Derivatives in Your Head!

Differentiate with respect to x:

	A	B	C	D	E	F	G
1.	x^3	$4x^3$	$\dfrac{8x^2}{3}$	$x^{\frac{1}{2}}$	$3x^{\frac{1}{3}}$	x^{q+2}	$\sqrt{x}$
2.	x^{10}	$8x$	$\dfrac{-7x^2}{2}$	$x^{\frac{3}{4}}$	$4x^{\frac{3}{4}}$	x^{3m}	$\sqrt[5]{x}$
3.	x^4	$5x^4$	$\dfrac{5x^3}{4}$	$x^{\frac{2}{3}}$	$-6x^{\frac{2}{3}}$	x^{p+q}	$-\sqrt[7]{x^2}$
4.	x^5	$-3x^2$	$\dfrac{2x^5}{3}$	$x^{\frac{5}{4}}$	$-10x^{-\frac{3}{5}}$	$-x^{171}$	$\sqrt[4]{x^3}$
5.	x^6	$2x$	$-\dfrac{6x^7}{7}$	$x^{\frac{3}{2}}$	$9x^{\frac{2}{3}}$	x^{n+1}	$\sqrt[3]{x^8}$

Differentiation (… Practice Set 4)

Derivatives in Your Head!

Differentiate with respect to x:

	A	B	C	D	E	F	G
6.	x^2	8	$\frac{2}{9}x^3$	$x^{1.8}$	$14x^{-\frac{3}{7}}$	x^{m+n+1}	$-\sqrt{x^{1.8}}$
7.	x^7	$-7x^6$	$\frac{11}{5}x^5$	$x^{6.1}$	$-2x^{-\frac{4}{5}}$	$-x^{5d-k+6}$	$\sqrt[3]{x^{2.4}}$
8.	x^9	$9x^5$	$-\frac{3}{4}x^6$	$x^{3.4}$	$4x^{-\frac{5}{3}}$	$x^{\sqrt{2}+1}$	$\sqrt[3]{x^{-5.1}}$
9.	x	$-12x^7$	$\frac{3}{7}x^4$	$x^{-\frac{1}{2}}$	$-7x^{\frac{2}{3}}$	$x^{3\pi+4}$	$\sqrt{\frac{1}{x^{7.6}}}$
10.	x^0	-14	$\frac{5}{8}x^3$	$x^{-\frac{7}{2}}$	$\frac{4x^{\frac{5}{4}}}{5}$	x^{3i-2}	$-\frac{1}{\sqrt[4]{x^3}}$

Derivatives in Your Head!

Differentiate with respect to x:

	A	B	C	D	E	F	G
11.	x^{-2}	$-8x^0$	$\dfrac{-7x^{-3}}{3}$	$x^{-\frac{4}{3}}$	$-\dfrac{2}{3}x^{\frac{3}{2}}$	π^3	$\dfrac{7}{\sqrt[5]{x^2}}$
12.	x^{-1}	$11x^{-7}$	$\dfrac{2x^{-6}}{9}$	$x^{-\frac{5}{4}}$	$\dfrac{4}{21}x^{\frac{7}{2}}$	$-5x^{2n+1}$	$-\sqrt[3]{\dfrac{1}{x^2}}$
13.	x^{-4}	$9x^{-8}$	$-\dfrac{4x^{-5}}{15}$	$x^{-5.3}$	$-\dfrac{9}{4}x^{-\frac{4}{3}}$	$3x^{5k+4}$	$\dfrac{1}{\sqrt{x^3}}$
14.	x^{-3}	$-14x^{-10}$	$\dfrac{5x^{-14}}{7}$	$x^{-2.6}$	$\dfrac{-2x^{\frac{5}{4}}}{5}$	$-4x^{\sqrt{3}+7}$	$x\sqrt{x}$
15.	x^{-10}	$4x^{-3}$	$-\dfrac{2}{9}x^{-3}$	$x^{-8.3}$	$\dfrac{4}{3}x^{\frac{7}{3}}$	$\sqrt{3}x^{\pi-2}$	$-\dfrac{5}{3\sqrt{x}}$

Derivatives in Your Head!

Differentiate with respect to x:

	A	B	C	D	E	F	G
16.	x^{-7}	$5x^{-1}$	$\dfrac{1}{5}x^{-3}$	$x^{\frac{11}{5}}$	$\dfrac{2}{7}x^{-\frac{2}{5}}$	$-2x^{5i+1}$	$\sqrt[4]{\dfrac{1}{x^{-1.2}}}$
17.	x^{-16}	$-2x^{-6}$	$\dfrac{-8}{5}x^{-4}$	$x^{\frac{5}{7}}$	$-\dfrac{9x^{-\frac{8}{5}}}{4}$	$2.5x^{2e+3}$	$-\dfrac{3}{7\sqrt{x^{1.4}}}$
18.	x^{-9}	$3x^{-5}$	$\dfrac{4}{7}x^{-6}$	$x^{-\frac{9}{2}}$	$-\dfrac{3}{14}x^{\frac{7}{3}}$	$0.4x^{6f}$	$\dfrac{14}{3\sqrt[7]{x^3}}$
19.	x^{-6}	$-7x^{-4}$	$\dfrac{5}{8}x^{3}$	$-7x^{-4}$	$\dfrac{10}{9}x^{-\frac{3}{5}}$	$2x^{a+b}$	$x^2\sqrt[3]{x}$
20.	x^{-11}	$6x^{-2}$	$-\dfrac{5}{14}x^{-7}$	$6x^{-2}$	$\dfrac{7x^{-\frac{5}{3}}}{2}$	$3.5x^{4w+2}$	$-\dfrac{2x^3}{\sqrt[5]{x}}$

Derivatives of Powers

Find $\frac{dy}{dx}$ if:

1. $y = x + \sqrt{x}$

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

3. $y = x^{\frac{5}{2}} - \frac{2}{x}$

4. $y = 3x^4 - \frac{2}{x} + \frac{6}{x^2}$

5. $y = (x + 5)(x + 2)$

6. $y = (3x + 1)(5x - 3)$

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

8. $y = (x^3 + 1)(2x + 3)$

9. $y = (x^5 - 2x)^2$

10. $y = (x - 2)(x + 1)(3x + 1)$

11. $y = (x - a)^3$

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

13. $y = 2x(3x^2 - 7x + 8)$

14. $y = 3x^2(x + 1)(x - 2)$

15. $y = (x + \frac{1}{x})^2$

16. $y = \frac{2x + 5}{x}$

17. $y = \frac{x^3 - 2}{x}$

18. $y = \frac{x^2 - 4x + 7}{x}$

19. $y = \frac{x^3 - 4x^2 + 3x - 2}{x^2}$

20. $y = \frac{3x^7 - 7x + 11}{2x^3}$

21. $y = \frac{(2x + 3)(2x - 3)}{x}$

22. $y = \frac{x + 6}{x^3}$

23. $y = \frac{2x^3 + x + 4}{2x^5}$

24. $y = \frac{x - 3}{\sqrt{x}}$

Derivatives of Powers

Find the derivative if:

25. $f(x) = ax^3 + bx^2 + cx + d$

26. $k = \frac{1}{a}(x^2 + \frac{b}{x} + c)$

27. $b = -3m^{-8} + 3\sqrt{7}$

28. $f = ax^4 + bx^2 + c$

29. $r = \frac{t^4}{4} - \frac{t^3}{3} + \frac{t^2}{2} - t + 4$

30. $g = -8h^5 + 3h^{-2} + h^{1.6}$

Derivatives of Powers

Find the derivative with respect to the variable indicated:

31. $C = 2\pi r$ [r]

32. $y = mx + b$ [x]

33. $v = u + at$ [t]

34. $A = \pi r^2$ [r]

35. $E = \frac{1}{2}mv^2$ [v]

36. $P = \frac{V^2}{R}$ [V]

37. $s = ut + \frac{1}{2}at^2$ [t]

38. $P = RI^2$ [I]

39. $V = \frac{4\pi r^3}{3}$ [r]

40. $F = \frac{\pi r^4 P}{8\eta l}$ [r]

41. $T = 2\pi \sqrt{\frac{l}{g}}$ [l]

42. $v = \sqrt{\frac{2GM}{r}}$ [r]

43. $F = \frac{GMm}{r^2}$ [r]

44. $E = \frac{q}{4\pi\varepsilon_0 r^2}$ [r]

45. $\Lambda = \sqrt{\frac{h^2}{2\pi mkT}}$ [T]

Derivatives of Powers

Calculate the first, second, third, and fourth derivatives of:

46. $y = 4x^4 + 2x^3 + 3$

47. $k = x^3 + 7x - 11$

48. $b = -m^{-2} + 3m^3$