Unit 4A Square Root Function **HONORS MATH 2** **NAME** KEY
QUIZ/TEST REVIEW

Write each expression in radical form.

1. $(2x)^{\frac{2}{3}}$ $\sqrt[3]{(2x)^2}$ or $(\sqrt[3]{2x})^2$

Does not have exponent (except 1)

2. $2x^{\frac{1}{3}}$ $2\sqrt[3]{x}$

3. $x^{5/4} - 1$ $\sqrt[4]{x^5} - 1$

Multiple choice example:

$\sqrt{20x}$

a. $20x^{\frac{1}{2}}$
b. $2\sqrt{5x}$
c. $5\sqrt{2x}$
d. $20^{\frac{1}{2}}x^{\frac{1}{2}}$

Write each expression in exponential form.

4. $\sqrt{13x}$ $(13x)^{1/2}$ or $13^{1/2}x^{1/2}$

4a. $\sqrt[3]{27a^3b^5}$ $27^{1/3}a^{3/3}b^{5/3}$ $3ab^{5/3}$

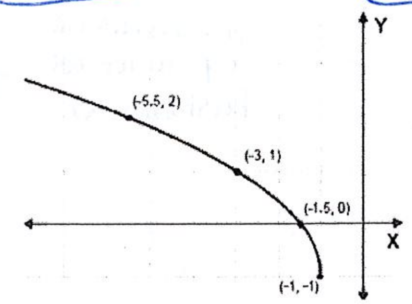
5. $\sqrt[5]{6x^2}$ $6^{\frac{1}{5}}x^{2/5}$

6. $\sqrt[3]{(5x-1)^4}$ $(5x-1)^{4/3}$

7) Find the domain and range of each function.

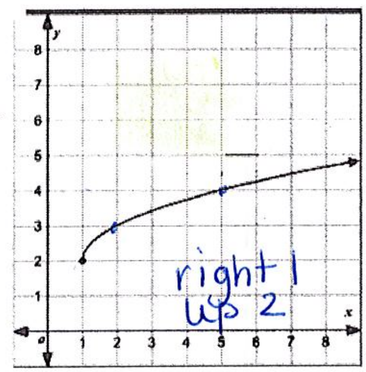
Domain: $x \le -1$

Range: $x \ge -1$



8) Write the equation of the square root function, given the graph.

$y = \sqrt{x-1} + 2$



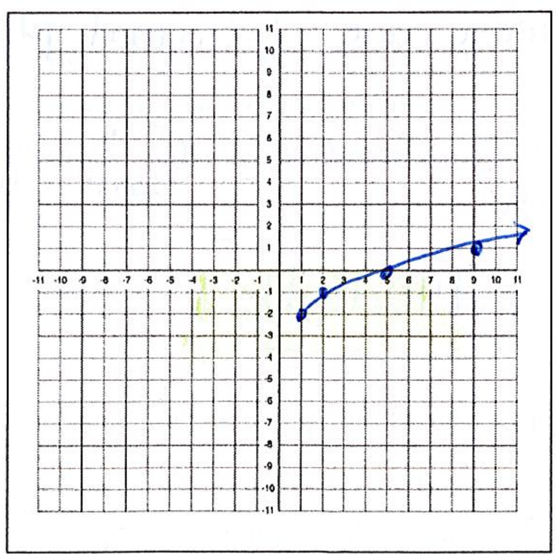
9a) Graph the following function by creating a table of values.

* Pick x-values that are nice square roots

x	y
1	-2
2	-1
5	0
9	1
17	2

$y = -2 + \sqrt{x-1}$

$-2 + \sqrt{1-1} = -2$
$-2 + 0$
$-2 + \sqrt{2-1}$
$-2 + \sqrt{1} = -1$
$-2 + \sqrt{5-1}$
$-2 + \sqrt{4} = 0$
$-2 + \sqrt{10-1}$
$-2 + \sqrt{9} = 1$
$-2 + \sqrt{17-1}$
$-2 + \sqrt{16} = 2$



9b) Increasing or Decreasing: increasing

State Domain: $x \ge 1$

State Range: $x \ge -2$

10) Given the table of the parent function, write the equation of the transformed function from the table on the right (decimals rounded to nearest hundredth). A blank graph is provided for you if you want it.

Parent Function: $y = \sqrt{x}$

Transformed Function: $y = 2\sqrt{x} + 3$

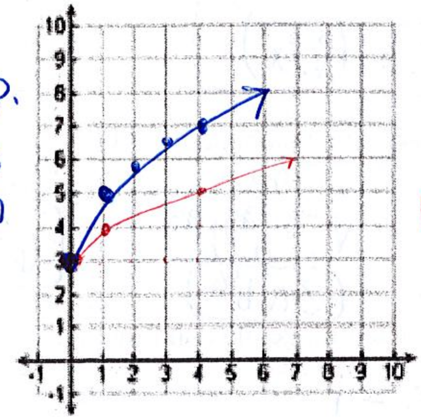
x	y
0	0
1	1
2	1.41
3	1.73
4	2

x	y
0	3
1	5
2	5.83
3	6.46
4	7

Vertically stretched, up.

So "a" value is greater than 1.

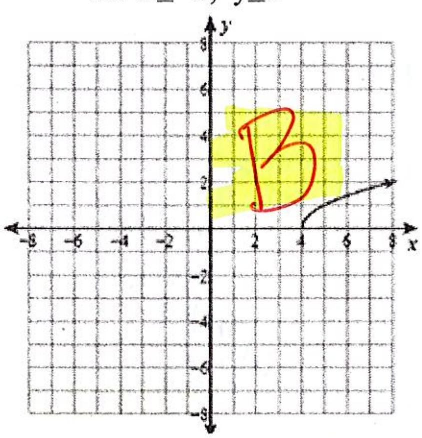
the values go up twice as fast than $\sqrt{x}$

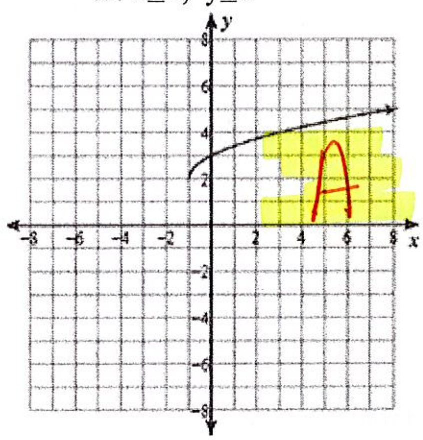


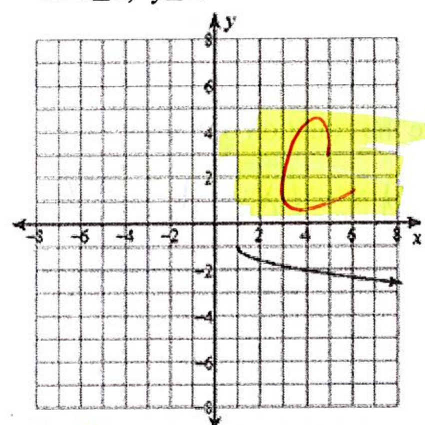
regular $\sqrt{x}$ in red

11) **Match the domain and range to the graph.**

A. $x \geq -1$; $y \geq 2$ **B.** $x \geq 4$; $y \geq 0$ **C.** $x \geq 1$; $y \leq -1$







Word Problems Please use 2 decimal places. (Round where necessary.)

12. Special airbags are used to protect scientific equipment when a rover lands on the surface of Mars. The function $f(x) = \frac{3}{5}\sqrt{64x}$ approximates an object's downward velocity, in feet per second, as the object hits the ground after bouncing x feet in height. How fast would the rover be traveling after a bounce of 70 feet?

Speed or f(x) x- feet high.

$f(x) = \frac{3}{5}\sqrt{64 \cdot 70}$

$f(x) = \text{speed} = \boxed{40.16\ \frac{ft}{sec}}$

13. The time T, in seconds, it takes for a pendulum to complete one back and forth swing can be determined by the formula $T = 2\pi\sqrt{\frac{L}{9.8}}$, where L is the length of the pendulum in meters. Estimate the length of a pendulum that completes one back and forth swing in 2.5 seconds. - period or time in sec.

$(2.5)^2 = (2\pi)^2\left(\sqrt{\frac{L}{9.8}}\right)^2$

$\frac{9.8 \cdot 6.25}{39.47} = \frac{39.478 \cdot \left(\frac{L}{\cancel{9.8}}\right) \cdot \cancel{9.8}}{39.47}$

$\boxed{1.55m = L}$

14. The speed s, in miles per hour, that a car is traveling when it goes into a skid can be estimated by the formula, $s = \sqrt{30fd}$ where f is the coefficient of friction and d is the length of the skid marks in feet. A police officer was investigating an accident where the driver claims to have been traveling 45 mph. The officer measured the skid marks to be 130 feet and knows that the coefficient of friction for dry roads is 0.7. Is the driver telling the truth? Justify with mathematics.

$S = \sqrt{30(.7)(130)}$

$S = 52.249$

or $\boxed{52.25 \text{ mph}}$

No, the driver had to be going more than 45mph. In fact, he was going 52mph.

Alternate solution: use speed, find d.

$(45)^2 = (\sqrt{30(.7)d})^2$

$45^2 = 21d$

$d = \frac{45^2}{21} = 96 \text{ ft}$

No, skid marks 130ft. are too long!

15. The velocity of an object dropped from a height of h meters is given by the function $V = \sqrt{2gh}$, where g is the gravitational constant, $32.2 \frac{ft}{s^2}$. If an object is dropped from the roof of a building that is 1000 feet tall, how fast is it travelling when it hits the ground?

height.

Velocity

$V = \sqrt{2(32.2)(1000)}$

$\boxed{V = 253.77 \text{ ft/sec}}$

16. Which most accurately describes the graph of the function $f(x) = \sqrt{x+2} - 5$?

start $(-2, -5)$

a. $g(x)=\sqrt{x}$ shifted 2 units up and 5 units to the right.
b. $g(x)=\sqrt{x}$ x shifted 5 units up and 2 units to the right.
c. $g(x)=\sqrt{x}$ shifted 2 units down and 5 units to the left.
d. $g(x)=\sqrt{x}$ shifted 5 units down and 2 units to the left.

. The function $h(x)=\sqrt{x}$ is changed to $h(x) = \sqrt{x-4} - 3$. What effect will this have on the graph of $h(x)=\sqrt{x}$?
a. The graph will shift up 4 units and left 3 units.
b. The graph will shift down 4 units and right 3 units.
c. The graph will shift left 4 units and down 3 units.
d. The graph will shift right 4 units and down 3.

18.
The graph of $f(x) = \sqrt{x} - 2$ is translated 4 units right and 5 units down. Which of these functions describes the transformed graph?

a. $g(x) = \sqrt{x-4} + 3$
b. $g(x) = \sqrt{x+4} - 5$
c. $g(x) = \sqrt{x-4} + 5$
d. $g(x) = \sqrt{x-4} - 7$

$\sqrt{x-4}$ -2 (already 2 units down)
-5 (goes 5 more units down)

$= \sqrt{x-4} - 7$

19.
How does the graph $y = \sqrt{x}$ change when the function is changed to $y = \frac{1}{2}\sqrt{x}$?

a. The graph is shifted $\frac{1}{2}$ units up on the x-axis.
b. The graph is shifted $\frac{1}{2}$ units up on the y-axis.
c. The graph is vertically compressed by a factor of $\frac{1}{2}$.
d. The graph is vertically stretched by a factor of $\frac{1}{2}$.

20.

What is the vertex of the graph of $y = \sqrt{x-2} + 5$?

a. (-2, 5)
b. (2, 5)
c. (2, -5)
d. (-2, -5)

(2,5)

21.

What is the vertex of the graph of $y = \sqrt{x+5} - 6$?

a. (-5, 6)
b. (5, 6)
c. (5, -6)
d. (-5, -6)

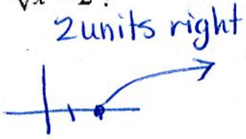
(-5, -6)

22.

What is the domain of $y = \sqrt{x-2}$?

a. $x \geq 2$
b. $x \leq 2$
c. $x \geq -2$
d. $x \leq -2$

2units right

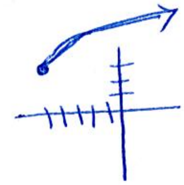


23.

What is the range of $y = \sqrt{x+5} + 3$?

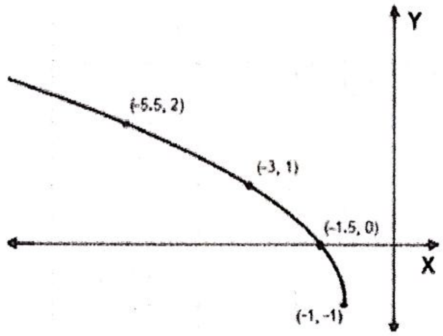
a. $y \geq 3$
b. $y \leq 3$
c. $y \geq -3$
d. $y \leq -3$

5units left
3units up



24.

What is the domain of the graph of the function shown below:



a. $x \geq -1$
b. $x \leq -1$
c. $x \geq 0$
d. $x \leq 0$

25.

Solve each of the following equations.

16. $4 + \sqrt{x-1} = 5$

$-4 \qquad -4$

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

$x - 1 = 1$

$x = 2$ ✓

Check

$4 + \sqrt{2-1} = 5$

$4 + \sqrt{1} = 5$

$4 + 1 = 5$

$5 = 5$ ✓

26. $(x-5)^{\frac{1}{2}} = 3$

same as square root

$(\sqrt{x-5})^2 = (3)^2$

$x - 5 = 9$

$x = 14$

Check

$\sqrt{14-5} = 3$

$\sqrt{9} = 3$

$3 = 3$ ✓

27. $3 = \frac{1}{4}\sqrt{3x+30}$ $\cdot 4$

$(12)^2 = (\sqrt{3x+30})^2$

$144 = 3x + 30$

$\frac{114}{3} = \frac{3x}{3}$

$38 = x$

Check

$3 = \frac{1}{4}\sqrt{3(38)+30}$

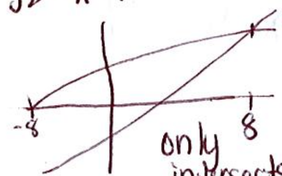
$3 = \frac{1}{4}\sqrt{144}$

$3 = \frac{1}{4}(12)$

$3 = 3$ ✓

28. $\sqrt{x+8} - x = -4$

Note: If you graph it $\rightarrow$
$y_1 = \sqrt{x+8}$
$y_2 = x - 4$



only intersects one time at x=8

$(\sqrt{x+8})^2 = (x-4)^2$

$x + 8 = x^2 - 8x + 16$

$-x \qquad -8$

$0 = x^2 - 9x + 8$

$0 = (x-1)(x-8)$

$\cancel{x=1}$ $\quad x = 8$

Check! $x=1$

$\sqrt{1+8} - 1 = -4$

$\sqrt{9} - 1 = -4$

$3 - 1 = -4$

$2 = -4$

NO!

Check! $x=8$

$\sqrt{8+8} - 8 = -4$

$\sqrt{16} - 8 = -4$

$4 - 8 = -4$

$-4 = -4$ ✓

29. $(\sqrt{35x})^2 = (5)^2(\sqrt{x+2})^2$

$35x = 25(x+2)$

$35x = 25x + 50$

$-25x$

$10x = 50$

$x = 5$

Check!

$\sqrt{35(5)} = 5\sqrt{5+2}$

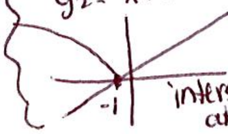
$\sqrt{175} = 5\sqrt{7}$

$5\sqrt{25 \cdot 7}$

✓ $5\sqrt{7} = 5\sqrt{7}$

30. $(\sqrt{-x-1})^2 = (x+1)^2$

Note: If you graph it
$y_1 = \sqrt{-x-1}$
$y_2 = x + 1$



intersects once at x=-1

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

$+x \qquad +1$

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

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

$x = -1$ ✓ $\quad \cancel{x=-2}$

Check $x=-1$

$\sqrt{-(-1)-1} = (-1)+1$

$\sqrt{1-1} = 0$

$\sqrt{0} = 0$

$0 = 0$

Check $x=-2$

$\sqrt{-(-2)-1} = (-2)+1$

$\sqrt{2-1} = -1$

$\sqrt{1} = -1$ NO!