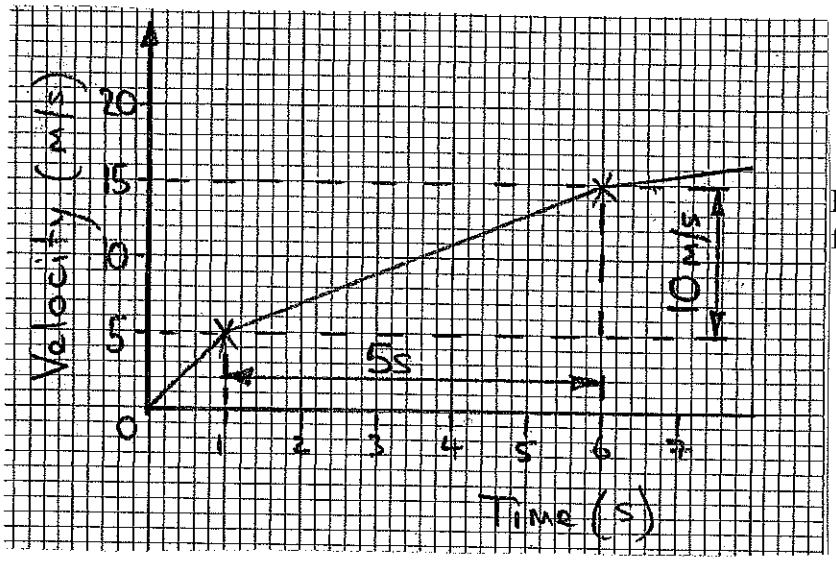
Chapter 3: Velocity – Time Graphs (Rev B)

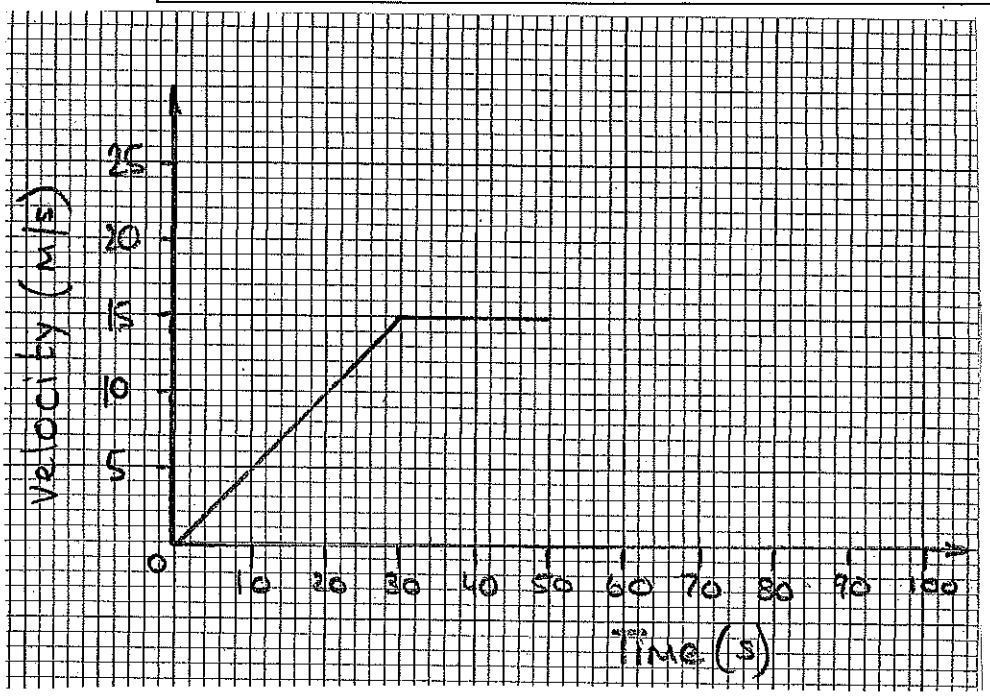
Accelerating means getting faster. The value of the acceleration shows the rate at which the speed is increasing. If the acceleration is negative it means the object is slowing down (decelerating).

Acceleration (m/s^2) = change in velocity (m/s) / time (s)



In the graph on the left, the acceleration from 1s to 6s = $\frac{10\ m/s}{5s} = 2m/s^2$

Question 1 This question is about a car journey.

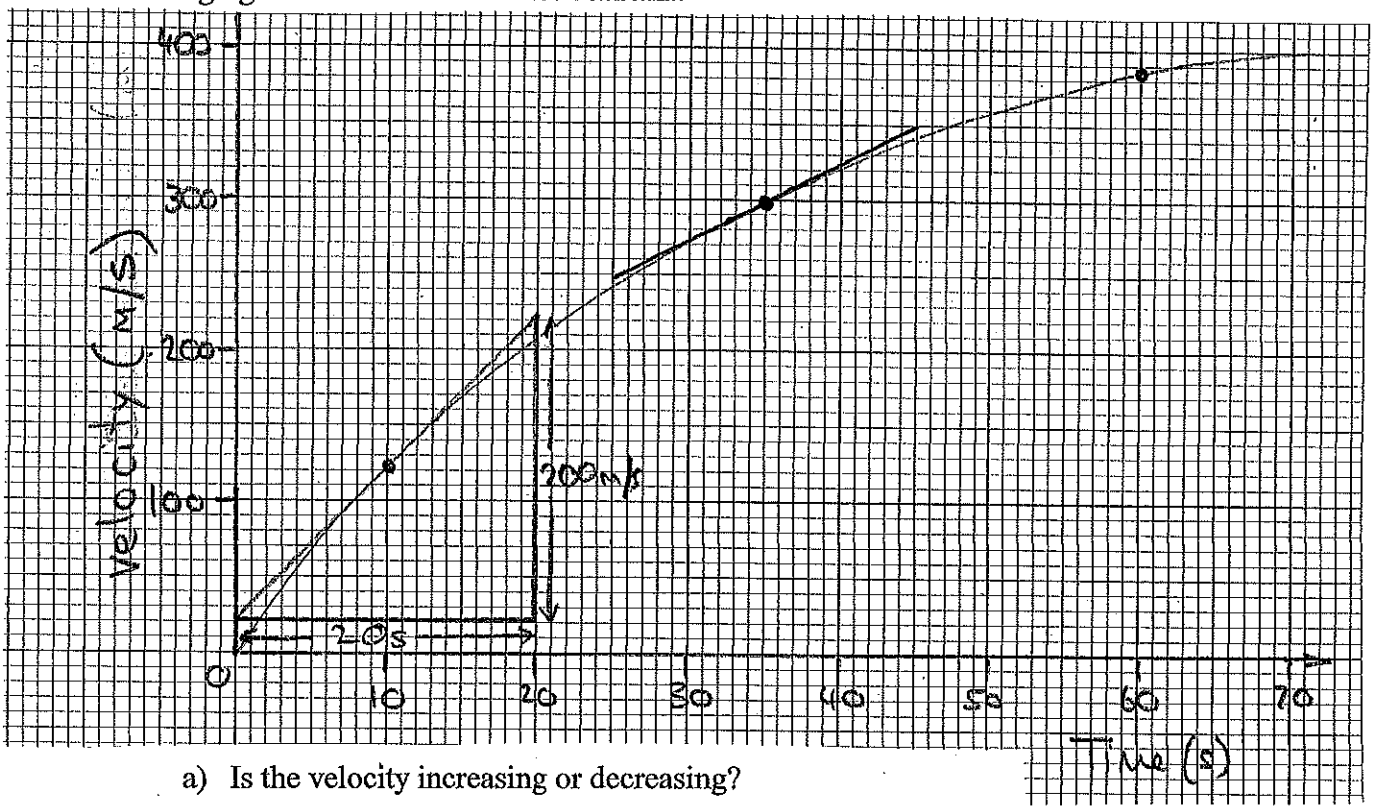


a) Calculate the acceleration for the first 30s.
b) Add a line to show the car steadily accelerating to 20m/s between a time of 50s and 60s.
c) Add a line to show a steady speed of 20m/s for the next 20s.
d) Add a line to show the car steadily slowing to a stop over the next 20s.
e) Calculate the acceleration occurring in part b.
f) Calculate the acceleration occurring in part d.

Question 2

This question will extend you to A level standard!

The graph below shows a velocity – time graph where the velocity is gradually changing. The acceleration is **not** constant.



a) Is the velocity increasing or decreasing?

b) Describe the way in which the velocity is changing.

c) Look at the line at a time of 10s. A tangent has been drawn at this point. The tangent has the same gradient as the curve, so we can use the tangent's gradient to calculate the acceleration at this time. Complete the calculation:

$$\text{Acceleration} = \frac{\text{change in velocity}}{\text{Time}} = \frac{200\ \text{m/s}}{20\text{s}} =$$

d) Complete the triangle for the tangent at a time of 35s. Use this triangle to calculate the acceleration at 35s.

e) Now draw a tangent and triangle at a time of 60s and calculate the acceleration.