

Sangam Skm College - Nadi

Year 12

Mathematics

Worksheet 2 - Solutions

$$\begin{aligned} 1. \log 100 &= \log 4 + \log 25 \\ &= 2\log 2 + 2\log 5 \\ &= \underline{2a + 2b} \end{aligned}$$

$$2. \log_2 11 = x - 3$$

First write in base-index form

$$\begin{aligned} 2^{x-3} &= 11 \\ x - 3 \log 2 &= \log 11 \\ x - 3 &= \frac{\log 11}{\log 2} \\ x - 3 &= 3.46 \\ \underline{x} &= \underline{6.46} \end{aligned}$$

$$\begin{aligned} 3. (a) \quad 3x(x-1) &= 0 \\ 3x &= 0 \quad (x-1) = 0 \\ \underline{x = 0} \quad \underline{x = 1} \end{aligned}$$

$$(b) 2x^2 = 18$$

$$\begin{aligned} x^2 &= 9 \\ \underline{x} &= \underline{\{-3, 3\}} \end{aligned}$$

$$4. (a) \frac{x+3}{x^2-3^2}$$

$$\begin{aligned} &\frac{x+3}{(x-3)(x+3)} \\ &= \frac{1}{x-3} \end{aligned}$$

$$(b) \frac{4x}{y} - \frac{x}{3} \div \frac{y}{3}$$

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

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

$$= \frac{12x}{3y} - \frac{3x}{3y}$$

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

$$\begin{aligned} 5. (a) \text{ discriminant} &= b^2 - 4ac \\ &= (-6)^2 - 4(5)(10) \\ &= \underline{-164} \end{aligned}$$

(b) No real roots

$$\begin{aligned}
 6. f(x) &= -x^3 - 3x^2 + bx + 5 \\
 f(-2) &= -(-2)^3 - 3(-2)^2 + b(-2) + 5 \\
 -2 &= 1 - 2b \\
 \underline{1.5} &= b
 \end{aligned}$$

$$7. \quad Y = \frac{mT}{q + mn}$$

$$Y(q + mn) = mt$$

$$Yq + Ymn = mt$$

$$Yq = mt - Ymn$$

$$Yq = m(t - Yn)$$

$$\frac{Yq}{t - Yn} = m$$

$$8. (a) \quad 2x^2 - 5x - 4 = 0$$

$$a = 2, b = -5, c = -4$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(2)(-4)}}{2(2)} = \frac{5 \pm \sqrt{57}}{4} = \underline{\{3.13, -0.64\}}$$

$$(b) \quad 3x^2 + 9 = 20x$$

First rearrange into the form  $ax^2 + bx + c = 0$

$$3x^2 - 20x + 9 = 0$$

$$a = 3, b = -20, c = 9$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-(-20) \pm \sqrt{(-20)^2 - 4(3)(9)}}{2(3)} = \frac{20 \pm \sqrt{292}}{6} = \underline{\{6.18, 0.48\}}$$