Yr 11, 2 unit

Mathematics Question Worksheet – Topic 11

Name: Date:

Topic: **DIFFERENTIATION**

Find $\frac{dy}{dx}$ for each of the following.

1. $y = 2x^8$

2. $y = \sqrt[3]{x^2}$

3. $y = 4x^3 - 5\sqrt{x}$

4. $y = 1 + x + x^2$

5. $y = \frac{4}{x^3}$

6. $y = 7x - \frac{1}{x^2} + \frac{2}{x}$

7. $y = \frac{3}{\sqrt{x}}$

8. $y = (3x+4)^5$

9. $y = 8(7-x)^4$

10. $y = (x^2+6)^7$

11. $y = (2x+x^3)^3$

12. $y = (4x^3-3x)^5$

13. $y = 5x^3(3x+7)^4$

14. $y = (3x+5)^2(5-4x)$

15. $y = (8x-5)^3(x+7)^4$

16. $y = \dfrac{3x^7}{4x-11}$

17. $y = \dfrac{5x-8}{x^2+4}$

18. $y = \dfrac{\sqrt{x+1}}{(x-6)^3}$

Name: Date:

Topic: **DIFFERENTIATION**

1. $y = 2x^8$

$\frac{dy}{dx} = 16x^7$

2. $y = \sqrt[3]{x^2}$

$\frac{dy}{dx} = \frac{2}{3\sqrt[3]{x}}$

3. $y = 4x^3 - 5\sqrt{x}$

$\frac{dy}{dx} = 12x^2 - \frac{5}{2\sqrt{x}}$

4. $y = 1 + x + x^2$

$\frac{dy}{dx} = 1 + 2x$

5. $y = \frac{4}{x^3}$

$\frac{dy}{dx} = -\frac{12}{x^4}$

6. $y = 7x - \frac{1}{x^2} + \frac{2}{x}$

$\frac{dy}{dx} = 7 + \frac{2}{x^3} - \frac{2}{x^2}$

7. $y = \frac{3}{\sqrt{x}}$

$\frac{dy}{dx} = -\frac{3}{2\sqrt{x^3}}$

8. $y = (3x+4)^5$

$\frac{dy}{dx} = 15(3x+4)^4$

9. $y = 8(7-x)^4$

$\frac{dy}{dx} = -32(7-x)^3$

10. $y = (x^2+6)^7$

$\frac{dy}{dx} = 14x(x^2+6)^6$

11. $y = (2x+x^3)^3$

$$\frac{dy}{dx} = 3(2x+x^3)^2(2+3x^2)$$

12. $y = (4x^3-3x)^5$

$$\frac{dy}{dx} = 5(4x^3-3x)^4(12x^2-3)$$

13. $y = 5x^3(3x+7)^4$

$$\frac{dy}{dx} = 15x^2(3x+7)^4 + 12(3x+7)^3 5x^3$$
$$= 105x^2(3x+7)^3(x+1)$$

14. $y = (3x+5)^2(5-4x)$

$$\frac{dy}{dx} = 6(3x+5)(5-4x)+(-4)(3x+5)^2$$
$$= -2(3x+5)(18-5x)$$

15. $y = (8x-5)^3(x+7)^4$

$$\frac{dy}{dx} = 24(8x-5)^2(x+7)^4 + 4(x+7)^3(8x-5)^3$$
$$= 4(8x-5)^2(x+7)^3(14x+37)$$

16. $y = \dfrac{3x^7}{4x-11}$

$$\frac{dy}{dx} = \frac{21x^6(4x-11)-4(3x^7)}{(4x-11)^2}$$
$$= \frac{3x^6(24x-77)}{(4x-11)^2}$$

17. $y = \dfrac{5x-8}{x^2+4}$

$$\frac{dy}{dx} = \frac{5(x^2+4)-2x(5x-8)}{(x^2+4)^2}$$
$$= \frac{20+16x-5x^2}{(x^2+4)^2}$$

18. $y = \dfrac{\sqrt{x+1}}{(x-6)^3}$

$$\frac{dy}{dx} = \frac{\frac{1}{2}(x+1)^{-\frac{1}{2}}(x-6)^3 - 3(x-6)^2\sqrt{x+1}}{(x-6)^6}$$
$$= \frac{-(x-6)^2(5x+12)}{2\sqrt{x+1}\,(x-6)^6}$$