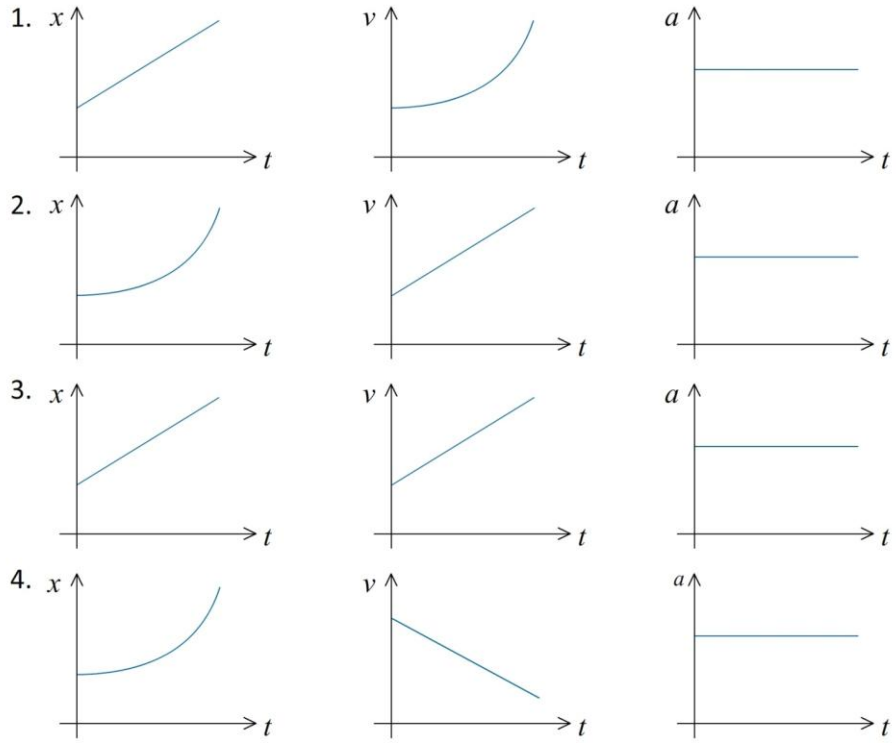
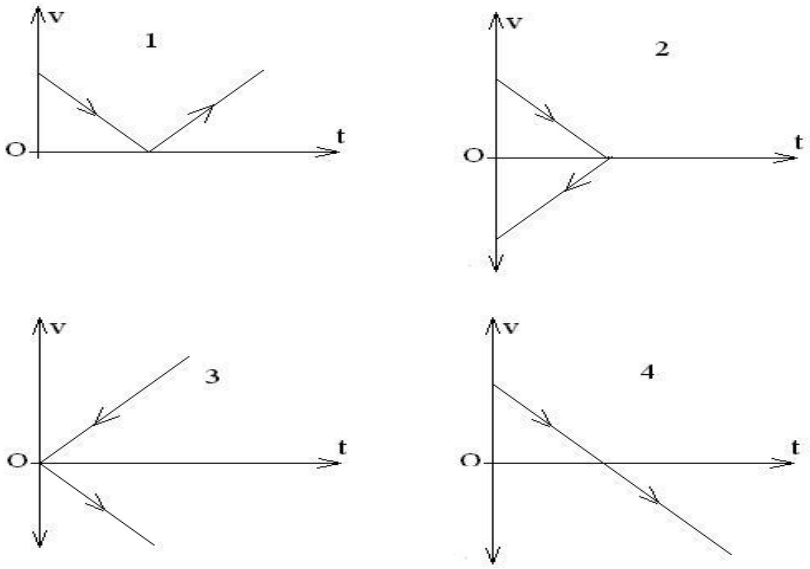
Motion in a straight line

Objective : Understanding given in the form of graphs and problem solving using graphs

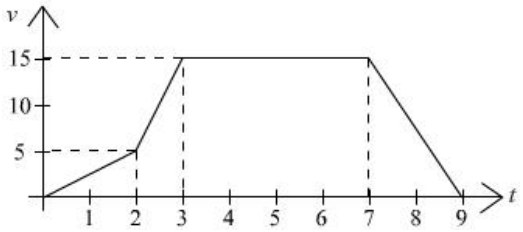
1. Position, velocity and acceleration of a particle moving with constant acceleration can be represented by



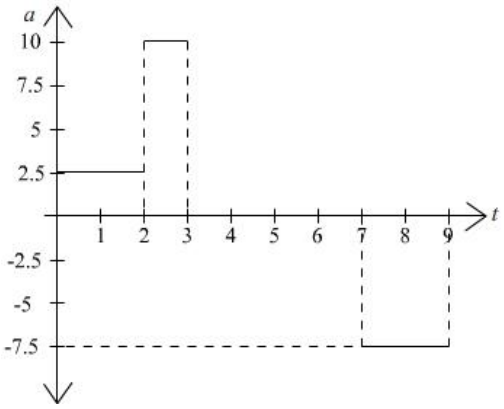
2. A body is thrown vertically upward. Which of the following graphs correctly represents the velocity of the body with time?

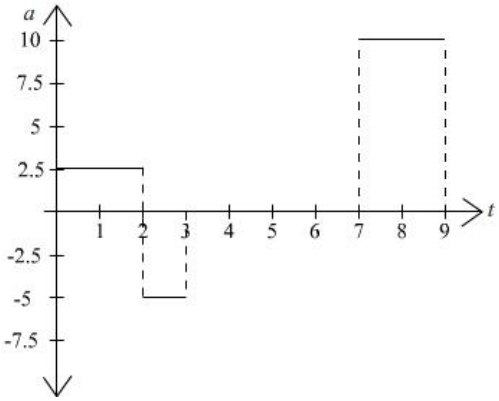


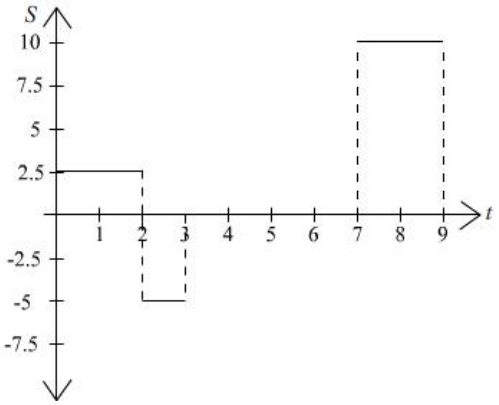
3. The velocity versus time plot of a body moving along a straight line is as given below.

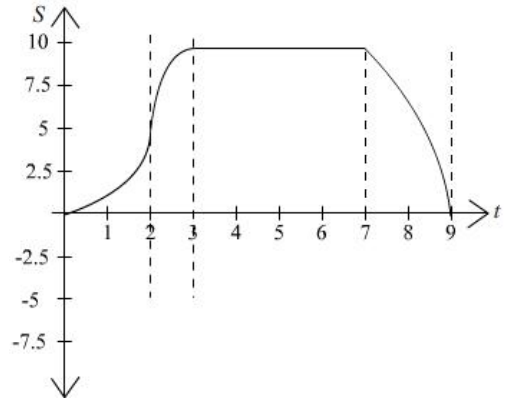


Which one of the following graphs is/are correct for the given situation?

1. 

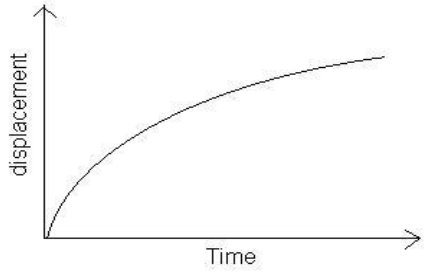
2. 

3. 



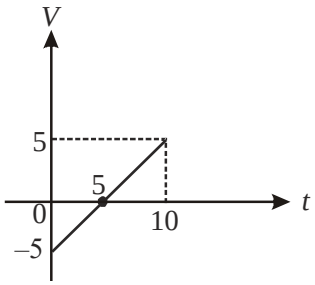
4.

4. Consider the graph given below and chose the correct option



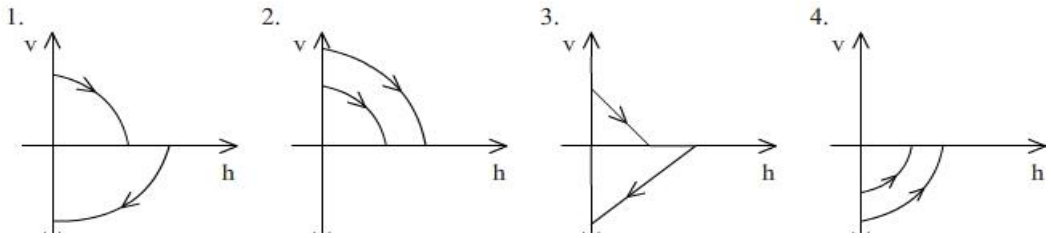
1. The body starts from origin with non zero speed and moves with increasing speed
2. The body starts from origin with non zero speed and moves with decreasing speed
3. The body starts from origin with zero speed and moves with decreasing speed
4. The body starts from origin with zero speed and moves with increasing speed

5. A particle moves rectilinearly with a constant acceleration 1 ms^{-2}. Its speed after 10 seconds is 5 ms^{-1}. Find the distance covered by the particle in this duration.

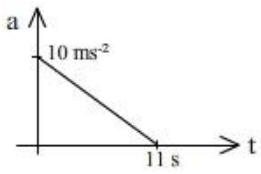


1. 20m 2. 25m 3. 32.6 m 4. zero

6. A ball is dropped from a height d above the ground. It hits the ground, rebounds vertically and reaches a height $d/2$. Neglecting the subsequent motion and the resistance due to air, which of the following plots represents the variation of velocity w.r.t. the height h of the body from the ground?

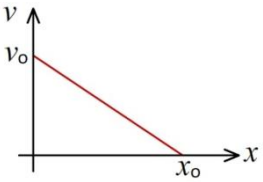


7. A particle starts from rest. The variation of its acceleration w.r.t. time is as shown in the plot. The maximum speed attained by the particle is

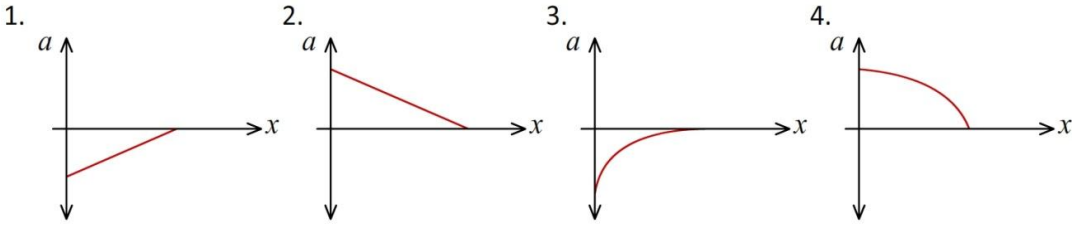


1. 110 ms^{-1} 2. 55 ms^{-1} 3. 550 ms^{-1} 4. 660 ms^{-1}

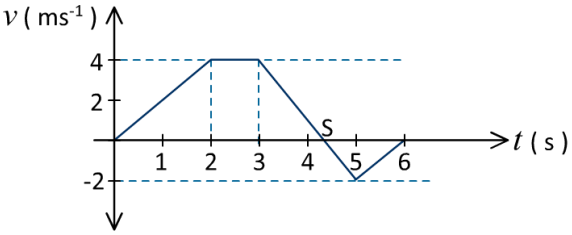
8. Consider the following graph of velocity versus displacement.



The variation of acceleration versus displacement is given by

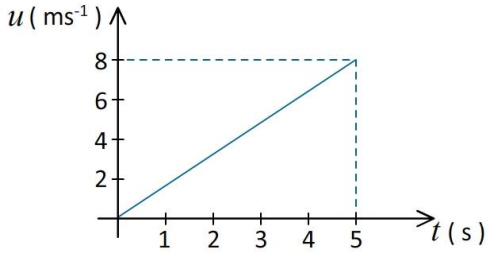


9. Velocity (v) and time (t) graph of a body in a straight line motion is shown in the figure. The point S is at 4.333 seconds. The total distance covered by the body in 6s is

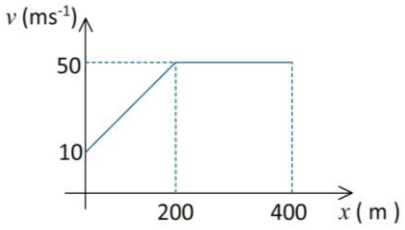


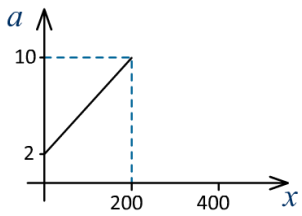
1. 12 m 2. 49/4 m 3. 11 m 4. 37/3 m

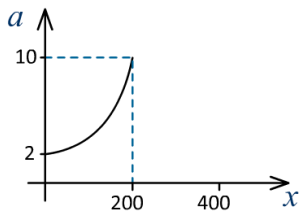
10. Speed versus time graph for a particle is shown in the figure. Distance travelled (in m) by the particle during the time interval t = 0 to t = 5 s will be _____

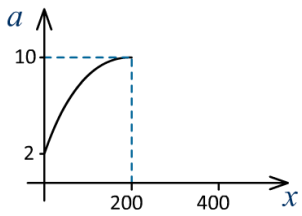


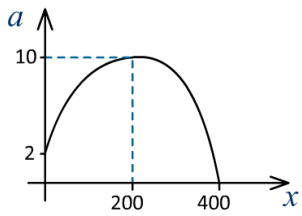
11. Velocity-displacement graph describing the motion of a bicycle is shown in the figure. Acceleration (ms^{-2}) – displacement (m) graph of the bicycle's motion is best given by



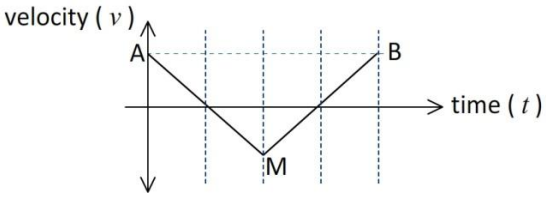
1.


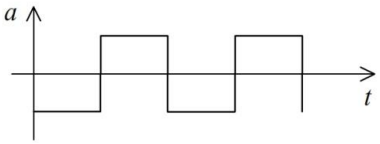
3.


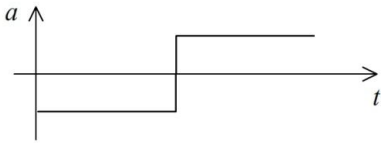
3.


4.


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



1.


2.


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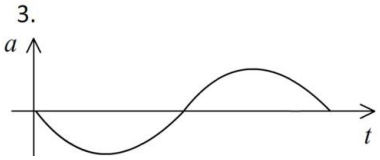

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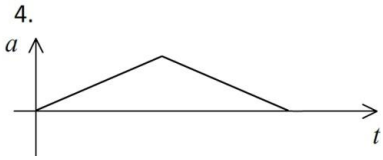
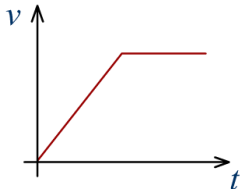
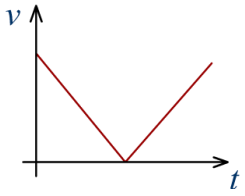
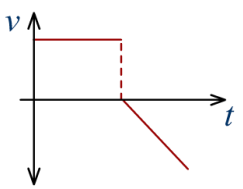


13. A body A is thrown vertically upwards with such a velocity that it reaches a maximum height of h. Simultaneously another body B is dropped from height h. It strikes the ground and does not rebound. The graph of relative velocity of A w.r.t. B as a function of time is best represented by

1.


2.


3.


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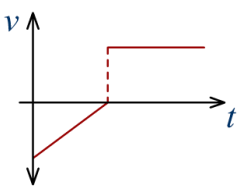
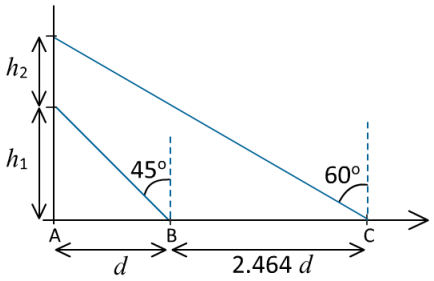
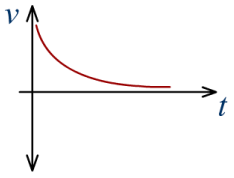


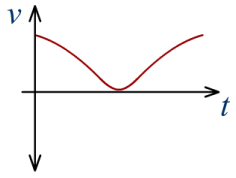
14. A balloon is moving up vertically above a point A on the ground. When it is a height h_1, a girl standing at a distance d (point B) from A (see figure) sees it at an angle 45° with respect to the vertical. When the balloon climbs up a further height h_2, it is seen at an angle 60° with respect to the vertical. If the girl moves further by a distance $2.464d$ (point C) then the height h_2 is _____ ($\tan 30^\circ = 0.5774$)



1. $0.732d$ 2. $0.464\,d$ 3. $1.464\,d$ 4. d

15. A particle is moving along x-axis with velocity v which varies with displacement as $v = v_o - Kx$ where v_o and K are constants. Acceleration as function of time is given by

1.


2.


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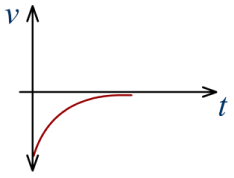

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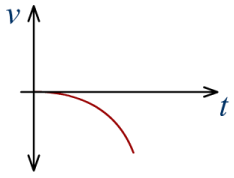

Key

1. 2 (refer to simulation)
2. 4
3. 1
4. 4
5. 2
6. 1
7. 2
8. 1
9. 4
10. 20 m
11. 1
12. 2
13. 3 (refer to simulation)
14. 4
15. 3