Position-Time Graphs
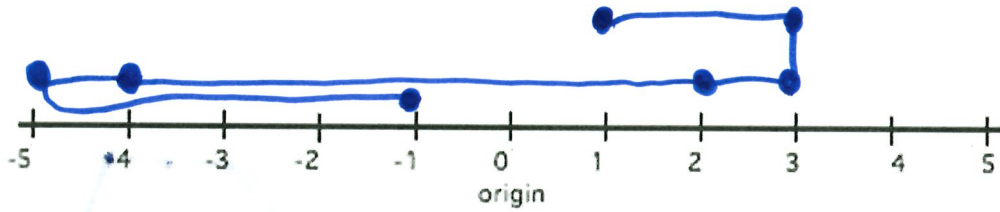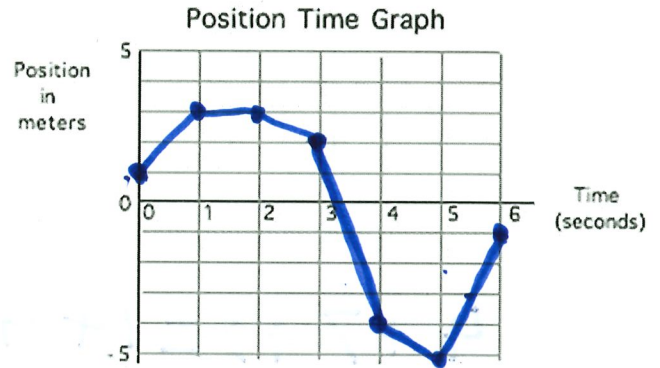
Consider the motion of an object moving back and forth along a straight line.

Time (s)	0	1	2	3	4	5	6
Position (m)	1	3	3	2	-4	-5	-1

Position Time Graph

What is the position of the object at 5.5 seconds?

$-3m$

What is the displacement of the object between:

0 and 3 seconds?	3 and 6 seconds?	0 and 6 seconds?
$X_f - X_i = 3m - 2m = 1m$	$-3m$	$-2m$

What is the distance travelled of the object between:

0 and 3 seconds?	3 and 6 seconds?	0 and 6 seconds?
$2 + 0 + 1 = 3m$	$6 + 1 + 4 = 11m$	$3 + 11 = 14m$

What is the average velocity and speed of the object between:

0 and 3 seconds?	3 and 6 seconds?	0 and 6 seconds?
$V = \frac{1m}{3sec} = 0.33m/s$ $Speed = \frac{3m}{3sec} = 1m/s$	$V = \frac{-3m}{3sec} = -1m/s$ $Speed = \frac{11m}{3sec} = 3.7m/s$	$\frac{-2m}{6sec} = -0.33m/s$ $Speed = \frac{14m}{6s} = 2.33m/s$

Practice

1. Sketch a position time graph based on the data in the following chart

Time (s)	0	1	2	3	4	5	6
Position (m)	-1	1	3	3	3	-4	-1

Position Time Graph

Position in meters

Time (seconds)
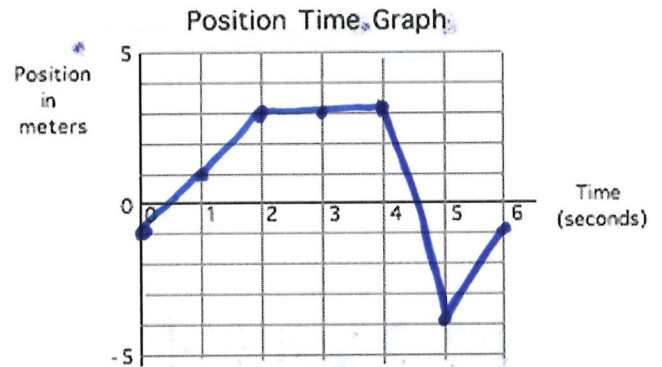
2. Determine the distance travelled between time 0 and time 6

$$4 + 7 + 3 = 14m$$

3. Determine the average speed between time 0 and time 6

$$\frac{14m}{6sec} = 2.3m/s$$

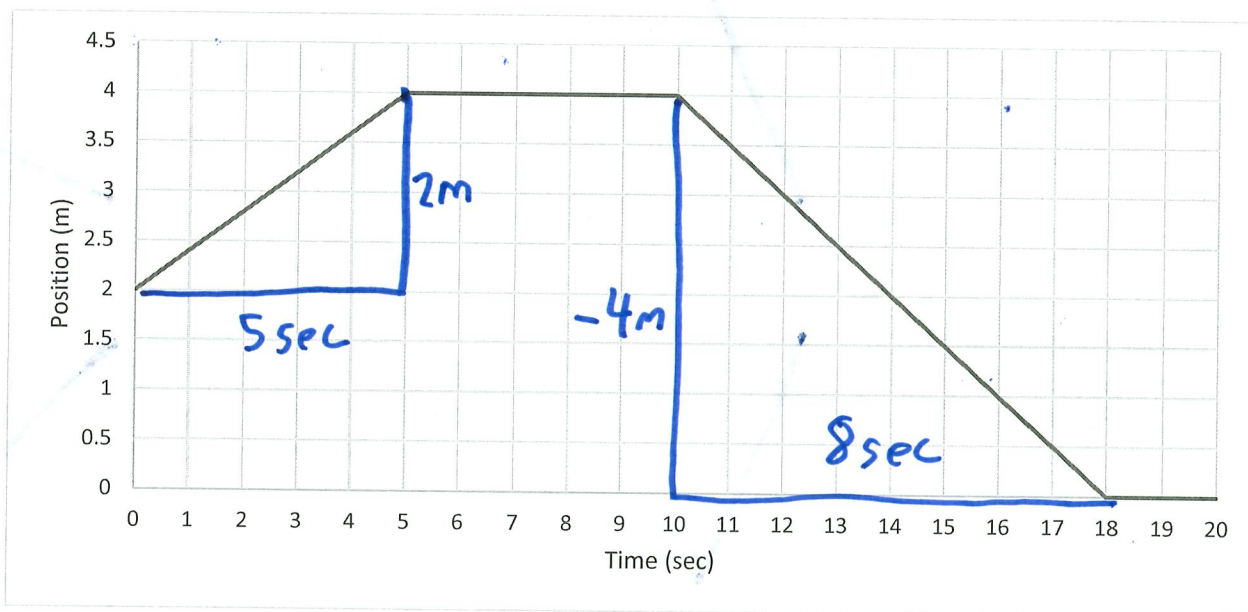4. Determine the displacement between time 0 and time 6

$$0m$$

5. Determine the average velocity between time 0 and time 6

$$0m/s$$

6. In what interval of time is the velocity negative?

Between 4-5 sec

Slope in a position time graph

Determine the slope of the position time graph shown with units, rounded to 2 sig figs

Between t=0 to t=5

$$\frac{2m}{5 sec} = 0.40 m/s$$

Between t=5 to t=10

$$0 m/s$$

Between t=10 to t=18

$$\frac{-4m}{8m} = -0.50 m/s$$

Between t=18 to t=20

$$0 m/s$$

The slope of a position time graph is the ___Velocity___ of the object.

Positive slope means the object is moving in the ___positive___ direction.
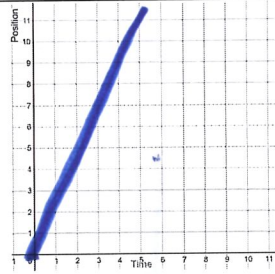
Negative slope means the object is moving in the ___negative___ direction.
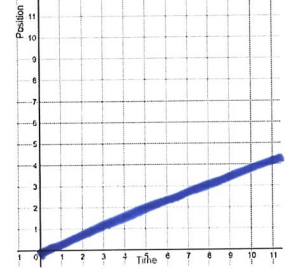
Zero slope means the object is ___not moving___.

The steeper the line the ___faster___ the object is moving.
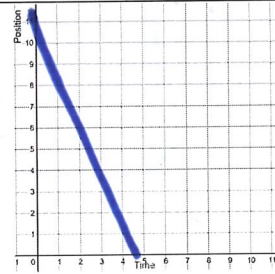
Examples:

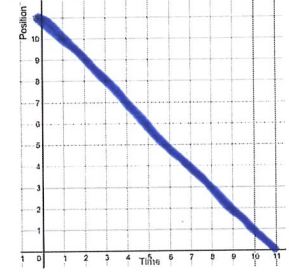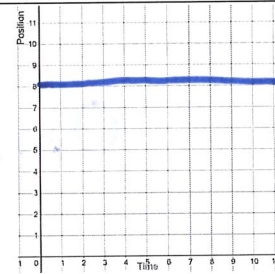|	
Draw a position time graph for an object moving quickly in the positive direction	Draw a position time graph for an object moving slowly in the positive direction.
Draw a position time graph for an object moving quickly in the negative direction	Draw a position time graph for an object moving slowly in the negative direction.
Draw a position time graph for an object which isn't moving.	Draw a position time graph for an object the moves in the positive direction quickly, pauses, and then moves in the negative direction slowly.