

5th Year Higher Level Maths Test on Chapter 1 and Simultaneous Equations



3-10-2013

① Expand: (i) $(3x-y)^2$ (ii) $(x-2)^3$

$$(a+b)^2 = a^2 + 2ab + b^2$$

(i) $9x^2 - 6xy + y^2$

(ii) $(x-2)(x-2)^2$

$$(x-2)(x^2 - 4x + 4)$$

$$x(x^2 - 4x + 4) - 2(x^2 - 4x + 4)$$

$$x^3 - 4x^2 + 4x - 2x^2 + 8x - 8$$

$$x^3 - 6x^2 + 12x - 8$$

② Simplify:

$$(i) \frac{2x^2 + 5x - 3}{2x + 1} = \frac{\cancel{(2x+1)}(x-3)}{\cancel{(2x+1)}} \\ = x - 3$$

$$(ii) \frac{x^3 - 8}{x - 2} = \frac{\cancel{(x-2)}(x^2 + 2x + 4)}{\cancel{(x-2)}} \\ = x^2 + 2x + 4$$

$$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$$

③ Divide $(x^3 - 2x^2 + 2x - 4)$ by $(x^2 + 2)$

$$\begin{array}{r} x - 2 \\ x^2 + 0x + 2 \overline{) x^3 - 2x^2 + 2x - 4} \\ \underline{+ x^3 + 0x^2 + 2x} \\ - 2x^2 - 4 \\ \underline{+ 2x^2 + 4} \\ 0 \end{array}$$

ANSWER = $x - 2$

$$(4) \quad f(x) = x^2 - 3x + 6$$

$$(i) \quad f(0) = (0)^2 - 3(0) + 6 = 6$$

$$(ii) \quad f(-2t) = (-2t)^2 - 3(2t) + 6$$

$$= 4t^2 - 6t + 6 \quad \checkmark$$

$$\text{or} \quad = 2(2t^2 - 3t + 3)$$

(5) Factorise :

$$(i) \quad 3x^2 - 27y^2 = 3(x^2 - 9y^2)$$

$$= 3(x - 3y)(x + 3y)$$

$$(ii) \quad 6y^2 + 11y - 35$$

$$(3y - 5)(2y + 7) \quad \checkmark$$

$\overset{-10y}{\curvearrowright}$
 $\underset{21y}{\curvearrowleft}$

$$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$$

$$(iii) \quad 64 + 125a^3$$

$$= (4 + 5a)(16 - 20a + 25a^2)$$

⑥ Simplify.

$$\begin{aligned} \text{LCD} = 20 \quad (i) \quad \frac{5x-1}{4} - \frac{2x-4}{5} &= \frac{5(5x-1) - 4(2x-4)}{20} \\ &= \frac{25x - 5 - 8x + 16}{20} \\ &= \frac{17x + 11}{20} \end{aligned}$$

$$\begin{aligned} \times \frac{4}{4} \quad (ii) \quad \frac{x + \frac{1}{4}}{\frac{1}{2}} &= \frac{4x + 1}{2} \quad \checkmark \\ \text{OR} \quad &= 2x + \frac{1}{2} \end{aligned}$$

⑦ (i) Solve

$$\begin{aligned} x + y + z &= 6 \quad (1) \\ 2x + y - z &= 1 \quad (2) \\ 4x - 3y + 2z &= 4 \quad (3) \end{aligned}$$

eliminate z

$$\begin{aligned} (1) \quad x + y + z &= 6 \\ + (2) \quad 2x + y - z &= 1 \\ \hline 3x + 2y &= 7 \quad (4) \\ (3) \quad 4x - 3y + 2z &= 4 \\ + 2(2) \quad 4x + 2y - 2z &= 2 \\ \hline 8x - y &= 6 \quad (5) \\ (4) \quad 3x + 2y &= 7 \\ + 2(5) \quad 16x - 2y &= 12 \\ \hline 19x &= 19 \quad \Rightarrow x = 1 \end{aligned}$$

$$\begin{aligned} \text{sub into (5)} \quad \Rightarrow 8(1) - y &= 6 \\ 8 - y &= 6 \quad \Rightarrow y = 2 \end{aligned}$$

$$\begin{aligned} \text{sub into (1)} \quad 1 + 2 + z &= 6 \\ 3 + z &= 6 \quad \Rightarrow z = 3 \end{aligned}$$

$$\textcircled{7} \text{ (ii) Solve } \frac{2a}{3} - \frac{a}{4} = \frac{5}{6}$$

$$\text{LCD} = 12.$$

$\times 12$

$$8a - 3a = 10$$

$$5a = 10$$

$$a = 2$$

$$\textcircled{7} \text{ (iii) Solve } 3x^2 - 8x + 1 = 0$$

use formula

$$a = 3$$

$$b = -8$$

$$c = 1$$

$$X = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$X = \frac{+8 \pm \sqrt{64 - 4(1)(3)}}{2(3)}$$

$$= \frac{8 \pm \sqrt{64 - 12}}{6}$$

$$= \frac{8 \pm \sqrt{52}}{6} = \frac{4 \pm \sqrt{13}}{3}$$

$$\textcircled{1} X = \frac{4 + \sqrt{13}}{3} \approx 2.5$$

$$\textcircled{2} X = \frac{4 - \sqrt{13}}{3} \approx 0.1$$

⊕ Solve

rewrite linear (iv)

Sub in & solve

only 1 solution!

Sub back into linear

Soln

$$\begin{aligned} 3x^2 - y^2 &= 3 \\ 2x - y &= 1 \Rightarrow y = 2x - 1 \end{aligned}$$

$$\begin{aligned} 3x^2 - (2x - 1)^2 &= 3 \\ 3x^2 - [4x^2 - 4x + 1] &= 3 \end{aligned}$$

$$3x^2 - 4x^2 + 4x - 1 = 3$$

$$-x^2 + 4x - 4 = 0$$

$$x^2 - 4x + 4 = 0$$

$$(x - 2)(x - 2) = 0$$

$$x = 2$$

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

$$y = 3$$

$$(x, y) = (2, 3)$$