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2.1 Motion

Medium

PHYSICS

IB HL

EXAM PAPERS PRACTICE

2.1 Motion

Question Paper

Course	DP IB Physics
Section	2. Mechanics
Topic	2.1 Motion
Difficulty	Medium

Time allowed: 20

Score: /10

Percentage: /100

Question 1

An object of mass 5.6 g is falling vertically at a constant speed in air.

What is the approximate magnitude of the drag force acting on the object?

A. 0 N

B. 0.056 N

C. 56 N

D. 0.112 N

[1 mark]

Question 2

A stone is released from a hot air balloon moving upwards with a uniform velocity of 25 m s^{-1}.

If the hot air balloon is 30 m high when the stone was dropped, what is its height when the stone hits the ground?

A. 180 m

B. 55 m

C. 150 m

D. 60 m

[1 mark]

Question 3

The projectile path taken by an object with air resistance is a shorter horizontal distance to that without air resistance.

The effects of air resistance could be decreased by a projectile with a

A. Rougher surface

B. Larger surface to volume ratio

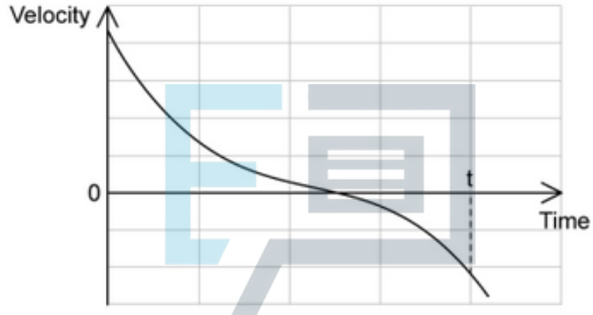
C. Smaller angle of release

D. Trajectory at a lower altitude

[1 mark]

Question 4

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



What can be deduced from the graph?

A. The car is never stationary

B. The car is always moving backwards

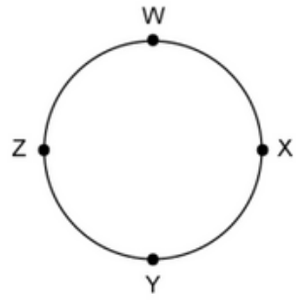
C. The car is always accelerating

D. The acceleration of the car is in the opposite direction to its velocity after time *t*

[1 mark]

Question 5

An object moves through one compete circle from point W to X to Y to Z and finally to W again.



The distance between X and Z is 6 km.

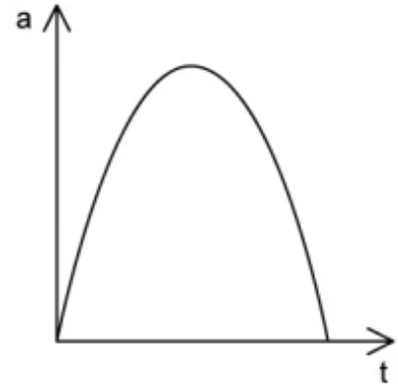
Which row is correct about the displacement and distance of the object?

	Displacement / km	Distance / km
A.	0	9π
B.	0	6π
C.	6π	0
D.	6π	9π

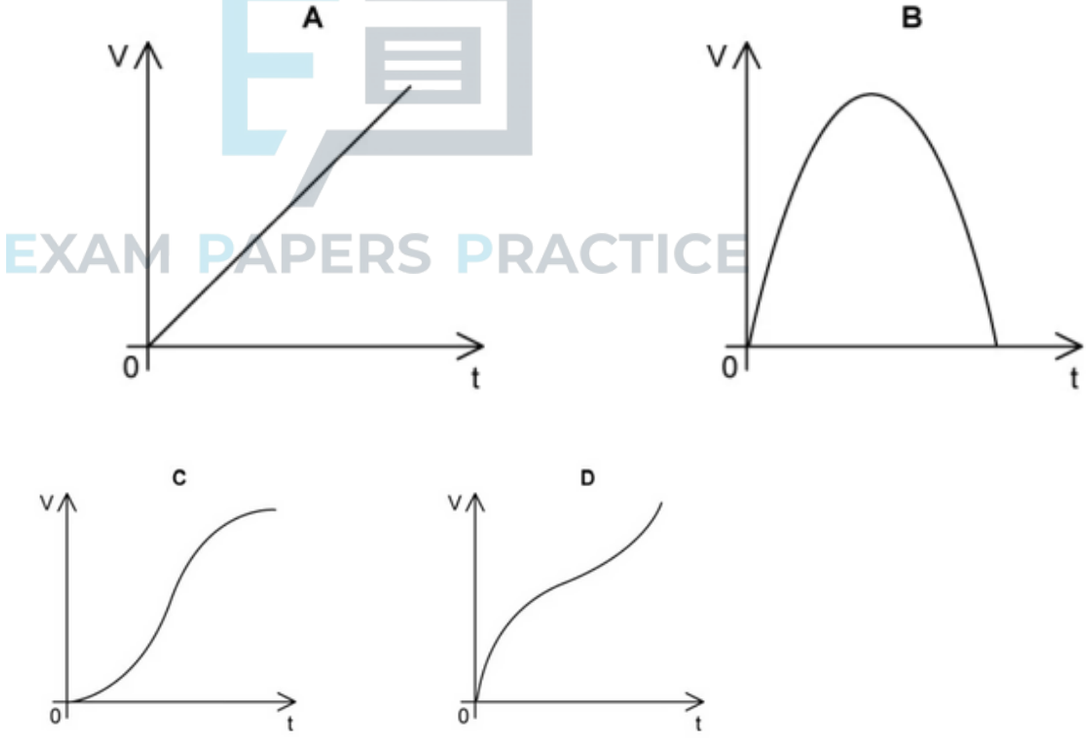
[1 mark]

Question 6

The graph shows the variation of acceleration *a* of an object with time *t*.



Which graph shows how the velocity *v* of the object varies with *t*?



[1 mark]

Question 7

A student throws a stone with velocity 3 m s^{-1} at an angle θ to the vertical from the surface of a lake. Air resistance can be ignored. The acceleration due to gravity is g.

What is the angle θ if the stone hits the surface of the lake 15 m from the student after 10 s?

You may use the fact that sin 30 = 0.5.

A. 90°

B. 45°

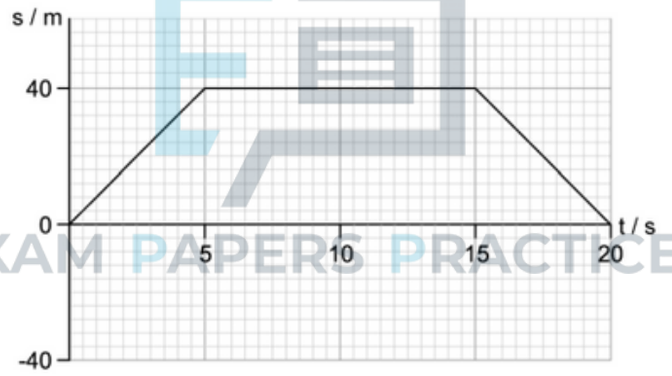
C. 60°

D. 30°

[1 mark]

Question 8

A particle moving in a straight line has the displacement–time graph shown.



Which row is correct about the average speed and average velocity of the particle?

	Average speed / m s^{-1}	Average velocity / m s^{-1}
A.	0	4
B.	0	2
C.	4	0
D.	2	16

[1 mark]

Question 9

An object is released from rest near the surface of the Earth and allowed to fall freely.

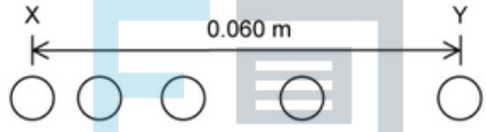
Which of the following correctly describes the speed and acceleration before the object reaches terminal velocity?

	speed	acceleration
A.	remains constant	remains constant
B.	remains constant	decreases
C.	increases	remains constant
D.	increases	decreases

[1 mark]

Question 10

A ball starts from rest and moves horizontally. Five positions of the ball are shown at time intervals of 0.50 ms. The horizontal distance between X, the initial position, and Y, the final position, is 0.060 m.



What is the average acceleration of the ball between X and Y?

A. 48 $m\,s^{-2}$

B. 60 $m\,s^{-2}$

C. 19 200 $m\,s^{-2}$

D. 30 000 $m\,s^{-2}$

[1 mark]