

Q. 2.

$$a) \quad y = x^2 + 3x$$

$$\frac{dy}{dx} = 2x + 3$$

$$\text{when } x = 1$$

$$\frac{dy}{dx} = 2(1) + 3$$

$$= 5$$

$$\therefore \text{gradient} = 5 = m$$

$$\therefore \text{using } y - y_1 = m(x - x_1)$$

$$\text{where } m = 5 \text{ and } (x_1, y_1) = (1, 4)$$

$$y - 4 = 5(x - 1)$$

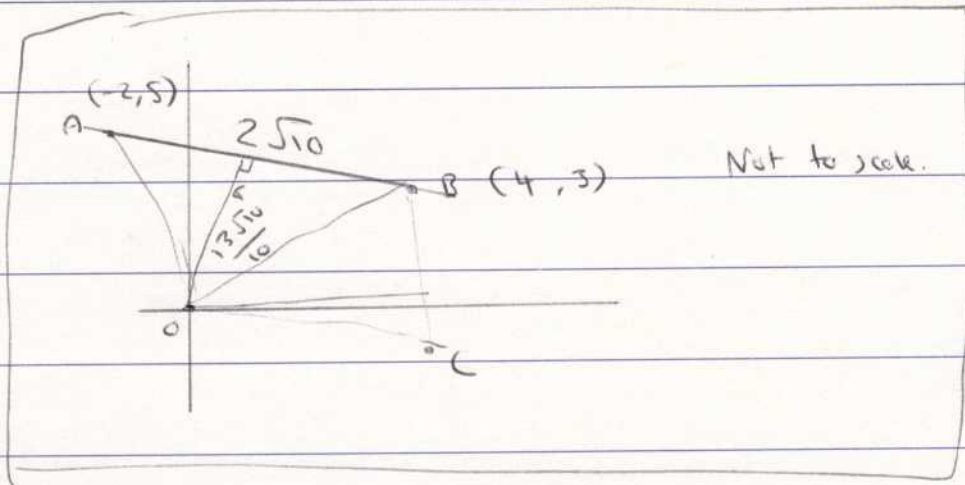
$$y - 4 = 5x - 5$$

$$\therefore y = 5x - 1$$



Q2  
cont'd.

b)i



To find eq. of AB:

using  $\frac{y-y_1}{x-x_1} = \frac{y_2-y_1}{x_2-x_1}$

$$\therefore \frac{y-3}{x-4} = \frac{5-3}{-2-4}$$

$$\therefore \frac{y-3}{x-4} = -\frac{1}{3}$$

$$\therefore y-3 = -\frac{1}{3}(x-4)$$

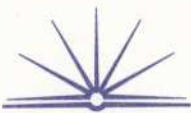
$$\therefore 3y-9 = -x+4$$

$$\therefore x+3y-13=0$$

ii)

Length AB, using  $d = \sqrt{(x_2-x_1)^2 + (y_2-y_1)^2}$

$$\begin{aligned} \therefore d(AB) &= \sqrt{(4-(-2))^2 + (3-5)^2} \\ &= \sqrt{36+4} \end{aligned}$$



Q2  
cont.

b ii)  
cont.)

$$\begin{aligned}\therefore d(AB) &= \sqrt{40} \\ &= \sqrt{4} \times \sqrt{10} \\ &= 2\sqrt{10}\end{aligned}$$

$$\therefore d(AB) = 2\sqrt{10}.$$

iii)

To calc. perp. dist. use:

$$\left| \frac{ax_1 + by_1 + c}{\sqrt{a^2 + b^2}} \right|$$

where  $a=1$ ,  $b=3$ ,  $c=-13$ ,  $x=0$ ,  $y=0$

$$\therefore \left| \frac{1(0) + 3(0) - 13}{\sqrt{1 + 9}} \right|$$

$$= \left| \frac{-13}{\sqrt{10}} \right|$$

$$= \frac{13}{\sqrt{10}}$$

$$= \frac{13}{\sqrt{10}} \times \frac{\sqrt{10}}{\sqrt{10}}$$

$$= \frac{13\sqrt{10}}{10}$$

$$\therefore \text{perp. dist.} = \frac{13\sqrt{10}}{10}$$



Q 2.  
b) cont

$$\text{iv) } A = 2 \left( \frac{1}{2} \times 2\sqrt{10} \times \frac{13\sqrt{10}}{10} \right)$$

$$= 52 \text{ u}^2$$

v) To find perp. dist o from BC:

$$m(AO) = \frac{0-5}{0--2}$$

$$= -\frac{5}{2}$$

$$\therefore m(BC) = -\frac{5}{2} \text{ (parallel } AO \parallel BC)$$

$\therefore$  using  $y - y_1 = m(x - x_1)$  ~~and~~

$$\text{where } m = -\frac{5}{2}, (x, y) = (4, 3)$$

$$\therefore y - 3 = -\frac{5}{2}(x - 4)$$

$$y - 3 = -\frac{5}{2}x + 10$$

$$\therefore y = -\frac{5}{2}x + 13$$

$$\therefore 2y + 5x - 26 = 0$$

Q2.

b, v  
continued
 $\therefore$  equat. of line BC =

$$5x + 2y - 26 = 0$$

 $\therefore$  for perp dist. 0 from BC use:

$$\left| \frac{ax_1 + by_1 + c}{\sqrt{a^2 + b^2}} \right|$$

 where  $a = 5$ ,  $b = 2$ ,  $c = -26$ ,  $x = 0$ ,  $y = 0$ 

$$\left| \frac{5(0) + 2(0) - 26}{\sqrt{25 + 4}} \right|$$

$$= \left| \frac{-26}{\sqrt{29}} \right|$$

$$= \frac{26}{\sqrt{29}}$$

$$= \frac{26\sqrt{29}}{29}$$

$$\therefore \text{perp. dist} = \frac{26\sqrt{29}}{29}$$