

Q2.

$$y = x^2 + 3x \quad \text{at } (1, 4)$$

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

~~when $x=1$.~~ $m = 2x + 3$.

~~$y - y_1 = m(x - x_1)$~~ $y - y_1 = m(x - x_1)$

$$y - 4 = 2x + 3(x - 1)$$

$$y - 4 = 2x^2 + 3x - 2x - 3$$

$$y - 4 = 2x^2 + x - 3$$

$$y = 2x^2 + x + 1$$

(b). (i). $AB = \frac{y - y_1}{x - x_1} = \frac{y_2 - y_1}{x_2 - x_1}$

$$\begin{aligned}
 &= \frac{y - 5}{x + 2} = \frac{3 - 5}{3 + 2} \\
 &= \frac{y - 5}{x + 2} = -\frac{1}{5} \\
 &= y - 5 = -\frac{1}{5}(x + 2) \\
 &= y = \frac{-x - 2}{5} \\
 &= \frac{x + 2}{5} + y = 0.
 \end{aligned}$$

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

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

$$= \frac{y - 5}{x + 2} = -\frac{2}{6}$$

$$y - 5 = -\frac{1}{3}(x + 2)$$

~~$$y = -\frac{1}{3}x + 2$$~~

$$\times 3: 3y - 15 = -x - 2$$

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

$$(ii) d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

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

$$= \sqrt{36 + 4}$$

$$= \sqrt{40}$$

$$= \sqrt{4 \times 10}$$

$$= 2\sqrt{10}$$

$$(iii) \perp d = \frac{|ax_1 + by_1 + c|}{\sqrt{a^2 + b^2}}$$

$$= \frac{|1(0) + 3(0) + 13|}{\sqrt{1^2 + 3^2}}$$

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

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

(iv) $A = bh.$

$A = \text{d of } AB \times \perp \text{ distance from } O \text{ to } AB.$

$$A = \left| 2\sqrt{10} \times \frac{13}{\sqrt{10}} \right|$$

$$A = \frac{26\sqrt{10}}{\sqrt{10}}$$

$$A = 26$$

$\therefore A = 26 \text{ units}^2.$

(v). ~~find~~ find ~~equation~~ equation of BC.

find m of AO: $m = \frac{y_2 - y_1}{x_2 - x_1}$

$$m = \frac{5 - 0}{-2 - 0}.$$

$$m = -2.5.$$

m of BC must = m of AO because equal sides of parallelogram.

$$\frac{y - y_1}{x - x_1} = -2.5.$$

$$\frac{y - 3}{x - 4} = -2.5$$

$$y - 3 = -2.5(x - 4).$$

x2: $2y - 6 = -5x + 20.$

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

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

$$d = \frac{|5(0) + 2(0) - 26|}{\sqrt{5^2 + 2^2}}$$

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