

Power Rule

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Name: _____ Date: _____ Score: _____

Find the derivative of each function using the Power Rule. Simplify where possible.

Calculus 1 Worksheet #10 Power Rule

Learn: The Power Rule: $f(x) = a(\circ)^n \Rightarrow f'(x) = n \bullet a(\circ)^{n-1}$

Example: $f(x) = \frac{1}{2}x^8 \Rightarrow f'(x) = 8\left(\frac{1}{2}\right)x^{8-1} = 4x^7$

Using the power formula, find the derivatives of the functions whose equations are given in Ex. 1–24.

1. $f(x) = x^4$ 2. $y = 4x^3$ 3. $f(x) = 5x^4$ 4. $f(x) = \frac{1}{12}x^6$ 5. $y = \frac{1}{9}x^3$ 6. $f(x) = -7x$

7. $f(x) = x$ 8. $y = 3$ 9. $f(x) = x^{-1}, x \neq 0$ 10. $f(x) = x^2 + x$ 11. $y = x^3 - x$

12. $f(x) = 3x^2 - 4x + 6$ 13. $f(x) = 10x - x^3$ 14. $y = x - 2x^3$ 15. $f(x) = x(x-3)$

16. $f(x) = (x-2)^2$ 17. $y = x^2(5-x)$ 18. $f(x) = mx+b$ 19. $f(x) = ax^2 + bx + c$

20. $y = 2x^{-1}, x \neq 0$ 21. $f(x) = \frac{1}{3}x^{-3}, x \neq 0$ 22. $f(x) = 4\sqrt{x}, x \geq 0$ 23. $y = \sqrt[3]{x^2}$ 24. $f(x) = \sqrt{x^3}, x \geq 0$

In Ex. 25–30, find the **slope** at the indicated values of the curve whose equation is given.

25. $y = 3x + 7$; $x = -1, 2$ 26. $y = x^2$; $x = 0, 1, 2$

27. $y = x^3 - x$; $x = -2, -1, 0, 1, 2$ 28. $y = \frac{1}{x}, x \neq 0$, $x = -2, 2, -1, 1$

29. $y = (x-1)^3$; $x = 0, 1, 2$

30. Use the **DEFINITION OF THE DERIVATIVE** to find $f'(x)$ if $f(x) = 2x^2 + 5x - 6$

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Answer key — for instructor use only.

Answers:

1. $4x^3$	2. $12x^2$	3. $20x^3$	4. $\frac{x^5}{2}$
5. $\frac{x^2}{3}$	6. -7	7. 1	8. 0
9. $\frac{-1}{x^2}$	10. $2x + 1$	11. $3x^2 - 1$	12. $2(3x - 2)$
13. $10 - 3x^2$	14. $1 - 6x^2$	15. $2x - 3$	16. $2(x - 2)$
17. $x(10 - 3x)$	18. m	19. $2ax + b$	20. $\frac{-2}{x^2}$
21. $\frac{-1}{x^4}$	22. $\frac{2}{\sqrt{x}}$	23. $\frac{2}{\sqrt[3]{x}}$	24. $\frac{3\sqrt{x}}{2}$
25. $3, 3$	26. $0, 2, 4$	27. $11, 2, -1, 2, 11$	28. $\frac{-1}{4}, \frac{-1}{4}, -1, -1$
29. $3, 0, 3$	30. $4x + 5$ (show work!)		