DIFFERENTIATION & FUNCTIONS (Q 6, 7 & 8, PAPER 1)

LESSON NO. 11: LINEAR GRAPHS



6 (b) (iii)

From the graph you can see that C = 2 degrees when t = 10 minutes.

 $C = \frac{1}{2}(t+k)$ $\Rightarrow 2 = \frac{1}{2}(10+k)$ $\Rightarrow 4 = 10+k$ $\Rightarrow k = -6$

2006

6 (b) The temperature, *C*, in degrees Celsius, of a liquid in an insulated container is related to time *t*, in hours, by

$$C=86-6t.$$

- (i) Draw the straight line graph of this relation, putting *t* on the horizontal axis, for $0 \le t \le 8$.
- (ii) Use your graph to estimate the temperature when t = 5.5 hours.
- (iii) Use your graph to estimate the time it takes for the temperature to fall from 80 degrees to 60 degrees.

SOLUTION

6 (b) (i)

C = 86 - 6t

As these graphs are straight lines, you only need to plot the first and last points in the domain.

The two end points of your straight line are (0, 86) and (8, 34).



6 (b) (ii)

Go to 5.5 hours on the horizontal axis. Go straight up until you meet the straight line graph and then go out to the vertical axis. Read off the temperature. Ans: C = 53 degrees

Сомт...

6 (b) (iii)

Draw lines from 80 degrees and 60 degrees on the vertical axis to the graph of the straight line and go straight down to the horizontal axis. Measure the time between both points.

Ans: t = 4.3 hours -1 hour = 3.3 hours

1998

6 (b) The speed, *v*, in metres per second of an engine moving along a track is related to time, *t*, in seconds by

$$v = \frac{1}{3}(2t+5).$$

- (i) Draw the straight line graph of this relation, putting *t* on the horizontal axis, for $0 \le t \le 8$.
- (ii) Use your graph to estimate the speed when t = 2.5 seconds.
- (iii) Use your graph to estimate the time at which the speed reaches 6 metres per second.

SOLUTION

6 (b) (i)

As these graphs are straight lines, you only need to plot the first and last points in the domain.

 $t = 0: v = \frac{1}{3}(2t+5) = \frac{1}{3}(2(0)+5) = \frac{1}{3}(5) = \frac{5}{3} \Longrightarrow (0, \frac{5}{3})$ is a point on the line.

 $t = 8: v = \frac{1}{3}(2t+5) = \frac{1}{3}(2(8)+5) = \frac{1}{3}(21) = 7 \implies (8, 7)$ is a point on the line.



6 (b) (ii)

Start at 2.5 s along the horizontal axis and go straight up till you meet the graph. Now go straight across to the vertical axis and read off the speed v.

$$:.v = 3.3 \text{ m/s}$$



6 (b) (iii)

Start at 6 m/s along the vertical axis and go straight across till you meet the graph. Now go straight down to the horizontal axis and read off the time t.

 $\therefore t = 6.5 \text{ s}$

