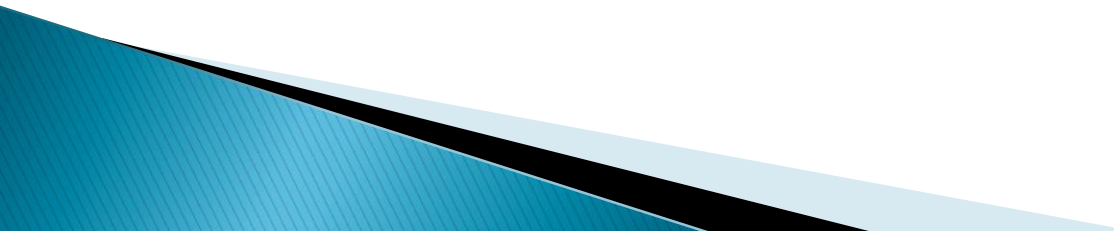


Classical Physics

Year 10 Pathway C

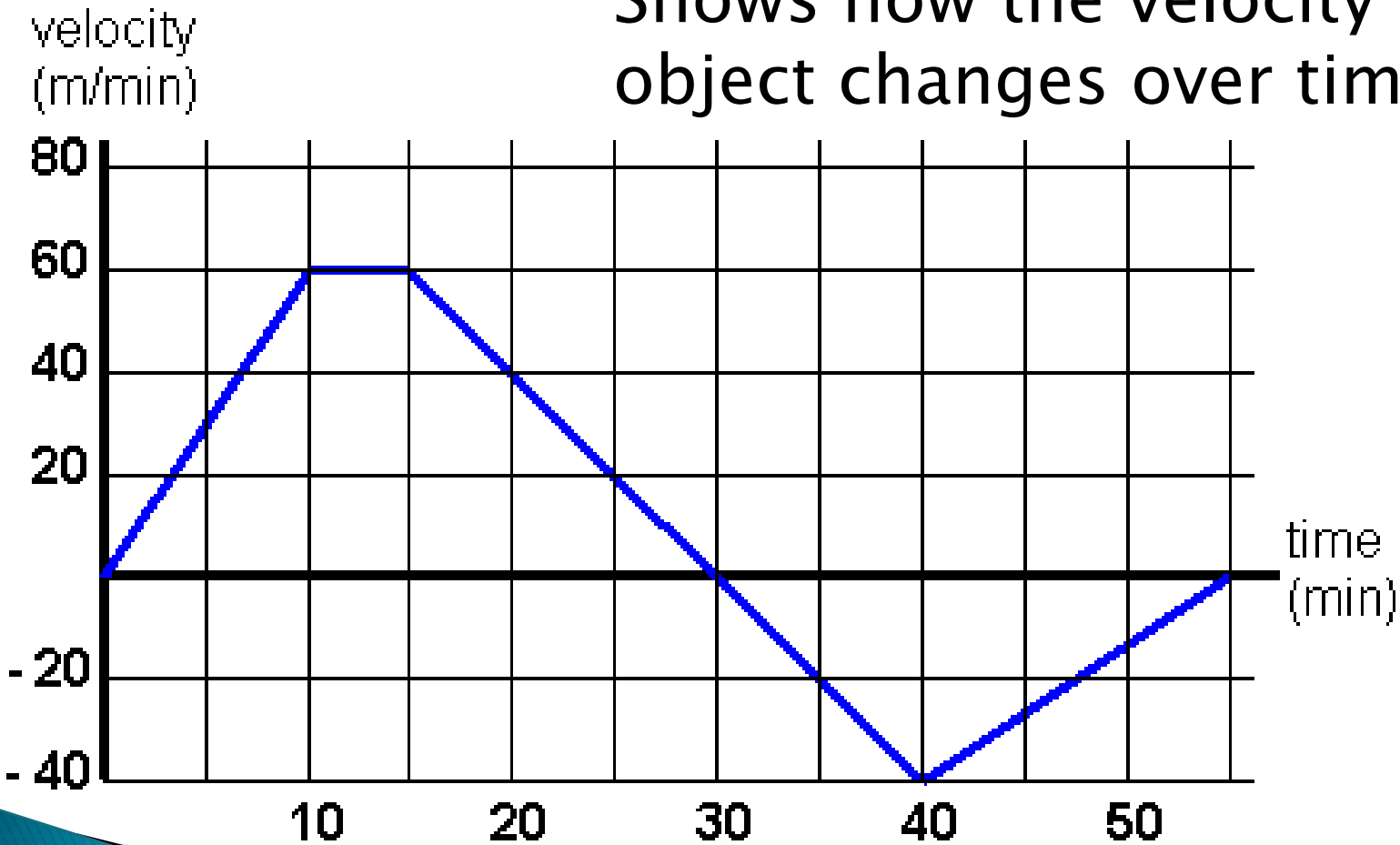
Mr. D. Patterson

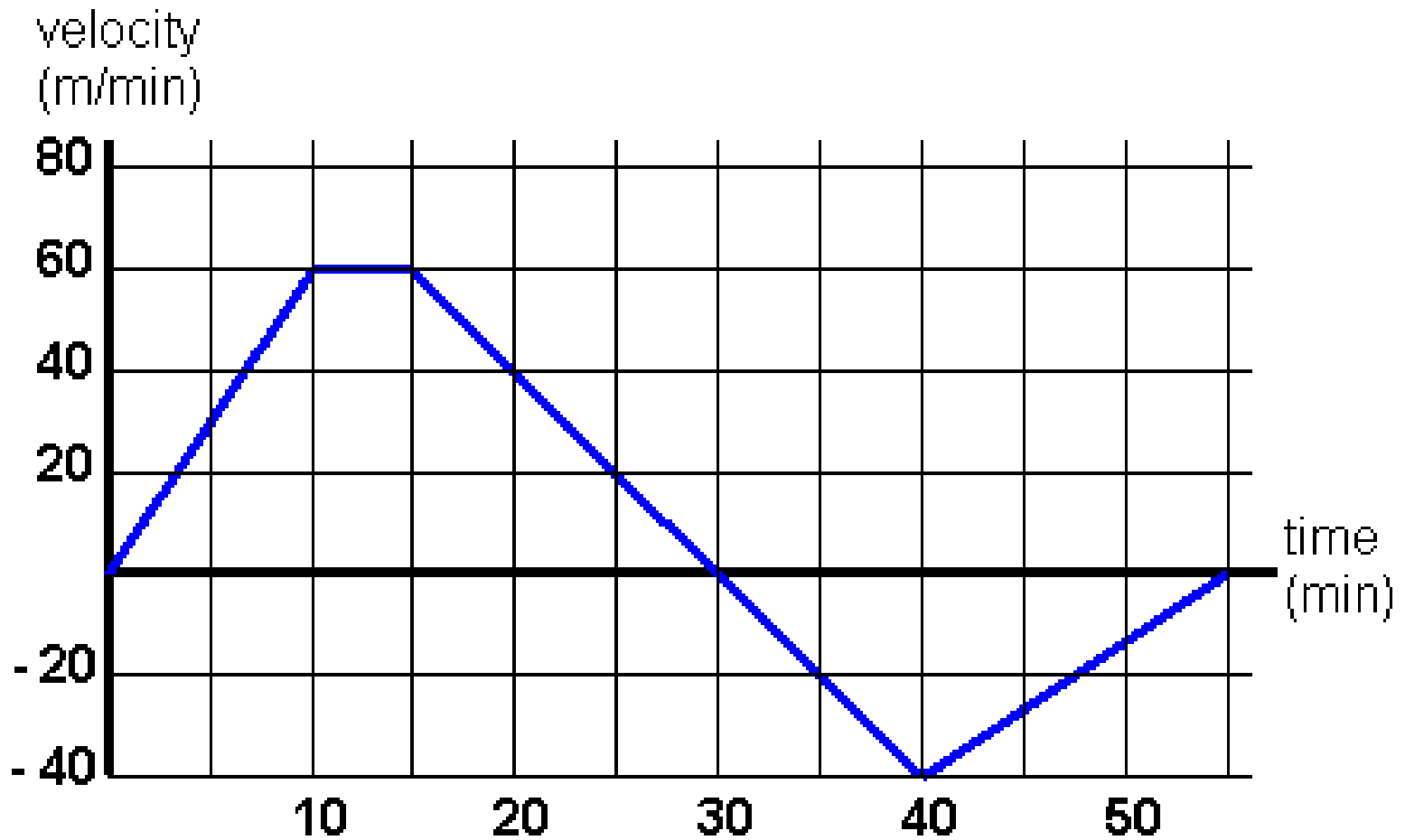
Outcomes

- ▶ Obtain information about the motion of an object through velocity–time graphs
 - ▶ Use the gradient of velocity–time graphs to determine the acceleration of an object
 - ▶ Use the area under velocity–time graphs to determine the displacement of an object
- 

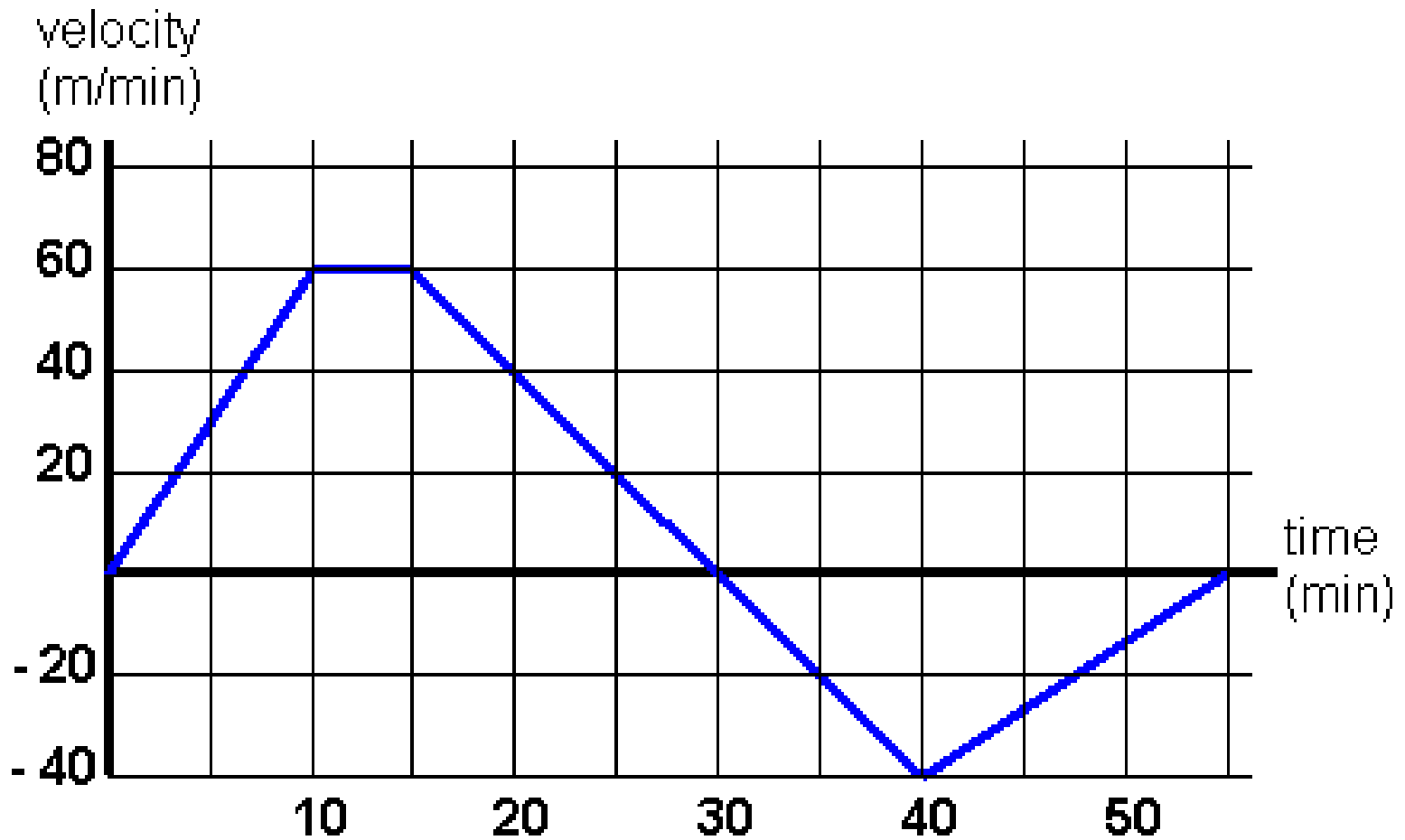
Velocity–time graphs

Shows how the velocity of an object changes over time





- 1) What is the velocity after 10 min have past?
- 2) What is the velocity when $t=30$ min?
- 3) At what point(s) in time is the velocity -30 m/min?

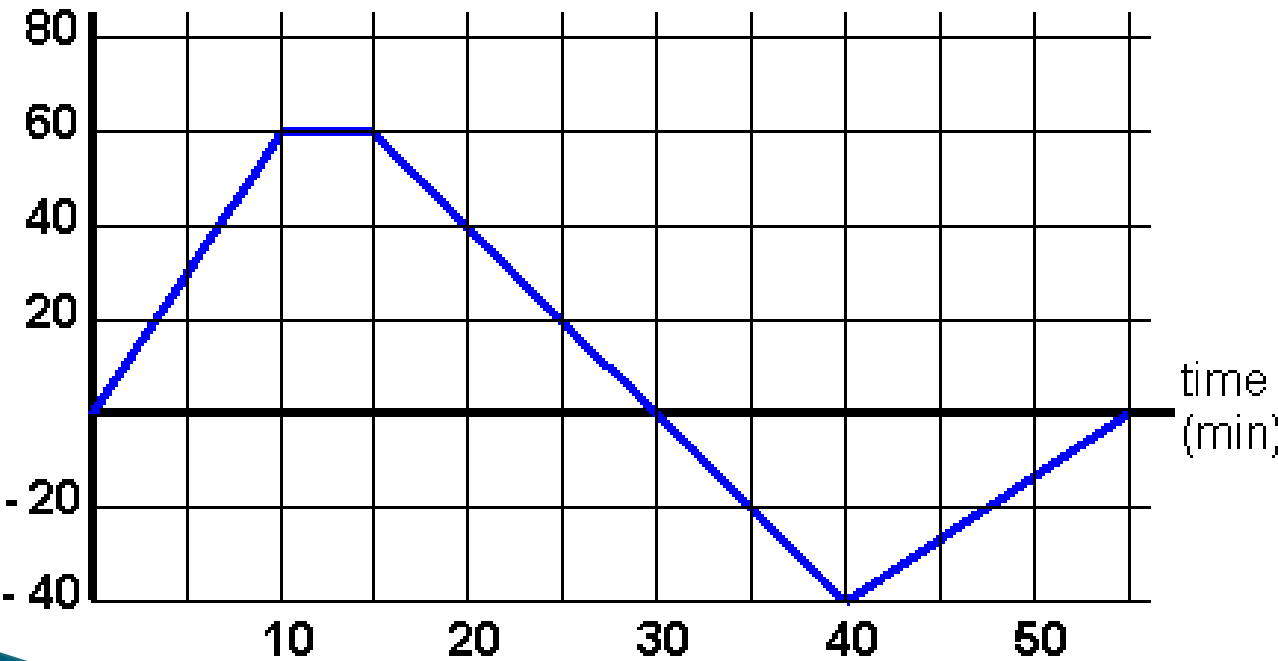


- 1) What is the velocity after 10 min have past? **60 m/min**
- 2) What is the velocity when $t=30$ min? **0**
- 3) At what point(s) in time is the velocity -30 m/min? **37.5min**
and 42.5 min

Velocity–time graphs

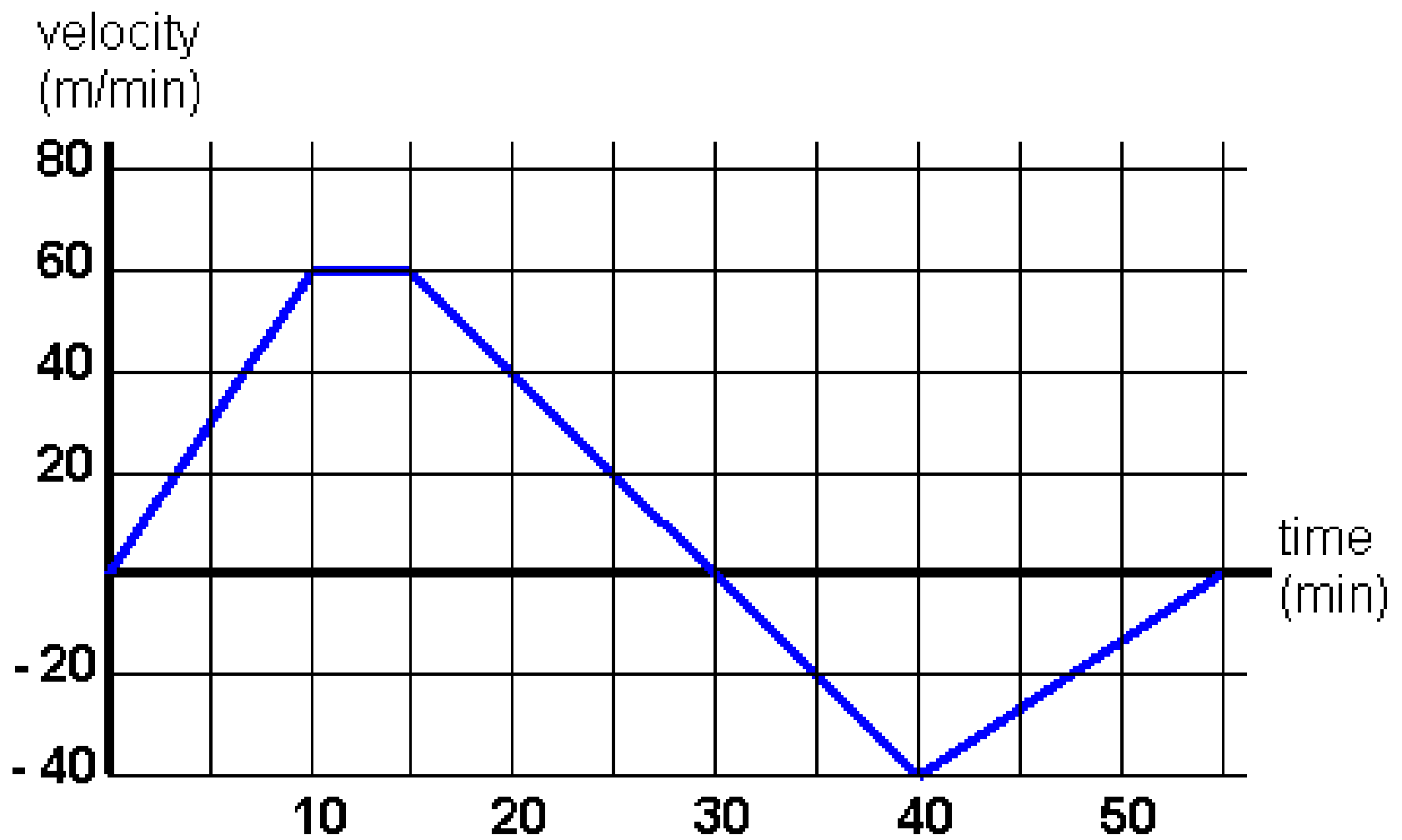
$$\text{Gradient} = \frac{\text{rise}}{\text{run}} = \frac{\text{velocity}}{\text{time}} = \frac{\Delta v}{\Delta t} = a$$

velocity
(m/min)



The gradient of a velocity time graph gives the acceleration.

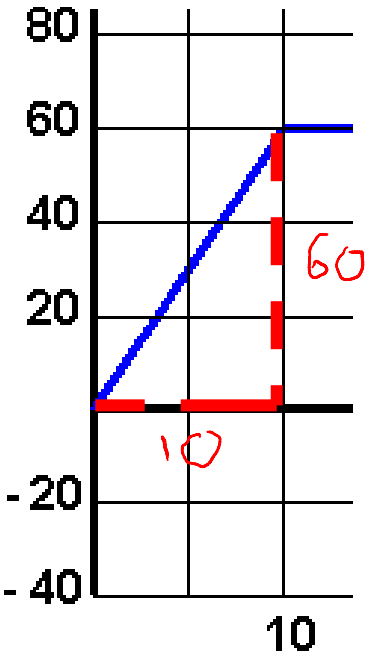
time (min) When the gradient changes, the velocity changes



What is the acceleration during the first 10 min and when $t=30\text{min}$?

Worked example

velocity
(m/min)



First 10 min

$$\text{acceleration} = \text{gradient} = \frac{\text{rise}}{\text{run}}$$

$$a = \frac{60}{10} = 6 \text{ m/min}^2$$

At $t = 30 \text{ min}$

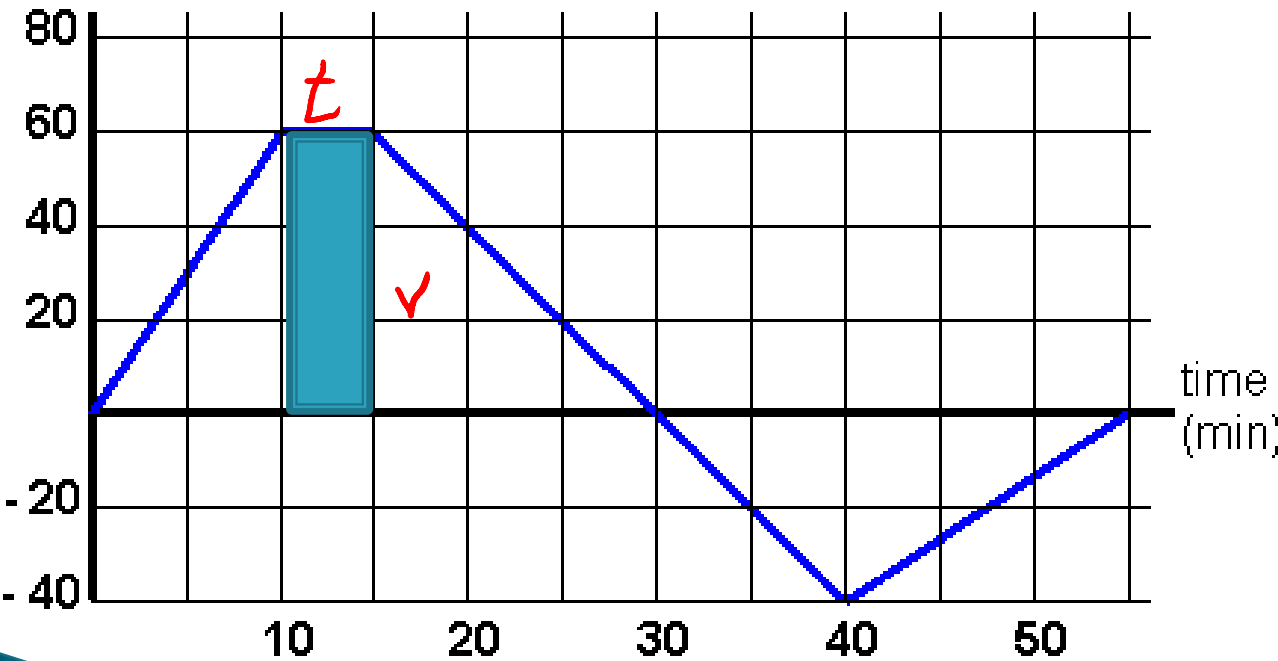
$$\text{acceleration} = \text{gradient} = \frac{\text{rise}}{\text{run}}$$

$$a = \frac{-100}{25} = -4 \text{ m/min}^2$$

Velocity–time graphs

$$\text{Area} = L * W = v * t = s$$

velocity
(m/min)



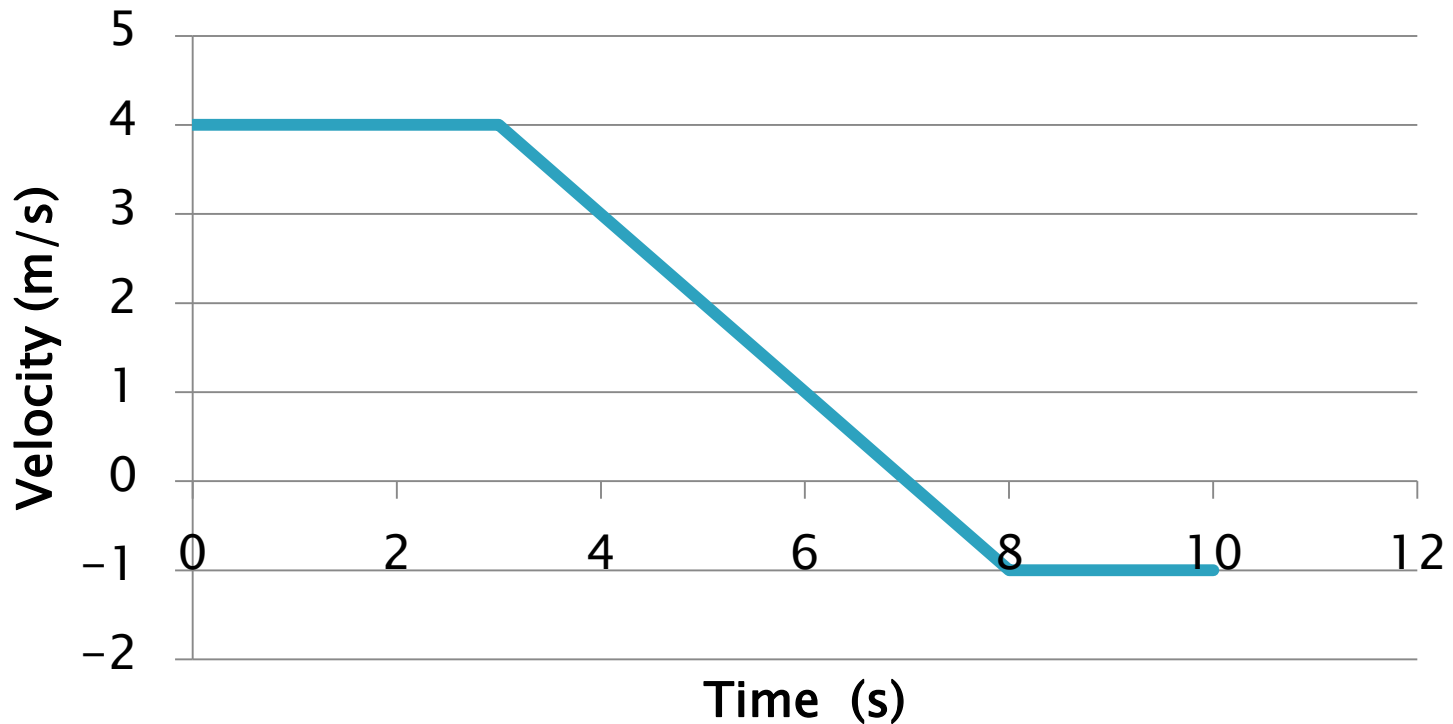
The area under a velocity–time graph gives the displacement.

time
(min)

Split the graph into simple shapes if calculating total displacement

Worked Example

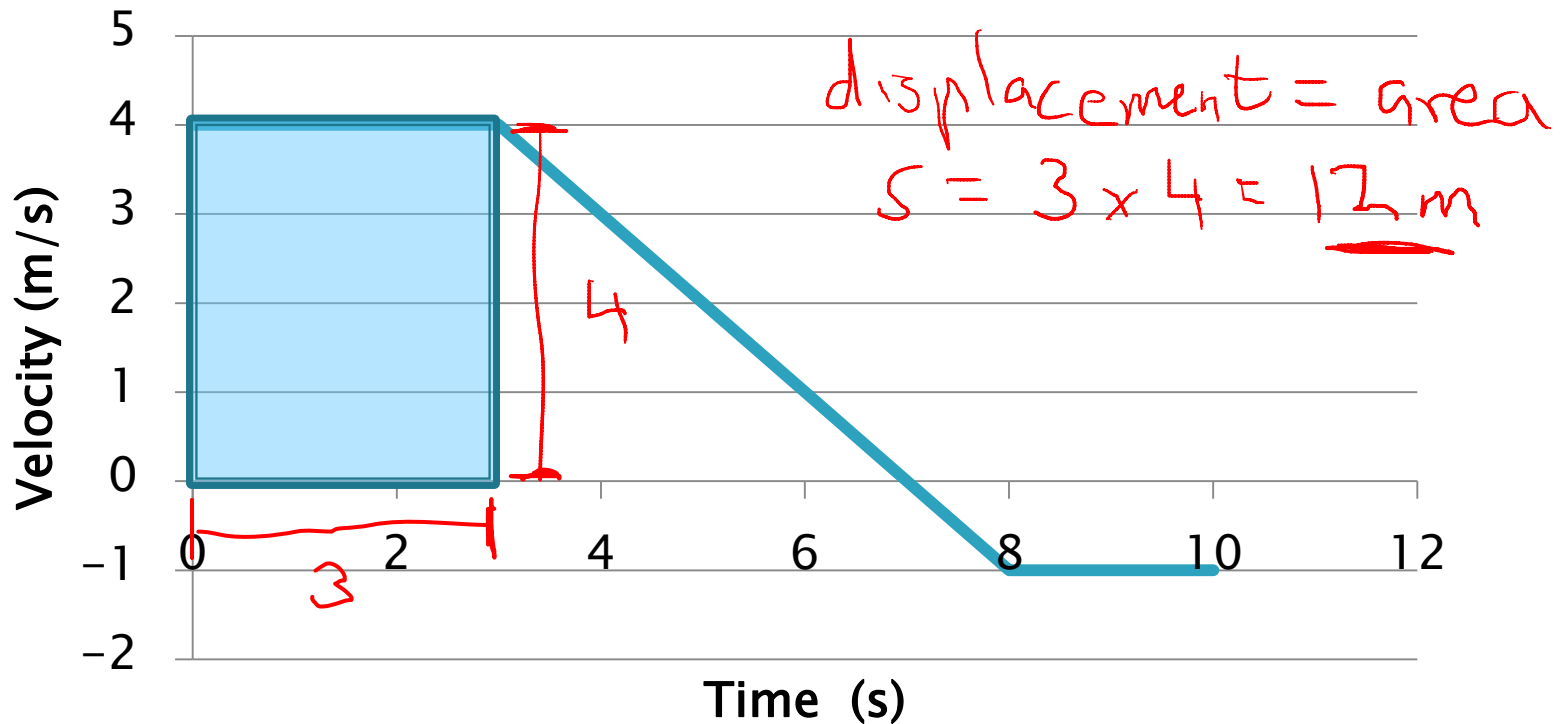
Velocity – time



- ▶ What is the displacement when $t=3\text{s}$
- ▶ How far does the object travel between $t=3\text{s}$ and $t=7\text{s}$?

Worked Example

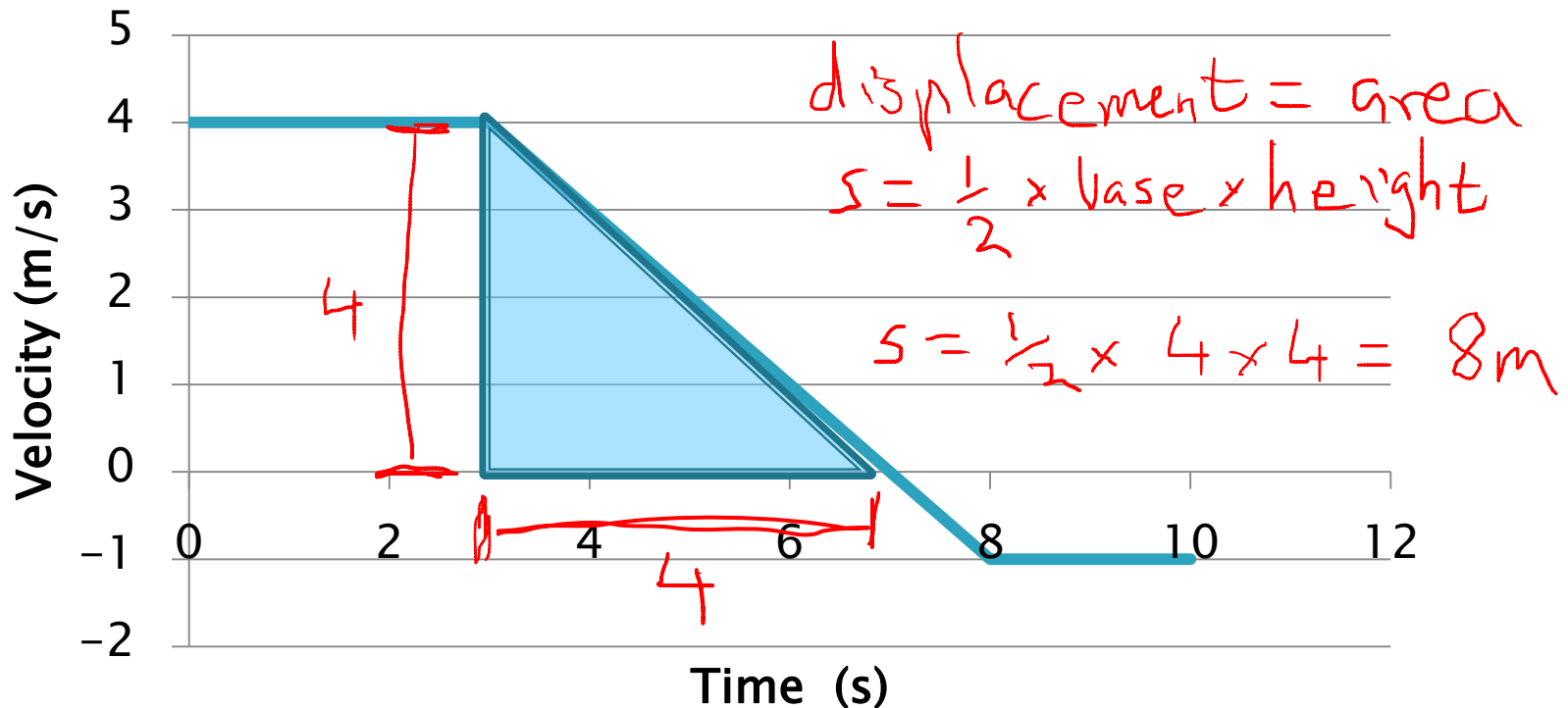
Velocity – time



- ▶ What is the displacement when $t=3s$ (12m)
- ▶ How far does the object travel between $t=3s$ and $t=7s$?

Worked Example

Velocity - time



- ▶ What is the displacement when $t=3\text{s}$ (12m)
- ▶ How far does the object travel between $t=3\text{s}$ and $t=7\text{s}$? (8m)

Outcomes

- ▶ Obtain information about the motion of an object through velocity–time graphs
 - ▶ Use the gradient of velocity–time graphs to determine the acceleration of an object
 - ▶ Use the area under velocity–time graphs to determine the displacement of an object
 - ▶ **Matthews and Winter Set 14**
- 