Algebra II
Unit 9 Review

Name Answer Key

1. Rewrite in **radical** form.

$y^{\frac{a}{b}}$ $\sqrt[b]{y^a}$

2. Simplify, and show the steps.

$(32^6)^{\frac{1}{5}}$ $32^{\frac{6}{5}}$ $\left(\sqrt[5]{32}\right)^6$

$2^6 = \boxed{64}$

3. Rewrite in **exponential** form.

$\sqrt[7]{9^3a^{35}b^{-12}c} = 9^{\frac{3}{7}}a^{\frac{35}{7}}b^{\frac{-12}{7}}c^{\frac{1}{7}}$

$\boxed{9^{\frac{3}{7}}a^5b^{\frac{-12}{7}}c^{\frac{1}{7}}}$

4. Solve the equation. Show your work.

$17 + (2x-5)^{\frac{4}{5}} = 98$

$-17 \qquad -17$

$\left[(2x-5)^{4/5}\right]^{5/4} = 81^{5/4}$

$2x-5 = \left(\sqrt[4]{81}\right)^5$

$2x-5 = 3^5$

$2x-5 = 243$

$+5 \qquad +5$

$\frac{2x}{2} = \frac{248}{2}$

$\boxed{x=124}$

5. Simplify. Show your work.

$\frac{8^{\sqrt{7}+3}}{2^{3\sqrt{7}+5}} = \frac{2^{3(\sqrt{7}+3)}}{2^{3\sqrt{7}+5}} = 2^{3\sqrt{7}+9-(3\sqrt{7}+5)}$

$= 2^{\cancel{3\sqrt{7}}+9-\cancel{3\sqrt{7}}-5} = 2^4 = \boxed{16}$

6. Solve for x. Show your work.

$64^{2x-4} = \sqrt{256^x}$

$64 = 8^2 \text{ or } \underline{4^3}$

$256 = \underline{4^4} \text{ or } \cancel{8}$

$4^{3(2x-4)} = \sqrt{4^{4x}}$

$4^{6x-12} = 4^{\frac{4x}{2}}$

$4^{6x-12} = 4^{2x}$

$6x-12 = 2x$

$-2x \quad +12 \quad -2x \quad +12$

$\frac{4x}{4} = \frac{12}{4}$

$\boxed{x=3}$

7. If $f(x)=|12-3x|$ and $g(x)=x^2-9$, then calculate $f(g(4))$.

$f(g(4))$: $g(4)=4^2-9$

$g(4)=7$

$f(7)=|12-3(7)|$

$=|12-21|$

$\rightarrow f(7)=9$

$\boxed{f(g(4))=9}$

8. Let $f(x)=15-3x$. Write an equation for $f^{-1}(x)$.

$y=15-3x$

$x=15-3y$

$-15 \quad -15$

$\frac{x}{-3}-\frac{15}{-3}=\frac{-3y}{-3}$

$\boxed{y^{-1}=-\frac{1}{3}x+5 \text{ or } f^{-1}(x)=-\frac{1}{3}x+5}$

9. Solve for x in each problem.

a) $\log_4 x = 3$

$4^3=x$

$\boxed{64=x}$

b) $\log_x 2410 = 4$

$\sqrt[4]{x^4}=\sqrt[4]{2410}$

$\boxed{x\approx 7}$

c) $\log_5 3125 = x$

$5^x=3125$

$5^x=5^5$

$\boxed{x=5}$

3125

5 625

5 125

5 25

5 5

10. Using the **given facts** below, find the given logarithm **without using the calculator**. Show all of the steps.

$\log_3 8 = 1.8928$ $\qquad$ $\log_3 5 = 1.4650$

a) $\log_3 40 = \log_3(8\cdot 5)=\log_3 8+\log_3 5$

$=1.8928+1.4650$

$=\boxed{3.3578}$

b) $\log_3 64 = \log_3 8^2 = 2\log_3 8$

$=2(1.8928)$

$=\boxed{3.7856}$

11. Rewrite each of the following **as a single log with a single argument.**

a) $\underline{4 \cdot \log 3}$ - log 27 = $\log 3^4 - \log 27$

$\log 81 - \log 27$

$\log \frac{81}{27} = \boxed{\log 3}$

b) $\underline{\log 10 + \log 4} - \log 2 + \log 4 =$

$\underline{\log 40 - \log 2} + \log 4$

$\log \frac{40}{2} + \log 4$

$\log 20 + \log 4 = \boxed{\log 80}$

12. Use the change of base formula to calculate the following: $\log_7 132$

$$\frac{\log 132}{\log 7} = \boxed{2.509}$$

13. Simplify the following expression.

$\frac{7}{3}\log_9 9^3$ $\log_9 9^{\cancel{3}\left(\frac{7}{\cancel{3}}\right)}$

$\cancel{\log_9} 9^7$

$\boxed{7}$

14. Solve for x in each of the following.

a) $7.4^x = 162$

$\log_{7.4} 162 = x$

$\frac{\log 162}{\log 7.4} = x$

$\boxed{2.54 = x}$

b) $\log_7 2x = 3.4$

$7^{3.4} = 2x$

$\frac{747.02}{2} = \frac{2x}{2}$

$\boxed{373.51 = x}$

c) $e^{1.7} = x$

$\boxed{5.47 = x}$

d) $\ln 5x = 2.3$

$\frac{e^{2.3}}{5} = \frac{5x}{5}$

$\boxed{1.99 = x}$

15. From the two given points, find the formula, in the form $f(x) = a \cdot b^x$, for the exponential function.

$f(1) = 4.2$
$f(3) = 6.048$

$(3, 6.048)$
$(1, 4.2)$

$$\frac{6.048 = \cancel{a} \cdot b^3}{4.2 = \cancel{a}\, b^1}$$

$$\sqrt{1.44} = \sqrt{b^2}$$

$$1.2 = b$$

$$\frac{4.2}{1.2} = \frac{a \cdot 1.2^1}{1.2}$$

$$3.5 = a$$

$$\boxed{f(x) = 3.5(1.2)^x}$$

16. You decide to plant asparagus in your back garden. You first harvest 15 stalks in 2014. By 2017 you produce 120 stalks. Assume that the number of stalks you harvest varies exponentially with the number of years since 2014.

start

a) Derive the particular equation in the form of $y = a \cdot b^x$ (x = number of years since 2014, y = number of stalks)

$(0, 15)$
$(3, 120)$

$$\frac{120 = \cancel{a} \cdot b^3}{15 = a\, b^0}$$

$b^0 = 1 \rightarrow a = 15$

$$\sqrt[3]{8} = \sqrt[3]{b^3}$$

$$2 = b$$

$$\boxed{y = 15(2)^x}$$

b) If a similar stalk equation is $y = 8\,(1.5)^x$ what was the number of stalks in 2019? (Remember that you are counting years since 2014)

$x = 5$

$$y = 8(1.5)^5$$

$$y = 8(7.59375)$$

$$\boxed{y = 60.75 \text{ stalks}}$$