



In this worksheet you will practise applying the power rule, the sum rule, and the constant multiple rule to differentiate various functions. Work through each question step by step, ensuring you simplify your answers where possible.

Easy Questions

1. Differentiate $f(x) = 3x^2$ with respect to x .
2. Differentiate $g(x) = 5x^3$ with respect to x .
3. Differentiate $h(x) = 7$ with respect to x .
4. Differentiate $f(x) = -2x^4$ with respect to x .
5. Differentiate $f(x) = 4x^2 + 6x$ with respect to x .

Intermediate Questions

6. Differentiate $f(x) = 2x^5 + 3x^2$ with respect to x .
7. Differentiate $f(x) = 7x^3 - 4x$ with respect to x .
8. Differentiate $f(x) = 5x^4 + 2x^3 - 3x$ with respect to x .
9. Differentiate $f(x) = x^6 + 4x^2 + 10$ with respect to x .
10. Differentiate $f(x) = -3x^3 + 8x^2 - 5x + 9$ with respect to x .
11. Differentiate $f(x) = x^7$ with respect to x .
12. Differentiate $f(x) = 3x^{-2}$ with respect to x .
13. Differentiate $f(x) = 2x^{\frac{1}{2}} + x^{\frac{3}{2}}$ with respect to x .
14. Differentiate $f(x) = 3x^{\frac{5}{2}} - 2x^{\frac{1}{2}}$ with respect to x .
15. Differentiate $f(x) = -6x^3 + 0.1$ with respect to x .
16. Differentiate $f(x) = 4 - 7x^5$ with respect to x .
17. Differentiate $f(x) = 9x^4 + x$ with respect to x .
18. Differentiate $f(x) = -8x^6 + 5x^2$ with respect to x .
19. Differentiate $f(x) = 3x^3 + 2x^2 + x + 1$ with respect to x .
20. Differentiate $f(x) = 12x^5 - 4x^3 + 7x - 8$ with respect to x .

Hard Questions

21. Differentiate $f(x) = 5x^{3.5} - 2x^{-1.5} + 7x^2$ with respect to x .
22. Differentiate $f(x) = 7x^4 - 3x^{\frac{1}{3}} + 9$ with respect to x .
23. Differentiate $f(x) = -4x^{2.5} + x^{-3} + 6x^{0.5}$ with respect to x .
24. Differentiate $f(x) = 10x^{-2} - 5x^{2.2} + 8$ with respect to x .
25. Differentiate $f(x) = 3x^{\frac{4}{3}} - 2x^{\frac{5}{3}} + 7$ with respect to x .
26. Differentiate $f(x) = 6x^{\frac{7}{2}} - 4x^{\frac{3}{2}} + 2x^{-\frac{1}{2}}$ with respect to x .
27. Differentiate $f(x) = -9x^{0.75} + 5x^{1.25} - x^{2.5}$ with respect to x .
28. Differentiate $f(x) = 8x^3 - 12x^{0.5} + 4x^{-0.5}$ with respect to x .
29. Differentiate $f(x) = 3 - 2x + 5x^2 - 7x^3 + 9x^{-4}$ with respect to x .
30. Differentiate $f(x) = 10x^{2.5} - 15x^{1.5} + 20x^{0.5} - 25$ with respect to x .