

Y12 : PRACTICE ASSESSMENT A. ACHIEVEMENT LEVEL ONLY.

Algebra.

1. Expand:

$$(3x-4)(5x+2)$$

$$= 15x^2 + 6x - 20x - 8$$

$$= 15x^2 - 14x - 8$$

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

$$= x^3 - 3x^2 + 4x - 2x^2 + 6x - 8$$

$$= x^3 - 5x^2 + 10x - 8$$

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

$$= x^3 + 3x^2 - 4x - 3x^2 - 9x + 12$$

$$= x^3 - 13x + 12$$

2. Simplify fully:

$$(a) \sqrt[4]{(16p^{16})} = 4p^4$$

$$(b) (8c^6d^9)^{1/3} = 2c^2d^3$$

3. Combine into one log function:

$$(a) 4\log p + 5\log v$$

$$= \log p^4 + \log v^5 = \log(p^4v^5)$$

$$(b) 5\log 2 - 3\log 5$$

$$= \log 2^5 - \log 5^3 = \log\left(\frac{2^5}{5^3}\right)$$

4. Simplify fully:

$$(a) \frac{5}{4k} + \frac{3}{k} = \frac{17}{4k}$$

$$(b) \frac{4}{(x+2)} + \frac{x}{(x+1)}$$

$$\frac{4(x+1)}{(x+2)(x+1)} + \frac{x(x+2)}{(x+1)(x+2)}$$

$$= \frac{4x+4 + x^2+2x}{(x+2)(x+1)}$$

$$= \frac{x^2 + 6x + 4}{(x+2)(x+1)}$$

5. Solve:

$$(a) 9(x+2) - 5(x-3) = 9$$

$$9x + 18 - 5x + 15 = 9$$

$$4x + 33 = 9$$

$$4x = -24$$

$$x = -6$$

$$(b) 5x^2 - 2x - 7 = 0$$

$$(5x+7)(x-1) = 0$$

$$x = -\frac{7}{5}, 1$$

$$(c) 2^x = 128$$

$$x = 7$$

OR $\log 2^x = \log 128$
 $x \log 2 = \log 128$
 $x = \frac{\log 128}{\log 2} = 7$

$$(d) \log_2 x = 5$$

$$2^5 = x$$

$$x = 32$$

$$(e) \log_b 64 = 3$$

$$b^3 = 64$$

$$b = 4$$

6. Factorise:

$$(a) 9x^2 - 25y^2 = (3x+5y)(3x-5y)$$

$$(b) 12a^4b^3 - 8a^3b^2$$

$$4a^3b^2(3ab - 2)$$

Calculus.

1. Find the gradient

of $y = 3x^2$ at $x = 4$

$$y' = 6x$$

Sub $y' = 24$

2. Find the x value of the point on the

curve $y = x^2 - 8x$

where the gradient equals 6.

$$y' = 2x - 8 = 6$$

$$2x = 14$$

$$x = 7$$

3. Find the x value of the point on the curve $y = 3x^2 - 12x$ where the gradient is zero.

$$y' = 6x - 12 = 0$$

$$6x = 12$$

$$x = 2$$

4. Find y if $y' = 3x^2 + 8x + 3$

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

5. Find the equation of the curve given that $\frac{dy}{dx} = 4x^3 - 6x$

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

and the point $(2, 4)$ is on the curve.

Subst

$$4 = 16 - 12 + C$$

$$4 = 4 + C$$

$$0 = C$$

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

6. If $y' = 3x^2 + 2$
find y if $x = 2, y = 3$

$$y = x^3 + 2x + C$$

Subst

$$3 = 8 + 4 + C \quad \text{so } C = -9$$

$$y = x^3 + 2x - 9$$

7. If $y = 4x^6$ find $\frac{dy}{dx} = 24x^5$

8. If $\frac{dy}{dx} = 4x^6$ find y

$$y = \frac{4x^7}{7} + C$$