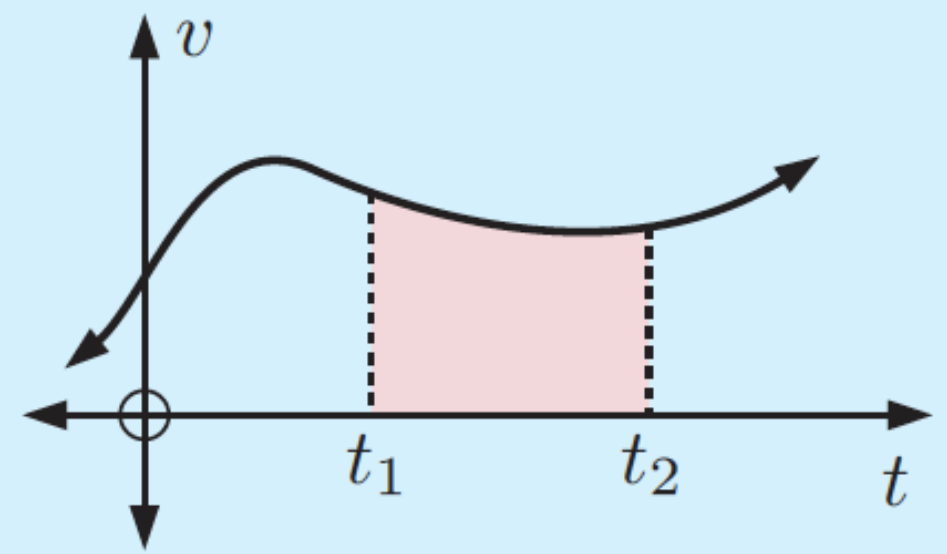
Kinematic

Displacement = $\int v(t)\ dt$

Distance = $\int_{t_1}^{t_2} v(t)\ dt$ = The area below the curve



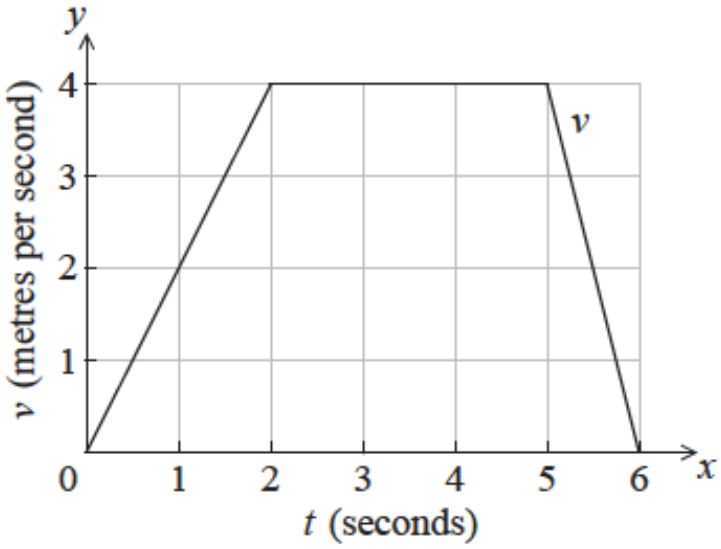
Velocity = $\int a(t)\ dt$

1. A car moves in a straight line has velocity $v\ km\ s^{-1}$.
Find the expression of displacement $s\ km$ at time t seconds.
The velocity v is given by $v(t) = 6e^{2t} + t$. When $t = 0, s = 10$.

2. A particle moves in a straight line with velocity function $v(t) = \cos t \quad m\ s^{-1}$. Find the distance travelled from $t = 0\ to\ t = \frac{\pi}{2}$.

Paper 1

1. A toy car travels with velocity $v\ ms^{-1}$ for six seconds. This is shown in the graph below.



(a) Write down the car's velocity at $t = 3$.

(b) Find the car's acceleration at $t = 1.5$.

2. A rocket moving in a straight line has velocity $v\ kms^{-1}$ and displacement $s\ km$ at time t seconds. The velocity v is given by $v(t) = 6e^{2t} + t$. When $t = 0, s = 10$.

Find an expression for the displacement of the rocket in terms of t.

Paper 2

1. (calculator) A particle moves in a straight line. Its velocity $v\ ms^{-1}$ after t seconds is given by

$$v = 6t - 6, \text{ for } 0 \leq t \leq 2.$$

After p seconds, the particle is 2 m from its initial position. Find the possible values of p.

2. A particle moves in a straight line with velocity $v = 12t - 2t^3 - 1$, for $t \geq 0$, where v is in centimeters per second and t is in seconds.

(a) Find the acceleration of the particle after 2.7 seconds.
(b) Find the displacement of the particle after 1.3 seconds.