



## Velocity-Time Graphs

1. State the definitions of:

a. Velocity

**The speed at which an object travels in a given direction.**

b. Acceleration

**The rate of change of velocity.**

2. Use the following distance-time graph to answer the questions.

a. Between 20 and 30 seconds

b. Between 0 and 20 seconds

c. 60 m

d. Speed = gradient

$$\text{Speed} = (60-40)/(50-30)$$

$$\text{Speed} = 1 \text{ m/s}$$

3. Complete the table to describe the features of displacement-time graphs and velocity-time graphs.

	Displacement-Time Graph	Velocity-Time Graph
Horizontal line	Stationary object	Object with constant velocity
Positive gradient	Constant speed	Constant acceleration (speeding up)
Negative gradient	Returning to original position (travelling in opposite direction)	Constant deceleration (slowing down)
What can be calculated from the gradient?	Speed	Acceleration

4. Explain how to calculate the distance travelled by an object from a velocity-time graph.

**Distance travelled can be calculated by calculating the area under the graph.**





5. Use the following velocity-time graph to answer the questions.

- a. Describe the motion of this object between:
- i. 0 and 5 seconds

#### Object travelling at constant velocity

- ii. 5 and 10 seconds

#### Increasing velocity/acceleration

- iii. 10 and 15 seconds

#### Constant velocity (higher than between 0 and 5 seconds)

- iv. 15 and 20 seconds

#### Decreasing velocity/slowing down/deceleration (to a stop)

- b. Calculate the distance travelled by this object during the 20 seconds.

**Distance travelled = area under the graph**

$$\text{Area under the graph} = (5 \times 5) + (5 \times 5) + (1/2 \times 5 \times 5) + (5 \times 10) + (1/2 \times 5 \times 10)$$

**Area under the graph = 137.5 m**

6. Use the following velocity-time graph to answer the questions.

- a. Describe the motion of this object between:
- i. 0 and 5 seconds

#### Object accelerating/increasing velocity

- ii. 5 and 10 seconds

#### Constant velocity/no acceleration

- iii. 10 and 15 seconds

#### Object decelerating/decreasing velocity

- iv. 15 and 20 seconds

#### Object is stationary (velocity = 0 m/s)

- v. 20 and 25 seconds

#### Object accelerating/increasing velocity

- vi. 25 and 30 seconds

#### Constant velocity (higher than between 5 and 10 seconds)

- b. Calculate the distance travelled by this object during the 30 seconds.

**Distance travelled = area under the graph**

$$\text{Area under the graph} = (1/2 \times 5 \times 6) + (5 \times 6) + (1/2 \times 5 \times 6) + (1/2 \times 5 \times 10) + (5 \times 10)$$

**Area under the graph = 135 m**

