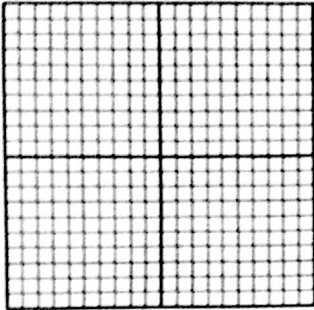# 10.1 to 10.3 Progress Check
## Algebra 2
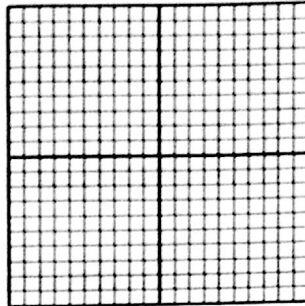
Key

**Graph each exponential or logarithmic function.**
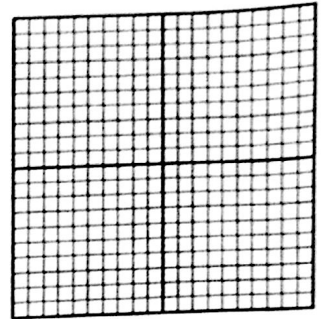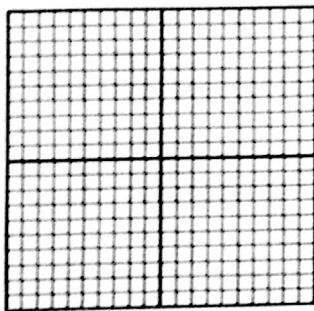
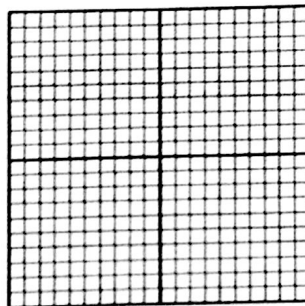1. $y = \left(\dfrac{1}{2}\right)^x$
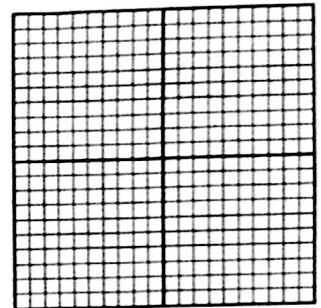
2. $y = 2^x - 2$

3. $y = -3^x + 2$

4. $y = 2\log_4 x$

5. $y = \log x - 3$

6. $y = \log_3(x+1) - 2$

7. Use the rules of exponents to simplify each expression.

A. $7^{\sqrt{5}} \cdot 7^{\sqrt{3}}$

$7^{\sqrt{5}+\sqrt{3}}$

B. $9^{\sqrt{18}} \cdot 3^{\sqrt{72}}$

$3^{2\sqrt{18}} \cdot 3^{6\sqrt{2}}$
$3^{6\sqrt{2}} \cdot 3^{6\sqrt{2}}$    $3^{12\sqrt{2}}$

C. $\left(8^{\sqrt{7}}\right)^{\sqrt{14}} 2^{\sqrt{98}}$

$2^{3\cdot7\sqrt{2}}$
$2^{21\sqrt{2}}$

D. $\left(27^{\sqrt{5}}\right)^{\sqrt{9}}$

$3^{9\sqrt{5}}$

$3^{3\sqrt{45}} \cdot 3^{3 \cdot 3\sqrt{5}}$

8. Find the value of $a$ if the graph of an exponential function of the form $y = a\cdot5^x$ passes through the given point $(2, -125)$.

$-125 = a\cdot5^2$     $-125 = 25a$
$-5 = a$

$\underline{y = 5\cdot5^x}$

9. Find the value of $a$ if the graph of an exponential function of the form $y = a\cdot6^x$ passes through the given point $(-1, 5)$.

$5 = a\cdot6^{-1}$    $5 = \dfrac{a}{6}$    $30 = a$

$\underline{y = 30\cdot6^x}$

10. Solve each equation.

A. $8^{4m+2} = 64$

$2^{(4m+2)} = 2^2$
$12m+6 = 2$
$12m = $

$m = 0$

B. $5^{x-6} = 125$

$5^{x-6} = 5^3$
$x-6 = 3$

$x = 9$

C. $81^{a+2} = 3^{3a+1}$

$3^{4(a+2)} = 3^{3a+1}$
$4a+8 = 3a+1$

$a = -7$

D. $\left(\dfrac{1}{2}\right)^{4x+1} = 8^{2x+1}$

$2^{-1(4x+1)} = 2^{3(2x+1)}$
$-4x-1 = 6x+3$
$-4 = 10x$     $x = -2/5$

$x = -2/5$

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11. Evaluate each expression.

    A. $\log_3 27$          B. $\log_4 \dfrac{1}{64}$          C. $\log_6 216$          D. $\log_{\frac{1}{2}} \dfrac{1}{2}$

    $\underline{\quad 3 \quad}$          $\underline{\quad -3 \quad}$          $\underline{\quad 3 \quad}$          $\underline{\quad 1 \quad}$

12. Solve each equation.

    A. $\log_2 x = 8$     B. $\log_{36} x = \dfrac{3}{2}$     C. $\log_2 (x^2 - 4) = \log_2 3x$     D. $\log_x (3x + 10) = 2$

    $2^8 = x$          $36^{3/2} = x$

                                   $x^2 - 4 = 3x$          $x^2 = 3x + 10$

                                     $x^2 - 3x - 4 = 0$     $x^2 - 3x - 10 = 0$

                                     $(x - 4)(x + 1) = 0$     $(x - 5)(x + 2) = 0$

                                     $x = 4 \;\; x \neq -1$       $x = 5 \;\; x \neq -2$

    $\underline{x = 256}$     $\underline{x = 216}$          $\underline{x = 4}$          $\underline{x = 5}$

13. Expand each expression.

    A. $\log_4 x^2 y^3$          B. $\log_3 \dfrac{a^4}{b^2}$          C. $\log_2 (2y^3)^2$

                                                    $\log_2 (2^2 y^6)$

                                                  $2\log_2 2 + 6\log_2 y$

    $\underline{2\log_4 x + 3\log_4 y}$     $\underline{4\log_3 a - 2\log_3 b}$     $\underline{2 + 6\log_2 y}$

14. Condense each expression.

    A. $3\log x - \tfrac{2}{3}\log y$     B. $\tfrac{1}{2}\log a + 4\log b$     C. $3\log_2 a + 7\log_2 b - 3\log_2 c$

    $\underline{\log\left(\dfrac{x^3}{y^{2/3}}\right)}$     $\underline{\log\left(a^{1/2} b^4\right)}$     $\underline{\log_2 \dfrac{a^3 b^7}{c^3}}$

15. Solve each equation.

    A. $\log_3 6 + \log_3 x = \log_3 12$     B. $\log_{10} 18 - \log_{10} 3x = \log_{10} 2$     C. $3\log 8 - \tfrac{1}{2}\log 36 = \log x$

    $\log_3 (6x) = \log_3 12$     $\log_{10}\left(\dfrac{18}{3x}\right) = \log_{10} 2$     $\log \dfrac{8^3}{36^{1/2}} = \log x$

        $6x = 12$               $\dfrac{6}{x} = 2 \quad 6 = 2x$          $\dfrac{8^3}{6} = x$

    $\underline{x = 2}$          $\underline{x = 3}$          $\underline{85.3 = x}$

    D. $\log_{10} z + \log_{10}(z + 9) = 1$     E. $\log_3 (a^2 + 3) + \log_3 3 = 3$     F. $\log_4 (2y + 2) - \log_4 (y - 2) = 1$

    $\log_{10}(z(z + 9)) = 1$     $\log_3 ((a^2 + 3)3) = 3$     $\log_4\left(\dfrac{2y + 2}{y - 2}\right) = 1 \quad 4^1 = \dfrac{2y + 2}{y - 2}$

    $10^1 = z^2 + 9z \quad z^2 + 9z - 10 = 0$     $3^3 = 3a^2 + 9$     $4y - 8 = 2y + 2$

                        $(z + 10)(z - 1) = 0$     $27 = 3a^2 + 9$     $2y = 10$

    $\underline{z = 1}$         $z \neq -10, z = 1$     $18 = 3a^2 \quad 6 = a^2$

                                       $\underline{a = \pm\sqrt{6}}$     $\underline{y = 5}$

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