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QUIZ 1 (1.1-1.10)

Name: _____ Date: _____ Score: 10 pts.
possible

1. Identify as rational or irrational.

a. 0.315215 rational

b. $\sqrt{29}$ irrational

Solve and/or simplify.

TEACHER KEY:

2. $-\frac{1}{5} + \frac{3}{2}$

$$-\frac{2}{10} + \frac{15}{10} = \frac{13}{10}$$

3. $-\frac{7}{6} \div \frac{3}{5}$

$$-\frac{7}{6} \cdot \frac{5}{3} = -\frac{35}{18}$$

4. $\frac{9uv}{3vw}$

$$\frac{3\cancel{9}u\cancel{v}}{1\cancel{3}\cancel{v}w} = \frac{3u}{w}$$

5. $8r - 3(2r - 7) + 4$

$$8r - 6r + 21 + 4$$
$$2r + 25$$

6. $15y - 5 = 6y + 3 - y$

$$15y - 5 = 5y + 3$$
$$15y - 5 - 5y = 5y + 3 - 5y$$
$$10y - 5 + 5 = 3 + 5$$
$$\frac{10y}{10} = \frac{8}{10}$$
$$y = \frac{8}{10} = \frac{4}{5}$$

Write an equivalent expression without using negative exponents.

7. $(-2x)^{-3}$

$$\frac{1}{(-2x)^3} = \frac{1}{-8x^3} = -\frac{1}{8x^3}$$

Multiply and simplify.

8. $(2a^{-3}b^6)(3a^5b^{-2})$

$6a^2b^4$

Multiply and write in scientific notation.

9. $(3.0 \cdot 10^6)(4.0 \cdot 10^7)$

$12 \times 10^{13} = 1.2 \times 10^{14}$

State the axiom or property that justifies the following statement:

10. $\frac{5}{2} [a + (-b)] = \frac{5}{2} a + \frac{5}{2} (-b)$

axiom or property: Distributive Property

TEST 12

Name: _____ Date: _____ Score: 38 pts.
possible

Find equations for $f^{-1}(x)$ for the following. (3 pts. each)

TEACHER KEY:

1. $f(x) = \frac{\sqrt{x+2}}{3}$

$$y = \frac{\sqrt{x+2}}{3}$$

exchange: $x = \frac{\sqrt{y+2}}{3}$

Solve for y : $(3x)^2 = y + 2$
 $y = 9x^2 - 2$

$$f^{-1}(x) = 9x^2 - 2$$

2. $f(x) = 4x - 3$

$$y = 4x - 3$$

$$x = \frac{y + 3}{4}$$

$$x + 3 = 4y$$

$$y = \frac{x + 3}{4}$$

$$f^{-1}(x) = \frac{x + 3}{4}$$

Convert the following to logarithmic equations. (2 pts. each)

3. $(1.2)^x = 15$

$$\log_{1.2}(15) = x$$

4. $e^x = \frac{2}{3}$

$$\log_e\left(\frac{2}{3}\right) = x$$

$$\ln\left(\frac{2}{3}\right) = x$$

Convert the following to exponential equations. (2 pts. each)

5. $\ln x = -5$

$$e^{-5} = x$$

6. $\log_x 23 = 0.4$

$$x^{(0.4)} = 23$$

Express the following as a single logarithm. Simplify, if possible. (2 pts. each)

$$7. \quad \frac{1}{2} \log_a x - 7 \log_a y + \log_a z$$

$$\log_a x^{\frac{1}{2}} - \log_a y^7 + \log_a z$$

$$\log_a \frac{\sqrt{x} \cdot z}{y^7} \quad \text{OR} \quad \log_a \frac{z\sqrt{x}}{y^7}$$

$$8. \quad \log_a x^2 - 2 \log_a \sqrt{x}$$

$$\log_a x^2 - \log_a x$$

$$\log_a \frac{x^2}{x}$$

$$\log_a x$$

Express the following in terms of logarithms of x , y , and z . Simplify, if possible. (2 pts. each)

$$9. \quad \log_a \sqrt[4]{\frac{xy}{z^3}}$$

$$\frac{1}{4} \log_a x + \frac{1}{4} \log_a y - \frac{3}{4} \log_a z$$

$$10. \quad \log_2 8xy^4z^3$$

$$\log_2 8 + \log_2 x + 4 \log_2 y + 3 \log_2 z$$

$$3 + \log_2 x + 4 \log_2 y + 3 \log_2 z$$

Given $\log_a 3 = 2$, $\log_a 5 = 0.2$, and $\log_a 7 = -1$, find the following. (2 pts. each)

$$11. \quad \log_a 45$$

$$2 \log_a (3) + \log_a 5$$

$$2(2) + .2$$

$$4.2$$

$$12. \quad \log_a \sqrt[3]{21}$$

$$\frac{1}{3} \log_a 3 + \frac{1}{3} \log_a 7$$

$$\frac{1}{3}(2) - \frac{1}{3}$$

$$\frac{1}{3}$$

Solve the following exponential and logarithmic equations. (2 pts. each)

$$13. \quad \log x + \log(x - 3) = 1$$

$$\log x(x - 3) = 1$$

$$10^{\log x(x-3)} = 10^1$$

$$(x - 3)x = 10$$

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

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

$$x = 5 \quad \checkmark \quad x = -2$$

14. $2^{x-1} = 8^x$

$$\begin{aligned}(x-1)\log 2 &= x\log 8 \\ x\log 2 - x\log 8 &= \log 2 \\ x(\log 2 - \log 8) &= \log 2 \\ x &= \frac{\log 2}{(\log 2 - \log 8)} \\ x &= -.5\end{aligned}$$

Easier

$$\begin{aligned}2^{x-1} &= 2^{3x} \\ x-1 &= 3x \\ 2x &= -1 \\ x &= \frac{-1}{2}\end{aligned}$$

15. $3^x = 7$

$$\begin{aligned}\log 3^x &= \log 7 \\ x\log 3 &= \log 7 \\ x &= \frac{\log 7}{\log 3} \\ x &= 1.771\end{aligned}$$

16. $\log x - \log(x+3) = -1$

$$\begin{aligned}\log \frac{x}{(x+3)} &= -1 \\ \frac{x}{(x+3)} &= \frac{1}{10} \\ 10x &= x+3 \\ 9x &= 3 \\ x &= \frac{1}{3}\end{aligned}$$

Use common logarithms to find the following. (2 pts.)

17. $\log_4 80$

$$\begin{aligned}&= \frac{\log 80}{\log 4} \\ &= 3.161\end{aligned}$$

Solve. (2 pts.)

18. The population of a colony of cells growing exponentially in a culture is 300 after 2 minutes and 1400 after 5 minutes. Find k in the growth formula and estimate the population of the colony after 20 minutes.

$$\begin{aligned}P &= P_0 e^{kt} \\ \frac{1400}{300} &= e^{3k} \\ \ln \frac{1400}{300} &= 3k \\ k &= .5135\end{aligned}$$

$$\begin{aligned}P &= 1400e^{(.5135)(15)} \\ &\approx 3,099,000\end{aligned}$$

Check:

$$\begin{aligned}P &= 300e^{(.5135)(18)} \\ P &= 3,100,000 \approx 3,099,000\end{aligned}$$