Name _____

Per/Sec. _____ Date _____

I.	Radical and Rational Form

II.	Writing Equations of Functions

1. Write $\sqrt[6]{3x}$ in exponential form. $(3x)^{1/6}$

A) $3^6 x^6$ B) $(3x)^6$ (C) $(3x)^{1/6}$

D) $3x^6$ E) $3x^{1/6}$

2. Write $\sqrt[5]{7^2}$ in exponential form. $7^{2/5}$

F) $7^{5/2}$ (G) $7^{2/5}$ H) $2^{5/7}$ J) 5^{49} K) 7^{10}

3. Write $(2x)^{5/7}$ in radical form. $2^{5/7} x^{5/7}$

A) $2\sqrt[7]{x^5}$ B) $\sqrt[5]{(2x)^7}$ C) $\sqrt[7]{2x}$

D) $\sqrt[35]{2x}$ (E) $\sqrt[7]{(2x)^5}$

$\sqrt[7]{(2x)^5}$

4. Write $8^{3/5}$ in radical form.

F) $\sqrt[8]{8}$ G) $\sqrt[5]{24}$ (H) $\sqrt[5]{8^3}$

J) $\sqrt[3]{8^5}$ K) $\sqrt[15]{8}$

$\sqrt[5]{8^3}$

5. Consider the graph of $y = \sqrt[3]{x}$. If it is translated 3 units to the right and is reflected across the x-axis, what would be the resulting equation?

A) $y = -\sqrt[3]{x+3}$ B) $y = \sqrt[3]{x-3}$

(C) $y = -\sqrt[3]{x-3}$ D) $y = \sqrt[3]{x+3}$

E) $y = -\sqrt[3]{x} - 3$ $y = -\sqrt[3]{x-3}$

6. Consider the graph of $y = \sqrt{x}$. If it is translated two units to the left, and 4 units down, what would the resulting equation?

F) $y = 2\sqrt{x} - 4$ G) $y = \sqrt{x-4} + 2$

H) $y = \sqrt{x+2} + 4$ J) $y = \sqrt{x-2} - 4$

(K) $y = \sqrt{x+2} - 4$

7. Consider the graph of $y = \frac{1}{x}$. If it is has a domain $x \neq 1$, a range $y \neq -3$, and a vertical stretch of 4, what would be the resulting equation?

(A) $y = \frac{4}{x-1} - 3$ B) $y = \frac{1}{x+1} - 3$

C) $y = \frac{4}{x+1} - 3$ D) $y = \frac{4}{x-1} + 3$

E) $y = \frac{1}{x+1} - 3$

8. Consider the graph of $y = \sqrt{x}$. If it has a domain $x \leq 4$ and a range $y \geq 2$, what would be the resulting equation?

$(-\infty, 4]$ $[2, \infty)$

(F) $y = \sqrt{-(x-4)} + 2$ G) $y = \sqrt{-(x+4)} + 2$

H) $y = \sqrt{x+4} + 2$ J) $y = -\sqrt{x-4} - 2$

K) $y = -\sqrt{x-4} + 2$

$\sqrt{-(x-4)} + 2$

III. Solving Radical Equations

9. Solve: $\sqrt{t-3} = -2$

$t-3 = 4$
$t = 7$

A) -1 B) 7
C) 0 D) no solution ⟲
E) -5

10. Solve: $\sqrt{5x+11} = x+3$

$5x+11 = x^2+6x+9$
$0 = x^2+x-2$

F) -2 or -6 G) -4 or -8 H) 1 or -2 ⟲
J) 2 or 6 K) 1 or 8

$0 = (x+2)(x-1)$
$x = -2 \quad x = 1$ ✓ ✓

11. Solve: $\sqrt{5y-5} = \sqrt{4y+1}$

$5y-5 = 4y+1$
$y = 6$

A) -3 or 1 B) 4 C) -2 or 4
D) 6 ⟲   E) -6 or -2

12. What is the solution to the equation $\sqrt{x-19} - 3 = 6$?

$x-19 = 81$
$x = 100$

F) 121 G) 196 H) 144 J) 100 ⟲   K) 169

13. The distance, d kilometres, to the horizon, seen from a height of h metres, is given by the relationship $d = 8\sqrt{\dfrac{h}{5}}$. From one of our local mountains an observer notices that she can see an island on the horizon 160 km away. How high up the mountain is our observer?

A) $4000\,\text{m}$ B) $2500\,\text{m}$ C) $2100\,\text{m}$
D) $1600\,\text{m}$ E) $2000\,\text{m}$ ⟲

$160 = 8\sqrt{\dfrac{h}{5}}$
$20 = \sqrt{\dfrac{h}{5}}$
$400 = \dfrac{h}{5}$

14. Solve: $\sqrt{m-4} = 1$

$m-4 = 1$
$m = 5$

F) no solution   G) 8
H) 5 ⟲   J) -25
K) -3

15. Solve: $\sqrt{21+x} = 3 + \sqrt{x}$

A) 10 B) 18 C) 8 D) 14 E) 4 ⟲

$21+x = 9 + 6\sqrt{x} + x$
$-9 \quad -x \quad -9 \quad\quad -x$
$\dfrac{12}{6} = \dfrac{6\sqrt{x}}{6}$ $2 = \sqrt{x}$
$\quad\quad\quad\quad\quad 4 = x$

IV. Solving Rational Equations

16. Solve: $\dfrac{4}{y} + \dfrac{2}{3} = 1$

$\dfrac{12}{3y} + \dfrac{2y}{3y} = \dfrac{3y}{3y}$

F) 12 ⟲   G) 5 H) $\dfrac{25}{2}$ J) $-\dfrac{5}{3}$ K) $\dfrac{3}{2}$

$12 + 2y = 3y$
$12 = 1y$

17. Solve the equation $\dfrac{1}{x-1} + \dfrac{1}{2} = \dfrac{2}{(x-1)(x+1)}$.

A) -3 or 1 B) -5 C) -3 ⟲
D) 0 or 1 E) -5 or 2

$\dfrac{2x+2}{w} + \dfrac{x^2-1}{w} = \dfrac{4}{w}$

$2x+2 + x^2-1 = 4$
$x^2 + 2x + 1 = 4$
$\quad\quad\quad\quad -4 \quad -4$
$x^2 + 2x - 3 = 0$

$(x+3)(x-1)$
$x = -3 \quad x = 1$

$$y = \frac{k}{x} \qquad F = \frac{k}{w}$$

18. Solve: $\frac{x+1}{8} = \frac{9}{24}$

    $3x+3=9$
    $3x=6 \qquad x=2$

    F) $13\frac{9}{10}$ G) $10\frac{1}{3}$ (H) 2

    J) 3   K) $2\frac{23}{24}$

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19. Solve the equation $\frac{2p+7}{3} = \frac{p-1}{4}$.

    (A) $-\frac{31}{5}$ B) $\frac{7}{2}$ C) -12

    D) -3 E) $-\frac{17}{2}$

    $8p+28 = 3p-3$
    $5p = -31 \qquad -\frac{31}{5}$

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20. Solve: $\frac{5}{x+1} + \frac{2}{x-2} = 2$

    $\frac{2}{1}(x^2-x-2) \quad 2x^2 9x+4$

    $x^2 9x+8$

    (F) $\frac{1}{2}$ and 4   G) -1 and -4

    H) $-\frac{1}{2}$ and -4 J) 1 and 4

    K) 2 and 4

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

    $(x-4)(2x-1)$

    $5x-10 + 2x+2 = 2x^2-2x-4 \quad x=4 \; x=\frac{1}{2}$
    $7x-8 = 2x^2-2x-4$
    $-7x+8 \qquad\qquad -7x+8$

V.	Types of Variations

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21. What kind of variation does the equation $K = \frac{4}{m^2}$ describe?

    (A) inverse   B) joint   C) direct

    D) disjoint   E) compound

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22. The frequency of a radio wave (kHz) varies inversely as the wavelength (m). If a wave 250 m long has a frequency of about 1200 kHz, approximate the length of a wave with a frequency of 800 kHz.

    $1200 = \frac{K}{250} \qquad K = 300000$

    F) ≈ 475 m   G) ≈ 325 m   (H) ≈ 375 m

    J) ≈ 258 m   K) ≈ 167 m

    $800 = \frac{300000}{w}$
    $\frac{800w}{800} = \frac{300000}{800}$

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23. The cost of pencils varies directly as the number of *gross* purchased. If 4 gross cost $10.68, then how much will 9 gross of pens cost?

    $\frac{10.68}{4} = \frac{4 \cdot K}{4}$

    A) $23.04   B) $24.30   (C) $24.03

    D) $20.34   E) $23.40

    $2.67 = K$
    $Y = KX$
    $C = K9$

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24. The load that a beam of fixed length can support varies jointly as its width and the **square** of its depth. A beam 40 cm wide and 20 cm deep can support a load of 880 kg. How much can a beam 10 cm wide and 50 cm deep support?

    $.055 = K$
    $Y = KX^2$
    $L = wd^2 K$

    F) 687.5 kg   (G) 1375 kg   H) 275 kg

    J) 2750 kg   K) 35.2 kg

    $880 = (40)(20)^2 K$
    $\frac{880}{16000} = \frac{16000 K}{16000}$

    $L = (10)(50)^2 .055$

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25. What kind of variation does the equation $K = \frac{3mv^2}{t}$ describe?

    A) disjoint   B) direct   C) joint

    (D) compound   E) inverse

$(x+3)(x+7)(x-1)$

Solve: $\sqrt{2x+7} = (\sqrt{x+3}+1)(\sqrt{x+3}+1)$ or

$$\frac{4}{(x+3)(x+7)} \overset{(x-1)}{} + \frac{2x+6}{(x+7)(x-1)} \overset{(x+3)}{} = \frac{x+7}{(x+3)(x-1)} \overset{(x+7)}{}$$

Left column:

$2x+7 = x+3 + 2\sqrt{x+3} + 1$

$2x+7 = x+4 + 2\sqrt{x+3}$

$\quad -x-4$

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

$x^2+6x+9 = 4(x+3)$

$x^2+6x+9 = 4x+12$

$\quad -4x-12 \quad -4x-12$

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

$(x+3)(x-1) = 0$

$x = -3 \quad x = 1$

$+5$

Right column:

$④4-4 + 2x^2 + 6x + 6x + 18 = x^2+14x+49$

$2x^2+16x+14 = x^2+14x+49$

$-x^2-14x-49 \qquad -x^2-14x-49$

$x^2+2x-35 = 0$

$(x+7)(x-5) = 0$

$x = -7 \quad x = 5$

undefined

$+5$