Practice

Real Exponents and Exponential Functions

Simplify each expression.

1. $(2^{\sqrt{2}})^{\sqrt{18}}$ 2^6 or 64

2. $13^{\sqrt{6}} \cdot 13^{\sqrt{24}}$ $13^{3\sqrt{6}}$

3. $125^{\sqrt{11}} \div 5^{\sqrt{11}}$ $5^{2\sqrt{11}}$

4. $(n^{\sqrt{3}})^{\sqrt{75}}$ n^{15}

5. $32^{\sqrt{3}} \cdot 16^{\sqrt{2}}$ $2^{5\sqrt{3} + 4\sqrt{2}}$

6. $(r^{\sqrt{3}} + p^{\sqrt{5}})^2$
$r^{2\sqrt{3}} + 2r^{\sqrt{3}}p^{\sqrt{5}} + p^{2\sqrt{5}}$

7. $(n^{\sqrt{6}} + w^{\sqrt{3}})(n^{\sqrt{6}} - w^{\sqrt{3}})$
$n^{2\sqrt{6}} - w^{2\sqrt{3}}$

8. $(r^{\sqrt{3}} \cdot p^{\sqrt{5}})^2$ $r^{2\sqrt{3}} \cdot p^{2\sqrt{5}}$

Solve each equation.

9. $7^{6x} = 7^{2x - 20}$ -5

10. $3^{6x - 5} = 9^{4x - 3}$ $\dfrac{1}{2}$

11. $9^{2x - 1} = 27^{x + 4}$ 14

12. $5^{2x + 3} = (\sqrt{5})^{x + 4}$ $-\dfrac{2}{3}$

13. $2^{3x - 1} = \left(\dfrac{1}{8}\right)^x$ $\dfrac{1}{6}$

14. $\left(\dfrac{1}{16}\right)^{x + 1} = \left(\dfrac{1}{8}\right)^{2x - 1}$ $\dfrac{7}{2}$

Algebra 2

Practice

Logarithms and Logarithmic Functions

Write each equation in logarithmic form.

1. $5^3 = 125$ $\quad \log_5 125 = 3$

2. $27^{\frac{4}{3}} = 81$ $\quad \log_{27} 81 = \dfrac{4}{3}$

Write each equation in exponential form.

3. $\log_{10} 0.00001 = -5$ $\quad 10^{-5} = 0.00001$

4. $\log_{\frac{3}{2}} \dfrac{\sqrt{6}}{3} = -\dfrac{1}{2}$ $\quad \left(\dfrac{3}{2}\right)^{-\frac{1}{2}} = \dfrac{\sqrt{6}}{3}$

Evaluate each expression.

5. $\log_3 81$ $\quad 4$

6. $\log_{10} 0.0001$ $\quad -4$

7. $\log_2 \dfrac{1}{16}$ $\quad -4$

8. $\log_{\frac{1}{3}} 27$ $\quad -3$

9. $\log_9 1$ $\quad 0$

10. $\log_8 4$ $\quad \dfrac{2}{3}$

Solve each equation.

11. $\log_4 x = \dfrac{3}{2}$ $\quad 8$

12. $\log_y 16 = -4$ $\quad \dfrac{1}{2}$

13. $\log_a \dfrac{1}{8} = -3$ $\quad 2$

14. $\log_7 n = -\dfrac{1}{2}$ $\quad \dfrac{\sqrt{7}}{7}$

15. $\log_{\sqrt{5}} y = \dfrac{4}{3}$ $\quad 5^{\frac{2}{3}}$ or $\sqrt[3]{25}$

16. $\log_x \sqrt[3]{9} = \dfrac{1}{6}$ $\quad 81$

17. $\log_8(3x + 7) = \log_8(7x + 4)$ $\quad \dfrac{3}{4}$

18. $\log_7(8x + 20) = \log_7(x + 6)$ $\quad -2$

19. $\log_3(9x - 1) = \log_3(4x - 16)$
no solution

20. $\log_{12}(x - 9) = \log_{12}(3x - 13)$
no solution

21. $\log_5(x^2 - 30) = \log_5 6$ $\quad \pm 6$

22. $\log_4(x^2 + 6) = \log_4 5x$ $\quad 2, 3$

Algebra 2

Practice

Properties of Logarithms

Evaluate each expression.

1. $n^{\log_n 3}$ **3**

2. $14^{\log_{14} 6}$ **6**

Use $\log_{10} 5 = 0.6990$ and $\log_{10} 7 = 0.8451$ to evaluate each expression.

3. $\log_{10} 35$ **1.5441**

4. $\log_{10} \dfrac{7}{5}$ **0.1461**

5. $\log_{10} 25$ **1.3980**

6. $\log_{10} 490$ **2.6902**

7. $\log_{10} \left(1\dfrac{3}{7}\right)$ **0.1549**

8. $\log_{10} 0.05$ **−1.3010**

Solve each equation.

9. $\log_6 x + \log_6 9 = \log_6 54$ **6**

10. $\log_8 48 - \log_8 w = \log_8 4$ **12**

11. $\log_7 n = \dfrac{2}{3} \log_7 8$ **4**

12. $\log_3 y = \dfrac{1}{4} \log_3 16 + \dfrac{1}{3} \log_3 64$ **8**

13. $\log_9 (3u + 14) - \log_9 5 = \log_9 2u$ **2**

14. $\log_7 x + \log_7 x - \log_7 3 = \log_7 12$ **6**

15. $4 \log_2 x + \log_2 5 = \log_2 405$ **3**

16. $\log_6 (2x - 5) + 1 = \log_6 (7x + 10)$ **8**

17. $\log_{16} (9x + 5) - \log_{16} (x^2 - 1) = \dfrac{1}{2}$ **3**

18. $\log_8 (n - 3) + \log_8 (n + 4) = 1$ **4**

19. $\log_6 (3m + 7) - \log_6 (m + 4) = 2 \log_6 6 - 3 \log_6 3$ **−1**

20. $\log_2 (2x + 8) - \log_2 (2x^2 + 21x + 61) = -3$ $\dfrac{1}{2}, -3$