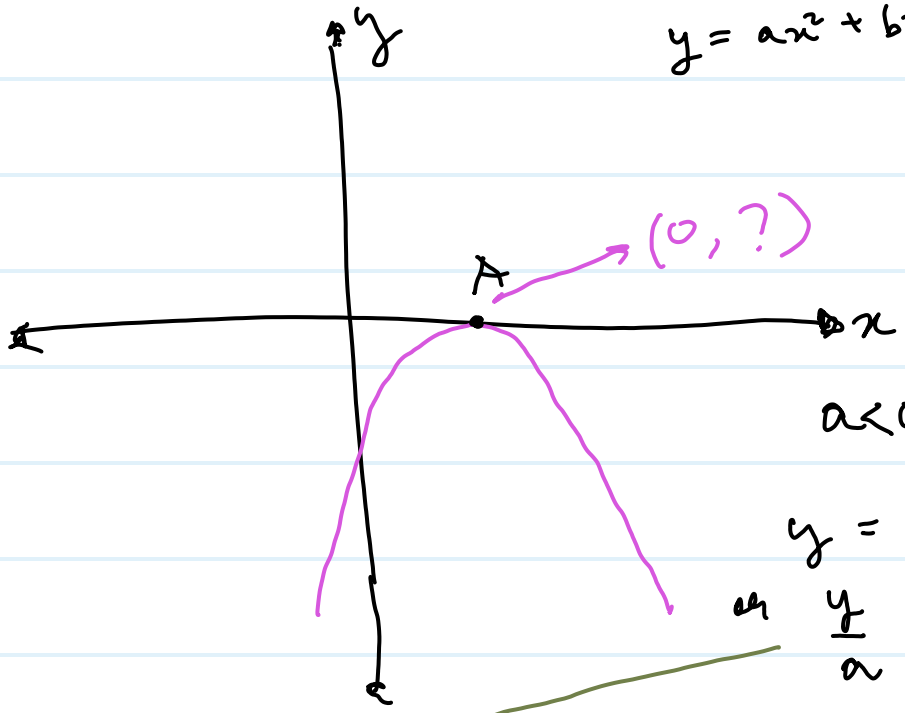
OT1 – 03 July 2024 Maths

17



$y = ax^2 + bx + c$

$a < 0$

$$y = ax^2 + bx + c$$

$$\text{or } \frac{y}{a} = x^2 + \frac{b}{a}x + \frac{c}{a}$$

$$\text{or } \frac{y}{a} = \left(x + \frac{b}{2a}\right)^2 - \left(\frac{b}{2a}\right)^2 + \frac{c}{a}$$

$$(x+\alpha)^2 = x^2 + 2\alpha x + \alpha^2$$

$$x^2 + 2\alpha x = (x+\alpha)^2 - \alpha^2$$

$$x^2 + kx = x^2 + 2\cdot\left(\frac{k}{2}\right)x + \left(\frac{k}{2}\right)^2 - \left(\frac{k}{2}\right)^2$$

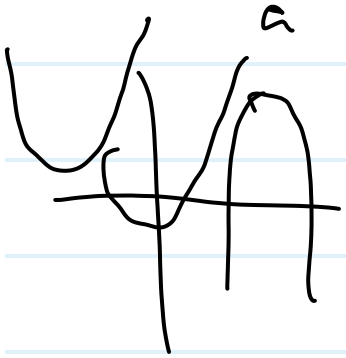
$$\text{or } x^2 + kx = \left(x + \frac{k}{2}\right)^2 - \left(\frac{k}{2}\right)^2$$

$$A \equiv \left(-\frac{k}{2}, -\left(\frac{k}{2}\right)^2\right)$$

$$\frac{y}{a} = x^2 + \frac{b}{a}x + \frac{c}{a}$$

$$\text{or } \frac{y}{a} = x^2 + 2\cdot\left(\frac{b}{2a}\right)\cdot x + \left(\frac{b}{2a}\right)^2 - \left(\frac{b}{2a}\right)^2 + \frac{c}{a}$$

$$\text{or } \frac{y}{a} = \left(x + \frac{b}{2a}\right)^2 + \frac{c}{a} - \left(\frac{b}{2a}\right)^2$$



Put $x = -\frac{b}{2a}$, $\frac{y}{a} = \frac{c}{a} - \left(\frac{b}{2a}\right)^2$

$$A = \left(\frac{-b}{2a}, \frac{c-b^2}{4a}\right)$$

$$y = c - \frac{b^2}{4a}$$

$\rightarrow$ $\frac{c-b^2}{4a} = 0$

$\rightarrow b^2 = 4ac$

$y = ax^2 + bx + c$ $< \alpha$ β

$y(x=\alpha) = 0$

$y(x=\beta) = 0$

$y = -x^2 + 2x + 5$

$y = x^2 + 2(1)x + (1)^2 - (1)^2 + 5$

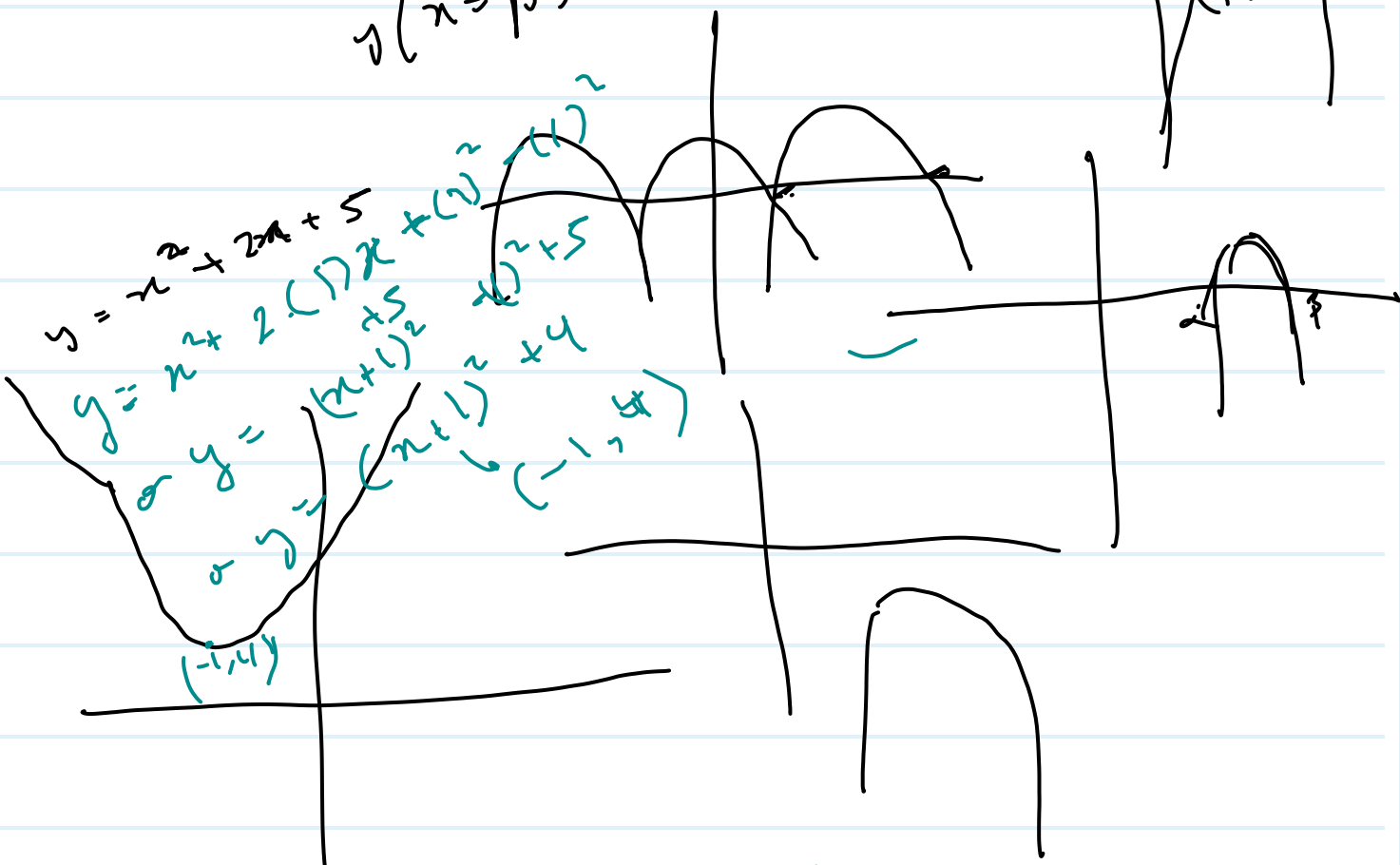
$y = (x+1)^2 + 5 - 1$

or $y = (x+1)^2 + 4$

$y = (x+1)^2$

$(-1, 4)$

$(-1, 4)$



$x^2 + 2x + 7$

$(x+1)^2 - 1^2 + 7$

$y = a(x-\alpha)^2$

$y = ax^2 - 2a\alpha x + a\alpha^2$

$ax^2 + bx + c$

$p = a(x-\alpha)(x-\beta)$

$p = a(x^2 - (\alpha+\beta)x + \alpha\beta)$

$x_1, x_2 = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$b^2 = 4ac$

$\Rightarrow$ equal roots.

24. $5x, 3x$ — LCM $= 3 \times 5$

$\text{HCF} = x$

$5x \cdot 3x = 3 \times 5 \times x^2$

a $n \pm 21$

25.