QUIZ DATES: ____________ & ____________

TEST DATE: ____________________

Math 2

Unit 4 – Radical & Rational Functions

Lesson 1 → Rational Exponents

Name_______________________________

Date________________________Pd_____

❖ Rational or fractional exponents can be rewritten in radical form:

Converting from rational exponent to radical form:

$$x^{a/b} = \sqrt[b]{x^a}$$

The **numerator** of the exponent becomes the **exponent** of the radicand.

The **denominator** of the exponent becomes the **index** of the radicand.

➢ **EXAMPLES:**

1. $9^{1/2} =$	2. $64^{1/3} =$
3. $x^{2/3} =$	4. $16^{-1/2} =$ *** **Negative** exponents become fractions
5. $4x^{1/7} =$	6. $(3x)^{3/4} =$

➢ You Try: Write each expression in **simplest** radical form:

1. $2^{1/2}$	2. $3^{1/2}$	3. $9^{-1/2}$	4. $25^{1/2}$	5. $7^{1/3}$
6. $x^{4/7}$	7. $15^{-1/4}$	8. $x^{1/2}$	9. $y^{-1/2}$	10. $4x^{2/3}$
11. $3x^{-1/2}$	12. $(7a)^{1/2}$	13. $(6x)^{-1/2}$	14. $27^{5/3}$	15. $(5x)^{1/6}$

❖ Radicals can be rewritten in rational exponent form:

Converting from radical to rational exponent form: $\sqrt[b]{x^a} = x^{a/b}$

The **exponent** of the radicand becomes the **numerator** of the fraction. The **index** of the radicand becomes the **denominator** of the fraction.

➢ **EXAMPLES:**

1. $\sqrt{5} =$	2. $\sqrt[3]{7^2} =$
3. $\sqrt[4]{x} =$	4. $\frac{1}{\sqrt[3]{x^2}} =$
5. $5\sqrt[3]{x} =$	6. $\sqrt[5]{3x^2} =$

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

16. $\sqrt{7}$	17. $\sqrt{6}$	18. $\sqrt[4]{8}$	19. $\sqrt[5]{18}$	20. $\sqrt[3]{x^2}$
21. $\sqrt[3]{(2x^2)}$	22. $\frac{1}{\sqrt[3]{5}}$	23. $2\sqrt[4]{15}$	24. $\sqrt{(3x)^7}$	25. $\left(\sqrt[3]{3v}\right)^2$

Math 2
Unit 4 – Radical & Rational Functions
Lesson 1 → Rational Exponents HOMEWORK

Name______________________________
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➢ Rewrite each expression in **radical form** and then simplify completely:

1. $100^{1/2}$	2. $125^{1/3}$	3. $(17x)^{1/2}$	4. $64^{1/3}$	5. $16^{1/4}$
6. $16^{3/4}$	7. $\left(8^{1/2}\right)^2$	8. $\left(8^{1/3}\right)^3$	9. $(16x^4)^{1/4}$	10. $125^{-1/3}$

➢ Rewrite each expression in **exponential form** and then simplify completely:

11. $\sqrt{81}$	12. $\sqrt[3]{125}$	13. $\sqrt[4]{20x^3}$	14. $\sqrt[3]{-64}$	15. $\sqrt[3]{8}$
16. $\left(\sqrt[3]{8x}\right)^3$	17. $\left(\sqrt{98}\right)^2$	18. $\left(\sqrt[3]{98}\right)^3$	19. $\left(\sqrt[4]{98}\right)^4$	20. $\left(\frac{1}{\sqrt{x}}\right)^{-4}$

➢ Evaluate each of the following expressions. Give exact answers.

21. $27^{2/3}$	22. $1^{3.5}$	23. $\left(\frac{1}{32}\right)^{1/5}$	24. $(-27)^{-2/3}$	25. $4^{2.5}$
26. $\left(\frac{1}{16}\right)^{3/4}$	27. $216^{1/3}$	28. $16^{-1/4}$	29. $25^{3/2}$	30. $(x^6)^{1/2}$

What Happens When the King of Beasts Runs in Front of a Train?

Match each expression with its equivalent expression. Write the corresponding letter in the box at the bottom of the page.

1.	$7^{1/2}$		**N**	$10^{3/2}$
2.	$\sqrt[3]{2}$		**N**	216
3.	$a^{6/5}$		**I**	3
4.	$(\sqrt[3]{3a})^4$		**I**	$\sqrt{7}$
5.	$(6v)^{1.5}$		**T**	$3n$
6.	$\sqrt[6]{2}$		**F**	$10^{1/6}$
7.	$4^{4/3}$		**S**	$(\sqrt[5]{a})^6$
8.	$(\sqrt{10})^3$		**O**	$5^{5/4}$
9.	$(x^6)^{1/2}$		**H**	$\frac{1}{\sqrt{m}}$
10.	$\sqrt{6p}$		**O**	$(6p)^{1/2}$
11.	$\sqrt[6]{10}$		**L**	$(\sqrt{10n})^3$
12.	$(9n^2)^{1/2}$		**T**	$(3a)^{4/3}$
13.	$m^{-1/2}$		**E**	$2^{5/3}$
14.	$(\sqrt[3]{2})^5$		**E**	$2^{1/6}$
15.	$(10n)^{3/2}$		**D**	x^3
16.	$9^{1/2}$		**H**	$(\sqrt{6v})^3$
17.	$(\sqrt[4]{5})^5$		**E**	$(\sqrt[3]{4})^4$
18.	$36^{1.5}$		**T**	$2^{1/3}$

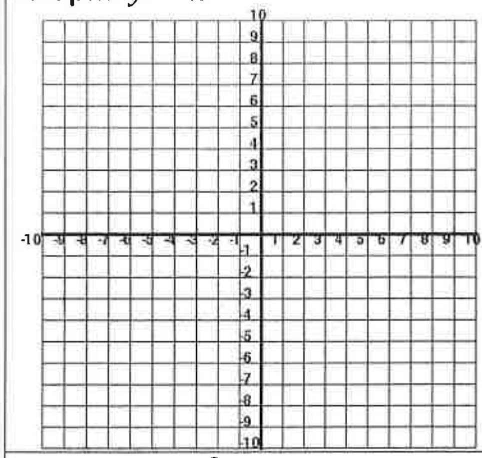
1	2	3		4	5	6		7	8	9		10	11		12	13	14		15	16	17	18

Math 2
Unit 4 – Radical & Rational Functions
Lesson 2 → Square Root & Cube Root Graphs

Name______________________________
Date________________________Pd______

➢ Graphs of **Parent Functions:**

Graph: $y = x^2$

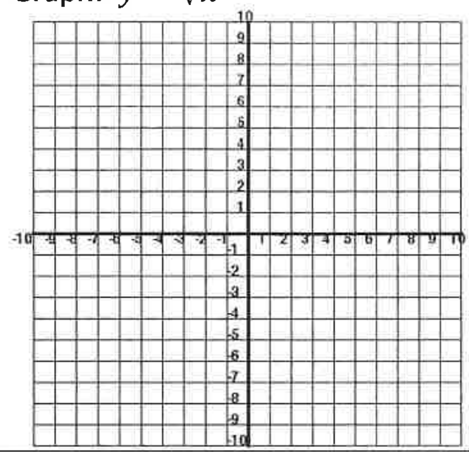


Vertex:

Domain:

Range:

Graph: $y = \sqrt{x}$

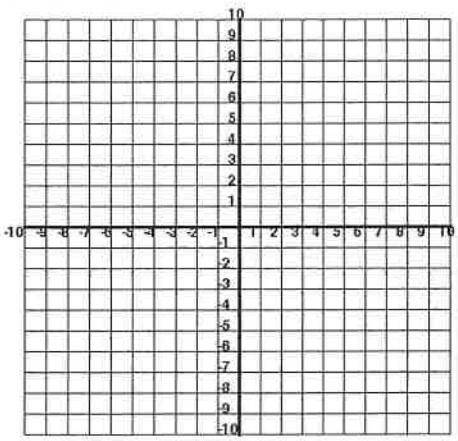


Vertex:

Domain:

Range:

Graph: $y = x^3$

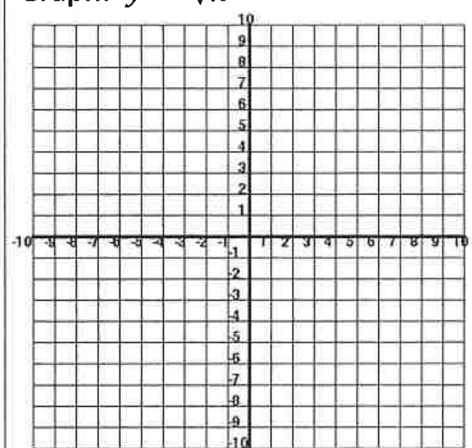


Vertex:

Domain:

Range:

Graph: $y = \sqrt[3]{x}$



Vertex:

Domain:

Range:

➢ **Recall Transformation Rules:**

$$y = a(x - h) + k$$

If a is negative, then the graph is a reflection across the x-axis

Vertical Stretch $|a| > 1$ **(makes it narrower)**

Vertical Compression $0 < |a| < 1$ **(makes it wider)**

Horizontal Translation (opposite of h)

Vertical Translation

Quadratic Function	Vertex	Shift Left or Right	Shift Up or Down
$y = (x-3)^2 + 6$			
$y = (x+1)^2$			
$y = x^2 - 4$			

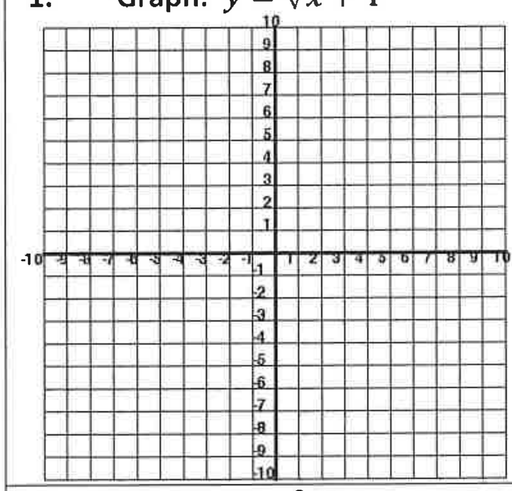
Cubic Function	Vertex	Shift Left or Right	Shift Up or Down
$y = (x+2)^3 - 5$			
$y = x^3 + 7$			
$y = (x-8)^3$			

Square Root Function	Vertex	Shift Left or Right	Shift Up or Down
$y = \sqrt{x-2} + 5$			
$y = \sqrt{x} - 1$			
$y = \sqrt{x+3}$			

Cube Root Function	Vertex	Shift Left or Right	Shift Up or Down
$y = \sqrt[3]{x} - 9$			
$y = \sqrt[3]{x+2} + 4$			
$y = \sqrt[3]{x-8}$			

➢ Graph using Transformation Rules:

1. Graph: $y = \sqrt{x+4}$

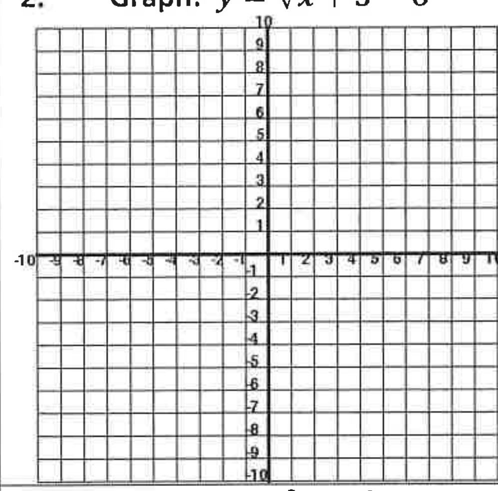


Vertex:

Domain:

Range:

2. Graph: $y = \sqrt{x+3} - 6$

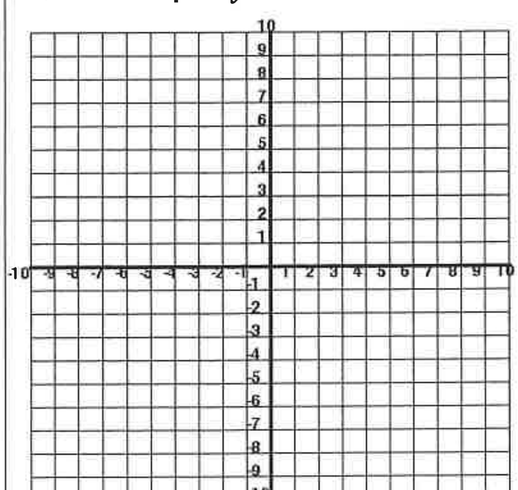


Vertex:

Domain:

Range:

3. Graph: $y = \sqrt[3]{x} + 2$

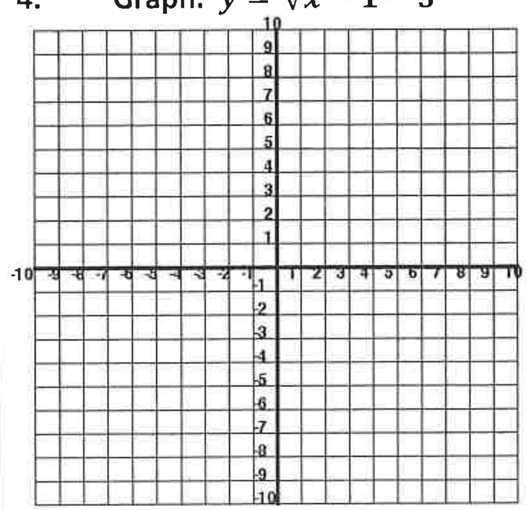


Vertex:

Domain:

Range:

4. Graph: $y = \sqrt[3]{x-1} - 3$

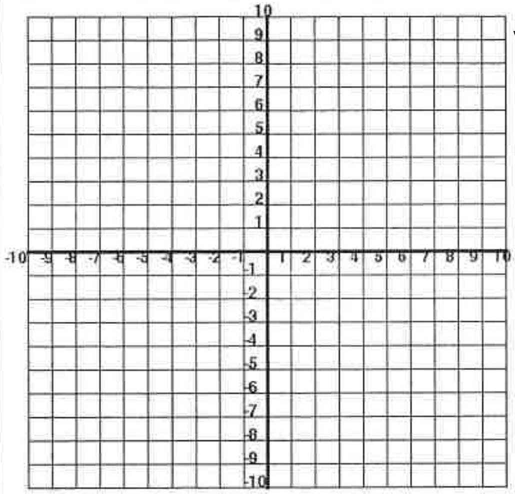


Vertex:

Domain:

Range:

5. **Graph:** $y = -\sqrt{x} + 2$

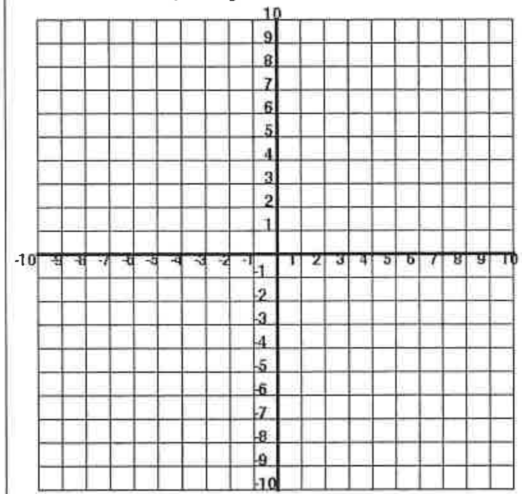


Vertex:

Domain:

Range:

6. **Graph:** $y = -\sqrt[3]{x+1}$



Vertex:

Domain:

Range:

7. Write the equation of a **square root** function with a vertex at $(-5, 3)$.

8. Write the equation of a **square root** function that has been translated right ten units and up six units.

9. Write the equation of a **cube root** function that has been translated left three units and down two units.

10. Write the equation of a **square root** function that has been translated right four units and reflected across the $x - axis$.

Math 2
Unit 4 – Radical & Rational Functions
Lesson 2 → Square Root & Cube Root Graphs HOMEWORK

Name________________________________
Date_____________________________Pd______

- Complete the table:

Function	Vertex	Horizontal Translation Left or Right	Vertical Translation Up or Down	Vertical Stretch or Compression	Reflection over x-axis	Domain	Range
$y = -\sqrt{x+4} - 1$							
$y = \sqrt{x-3} + 2$							
$y = -3\sqrt{x+1} + 2$							
$y = \sqrt[3]{x} + 4$							
$y = \sqrt[3]{x+4} - 5$							
$y = -4\sqrt[3]{x+3}$							
$y = \frac{1}{2}\sqrt{x+3} - 4$							

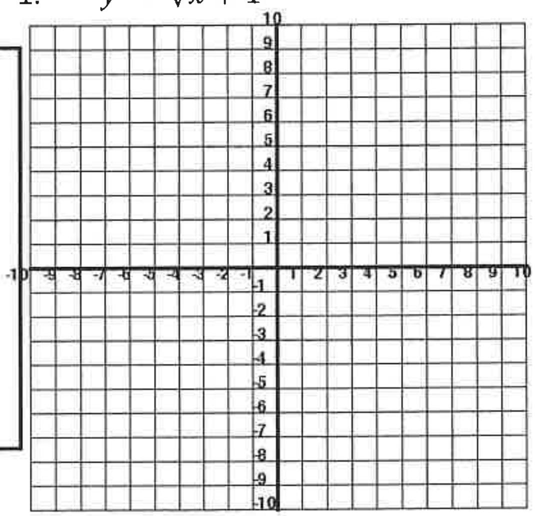
- Sketch each graph:

1. $y = \sqrt{x} + 1$

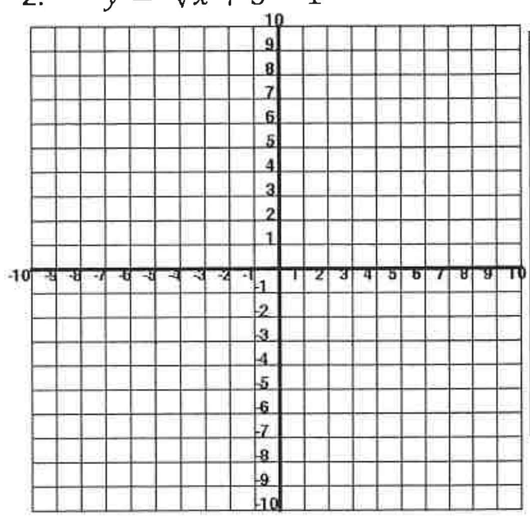
Vertex:

Domain:

Range:



2. $y = \sqrt{x+3} - 1$



Vertex:

Domain:

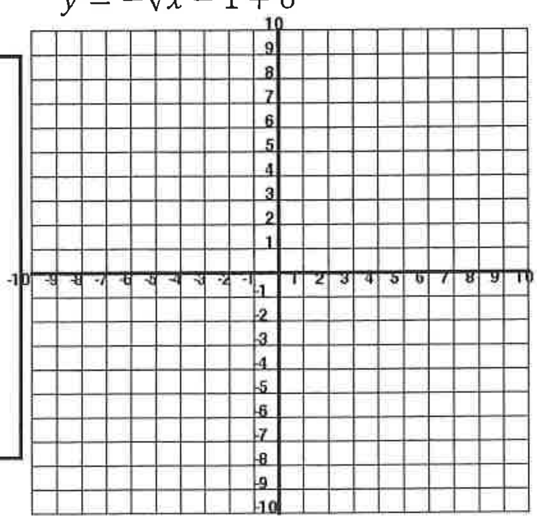
Range:

3. $y = -\sqrt{x-1} + 6$

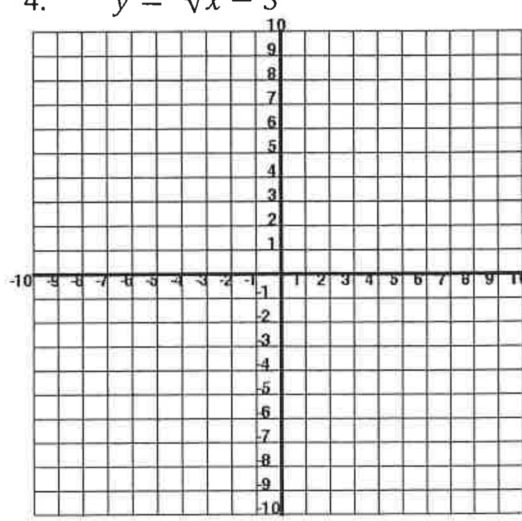
Vertex:

Domain:

Range:



4. $y = \sqrt[3]{x} - 3$



Vertex:

Domain:

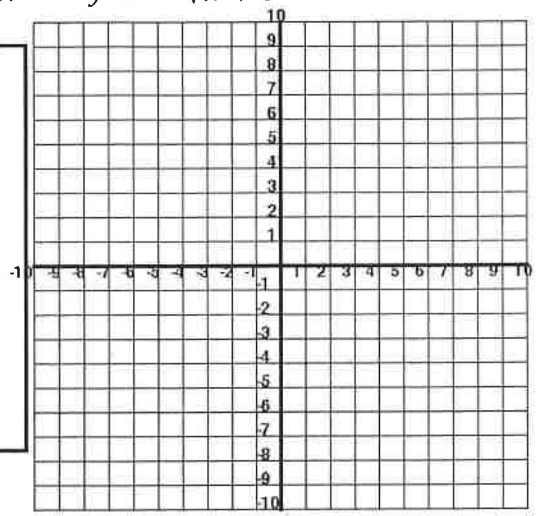
Range:

5. $y = -\sqrt[3]{x+3}$

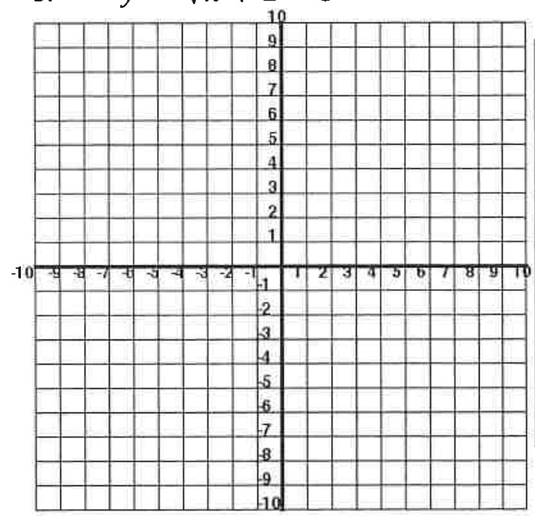
Vertex:

Domain:

Range:



6. $y = \sqrt[3]{x+2} - 5$



Vertex:

Domain:

Range:

- Write the equation of the function:

7. Write the equation of a **cubed** function that has been translated left four units and up six units.

8. Write the equation of a **cube root** function that has been translated left seven units and down one unit.

9. Write the equation of a **cube root** function that has been translated left four units and up six units and reflected across the $x - axis$.

10. Write the equation of a **square root** function that has been translated right three units and down two units.

11. Write the equation of a **square root** function that has been translated left two units and reflected across the $x - axis$.

12. Write the equation of a **square root** function that has been translated up two units and reflected across the $x - axis$ and stretched by a factor of 2.

Math 2
Unit 4 – Radical & Rational Functions
Lesson 3 → Square Root & Cube Root Equations

Name______________________________
Date________________________**Pd**______

There are three steps to solving a radical equation: 1) Isolate the radical.
2) Raise both sides to the power of the root.
3) Solve for x.

- Examples:

1. $\sqrt{x} = 8$ $x =$ ____________	2. $\sqrt{x+7} = 8$ $x =$ ____________	3. $2\sqrt{x+6} = 14$ $x =$ ____________
4. $-4\sqrt{x} + 11 = 3$ $x =$ ____________	5. $\sqrt{x-2} - 2 = 2$ $x =$ ____________	6. $-3\sqrt[3]{2x+5} = -21$ $x =$ ____________
7. $\sqrt{10x^2 - 49} = 3x$ $x =$ ____________	8. $\sqrt{2x-6} = \sqrt{5x-15}$ $x =$ ____________	9. $\sqrt[3]{6x-5} = \sqrt[3]{3x+2}$ $x =$ ____________

Math 2
Unit 4 – Radical & Rational Functions
Lesson 3 → Square Root & Cube Root Equations HOMEWORK

Name____________________________
Date______________________**Pd**_____

1. $\sqrt{x-1}=3$ $x=$ ____________	2. $2=\sqrt{\frac{x}{2}}$ $x=$ ____________
3. $\sqrt{-8+2x}=0$ $x=$ ____________	4. $\sqrt{x+4}=7$ $x=$ ____________
5. $\sqrt[3]{x-3}=5$ $x=$ ____________	6. $\sqrt{2x-6}=\sqrt{3x-14}$ $x=$ ____________
7. $\sqrt{8x}=x$ $x=$ ____________	8. $\sqrt[3]{9-x}=\sqrt[3]{1-9x}$ $x=$ ____________
9. $\sqrt{3-2x}=\sqrt{1-3x}$ $x=$ ____________	10. $x=\sqrt{20-x}$ $x=$ ____________

Math 2
Unit 4 –Radical & Rational Functions
Lesson 4 → Graphs of Rational Functions

Name________________________________
Date_________________________Pd_____

- A rational function is a function that can be written as the ratio of two polynomials where the denominator does not equal zero.

- $f(x) = \frac{p(x)}{q(x)}$ where $q(x) \neq 0$

❖ **Steps to graph a rational function:** $y = \frac{n}{x-h} + k$

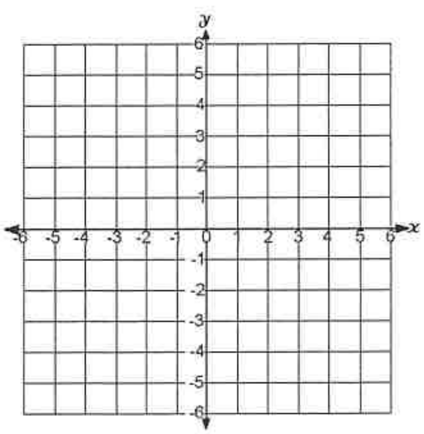
1) Determine the location of the asymptotes based on the transformations:
   A) Vertical asymptotes are placed based on the **horizontal translation**: $x = h$
   B) Horizontal asymptotes are placed based on the **vertical translation**: $y = k$
2) **Vertical Stretch or Compression**: *n* tells us how far the branches have been stretched from the asymptotes. We can use it to help us find out corner points to start our branches.

   Distance from asymptotes = $\sqrt{n}$

3) Look at the table on the calculator for other points and then sketch the two branches.

❖ Graph each of the following examples:

1. $y = \frac{1}{x}$



Equation of VA:

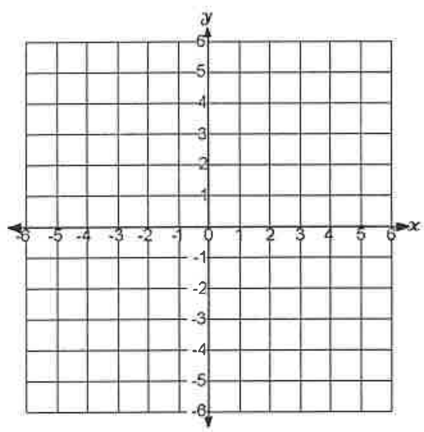
Equation of HA:

Describe translations:

Domain:

Range:

2. $y = \frac{1}{x-2} + 1$



Equation of VA:

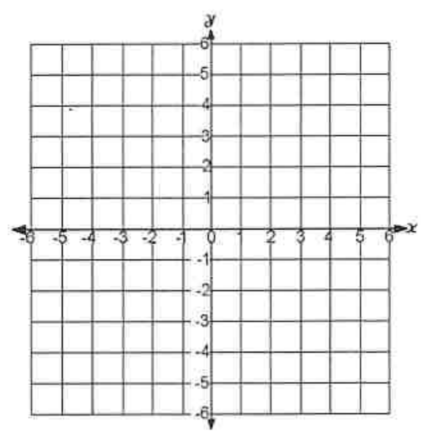
Equation of HA:

Describe translations:

Domain:

Range:

3. $y = -\frac{4}{x+1}$



Equation of VA:

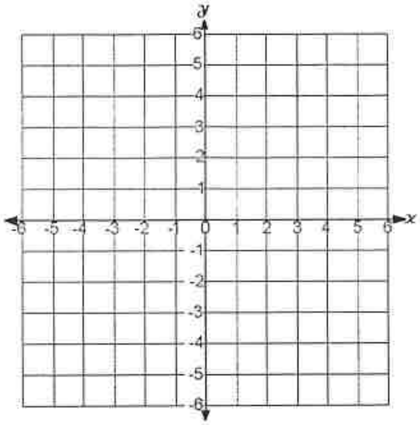
Equation of HA:

Describe translations:

Domain:

Range:

4. $y = \frac{1}{x} - 4$



Equation of VA:

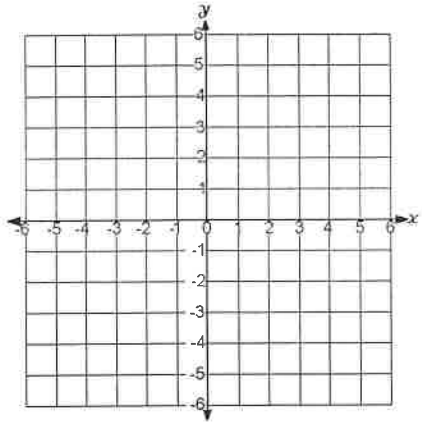
Equation of HA:

Describe translations:

Domain:

Range:

5. $xy = 9$



Equation of VA:

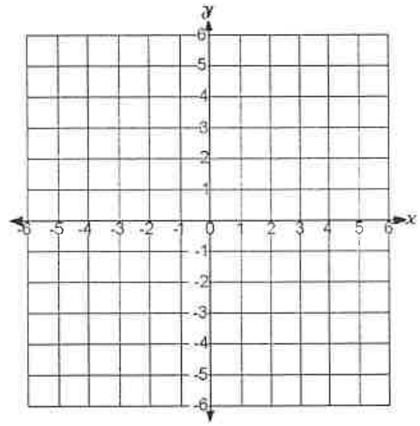
Equation of HA:

Describe translations:

Domain:

Range:

6. $y = \frac{3}{x-2} - 3$



Equation of VA:

Equation of HA:

Describe translations:

Domain:

Range:

7. Describe each graph as compared to the parent graph $y = \frac{1}{x}$.

$y = \frac{-2}{x-7} + 5$	$y = \frac{7}{x+2} - 4$
The graph of this ____________________ function has been translated ________ seven units and translated _____ units ________. It has been vertically stretched by a factor of ______ and ______________ across the x-axis. The graph is increasing from _________ to __________. The function has a domain of ______________ and a range of ______________.	The graph of this ____________________ function has been translated ________ two units and translated ____ units _________. It has been vertically stretched by a factor of _______. The graph is ________________ from left to right. The function has a domain of ______________ and a range of _______________.

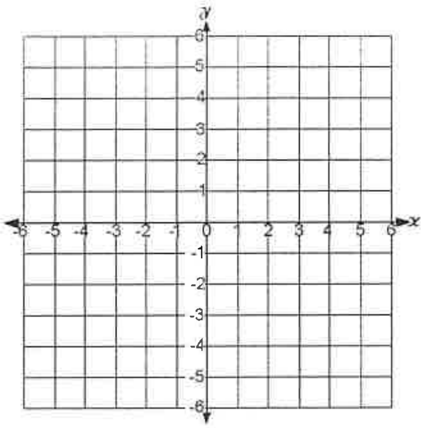
8. Write the equation of a rational function $y = \frac{1}{x}$ with following transformations:

A. Right 4 and Down 5	B. Left 3 and Up 2 and Reflected across $x - axis$.
C. Left 6 and Vertically Stretched by a factor of 4.	D. Right 5 and graph will be in II & IV quadrants

Math 2
Unit 4 – Radical & Rational Functions
Lesson 4 → Graphing Rational Functions HOMEWORK

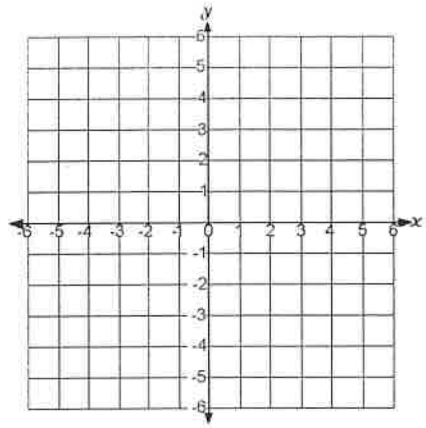
Name______________________________
Date_______________________Pd______

1. $y = \frac{1}{x} + 3$



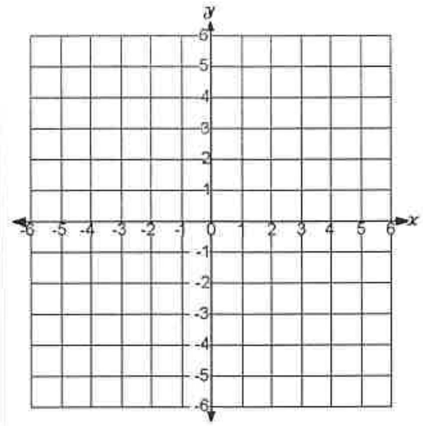
D: __________ R: __________

2. $y = \frac{1}{x-3}$



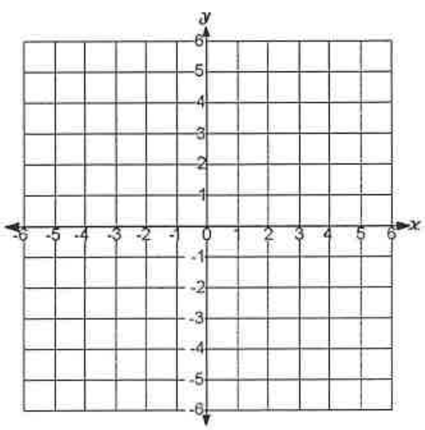
D: __________ R: __________

3. $y = \frac{1}{x+2} - 1$



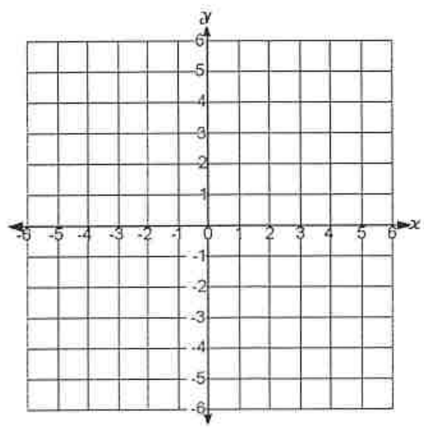
D: __________ R: __________

4. $y = \frac{2}{x}$



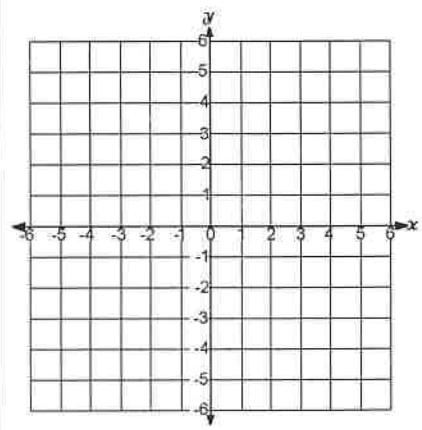
D: __________ R: __________

5. $y = \frac{3}{x+1}$



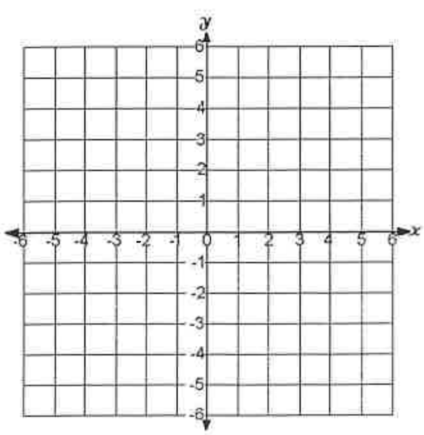
D: __________ R: __________

6. $y = \frac{4}{x-4} + 2$



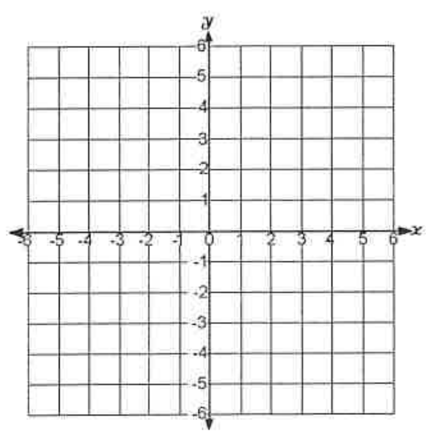
D: __________ R: __________

7. $y = -\frac{1}{x}$



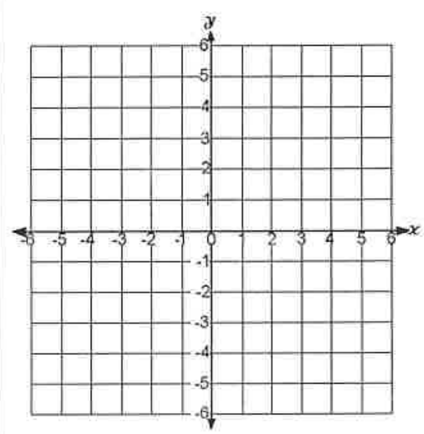
D: __________ R: __________

8. $y = -\frac{3}{x-2} + 1$



D: __________ R: __________

9. $y = -\frac{2}{x+1} - 2$



D: __________ R: __________

10. Consider the equation: $y = \frac{9}{x+1} - 2$

A) For what value is the function undefined (makes denominator = 0)? ____________________

B) What is the equation of the vertical asymptote? ____________________________

C) What is the equation of the horizontal asymptote? __________________________

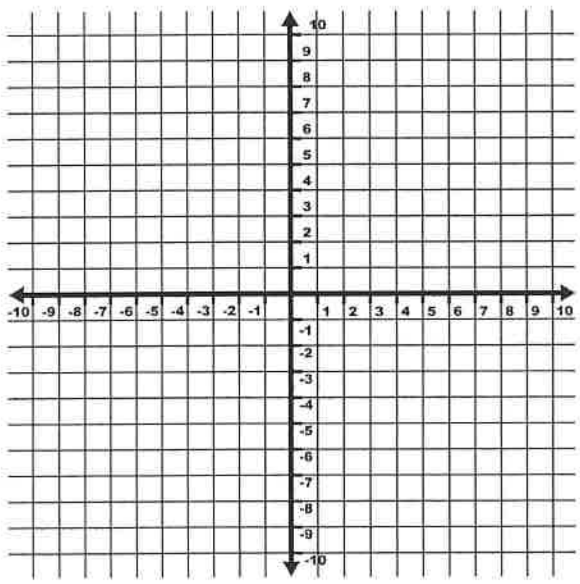
D) What is the domain of the function? ______________________

E) What is the range of the function? _______________________

F) What is the distance of the turning point from the intersection of the asymptotes? __________

G) In which quadrant is the center point located? _________________________

H) Graph the equation:



Math 2
Unit 4 – Radical & Rational Functions
Lesson 5 → Rational Equations

Name____________________________
Date________________________**Pd**_____

- **Recall:** A rational function is a function that can be written as the ratio of two polynomials where the denominator does not equal zero: $f(x) = \frac{p(x)}{q(x)}$ where $q(x) \neq 0$

- When solving rational equations with variables in the denominator, you must check the solution to be sure the denominator will not equal zero. **The solution will be eliminated if the denominator is zero.**

Examples: Solve for x.

1. $\frac{6}{x} = \frac{3}{7}$ $x =$ ____________	2. $\frac{4}{x-7} = \frac{6}{x}$ $x =$ ____________
3. $\frac{-5}{x+4} = \frac{1}{x+4}$ $x =$ ____________	4. $\frac{4}{x+5} = \frac{x}{6}$ $x =$ ____________
5. $\frac{x-4}{4} + \frac{x}{3} = 6$ $x =$ ____________	6. $\frac{3}{2x} - \frac{2x}{x+1} = -2$ $x =$ ____________

Math 2
Unit 4 – Radical & Rational Functions
Lesson 5 → Rational Equations HOMEWORK

Name________________________
Date____________________Pd_____

➢ Solve for x:

1. $\frac{3}{x} = \frac{2}{x+4}$ $x =$ ____________	2. $\frac{x+1}{2x+5} = \frac{2}{x}$ $x =$ ____________
3. $\frac{3}{x+2} + 5 = \frac{4}{x+2}$ $x =$ ____________	4. $\frac{6}{x-3} = \frac{x}{18}$ $x =$ ____________
5. $\frac{5x}{x+2} + \frac{2}{x} = 5$ $x =$ ____________	6. $\frac{2x-3}{7} - \frac{x}{2} = \frac{x+3}{14}$ $x =$ ____________

Math 2
Unit 4 - Radical & Rational Functions
Lesson 6 → Types of Variations

Name______________________________
Date_________________________**Pd**______

- **DIRECT VARIATION:** Linear function with a y-intercept of 0. In a direct variation, both of the quantities are either increasing or both are decreasing.
- There are two methods for solving a direct variation problem:
  1) Equation of Variation: $y = kx$ where k is called the **constant of variation**
  2) Proportion: $\frac{y_1}{x_1} = \frac{y_2}{x_2}$

#1: The distance that a body near Earth's surface will fall from rest varies directly as the **square** of the number of seconds it has been falling. If a boulder falls from a cliff a distance of 122.5 m in 5 $seconds$, approximately how far will it fall in 8 $seconds$?

Method 1

Method 2

- **JOINT VARIATION**: more than two quantities in a **direct variation** relationship
- Equation of Variation: $y = kxz$ where k is called the **constant of variaton**

#2: If y *varies jointly as* x *and* z, and $y = \frac{1}{2}$ when $x = 27$ and $z = \frac{-2}{3}$, find y when $x = 9$ and $z = 18$.

- **INVERSE VARIATION:** Rational function with vertical and horizontal asymptotes. In an inverse variation, one of the quantities is increasing while the second quantity is decreasing.
- Equation of Variation: $y = \frac{k}{x}$ where k is called the **constant of variation**

#3: The time of a trip varies inversely as the speed of the car. If a car being driven at 55 mph takes 2 $hours$ to get from Wake Forest to Greensboro, how fast is the car traveling if the trip takes 2.5 $hours$?

- **COMPOUND VARIATION:** Both Inverse and Direct Variation in the same problem

- Equation of Variation: $y = \frac{kx}{z}$ where k is called the **constant of variation**

#4: The volume of gas varies directly with Kelvin temperature and inversely with pressure. If a certain gas has a volume of 342 *cubic meters* at a temperature of 300 *Kelvin degrees* under a pressure of 200 *KPa (kilopascals)*, what will be the volume of the same gas at a temperature of 320 *Kelvin degrees* under a pressure of 400 *kPA*?

- **State whether each equation represents a direct, inverse, joint or compound variation. Then state the constant of variation.**

1. $y = \frac{9}{x}$	2. $z = 5xy$	3. $y = \frac{8x}{z}$	4. $y = 2x$	5. $xy = 12$
6. $z = \frac{xy}{15}$	7. $y = \frac{3}{4}xz$	8. $y = \frac{1}{3}x$	9. $z = \frac{x}{12y}$	10. $y = \frac{x}{5}$

- **Write a function for each variation relationship:**

11. W varies directly as the square of d.

12. V varies inversely as J.

13. V varies inversely as p and directly as T.

14. F varies jointly as A and the square of v.

15. L varies directly as the fourth power of d and inversely as the square root of h.

Math 2 Name________________________________

Unit 4 - Radical & Rational Functions Date__________________________Pd______

Lesson 5 → Types of Variations HOMEWORK

Write an equation for each statement and then solve:

1. If y *varies directly as* x and $y = 15$ when $x = 3$, find y when $x = 12$.	2. If y *varies directly as* x and $x = 36$ when $y = 4$, find x when $y = 24$.	3. If y *varies directly as* x^2 and $y = 12$ when $x = 4$, find y when $x = 6$.
4. If y *varies inversely as* x and $y = 2$ when $x = 8$, find x when $y = 14$.	5. *If* y *varies inversely as* x and $x = 7$ when $y = 21$, find y when $x = 42$.	6. If y *varies inversely as* x^3 and $y = 6$ when $x = \frac{-3}{4}$, find y when $x = 3$.
7. Suppose y *varies jointly with* x *and* z. If $y = 20$ when $x = 2$ and $z = 5$, find y when $x = 14$ and $z = 8$.	8. Suppose z *varies jointly with* x *and* y. If $x = 3$ and $y = 2$ when $z = 12$, find z when $x = 4$ and $y = 5$.	9. Suppose m *varies jointly* as n *and* p. If $n = 4$ and $p = 5$ when $m = 60$, find m when $n = 12$ and $p = 2$.
10. Suppose that y *varies directly as* x *and inversely as* z. If $y = 5$ when $x = 3$ and $z = 4$, find y when $x = 6$ and $z = 8$.	11. Suppose y *varies directly as* $\sqrt{x}$ and *inversely as* z. If $y = 10$ when $x = 9$ and $z = 12$, find y when $x = 16$ and $z = 10$.	12. Suppose x *varies directly as* y^3 *and inversely as* $\sqrt{z}$. If $x = 7$ when $y = 2$ and $z = 4$, find x when $y = 3$ and $z = 9$.

Determine the type of variation and then write an equation for each statement. Then solve.

13. The number (B) of bolts a machine can make $varies\ directly$ as the time (T) it operates. If the machine can make 6578 $bolts$ in 2 $hours$, how many bolts can it make in 5 $hours$?

14. The number of cooks needed to prepare lunch $varies\ inversely$ with the time. If it takes 9 $cooks\ four\ hours$ to prepare a school lunch, how long would it take 8 $cooks$ to prepare the lunch?

15. The current (I) in an electrical conductor $varies\ inversely$ as the resistance (r) of the conductor. If the current is 2 $amperes$ when the resistance in 960 $ohms$, what is the current when the resistance is 480 $ohms$?

16. Cheers $varied\ jointly$ as the number of fans and the **square** of the jubilation factor. If there were 100 $cheers$ when the number of fans was 100 and the jubilation factor was 4, how many cheers were there when there were only 10 $fans$ whose jubilation factor was 20?

17. The volume of a cone $varied\ jointly$ as the height of the cone and the area of the base. If a cone has a volume of 140 cm^3 when the height is 15 cm and the area of the base is 28 cm^2, find the volume of a cone with a height of 7 cm and a base area of 12 cm^2.

18. The number of girls $varies\ directly$ as the number of boys and $inversely$ as the number of teachers. When there were 50 $girls$, there were 10 $boys$ and 20 $teachers$. How many boys were there when there were 10 $girls$ and 100 $teachers$?

19. A pitcher's earned run average (ERA) $varies\ directly$ as the number of earned runs allowed and $inversely$ as the number of innings pitched. Joe Price had an ERA of 2.55 when he gave up 85 $earned\ runs\ in$ 300 $innings$. What would be his ERA if he gave up 120 $earned\ runs\ in$ 600 $innings$?

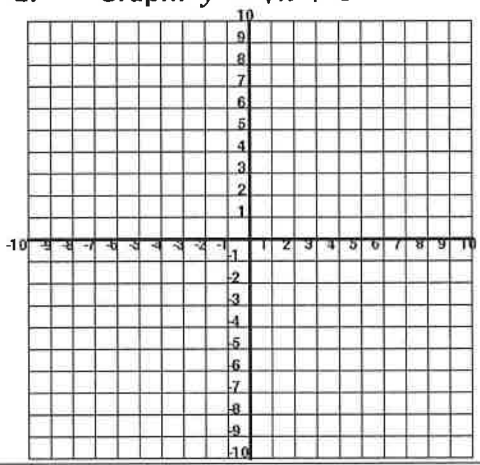
20. The maximum load that a cylindrical column with a circular cross section can hold $varies\ directly$ as the fourth power of the diameter and $inversely$ as the square of the height. A 9 $meter\ column$ with a 2 $meter\ diameter$ will support 64 $metric\ tons$. How many metric tons can be supported by a column 9 $meters\ high$ and 3 $meters$ in $diameter$?

Math 2
Unit 4 – Test Review

Name______________________________
Date________________________Pd______

I. Graph each of the following:

1. Graph: $y = \sqrt{x+4}$

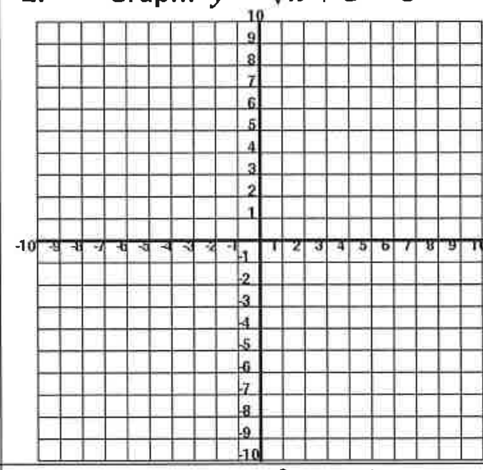


Vertex:

Domain:

Range:

2. Graph: $y = \sqrt{x+3} - 6$

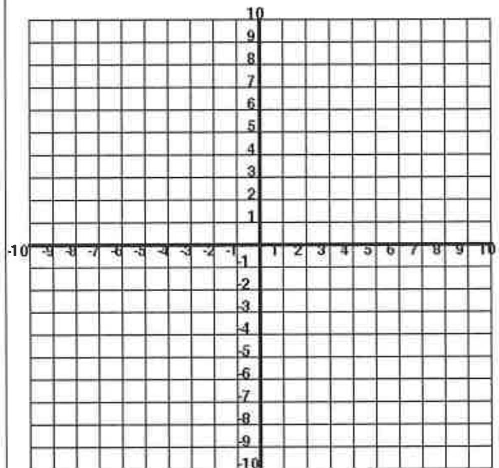


Vertex:

Domain:

Range:

3. Graph: $y = \sqrt[3]{x} + 2$

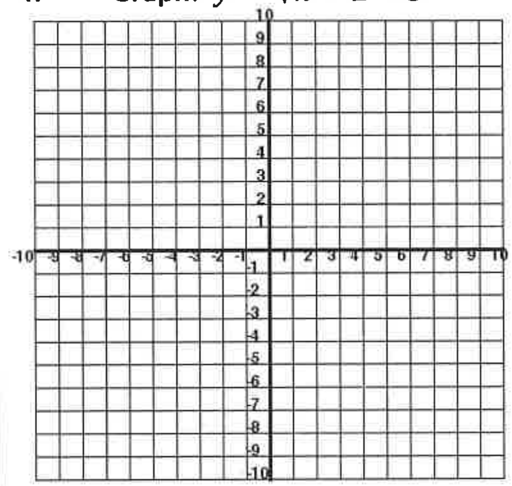


Vertex:

Domain:

Range:

4. Graph: $y = \sqrt[3]{x-1} - 3$

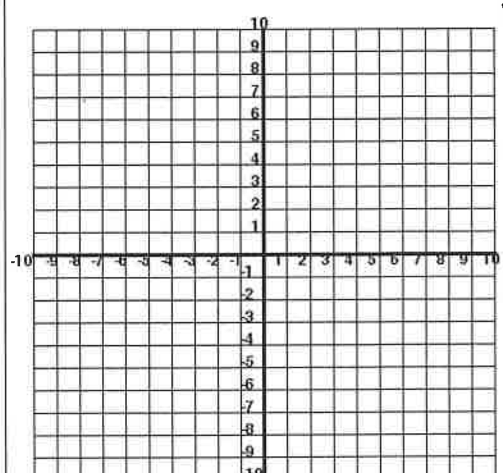


Vertex:

Domain:

Range:

5. Graph: $y = \frac{1}{x} + 2$

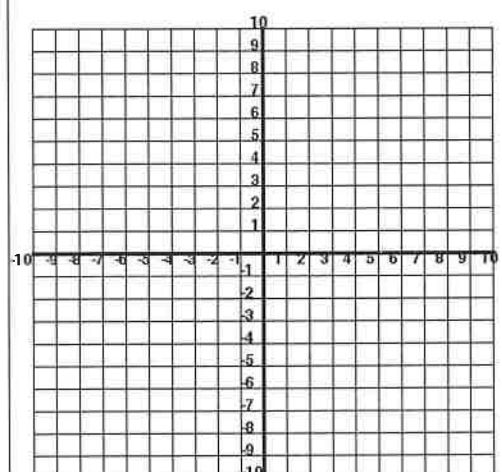


Vertex:

Domain:

Range:

6. Graph: $y = \frac{4}{x-1} - 3$



Vertex:

Domain:

Range:

II. Write the equivalent expression for each:

1. $x^{2/5}$	2. $5x^{3/2}$	3. $25^{-3/2}$	4. $(\sqrt[3]{x})^7$	5. $\sqrt{5x}$	6. $6\sqrt[5]{x^3}$

III. Solve each of the following square root equations:

1. $\sqrt{x} = 10$ $x =$ __________	2. $\sqrt{3x+1} = 2$ $x =$ __________	3. $\sqrt{2x-6} = \sqrt{x+5}$ $x =$ __________
4. $5\sqrt{x} = 45$ $x =$ __________	5. $\sqrt{x} + 4 = 6$ $x =$ __________	6. $-4\sqrt{5x} + 1 = -7$ $x =$ __________

IV. Solve each of the following rational equations:

7. $\frac{x+5}{2} = \frac{x}{3}$ $x =$ __________	8. $\frac{1}{3} = \frac{3}{x-5}$ $x =$ __________
9. $\frac{x+5}{2} - \frac{x}{3} = 4$ $x =$ __________	10. $\frac{3}{x} + \frac{2x}{x+1} = 2$ $x =$ __________

IV. Solve each variation problem:

11. Your distance from lightning **varies directly** with the time it takes you to hear thunder. If you hear thunder 10 $sec.$ after you hear lightning, you are about 2 $miles$ from the lightning. About how many seconds would it take for thunder to travel a distance of 4 $miles$?	12. The drama club is planning a bus trip to NYC. 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 bus. How much will it cost per person if 60 people go on the bus?