Algebra 2
Solving for Exponents Using a Common Base

Name: _____
Period: _____

Solve for $x$.

1. $2^{x+2} = 2^{3x}$
2. $3^{2x+2} = 3^4$
3. $25^{25} = 5^x$
4. $16^{12} = 2^x$
5. $27^4 = 3^{x+3}$
6. $125^{30} = 5^{x+10}$
7. $8^{4-x} = 4^{3x}$
8. $32^{2x+3} = 16^{x+4}$
9. $9^{4x} = \frac{1}{27}$
10. $2^{x+2} = 4^{3x}$
11. $4^{3x} = 8^{x+6}$
12. $49^{-x-3} = \left(\frac{1}{343}\right)^{8x}$
13. $8^{x+3} = \left(\frac{1}{16}\right)^{5-2x}$
14. $2^{x+1} \cdot 2^{3x-7} = 4^x \cdot 4^{7x+5}$

Simplify.

15. $\left(\frac{2x^5}{6x}\right)^4$
16. $\left(\frac{25x^{-7}}{5x^3}\right)^{-2}$
17. $\left(\frac{6xy^5}{8x^0y^2}\right)^{-5}$
18. $\left(\frac{9x^6}{6x^{-2}}\right)^0$
19. $\left(\frac{x^{-2}y^2}{3x^2}\right)^4 \cdot \left(\frac{1}{xy}\right)$
20. $\left(\frac{16x^2y^{-5}}{4y^{-2}}\right)^{-2}$
21. $\left(\frac{8a^4b^{-3}}{32a^{-2}b}\right)^2$
22. $\left(\frac{24d^7f^{-5}g^3}{18d^9f^2g^{-4}}\right)^{-3}$
23. $\left(\frac{2x^3\left(yz^{-2}\right)^3}{6\left(x^{-2}y^4\right)^4z^{-3}}\right)^2 \cdot \left(\frac{6}{x^2yz^{-4}}\right)$


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