

Laws of Exponents

Simplify the following:

1. $x^5 \cdot x^7$
2. $x^{-4} \cdot x^2 \cdot x^7$
3. $x^{\frac{1}{3}} \cdot x^{\frac{7}{3}}$
4. $x^3 \cdot y^5 \cdot x^7 \cdot y^{-2}$
5. $5^4 \cdot 5^6$
6. $3^{2x-1} \cdot 3^{5x+7}$
7. $7^{6x^2-5x+2} \cdot 7^{-4x^2+8x-5}$
8. $3^{\frac{5}{x+1}} \cdot 3^{\frac{2}{x+1}}$
9. $11^{\frac{5}{x-1}} \cdot 11^{\frac{2}{x+1}}$
10. $5^2 \cdot 25^3$
11. $4^{-2} \cdot 8^3 \cdot 32^2$
12. $50^3 \cdot 15^2 \cdot 6^4$
13. $(x^2)^5$
14. $(x^{-4})^5$
15. $(x^3 y^5)^7$
16. $\left(\frac{x^5}{y^2}\right)^3$
17. $\left(x^{\frac{2}{3}}\right)^{\frac{3}{4}}$
18. $\left(\frac{x^{\frac{1}{4}}}{y^{\frac{3}{5}}}\right)^{\frac{4}{7}}$
19. $(5^4)^3$
20. $(15^2)^3 (12^4)^2$
21. $(3^{x+3})^{x-5}$
22. $(2^{x-4})^{x-4}$
23. $\left(5^{\frac{x-2}{x+1}}\right)^{\frac{x^2-1}{x-2}}$
24. $\left(2^{\frac{x^2-5x+4}{x^2-9}}\right)^{\frac{x^3+27}{x^2-16}}$
25. $\frac{x^7}{x^3}$
26. $\frac{x^6}{x^{11}}$
27. $\frac{x^3 y^7}{x^5 y^3}$
28. $\frac{15^4}{75^2}$
29. $\frac{20^6 12^3}{30^8}$
30. $\frac{5^{x^2-6x+7}}{5^{-3x^2+9x-11}}$
31. $3^{x^2+1} \cdot 9^{2x-5} \cdot 3^{-7x+2} \div 27^{x^2-6x+3}$
32. $\frac{(5^{2x^2-x+3})^2 (25^{3x-1})^x}{(5^{x^2-2x+5})^3}$
33. $\left(\frac{4^{3x-2}}{12^{x+1}}\right)^x \cdot \left(\frac{24^{3x^2-5}}{8^{x^2-x+3}}\right)^2 \left(\frac{2^{x^2-7x+1}}{3^{4x^2-5}}\right)^3$
34. $\left(\frac{(5^{3x-1})^x}{(10^{4x^2-3x+1})^2}\right)^2 \left(\frac{(50^{3x^2+x-1})^3}{(20^{2x^2-9})^{-1}}\right)^3$