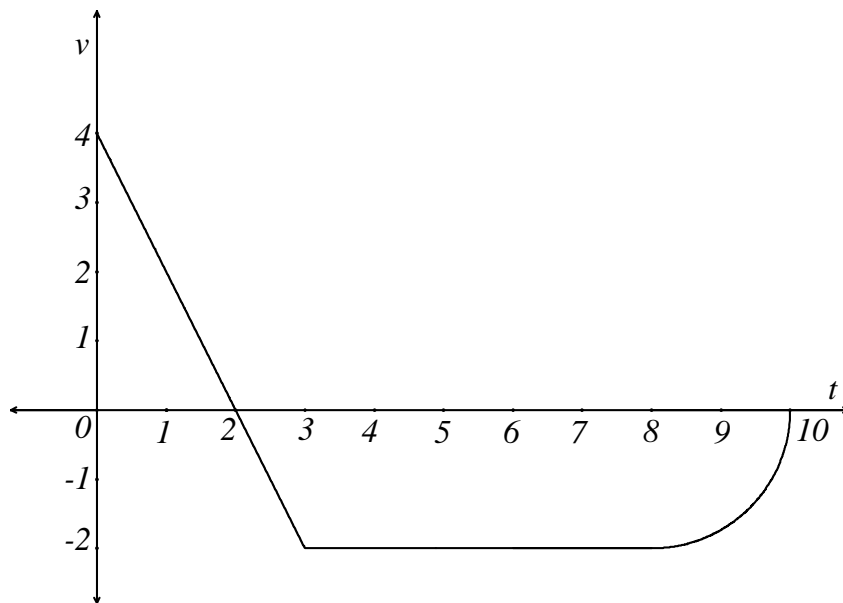


» Motion | Past JRAHS Questions

- The displacement x metres at time t seconds of a particle moving in a straight line is given by $x = 1 + 3 \cos^2 t$. Find:
 - An expression for the velocity in terms of t
 - An expression for the acceleration in terms of t
 - Hence or otherwise show that $a^2 = 36 - 4v^2$
- A particle moves in a straight line in such a way that its distance in metres from the origin after t seconds is given by $x = 2t^3 + 3t^2 - 36t + 10$.
 - In which direction is the particle moving initially? Provide reasoning.
 - When and where is the particle instantaneously at rest?
 - What total distance has the particle travelled in the first three seconds of its motion?
- The acceleration a (in ms^{-2}) of a body moving in a straight line at time t is given by $a = 20e^{5t} + 6 \sin 3t$. If initially the body is at distance $x = 3$ metres and velocity $v = 2 \text{ms}^{-1}$, find:
 - The velocity in terms of t
 - The distance in terms of t
- The velocity v m/s against t seconds is a graph comprised of straight lines and a circular arc, as shown in the diagram below.



- Copy the graph, and on top of it superimpose the graph of the acceleration function \ddot{x} against time t for $0 \leq t \leq 10$.
- On a separate axes with identical scale, sketch the displacement function x against time t for $0 \leq t \leq 10$, if it is given that the particle is initially at the origin.