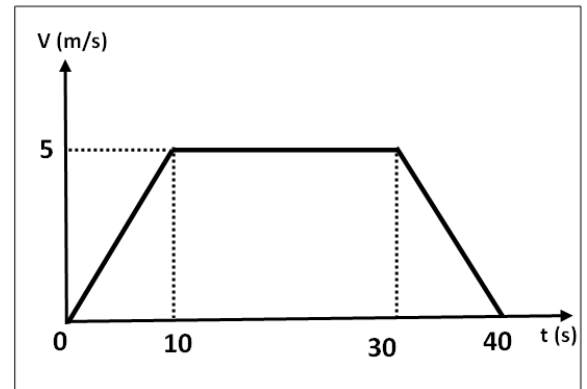# Series 2

Exercise 1

The figure shows a velocity time graph illustrating the motion of a mobile moving along a straight road for a period of 40 seconds.

1. Find the acceleration of this motion in each interval.
2. Deduce the nature of the movement.

Exercise 2

A material point moves along an axis (Ox) with an acceleration given by :

$$a = 8t+1 \ (ms^{-2})$$

1. Find the velocity of this movement knowing that at t = 0, v = 2(m/s).
2. Determine the time equation of this movement at t = 0, x = 0 m.
3. What is the nature of the movement?

Exercise 3

A mobile is animated by a sinusoidal rectilinear movement following the (Ox) axis around an origin position O of the axis. The mobile takes 0.2 seconds to travel half of the segment of length L = 6 cm that is formed by the two ends of the trajectory. At t=0s, the mobile is at the origin of the abscissas with a velocity of value 3 m/s. The equation of time for this motion can be expressed by the following equation:

$$x(t) = X_m \cos(\omega t + \varphi)$$

1. Determine the maximum elongation, period, pulsation, frequency and the initial phase of this movement.

2. At what time does the mobile pass through the coordinate point x=3 cm for the first time? Deduce its velocity at this date.

3. At what time the moving mobile passes through the coordinate point $x = \frac{3}{2}$ cm for the first time in the negative direction?