Math 2 - Honors
Unit 4 Radical & Rational Functions
Test Review

Name _____
Date: _____ PD: _____

➢ Write each expression in **simplest radical** form

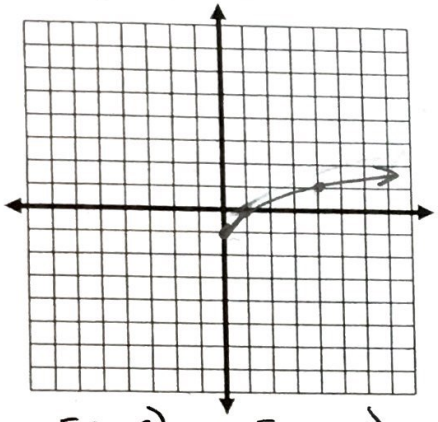
| | | | | |
|---|---|---|---|---|
| 1. $7^{1/2}$ $\sqrt{7}$ | 2. $x^{-2/3}$ $\frac{1}{\sqrt[3]{x^2}}$ | 3. $5y^{2/3}$ $5\sqrt[3]{y^2}$ | 4. $(7x)^{1/4}$ $\sqrt[4]{(7x)'}$ | 5. $36^{-1/2}$ $\frac{1}{\sqrt{36}} = \frac{1}{6}$ |

➢ Write each expression in **exponential** form:

| | | | | |
|---|---|---|---|---|
| 6. $\sqrt{5}$ $5^{1/2}$ | 7. $\sqrt[4]{2x}$ $(2x)^{1/4}$ | 8. $\sqrt[3]{x^2}$ $x^{2/3}$ | 9. $3\sqrt[5]{x^3}$ $3x^{3/5}$ | 10. $\frac{1}{\sqrt{11}}$ $11^{-1/2}$ |

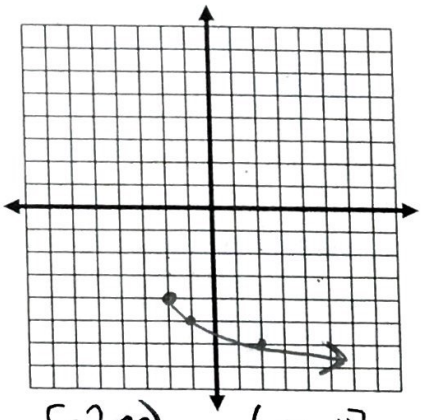
➢ **Graph each function. Then state the Domain & Range.**

1) $y = \sqrt{x} - 1$



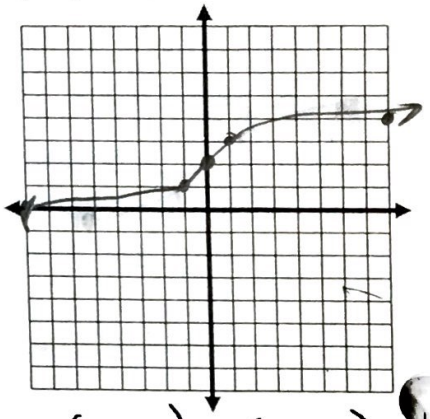
D: $[0, \infty)$ R: $[-1, \infty)$

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



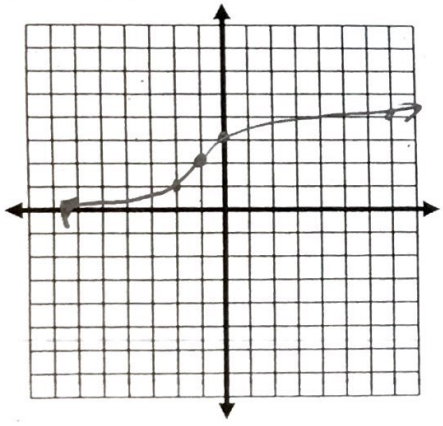
D: $[-2, \infty)$ R: $(-\infty, -4]$

3) $y = \sqrt[3]{x} + 2$



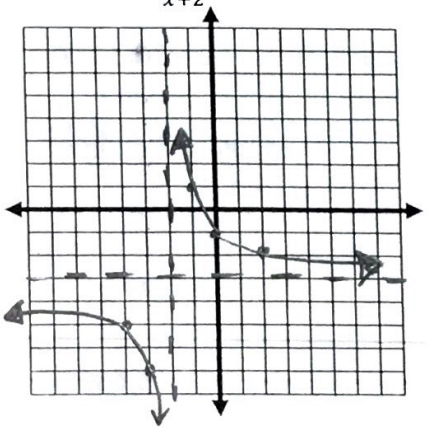
D: $(-\infty, \infty)$ R: $(-\infty, \infty)$

4) $f(x) = \sqrt[3]{x+1} + 2$



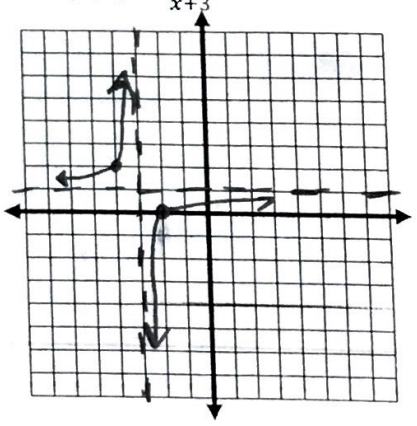
D: $(-\infty, \infty)$ R: $(-\infty, \infty)$

5) $f(x) = \frac{4}{x+2} - 3$



D: $x \neq -2$ R: $y \neq -3$
$(-\infty, -2) \cup (-2, \infty)$ $(-\infty, -3) \cup (-3, \infty)$

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



D: $x \neq -3$ R: $y \neq 1$
$(-\infty, -3) \cup (-3, \infty)$ $(-\infty, 1) \cup (1, \infty)$

7) Write the equation of a square root function that has been translated four units left and five units down and reflected across the $x-axis$. $y = -\sqrt{x+4} - 5$

8) Write the equation of a rational function that has a domain of $x \neq 2$ and a range of $y \neq -4$ with a vertical stretch of 9. $y = \frac{9}{x-2} - 4$

Solve each equation. Be sure to check for extraneous solutions!!

9) $\sqrt{x+10} - 7 = -5$

$X = -6$

10) $\sqrt{-3x+40} = x$

$X = 5$

11) $\sqrt{x+14} = x - 16$

$X = 22$

12) $\frac{-2}{x+4} = \frac{4}{x+3}$

$X = -11/3$

13) $\frac{x+4}{x-2} = \frac{x-5}{x-8}$

$X = 14$

14) $\frac{5}{6x} + \frac{1}{x} = 4$

$X = 11/24$

15) $\frac{2}{(x-1)(x+1)} - 1 = \frac{1}{x-1}$

$X = -2$

16) Your distance from lightning *varies directly* with the time it takes you to hear thunder. If you hear thunder 10 *seconds* after you see lightning, you are about 2 *miles* from the lightning. About how many seconds would it take for thunder to travel a distance of 4 *miles*?

$t = 20$ seconds

17) The drama club is planning a bus trip to New York City. The cost per person *varies inversely* as the number of people going on the trip. It will cost \$30 per person if 44 *people* go on the trip. How much will it cost per person if 60 *people* go on the trip?

$C = \$22$ per person

18) For a given interest rate, simple interest *varies jointly* as principal and time. If \$2000 left in an account for 4 *years* earns interest of \$320, how much interest would be earned in if you deposit \$5000 for 7 *years*?

$I = \$1400$

19) The volume of gas *varies directly* as the temperature and *inversely* as the pressure. If the volume is 230 *cubic centimeters* when the temperature is $300°K$ and the pressure is 20 *pounds* per square centimeter, what is the volume when the temperature is $270°K$ and the pressure is 30 *pounds* per square centimeter?

$V = 138 cm^3$

20)

A. In a thunderstorm, the wind velocity in *meters per second* can be described by the function, $v(p) = 5.7\sqrt{998 - p}$ where $p$ is the air pressure in millibars. What is the wind velocity if the air pressure is 437 *millibars*?

$\approx 135$ m/sec

B. What is the air pressure of a thunderstorm in which the wind velocity is 49.3 *meters per second*?

$\approx 923.19$ millibars

9) $\sqrt{x+10} - 7 = -5$

$+7 \quad +7$

$(\sqrt{x+10})^2 = (2)^2$

$x+10 = 4$

$-10 \quad -10$

$\boxed{x = -6}$

Double-check: ✓

10) $(\sqrt{-3x+40})^2 = (x)^2$

$-3x+40 = x^2$

$+3x-40 \quad +3x-40$

$0 = x^2+3x-40$

$0 = (x+8)(x-5)$

$x \neq -8 \quad \boxed{x = 5}$ ✓

11) $(\sqrt{x+14})^2 = (x-16)^2$

$x+14 = x^2-32x+256$

$-x \quad -14 \quad -x \quad -14$

$0 = x^2-33x+242$

$0 = (x-11)(x-22)$

$x \neq 11 \quad \boxed{x = 22}$ ✓

12) $\frac{(x+3)}{(x+3)} \cdot \frac{-2}{x+4} = \frac{4}{x+3} \cdot \frac{(x+4)}{(x+4)}$

$\frac{-2x-6}{(x+3)(x+4)} = \frac{4x+16}{(x+3)(x+4)}$

$-2x-6 = 4x+16$

$+2x \quad +2x$

$-6 = 6x+16$

$-16 \quad -16$

$-22 = 6x$

LCD: $(x-2)(x-8)$

13) $\frac{(x-8)}{(x-8)} \cdot \frac{x+4}{x-2} = \frac{x-5}{x-8} \cdot \frac{(x-2)}{(x-2)}$

$\frac{x^2-4x-32}{(x-8)(x-2)} = \frac{x^2-7x+10}{(x-8)(x-2)}$

$x^2-4x-32 = x^2-7x+10$

$-x^2 \quad +4x \quad +32 \quad -x^2 \quad +4x \quad +32$

$0 = -3x+42$

$3x = 42$

$\boxed{x = 14}$

LCD: $6x$

14) $\frac{1}{1} \cdot \frac{5}{6x} + \frac{6}{6} \cdot \frac{1}{x} = \frac{4}{1} \cdot \frac{6x}{6x}$

$\frac{5}{6x} + \frac{6}{6x} = \frac{24x}{6x}$

$5+6 = 24x$

$\frac{11}{24} = \frac{24x}{24}$

$\boxed{11/24 = x}$ ✓

LCD: $(x+4)(x+3)$

$x = -22/6 = \boxed{-11/3}$ ✓

LCD: $(x-1)(x+1)$

15) $\frac{2}{(x-1)(x+1)} - \frac{1}{1} \cdot \frac{(x-1)(x+1)}{(x-1)(x+1)} = \frac{1}{x-1} \cdot \frac{(x+1)}{(x+1)}$

$\frac{2}{(x-1)(x+1)} - \frac{1}{1} \cdot \frac{(x^2-1)}{(x-1)(x+1)} = \frac{x+1}{(x-1)(x+1)}$

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

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

$2 - x^2 + 1 = x + 1$

$+x^2$

$3 = x^2 + x + 1$

$-3 \qquad -3$

$0 = x^2 + x - 2$

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

$x = -2$ ✓ $\quad x = 1$ ✗

16) $y = kx$

$d = kt \qquad 4 = .2(t)$

$\frac{2}{10} = \frac{k(10)}{10} \qquad \frac{.2}{.2} = \frac{.2}{.2}$

$.2 = k \qquad t = 20$ seconds

17) $y = \frac{k}{x}$

$C = \frac{k}{p} \qquad C = \frac{1320}{60}$

$\frac{30}{1} = \frac{k}{44} \qquad C = \$22$/person

$1320 = k$

18) $y = kxz$

$I = kpt$

$320 = k(2000)(4)$

$\frac{320}{8000} = \frac{8000k}{8000}$

$.04 = k$

$I = (.04)(5000)(7)$

$I = \$1400$

19) $y = \frac{kx}{z}$

$v = \frac{kt}{p}$

$\frac{230}{1} = \frac{k(300)}{20}$

$\frac{4600}{300} = \frac{300k}{300}$

$46/3 = k$

$v = \frac{(46/3)(270)}{30}$

$v = 138\,cm^3$

20) $v = 5.7\sqrt{998 - p}$

$v = 5.7\sqrt{998 - 437}$

A) $\approx 135$ m/sec

$\frac{49.3}{5.7} = \frac{5.7\sqrt{998-p}}{5.7}$

$\left(\frac{493}{57}\right)^2 = \left(\sqrt{998-p}\right)^2$

$\frac{243049}{3249} = 998 - p$

$-998 \qquad -998$

$-923.19 = -p$

B) $p \approx 923.19$ millibars