① Evaluate Surd form =

a) $\frac{2}{\sqrt{3}} = \frac{2}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$

b) $\frac{3}{1-\sqrt{2}} = \frac{3}{1-\sqrt{2}} \times \frac{1+\sqrt{2}}{1+\sqrt{2}} = \frac{3(1+\sqrt{2})}{(1-\sqrt{2})(1+\sqrt{2})} = \frac{3+3\sqrt{2}}{1-\sqrt{2}+\sqrt{2}-2}$

$= \frac{3+3\sqrt{2}}{-1}$

$= -3-3\sqrt{2}$

c) $\frac{\sqrt{5}}{\sqrt{3}-\sqrt{2}} \times \frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}+\sqrt{2}} = \frac{\sqrt{15}+\sqrt{10}}{3-\sqrt{6}+\sqrt{6}-2} = \frac{\sqrt{15}+\sqrt{10}}{1}$

$= \sqrt{15}+\sqrt{10}$

② Solve the exponential equation

a) $2^{1-x} \times 8^{2+x} = 16$

$2^{1-x} \times (2^3)^{2+x} = 2^4$

$2^{1-x} \times 2^{6+3x} = 2^4$

$\cancel{2}^{1-x+6+3x} = \cancel{2}^4$

$7+2x = 4$

$2x = 4-7$

$2x = -3$

$x = -\frac{3}{2}$

b) $5^{x-4} \div 25 = 125$

$5^{x-4} \div 5^2 = 5^3$

$\cancel{5}^{x-4-2} = \cancel{5}^3$

$x-6 = 3$

$x = 9$

c) $2^{x+1} \times 4^{x-1} \times 8^{x+3} = 16$

$2^{x+1} \times (2^2)^{x-1} \times (2^3)^{x+3} = 2^4$

$2^{x+1} \times 2^{2x-2} \times 2^{3x+9} = 2^4$

$\cancel{2}^{x+1+2x-2+3x+9} = \cancel{2}^4$

$6x+8 = 4$

$6x = -4$

$x = -\frac{2}{3}$

d) $(2^x)^{x-1} = 64$

$\cancel{2}^{x^2-x} = \cancel{2}^{6}$

$x^2 - x = 6$

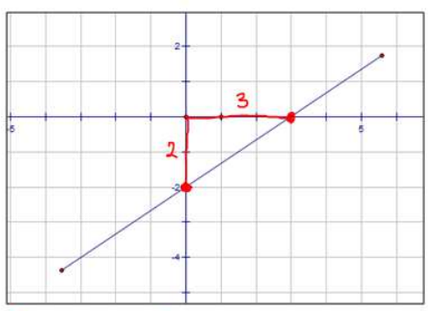
$x^2 - x - 6 = 0$

$(x-3)(x+2) = 0$

$x_1 = 3$ // $x_2 = -2$ //

③ Find y intercept, gradient and equation (in form of $y = mx + c$ and $ax + by = c$)

a)



y intercept = -2 //

$m = \frac{\text{rise}}{\text{run}} = \frac{2}{3}$ //

$y = mx + c$

$y = \frac{2}{3}x - 2$ //

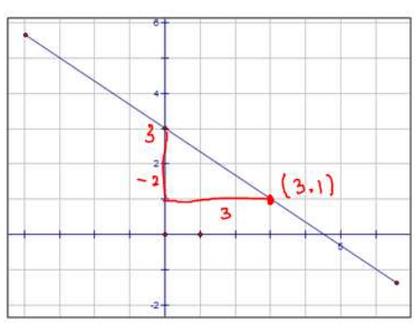
$\left(y = \frac{2}{3}x - 2\right) \times 3$

$3y = 2x - 6$

$-2x + 3y = -6$

$2x - 3y = 6$ //

b)



y intercept = 3 //

$m = -\frac{2}{3}$ //

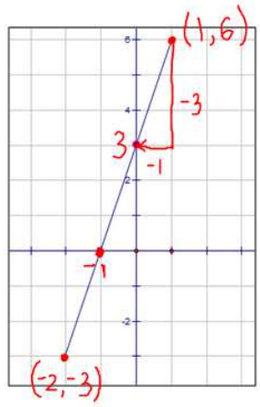
$y = -\frac{2}{3}x + 3$ //

$\left(y = -\frac{2}{3}x + 3\right) \times 3$

$3y = -2x + 9$

$2x + 3y = 9$ //

c)



y intercept = 3

$m = \frac{-3}{-1} = 3$

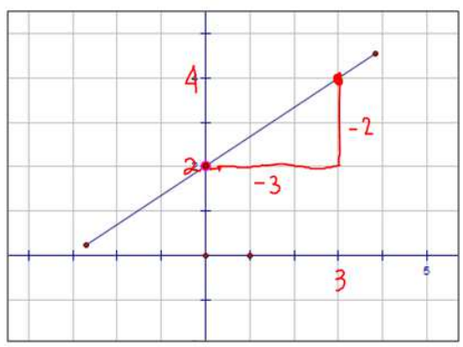
$y = 3x + 3$

$-3x + y = 3$

OR

$3x - y = -3$

d)



y intercept = 2

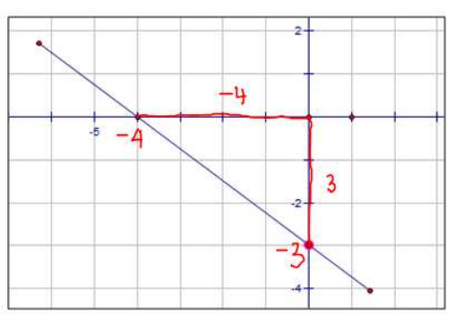
$m = \frac{-2}{-3} = \frac{2}{3}$

$y = \frac{2}{3}x + 2$

$3y = 2x + 6$

$-2x + 3y = 6$ OR $2x - 3y = -6$

e)



y intercept = -3

$m = \frac{3}{-4} = -\frac{3}{4}$

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

$4y = -3x - 12$

$3x + 4y = -12$

(4) Find the line that has gradient 2 and passes through $(-1, 3)$

$x \quad y$

$y = mx + c$

$3 \quad 2 \quad -1$

$3 = 2(-1) + c$

$3 = -2 + c$

$5 = c$

$\therefore y = mx + c$

$y = 2x + 5$

(5) If the line from (4) also passes $(p, -3)$, find p.

$x \quad y$

$y = 2x + 5$

$-3 = 2p + 5$

$-3 - 5 = 2p$

$-8 = 2p$

$-4 = p$

(6) Find the equation of a line that is parallel to $-2x + 5y - 11 = 0$, and crosses the y axis at $(0, 3)$

$-2x + 5y - 11 = 0$

$5y = 2x + 11$

$y = \frac{2x + 11}{5}$

$y = \frac{2}{5}x + \frac{11}{5}$

$m_1 = \frac{2}{5}$

$m_2 = m_1$ (parallel)

$m_2 = \frac{2}{5}$

The 2nd equation passes $(0,3)$ means y int $= 3$

$y = mx + c$

$m_2 \quad y\text{int}$

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

(7) Find the equation of a line that is parallel to $x - 3y = 6$ and passes through $(-3,4)$

$x - 3y = 6$

$-3y = -x + 6$

$y = \frac{-x+6}{-3}$

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

$m_1 = \frac{1}{3}$

$m_2 = \frac{1}{3}$

The 2nd line passes $(-3,4)$

$y = mx + c$

$y \to 4$, $m \to m_2$, $x \to -3$

$4 = \frac{1}{3}(-3) + c$

$4 = -1 + c$

$c = 5$

$\therefore y = \frac{1}{3}x + 5$

(8) Find the equation of a line that is perpendicular to the line $2x - y = 5$ and passes through point $(-2,3)$.

$2x - y = 5$

$2x - 5 = y$

$y = 2x - 5$

$m_1 = 2$

$m_1 \times m_2 = -1$ (perpendicular)

$2 \times m_2 = -1$

$m_2 = -\frac{1}{2}$

$m_2 = -\frac{1}{2}$ (negative reciprocal of m_1)

The 2nd line passes $(-2,3)$

$y = mx + c$

$y \to 3$, $m \to m_2$, $x \to -2$

$3 = -\frac{1}{2}(-2) + c$

$3 = 1 + c$

$c = 2$

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