

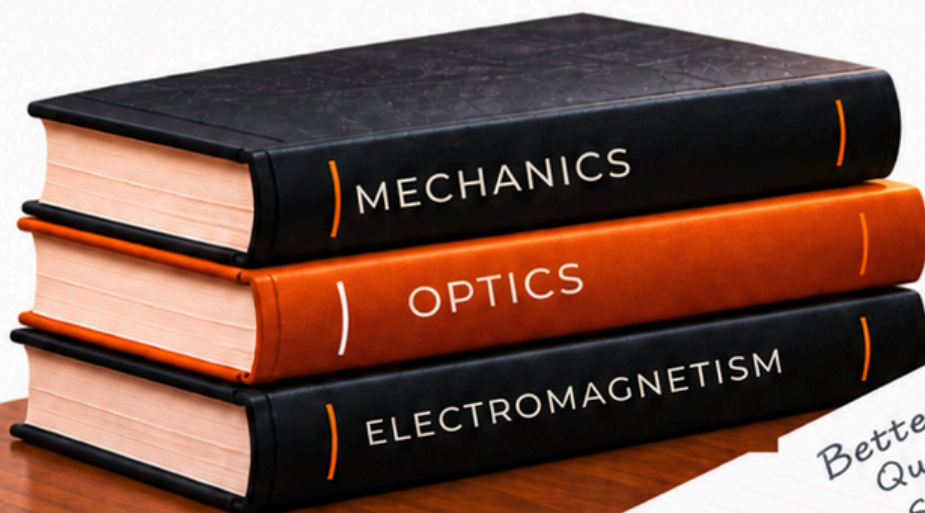
JEE Main Physics

Velocity-time and position-time graphs PYQ

$$F = ma$$



$$v = u + at$$



Better
Questions
Stronger
Concepts
Brighter Future

Subject: Physics

Years: 2026-2008

Total Questions: 26

About this PYQ collection

What is inside

A complete topic-wise set of **26 previous year questions** on **Velocity-time and position-time graphs** from **JEE Main (2026-2017)** and its predecessor **AIEEE (2012-2008)**, across **12 exam years**. **19 questions** are from 2019 onwards, so most of the set reflects the recent NTA pattern.

Questions are arranged to reduce unused page space, with newest-first priority and continuous numbering from 1. Each carries an exam date and shift tag to trace the original paper.

Topic-wise questions

TOPIC	QS	%
Velocity-time and position-time graphs	26	100%

Question types

TYPE	QS	%
Single-correct MCQ	24	92%
Numerical value	2	8%

Numerical-value questions have no options; all 2 are from 2020 onwards.

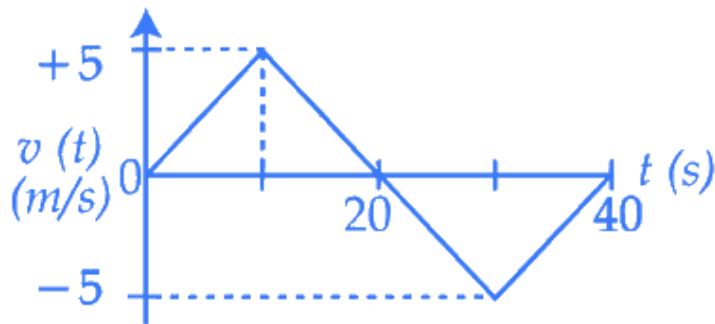
How these questions help you

- **Know where the marks are:** velocity-time and position-time graphs make up **26 of 26 questions** (about 100%).
- **Build speed and accuracy:** practice the concepts and question styles used in previous papers.
- **Learn the patterns:** the same question styles return year after year.
- **Strengthen other chapters:** these concepts support further study in Physics.

Questions – Velocity-time and position-time graphs

1. The velocity (v) versus time (t) plot of a particle is shown in the figure, for a time interval of 40 s. The total distance travelled by the particle and the average velocity during this period are, respectively

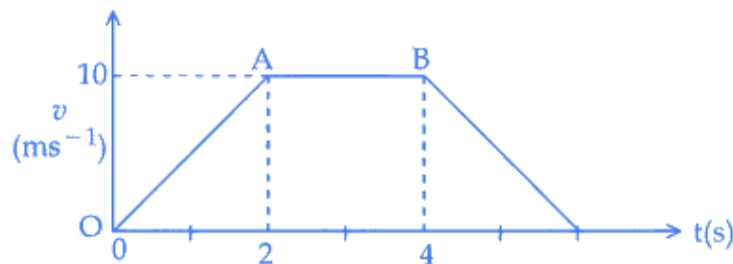
_____.



(5 Apr 2026 | Shift 2)

- (A) 25 m and zero
(B) 50 m and zero
(C) 100 m and zero
(D) 100 m and 2.5 m/s

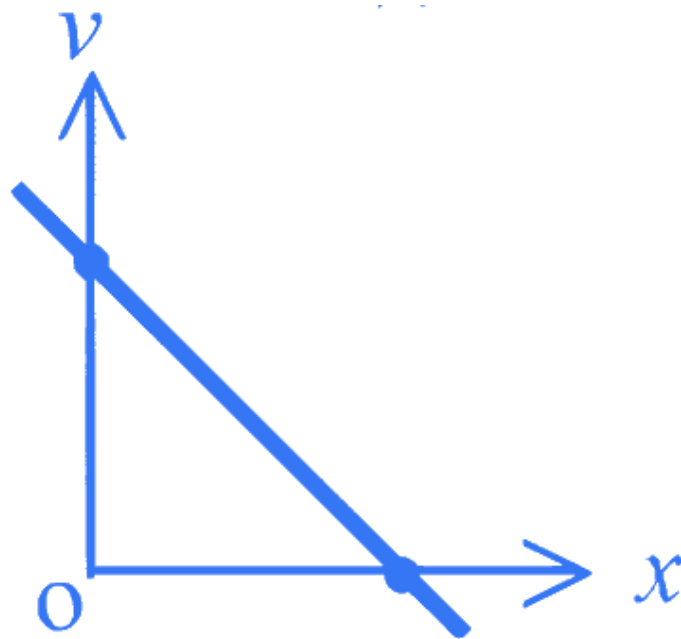
2. The velocity-time graph of an object moving along a straight line is shown in the figure. What is the distance covered by the object between $t = 0$ to $t = 4\text{ s}$?



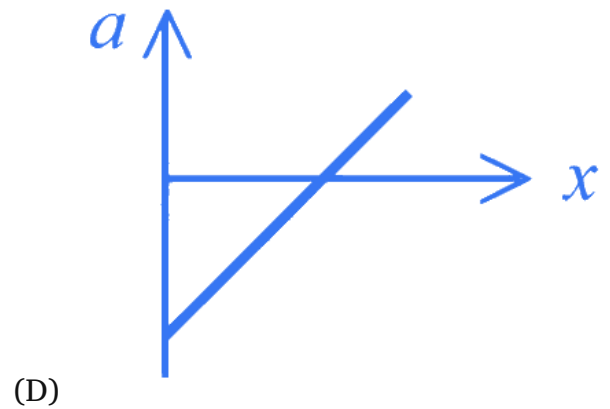
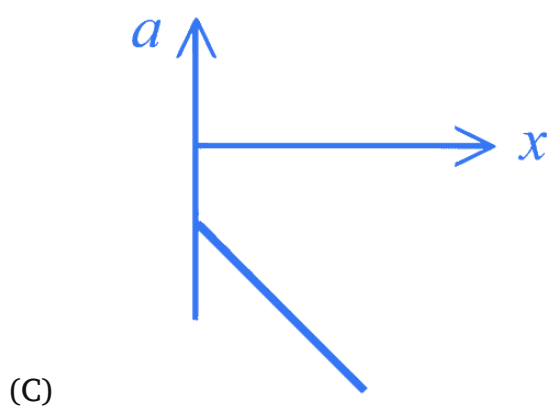
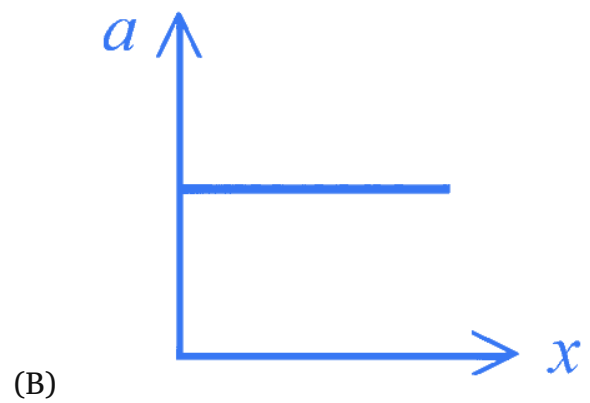
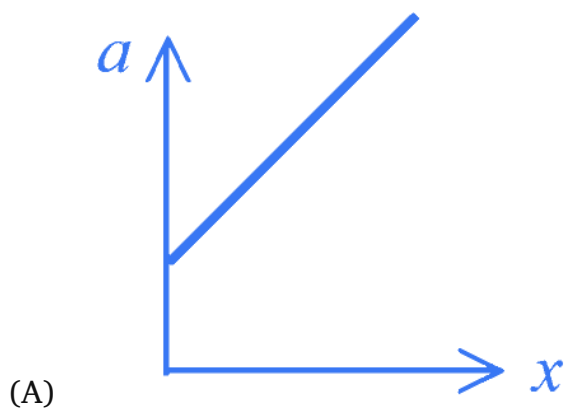
(28 Jan 2025 | Shift 2)

- (A) 11 m
(B) 30 m
(C) 13 m
(D) 10 m

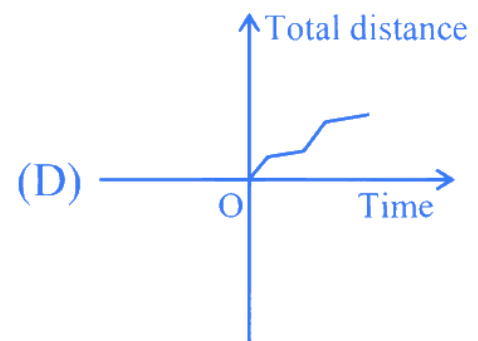
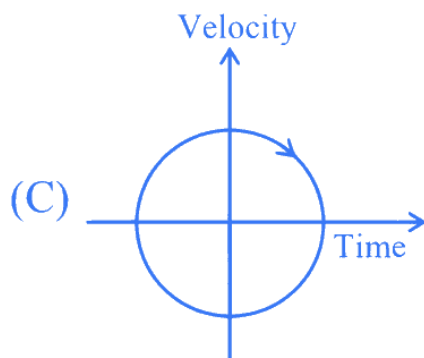
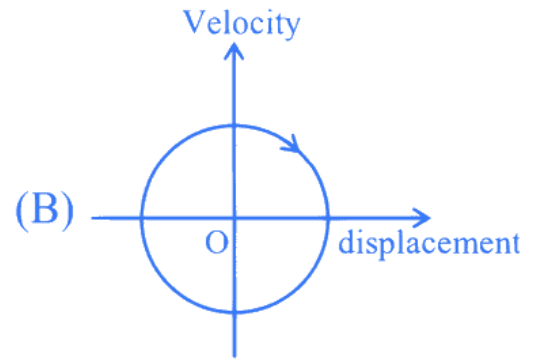
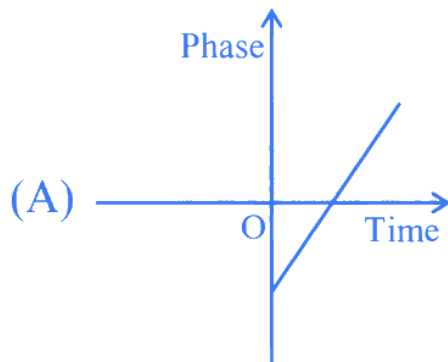
3. The velocity (v) - Distance (x) graph is shown in figure. Which graph represents acceleration(a) versus distance (x) variation of this system?



(24 Jan 2026 | Shift 2)



4. Which of the following curves possibly represent one-dimensional motion of a particle?



Choose the correct answer from the options given below :

(3 Apr 2025 | Shift 1)

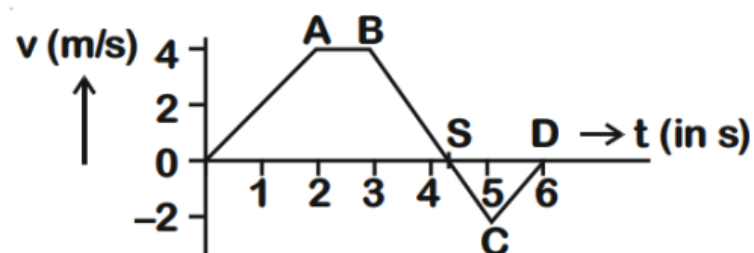
(A) A, B and C only

(B) A, C and D only

(C) A, B and D only

(D) A and B only

5. The velocity (v) and time (t) graph of a body in a straight line motion is shown in the figure. The point S is at 4.333 seconds. The total distance covered by the body in 6 s is :



(5 Sept 2020 | Shift 2)

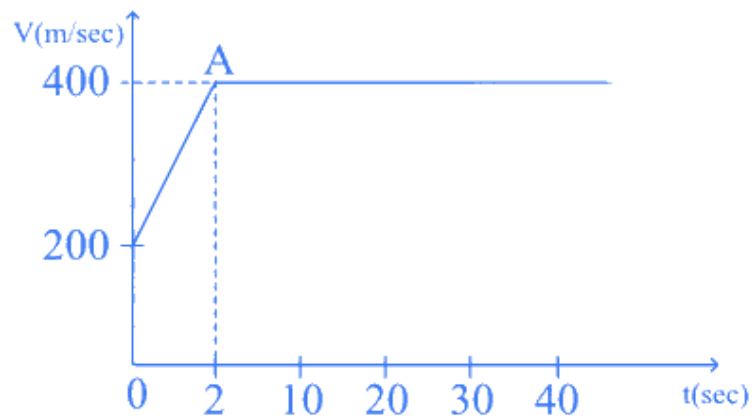
(A) 12 m

(B) 11 m

(C) $\frac{49}{4}$ m

(D) $\frac{37}{3}$ m

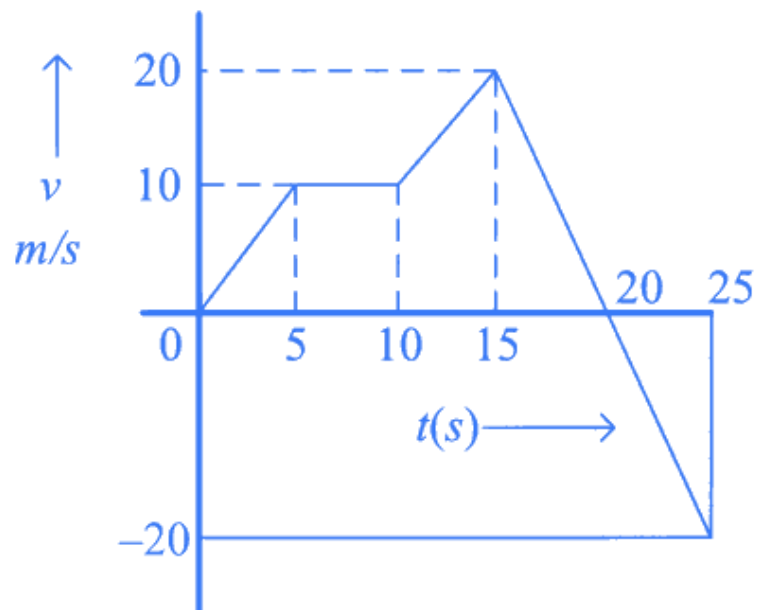
6. The motion of an airplane is represented by velocity-time graph as shown below. The distance covered by airplane in the first 30.5 second is _____ km .



(23 Jan 2025 | Shift 1)

- (A) 12 (B) 6
(C) 3 (D) 9

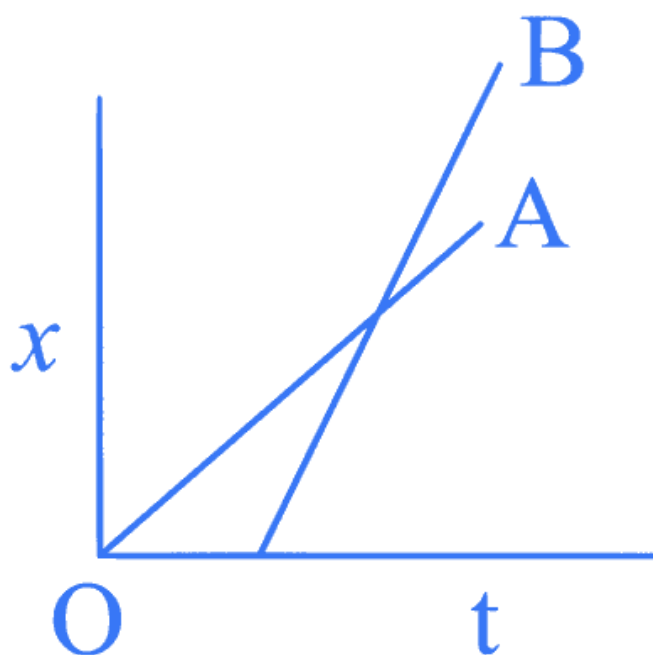
7. From the $v - t$ graph shown, the ratio of distance to displacement in 25 s of motion is:



(11 Apr 2023 | Shift 1)

- (A) 1 (B) $\frac{3}{5}$
(C) $\frac{1}{2}$ (D) $\frac{5}{3}$

8. The position-time graphs for two students A and B returning from the school to their homes are shown in figure.



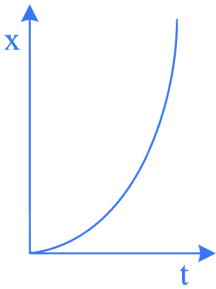
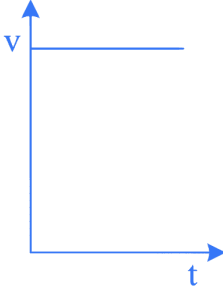
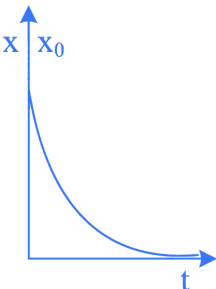
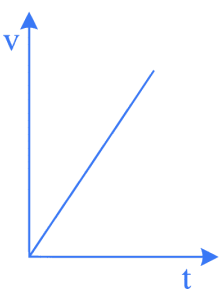
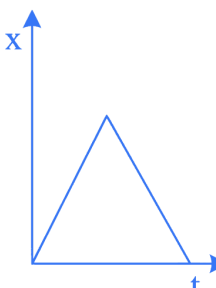
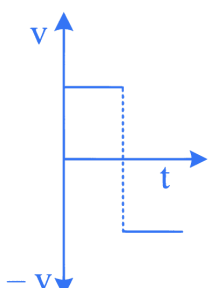
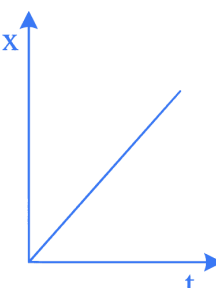
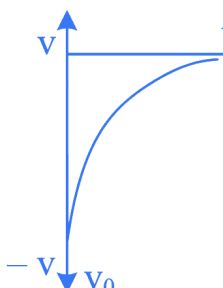
- (A) A lives closer to the school
- (B) B lives closer to the school
- (C) A takes lesser time to reach home
- (D) A travels faster than B
- (E) B travels faster than A

Choose the correct answer from the options given below :

(10 Apr 2023 | Shift 1)

- | | |
|---------------------------|----------------------|
| (A) (A), (C) and (D) only | (B) (A) and (E) only |
| (C) (A), (C) and (E) only | (D) (B) and (E) only |

9. Match Column-I with Column-II :

	Column-I (x - t graphs)		Column-II (v - t graphs)
A.		I.	
B.		II.	
C.		III.	
D.		IV.	

Choose the correct answer from the options given below:

(30 Jan 2023 | Shift 1)

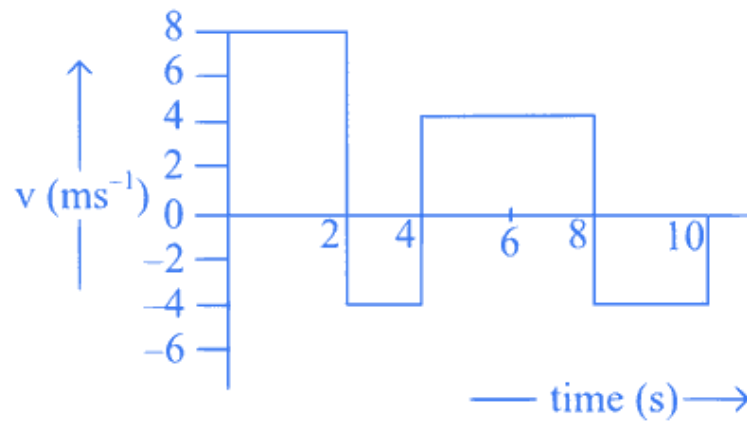
(A) A- II, B-III, C-IV, D-I

(B) A- II, B-IV, C-III, D-I

(C) A- I, B-III, C-IV, D-II

(D) A- I, B-II, C-III, D-IV

10. The velocity time graph of a body moving in a straight line is shown in the figure.

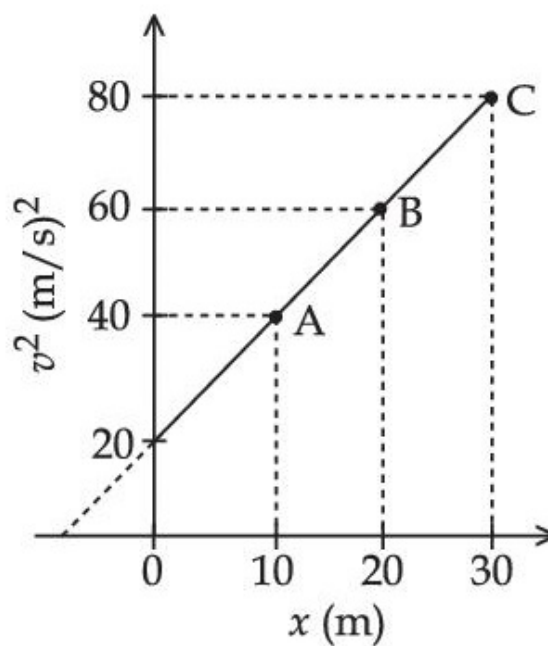


The ratio of displacement to distance travelled by the body in time 0 to 10s is :

(24 Jan 2023 | Shift 2)

- (A) 1 : 1
(B) 1 : 3
(C) 1 : 4
(D) 1 : 2

11. A particle is moving with constant acceleration 'a'. Following graph shows v^2 versus x (displacement) plot. The acceleration of the particle is _____ m/s^2 .

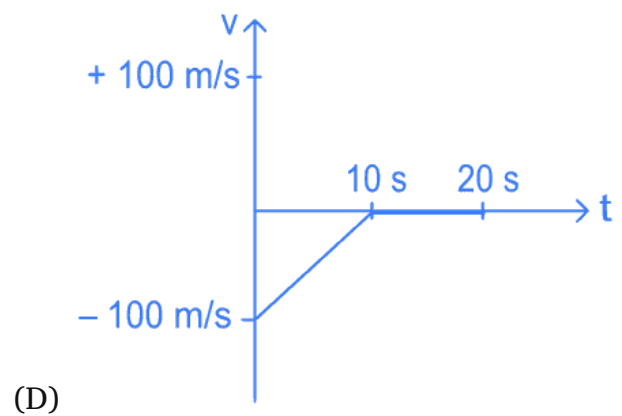
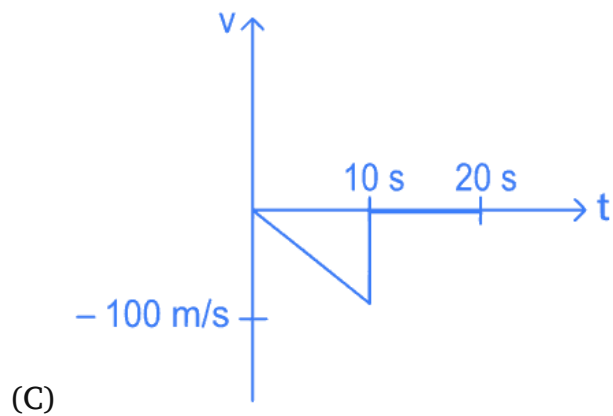
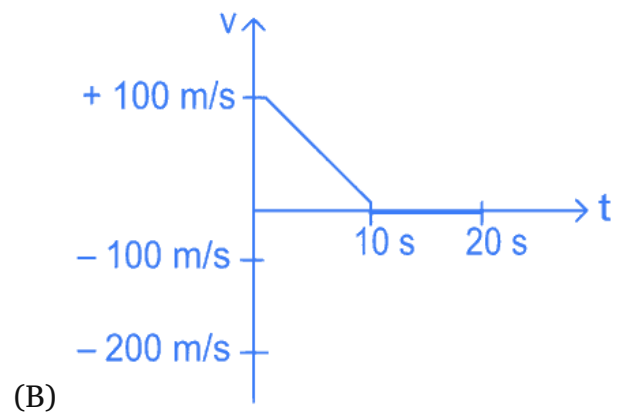
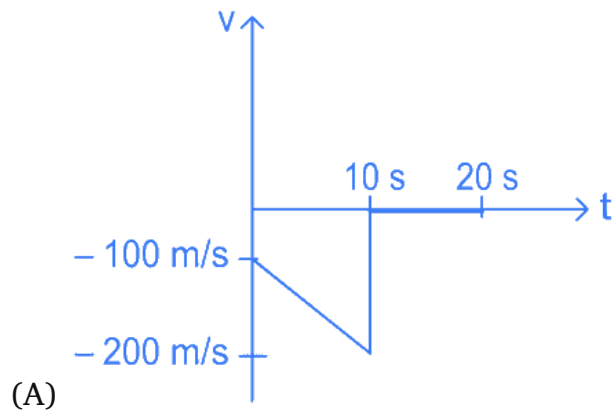


(31 Aug 2021 | Shift 2)

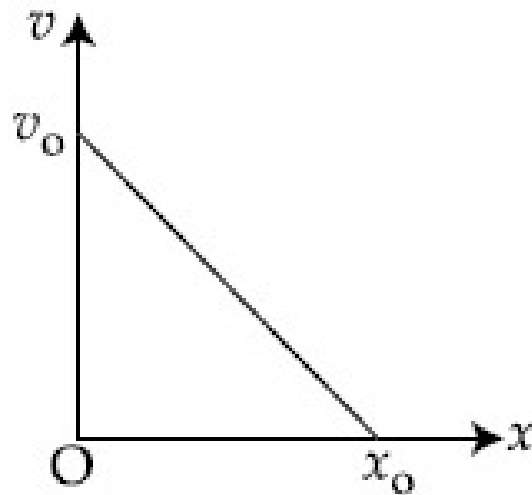
12. A bullet is shot vertically downwards with an initial velocity of 100 m/s from a certain height. Within 10 s , the bullet reaches the ground and instantaneously comes to rest due to the perfectly inelastic collision. The velocity-time curve for total time $t = 20 \text{ s}$ will be:

(Take $g = 10 \text{ m/s}^2$).

(27 Jul 2022 | Shift 1)

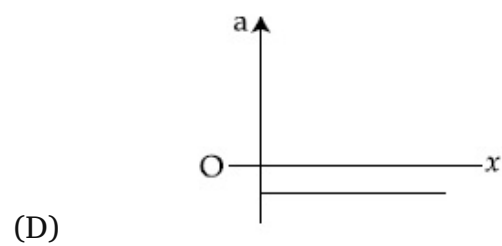
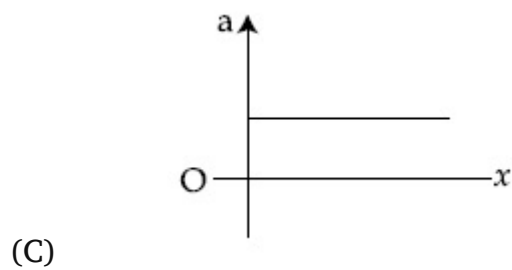
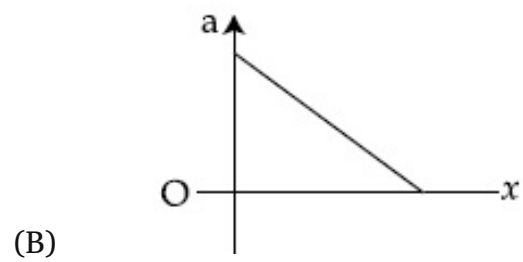
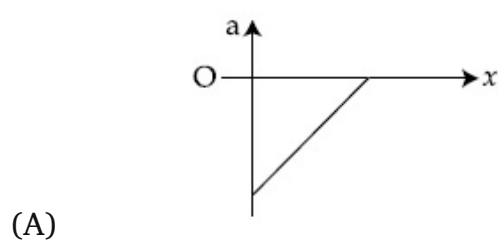


13. The velocity – displacement graph of a particle is shown in the figure.

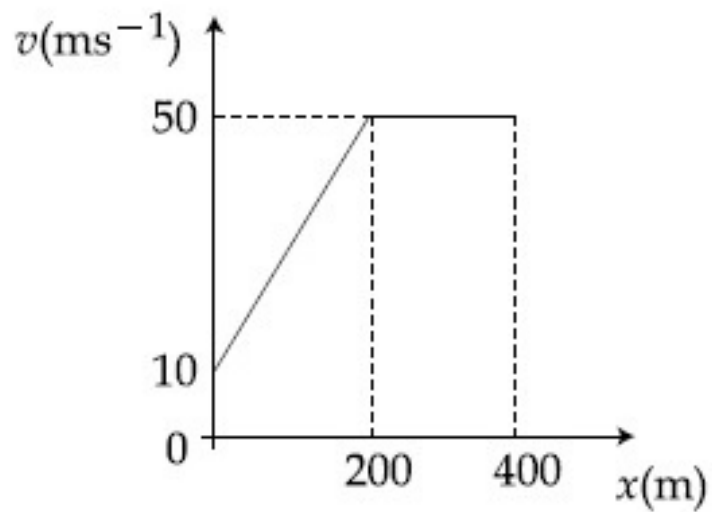


The acceleration – displacement graph of the same particle is represented by :

(18 Mar 2021 | Shift 2)

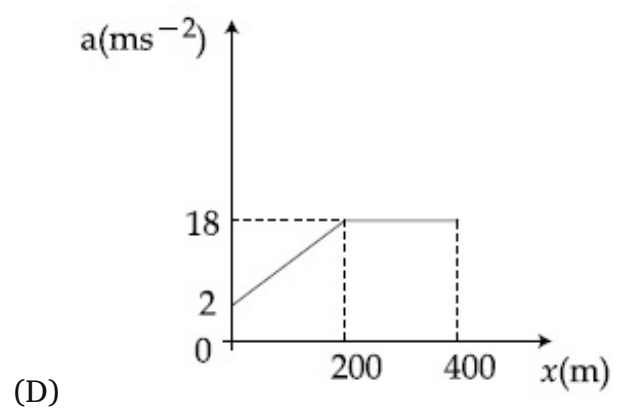
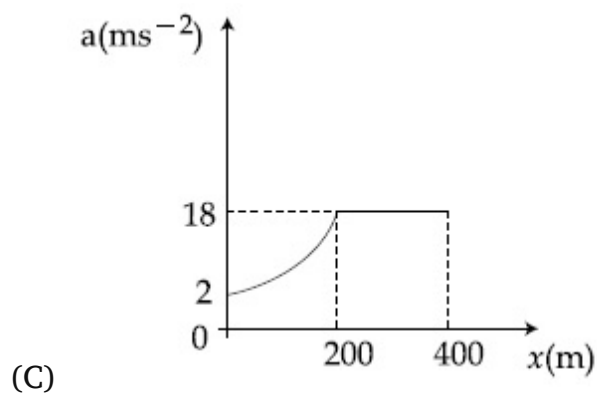
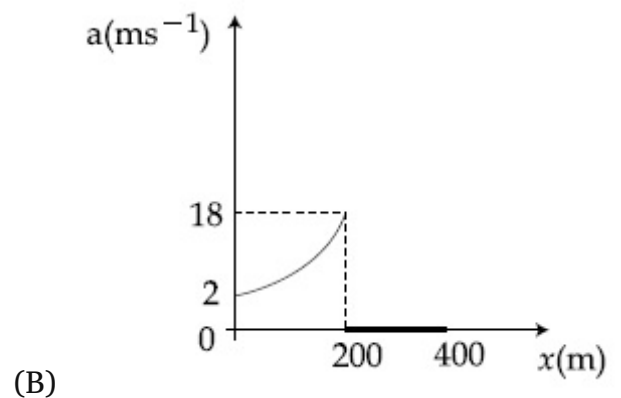
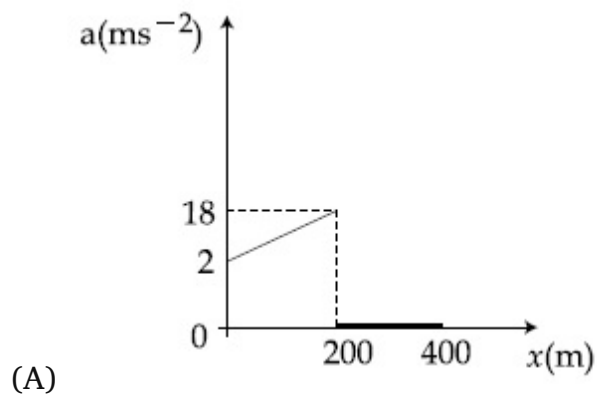


14. The velocity-displacement graph describing the motion of bicycle is shown in the figure.

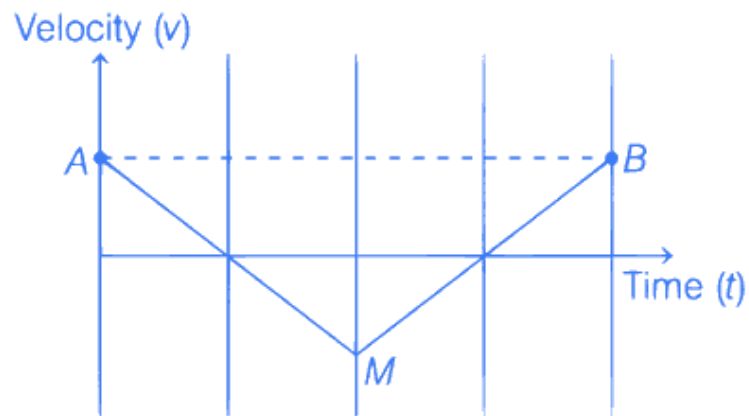


The acceleration-displacement graph of the bicycle's motion is best described by :

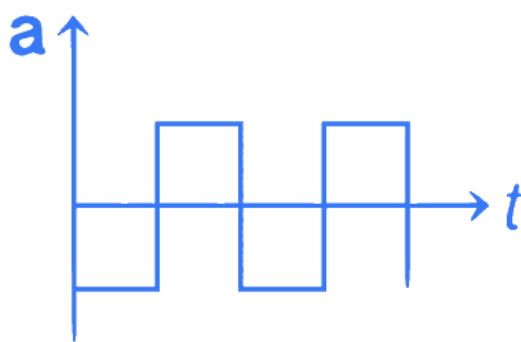
(16 Mar 2021 | Shift 1)



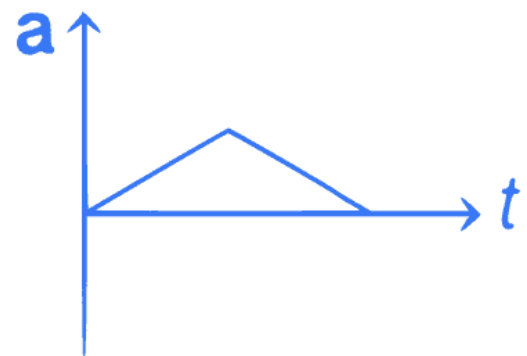
15. If the velocity-time graph has the shape AMB, what would be the shape of the corresponding acceleration-time graph?



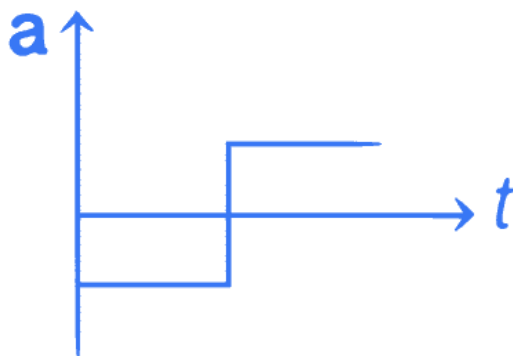
(24 Feb 2021 | Shift 1)



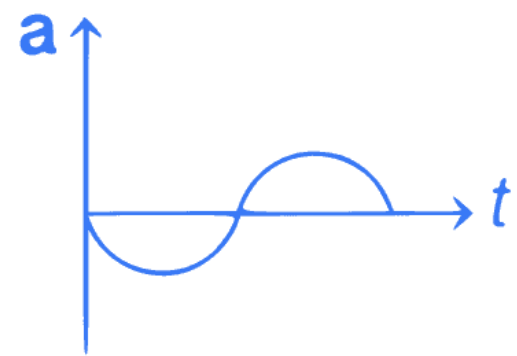
(A)



(B)



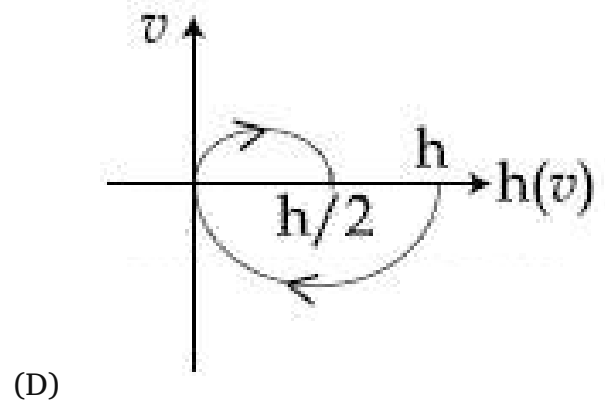
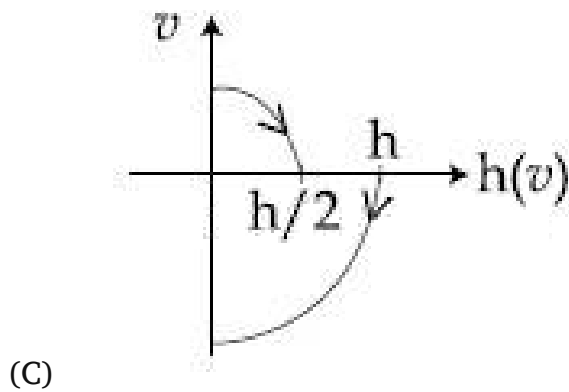
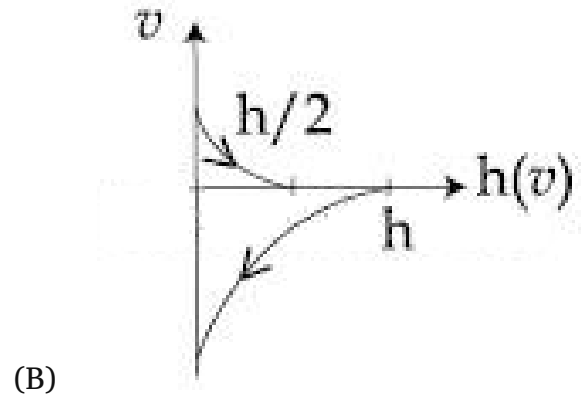
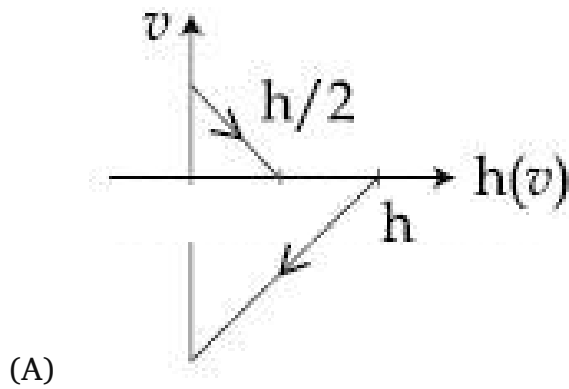
(C)



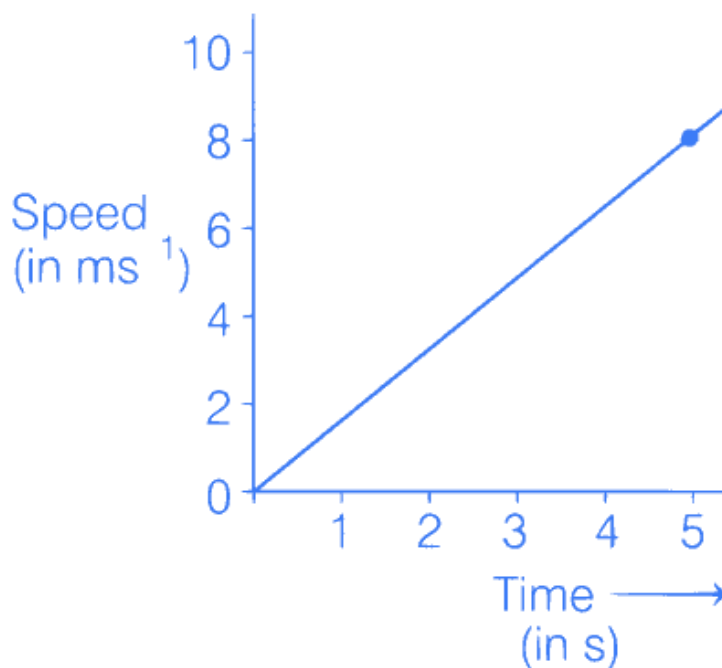
(D)

16. A Tennis ball is released from a height h and after freely falling on a wooden floor it rebounds and reaches height $\frac{h}{2}$. The velocity versus height of the ball during its motion may be represented graphically by :
(graph are drawn schematically and on not to scale)

(4 Sept 2020 | Shift 1)

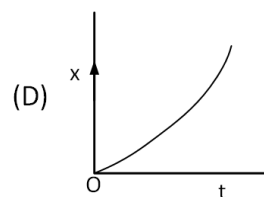
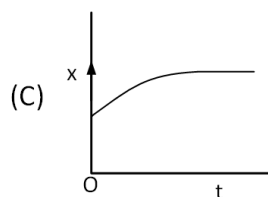
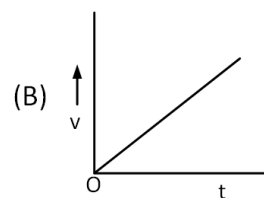
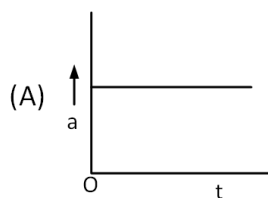


17. The speed versus time graph for a particle is shown in the figure. The distance travelled (in m) by the particle during the time interval $t = 0$ to $t = 5$ s will be_____.



(4 Sept 2020 | Shift 2)

18. A particle starts from origin O from rest and moves with a uniform acceleration along the positive x-axis. Identify all figures that correctly represent the motion qualitatively. (a = acceleration, v = velocity, x = displacement, t = time)



(8 Apr 2019 | Shift 2)

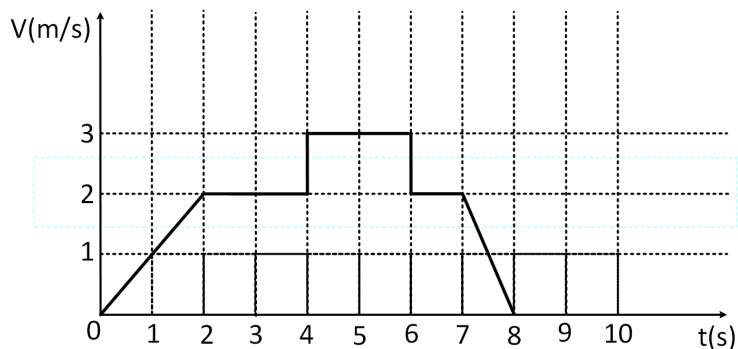
(A) (B), (C)

(B) (A)

(C) (A), (B), (C)

(D) (A), (B), (D)

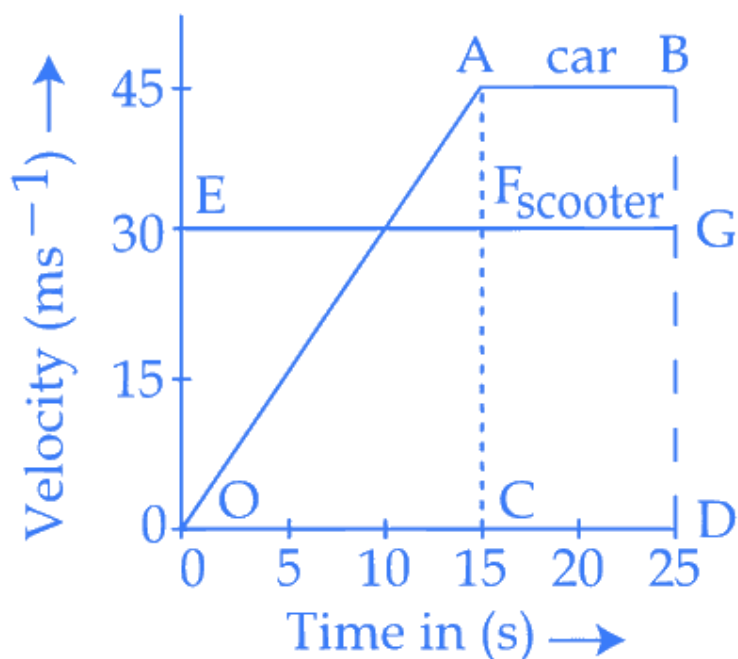
19. A particle starts from the origin at time $t = 0$ and moves along the positive x -axis. The graph of velocity with respect to time is shown in figure. What is the position of the particle at time $t = 5\text{ s}$?



(10 Jan 2019 | Shift 2)

- (A) 3 m (B) 9 m
(C) 10 m (D) 6 m

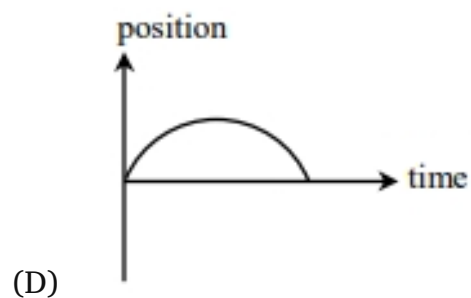
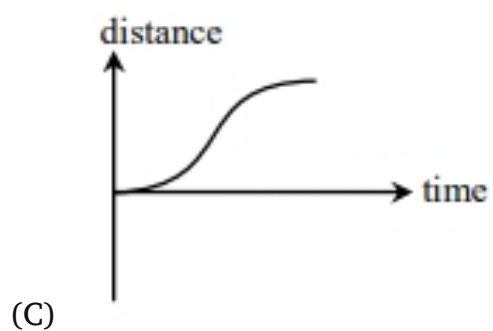
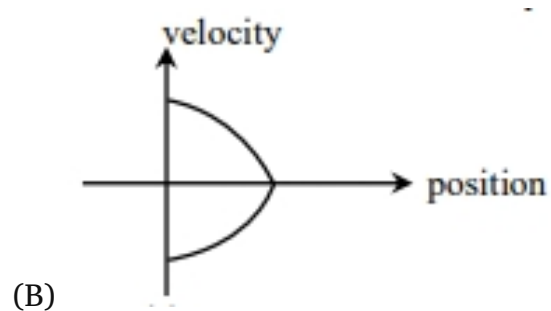
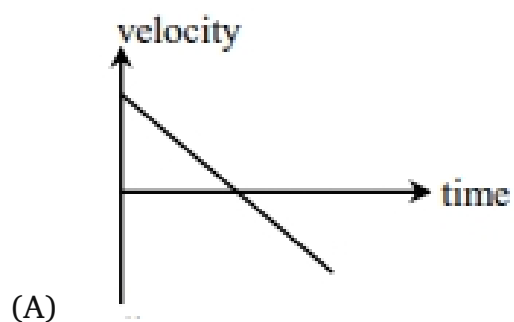
20. The velocity-time graphs of a car and a scooter are shown in the figure. (i) The difference between the distance travelled by the car and the scooter in 15 s and (ii) the time at which the car will catch up with the scooter are, respectively.



(15 Apr 2018 | Shift 1)

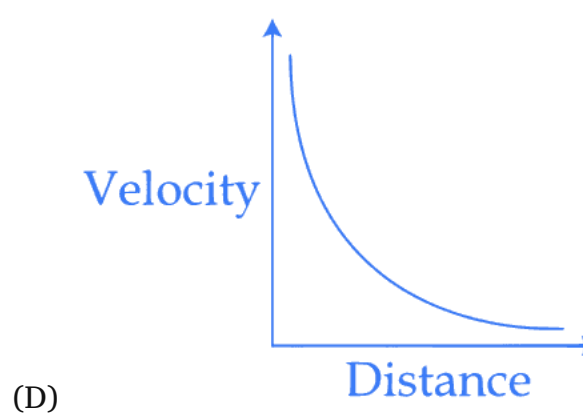
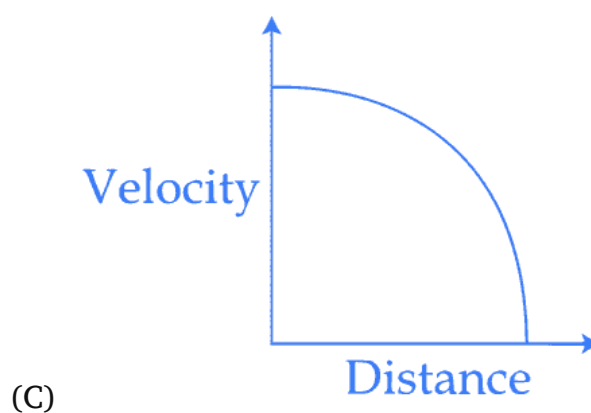
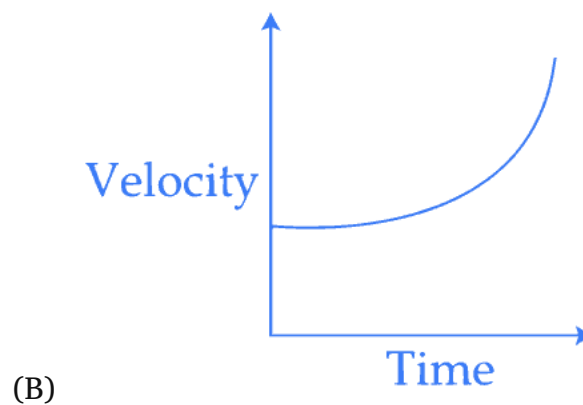
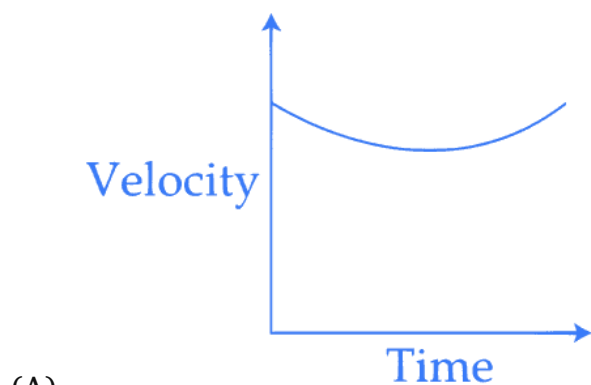
- (A) 112.5 m and 22.5 s (B) 337.5 m and 25 s
(C) 112.5 m and 15 s (D) 225.5 m and 10 s

21. All the graphs below are intended to represent the same motion. One of them does it incorrectly. Pick it up. (8 Apr 2018 | Single sitting)



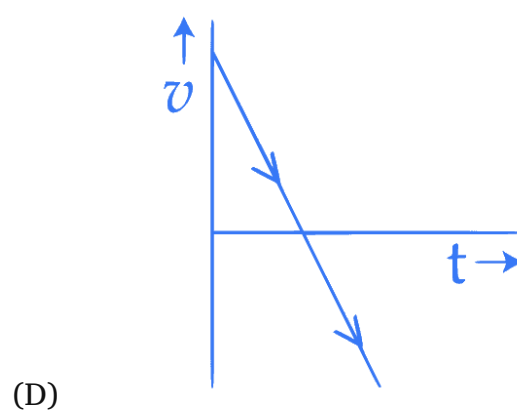
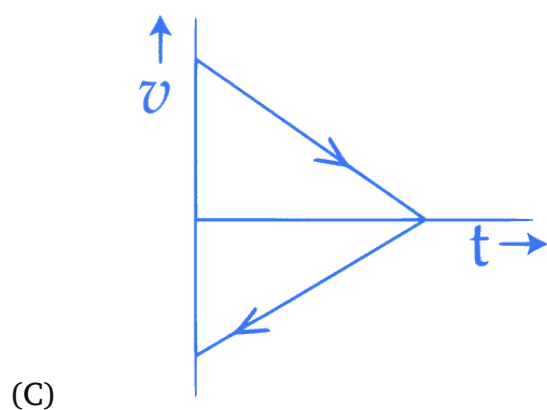
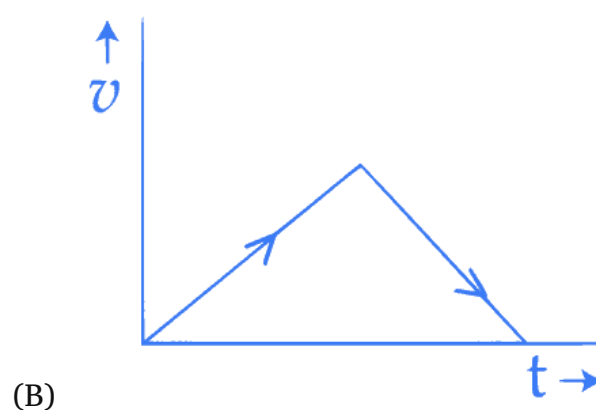
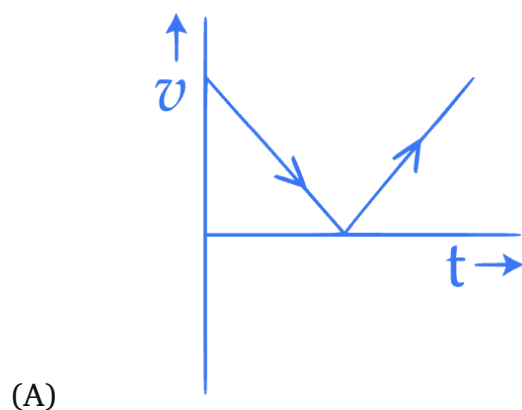
22. Which graph corresponds to an object moving with a constant negative acceleration and a positive velocity ?

(8 Apr 2017 | Shift 1)

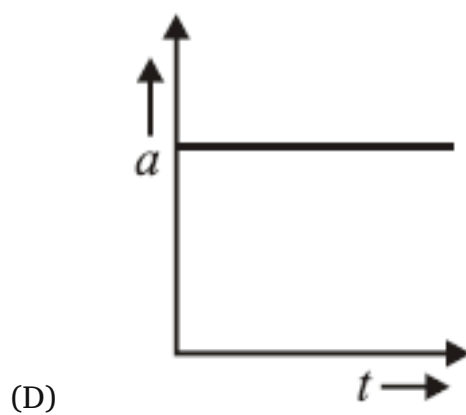
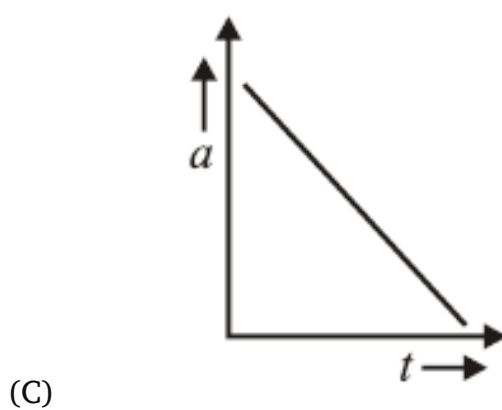
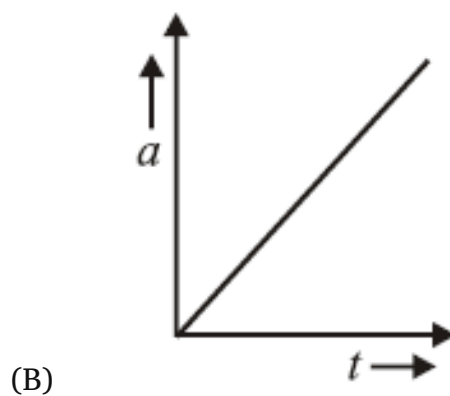
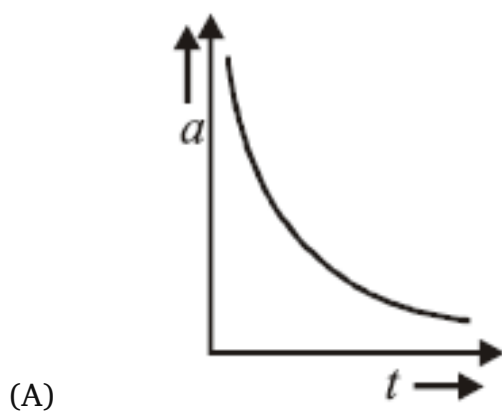


23. A body is thrown vertically upwards. Which one of the following graphs correctly represent the velocity vs time?

(2 Apr 2017 | Single sitting)



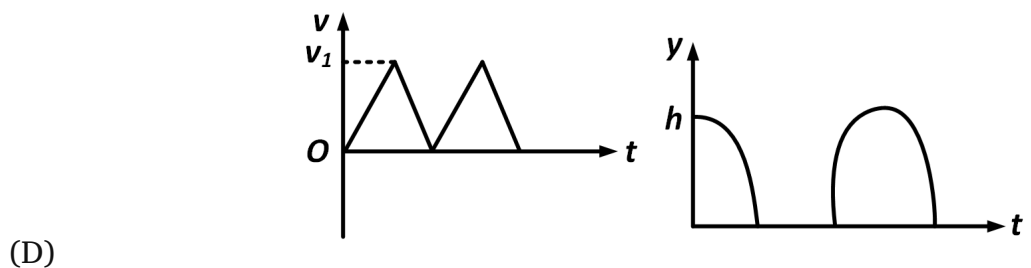
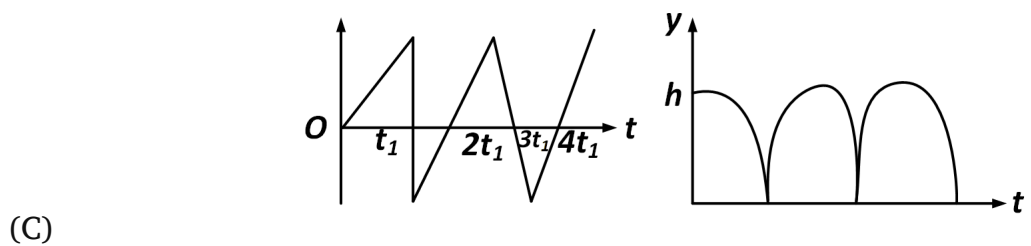
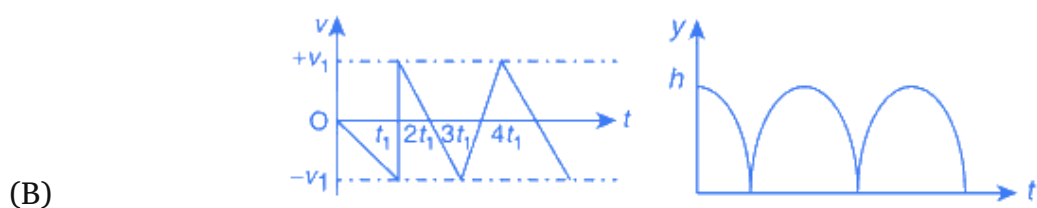
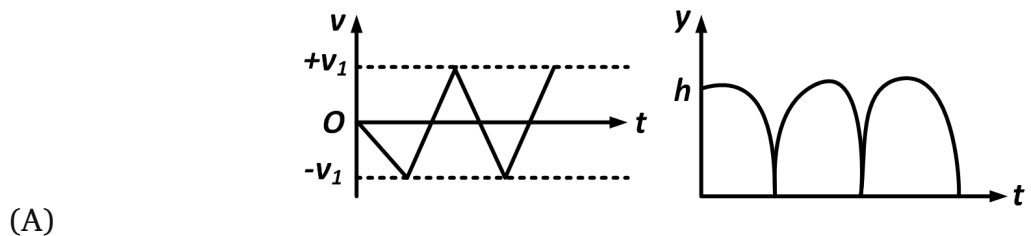
24. The distance travelled by a body moving along a line in time is proportional to t^3 . The acceleration-time (a, t) graph for the motion of the body will be (12 May 2012 | Single slot)



25. Consider a rubber ball freely falling from a height $h = 4.9 \text{ m}$ onto a horizontal elastic plate. Assume that the duration of collision is negligible and the collision with the plate is totally elastic.

Then the velocity as a function of time and the height as a function of time will be :

(26 Apr 2009 | Single sitting)



26. A body is at rest at $x = 0$. At $t = 0$, it starts moving in the positive x -direction with a constant acceleration. At the same instant another body passes through $x = 0$ moving in the positive x direction with a constant speed. The position of the first body is given by $x_1(t)$ after time ' t '; and that of the second body by $x_2(t)$ after the same time interval. Which of the following graphs correctly describes $(x_1 - x_2)$ as a function of time ' t ' ?

(27 Apr 2008 | Single sitting)

