Question 2

(A) $y = x^2 + 3x$ at $(1,4)$.

$\dfrac{dy}{dx} = 2x + 3$ $sub (1,4)$.

   $\phantom{\dfrac{dy}{dx}} = 2 + 3$

   $\phantom{\dfrac{dy}{dx}} = 5$.

$\therefore y - 4 = 5(x-1)$.

$y - 4 = 5x - 5$

$\underline{5x - y - 1 = 0}$.

(B)(i) GRADIENT AB: $\dfrac{5-3}{-2-4}$

$ = \dfrac{2}{-6}$

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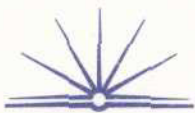
$y - 3 = -\dfrac{1}{3}(x - 4)$

$3y - 9 = -x + 4$

~~$x + 3y - 7 = 0$~~

$3y - 9 = -x + 4$

$x + 3y - 13 = 0$.

(ii) $d(AB)^2 = (-2-4)^2 + (5-3)^2$

$= 36 + 16$

$= \sqrt{52}$

(ii) $x_1 = -2 \quad x_2 = 4 \qquad y_1 = 5 \qquad y_2 = 3$

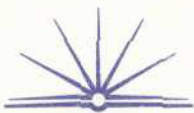$D = \sqrt{(4+2)^2 + (3-5)^2}$

$= \sqrt{6^2 + -2^2}$

$= \sqrt{40}$

$= 2\sqrt{10}$ units.

(iii) $D = \dfrac{|ax_1 + by_1 + c|}{\sqrt{a^2+b^2}}$

$= \dfrac{|0 + 0 - 13|}{\sqrt{1^2 + 3^2}} \qquad = \dfrac{13}{\sqrt{10}} \times \dfrac{\sqrt{10}}{\sqrt{10}}$

$= \dfrac{\sqrt{10}}{\sqrt{10}} \qquad = \dfrac{13\sqrt{10}}{10}$ units.

$= 3\sqrt{10}$ units

(iv) Area = b × ⊥h.

$$= 2\sqrt{10} \times \frac{13\sqrt{10}}{10}$$

$$= \frac{\cancel{} \; 26\sqrt{10}}{10}$$

$$= \cancel{6\text{units}}^2 \quad = \frac{26\sqrt{10}}{10} \text{ units}^2.$$

(v) By observation:

Across 6, down 2.

∴ ~~& coordinates (∗~~

C (6, -2).

∴ BC = $\dfrac{3+2}{4-6}$

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

∴ $y + 2 = \dfrac{5}{-2}(x - 6)$.

$-2y - 4 = 5x - 30$

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

∴ Perpin. dist with (0,0)

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

$$= \frac{|0 + 0 - 26|}{\sqrt{25 + 4}} = \frac{26}{\sqrt{29}} \text{ units}$$