➢ Write each expression in simplest radical form
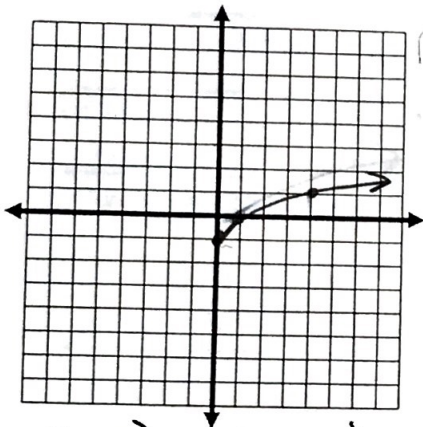
1. $7^{1/2}$ $\sqrt{7'}$	2. $x^{-2/3}$ $\dfrac{1}{\sqrt[3]{x^2}}$	3. $5y^{2/3}$ $5\sqrt[3]{y^2}$	4. $(7x)^{1/4}$ $\sqrt[4]{(7x)'}$	5. $36^{-1/2}$ $\dfrac{1}{\sqrt{36}} = \frac{1}{6}$

➢ Write each expression in exponential form:

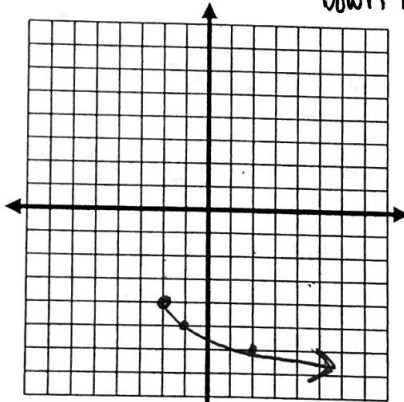| 6. $\sqrt{5}$ $5^{1/2}$	7. $\sqrt[4]{2x}$ $(2x)^{1/4}$	8. $\sqrt[3]{x^2}$ $x^{2/3}$	9. $3\sqrt[5]{x^3}$ $3x^{3/5}$	10. $\dfrac{1}{\sqrt{11}}$ $11^{-1/2}$

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

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

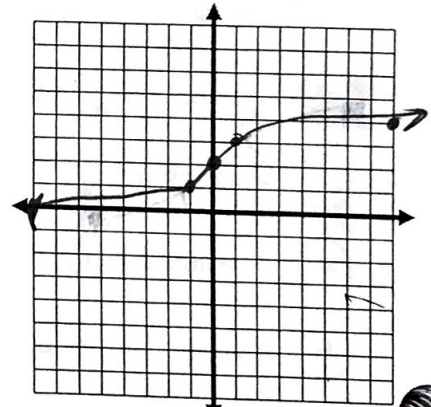
D: $[0,\infty)$ R: $[-1,\infty)$

2) $f(x) = -\sqrt{x+2} - 4$ Reflect x-axis Left 2 Down 4

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

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

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

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

D: $(-\infty,\infty)$ R: $(-\infty,\infty)$
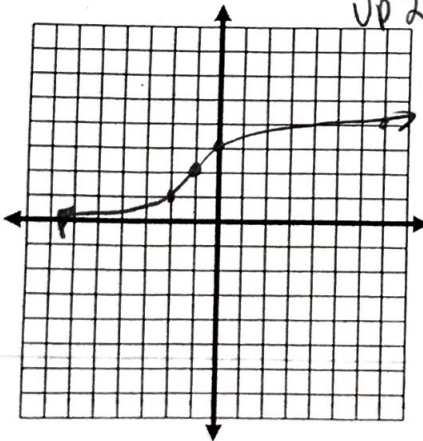
5) $f(x) = \dfrac{4}{x+2} - 3$ S by 4 Left 2 Down 3
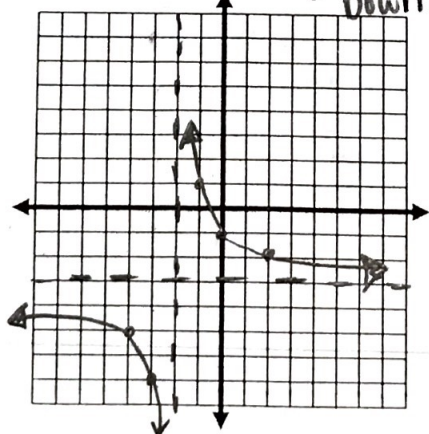
D: $x \neq -2$ R: $y \neq -3$
$(-\infty,-2)\cup(-2,\infty)$ $(-\infty,-3)\cup(-3,\infty)$

6) $f(x) = \dfrac{-1}{x+3} + 1$ Reflect x-axis Left 3 Up 1
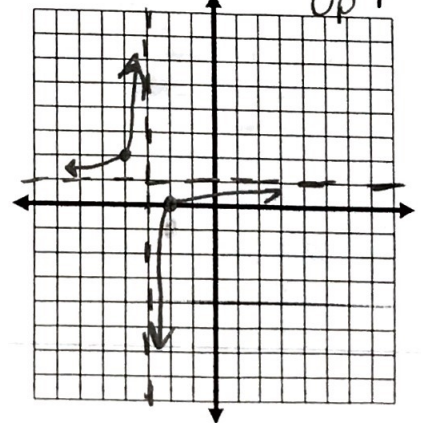
D: $x \neq -3$ R: $y \neq 1$
$(-\infty,-3)\cup(-3,\infty)$ $(-\infty,1)\cup(1,\infty)$

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. $y = \dfrac{9}{x-2} - 4$

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

$X = -11/3$

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

$X = 14$

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

$X = 11/24$

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

$X = -2$

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*?

$\approx 923.19 \, millibars$

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

$\quad\quad\quad +7 \quad\quad +7$

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

$x+10 = 4$

$\quad -10 \quad -10$

$\boxed{x = -6}$

Double-check: ✓

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

$-3x+40 = x^2$

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

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

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

$\cancel{x = -8} \quad \boxed{x=5}$ ✓

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

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

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

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

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

$\cancel{x = 11} \quad \boxed{x=22}$ ✓

12) $\dfrac{(x+3)}{(x+3)} \cdot \dfrac{-2}{x+4} = \dfrac{4}{x+3} \cdot \dfrac{(x+4)}{(x+4)}$ LCD: $(x+4)(x+3)$

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

$x = -22\mid 6 = \boxed{-11/3}$ ✓

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

$+2x \quad\quad +2x$

$-6 = 6x+16$

$-16 \quad\quad -16$

$-22 = 6x$

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

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

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

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

$0 = -3x+42$

$3x = 42$

$\boxed{x=14}$

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

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

$5+6 = 24x$

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

$\boxed{11/24 = x}$ ✓

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

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

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

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

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

$+x^2$

$3 = x^2 + x + 1$

$-3 -3$

$0 = x^2 + x - 2$

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

$\boxed{x = -2} \quad x = \cancel{1}$

✓

16) $y = kx$

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

$2 = k(10) \qquad \dfrac{4}{.2} = \dfrac{.2}{.2}$

$\dfrac{2}{10} \quad \dfrac{}{10} \qquad \boxed{t = 20 \text{ seconds}}$

$.2 = k$

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

$6 = \dfrac{k}{p}$

$30 = k$

$\dfrac{30 = k}{1 \cancel{\times} 44} \qquad \boxed{C = \$22/\text{person}}$

$1320 = k$

$C = \dfrac{1320}{60}$

18) $y = k \times z$

$I = k p t$

$320 = k(2000)(4)$

$320 = 8000 k$

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

$.04 = k$

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

$\boxed{I = \$1400}$

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

$V = \dfrac{kt}{p}$

$230 = \dfrac{k(300)}{\cancel{1} \cancel{\times} 20}$

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

$46/3 = k$

$V = \dfrac{(46/3)(270)}{30}$

$\boxed{V = 138 \text{cm}^3}$

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

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

A) $\approx 135 \text{ m/sec}$

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

$\dfrac{49.3}{5.7} \quad \dfrac{5.7}{5.7}$

$\left(\dfrac{49.3^2}{5.7}\right) = \left(\sqrt{998-p}\right)^2$

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

$\dfrac{}{-998}$

$-923.19 = -p$

B) $p \approx 923.19$