



Section A

1. Is acceleration a vector or a scalar?
2. What are the units of acceleration?

Section B

1. Define the term 'acceleration'.
2. Write down the equation for acceleration, label each letter.

Section C

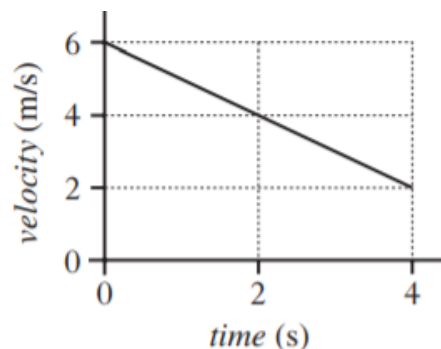
1. The table shows the velocities of three objects X, Y and Z over a period of 3 seconds. Each object is moving in a straight line.

Time (s)	0	1	2	3
Velocity of X (m s^{-1})	2	4	6	8
Velocity of Y (m s^{-1})	0	1	2	3
Velocity of Z (m s^{-1})	0	2	5	9

Which of the following statements is/are correct?

- I. X moves with constant velocity.
 - II. Y moves with constant acceleration.
 - III. Z moves with constant acceleration.
- A. I only
 - B. II only
 - C. I and II only
 - D. I and III only
 - E. II and III only

2. A car accelerates from rest to 20ms^{-1} in a time of 1 minute. Calculate the acceleration of the car.
 - A. 20 ms^{-2}
 - B. 0.33 ms^{-2}
 - C. -0.33 ms^{-2}
 - D. -20 ms^{-2}
 - E. 10 ms^{-1}
3. The graph shows how the velocity of a ball changes with time.



The acceleration of the ball is

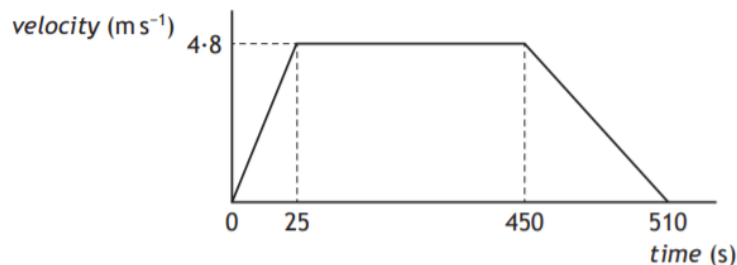
- A. -8 ms^{-2}
 - B. -1 ms^{-2}
 - C. 1 ms^{-2}
 - D. 8 ms^{-2}
 - E. 24 ms^{-2}
4. Calculate the final speed of a 0.001kg penny which falls for 3s.
 - A. 30 ms^{-1}
 - B. 29.4 ms^{-1}
 - C. 0.003 ms^{-1}
 - D. 0.05 ms^{-1}
 - E. 10 ms^{-1}
 5. A bullet decelerates from 120 ms^{-1} to rest in a time of 30 seconds. Calculate the deceleration of the bullet.
 - A. 40 ms^{-1}
 - B. -4 ms^{-2}
 - C. -4 ms^{-1}
 - D. -40 ms^{-2}
 - E. 3600 ms^{-2}



Section D

: In a rowing event a boat moves off in a straight line.

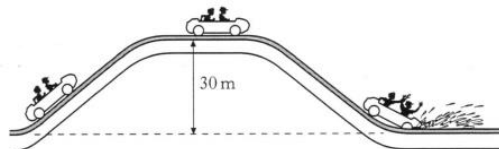
a) A graph of the boat's motion is shown.



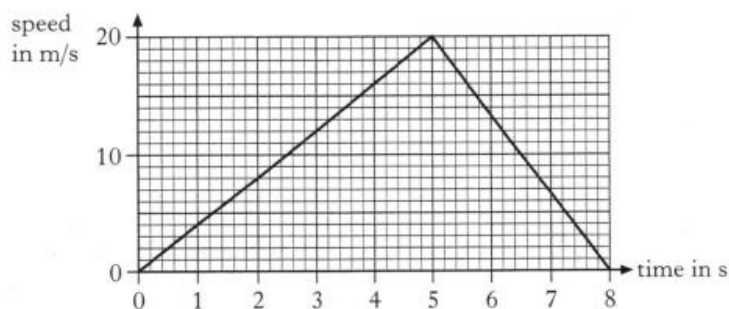
Calculate the acceleration of the boat during the first 25 s.

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2. A theme park has a water splash ride. A carriage loaded with passengers is raised through a height of 30m to the top of the ride. The combined mass of the carriage and the passengers is 1400kg.



The carriage and passengers stop briefly before being released at the top of the ride. A speed-time graph of the motion of the carriage from the top of the ride is shown below.



Calculate the acceleration of the carriage from the top of the ride to the point where it reaches the water. **3**