight line.



At $t = 0$, the displacement of the object is zero.

What is the displacement of the object at $t = 20$ s?

A –3 m **B** 21 m **C** 24 m **D** 27 m

6 A science museum designs an experiment to show the fall of a feather in a vertical glass vacuum tube.

The time of fall from rest in the vacuum is to be close to 0.5 s.

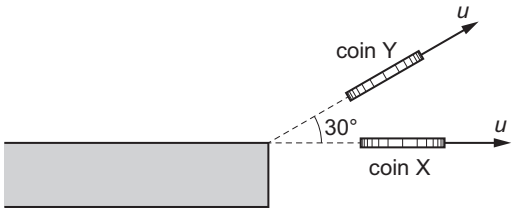
Which length of tube is required?

A 1.2 m **B** 2.5 m **C** 4.9 m **D** 9.8 m

7 Two coins are projected from a horizontal table at the same initial speed u.

Coin X is projected horizontally.

Coin Y is projected upwards at an angle of 30° to the horizontal.



Both coins hit the horizontal ground without bouncing.

Assume the air resistance on each coin is negligible.

Which statement about the motion of the coins is correct?

A Both coins hit the ground with the same speed.

B Both coins travel the same vertical distance.

C Coin Y hits the ground before coin X.

D Coin Y has a smaller vertical acceleration.