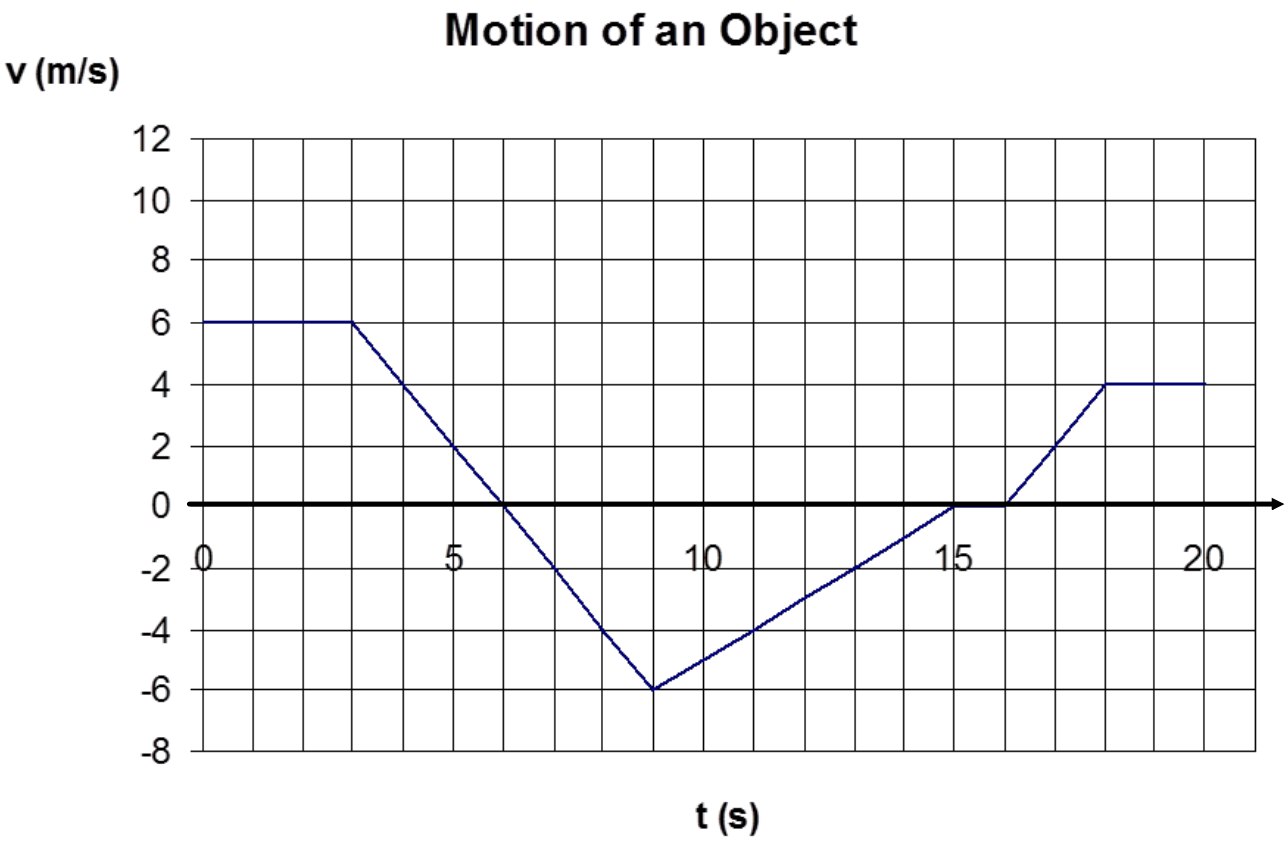
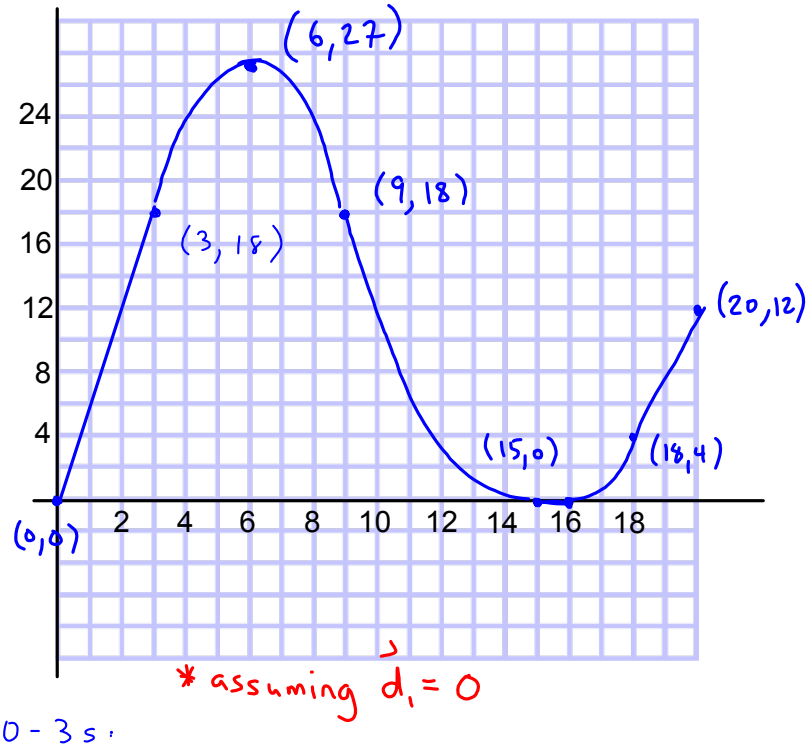
VELOCITY-TIME GRAPHS

Goal:

- to draw the position-time graph and acceleration-time graph that corresponds to a given velocity-time graph


Motion of an Object
v (m/s)
12
10
8
6
4
2
0
-2
-4
-6
-8
0
5
10
15
20
t (s)

Draw the corresponding position-time graph.



0 - 3 s:

$\vec{\Delta d}$ = area = $(6\ m/s)(3s) = 18\ m$

3 - 6 s:

$\vec{\Delta d}$ = area = $\frac{(6\ m/s)(3s)}{2} = 9\ m$

6 - 9 s:

$\vec{\Delta d}$ = area = $\frac{(-6\ m/s)(3s)}{2} = -9\ m$

9 - 15 s:

$\vec{\Delta d}$ = area = $\frac{(-6\ m/s)(6s)}{2} = -18\ m$

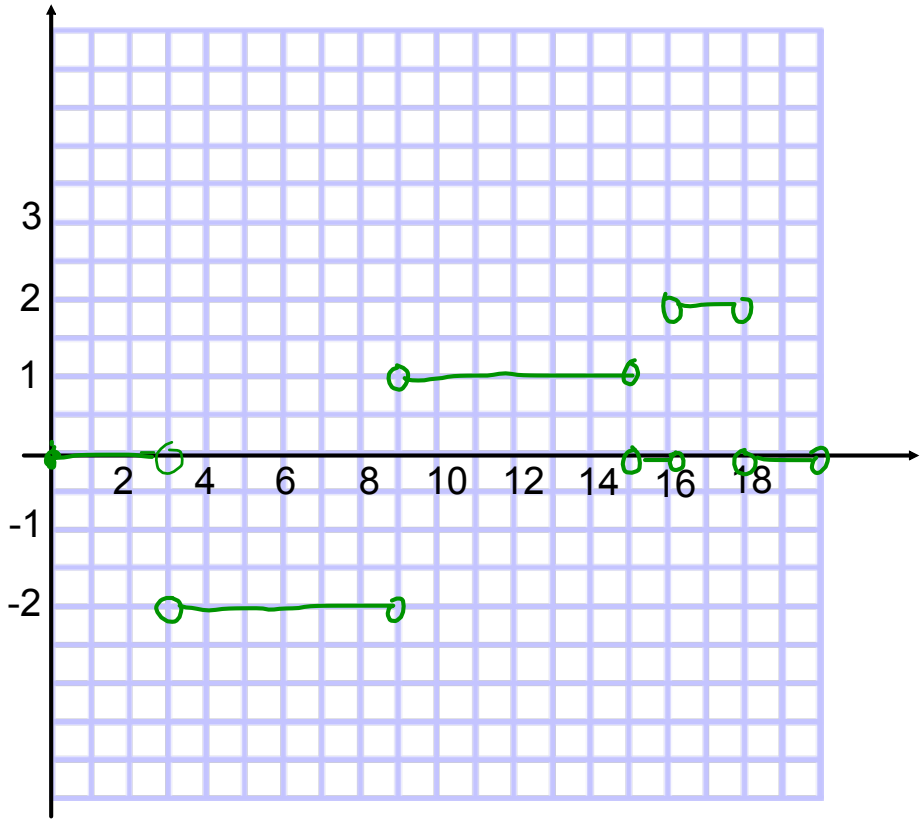
16 - 18 s:

$\vec{\Delta d}$ = area = $\frac{(4\ m/s)(2s)}{2} = 4\ m$

18 - 20 s:

$\vec{\Delta d}$ = area = $4\ m/s\,(2s) = 8\ m$

Draw the corresponding acceleration-time graph



acceleration = slope

0-3 s: $0\ m/s^2$

3-9 s: $\vec{a} = \frac{-6\ m/s - 6\ m/s}{6s} = -2\ m/s^2$

9-15 s: $\vec{a} = \frac{0 - (-6\ m/s)}{6s} = 1\ m/s^2$

15-16 s: $0\ m/s^2$

16-18 s: $\vec{a} = \frac{4\ m/s - 0}{2s} = 2\ m/s^2$

18-20 s: $0\ m/s^2$