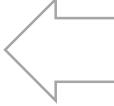


## Algebra 2 Unit 4C: Radicals and Rational Exponents

I CAN:

- Simplify expressions using the properties of exponents
- Translate between radical and rational exponent form
- Simplify expressions involving nth roots and rational exponents
- Solve equations involving rational exponents, radical equations, and inequalities
- Graph square root, cube root, and absolute value functions
- Graph and evaluate piecewise functions

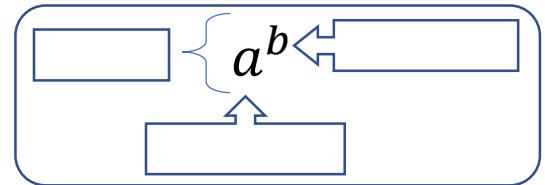


Monday	Tuesday	Wednesday	Thursday	Friday
29	<b>30</b>	31	1 <b>DAY 1</b> Properties of Exponents	2 <b>DAY 2</b> More Practice with Properties of Exponents
5 	<b>6</b>	7 <b>Spring Break</b>	8	9 
12 <b>DAY 3</b> Nth Roots and Rational Exponents	13 <b>DAY 4</b> Solving Radical Equations	14 <b>DAY 5</b> Solving Equations with Rational Exponents	15 <b>DAY 6</b> Graphing Square Root and Cube Root Functions <b>Unit 4C Quiz</b>	16 Help Sessions
19 <b>DAY 7</b> Solving and Graphing Absolute Value Equations <b>Unit 4C Quiz due 8 am</b>	20 <b>DAY 8</b> Graphing and Evaluating Piecewise Functions	21 <b>DAY 9</b> Review	22 <b>DAY 10</b> <b>Unit 4C Test</b>	23 Help Sessions

\*THIS PLAN IS SUBJECT TO CHANGE. PLEASE REFER TO CTLS DIGITAL CLASSROOM FOR UPDATES.\*

A **power** is an expression consisting of a \_\_\_\_\_ and an \_\_\_\_\_.

To simplify expressions involving powers, we use the properties of exponents.



## Properties of Exponents

Property	Expression	Description	Example
Product of Powers	$x^a \cdot x^b =$	When multiplying powers with <b>like bases</b> , keep the _____ and _____ the exponents.	$(2a^3b)(4a^5b^2) =$
Power of a Power	$(x^a)^b =$	Keep the _____ and _____ the exponents.	$(m^4)^3 =$
Power of a Product	$(x \cdot y)^a =$	Apply the exponent to each _____ of the base.	$(3pq)^3 =$
Quotient of Powers	$\frac{x^a}{x^b} =$	When finding the quotient of powers with <b>like bases</b> , keep the _____ and _____ the exponents.	$\frac{y^9}{y^4} =$
Power of a Quotient	$\left(\frac{x}{y}\right)^a =$	Apply the exponent to every _____ of the base, both _____ and _____.	$\left(\frac{4x}{3y}\right)^2 =$
Zero Exponent	$x^0 =$	Any power with a zero exponent equals _____.	$(2ab)^0 =$
Negative Exponent	$x^{-1} =$	Any power with a negative exponent is on the wrong side of the _____. Move the base to the opposite side to make the exponent positive.	$\frac{2a^{-3}}{5^{-2}} =$

## Practice with Properties of Exponents

Date \_\_\_\_\_ Period \_\_\_\_\_

**Simplify. Your answer should contain only positive exponents.**

1)  $2mn^4 \cdot 4nm^3$

2)  $3y \cdot 3x^4y^4 \cdot y^2$

3)  $(4m^3n^2)^2$

4)  $(m^3n^4)^3$

5)  $\frac{2x^3}{4y^2}$

6)  $\frac{4u^4v^2}{2v}$

7)  $\frac{2nm^2 \cdot 2n^4}{(2m^4n^2)^2}$

8)  $\frac{(yx^2)^4}{yx^3 \cdot y^2}$

9)  $\left(\frac{2b^2}{2ba^3 \cdot a \cdot 2b^4}\right)^4$

10)  $2a^4b^4 \cdot (a^{-1}b^2)^4$

11)  $2x^2y^4 \cdot (2x^2y^3)^3$

12)  $(m^2n^{-2} \cdot (m^{-3}n^{-4})^3)^4$

13)  $\frac{(2x^{-4})^2}{x^{-2}y^2}$

14)  $\frac{xy}{(2xy^{-3})^{-4}}$

15)  $\frac{(ab^3)^{-1}}{(a^{-1}b^{-4})^4}$

16)  $(a^4)^3 \cdot 2b^0$

17)  $(2x^0y^3 \cdot 2x)^3$

18)  $(ba^3)^2 \cdot (a^4b^3)^3$

## Nth Roots and Rational Exponents

Use your calculator to complete the table.

	Exponent				
	2	3	4	5	6
Base	2				
3					
4					
5					
6					
7					
8					
9					
10					

Radical Expressions

**INDEX:** tells you what **ROOT** to take; the number of identical factors required to evaluate

**RADICAND:** find a perfect *n*th power inside and bring out the root

$$\sqrt[n]{b}$$

Taking the root of a number is the inverse operation of applying a power.

Ex 1: Given that  $3^4 = \underline{\hspace{2cm}}$ , we know that  $\sqrt[4]{\underline{\hspace{2cm}}} = 3$ .

Ex 2: Given that  $(\underline{\hspace{2cm}})^5 = 32$ , we know that  $\sqrt[5]{32} = \underline{\hspace{2cm}}$

Ex 3: Evaluate.

a.  $\sqrt[3]{27}$

b.  $\sqrt[4]{625}$

c.  $\sqrt[5]{1024}$

d.  $\sqrt[6]{64}$

Ex 2: Simplify

a.  $\sqrt[3]{54}$

b.  $\sqrt[4]{48}$

c.  $\sqrt[6]{128}$

d.  $\sqrt[3]{-4000}$

e.  $\sqrt[3]{16x^3y^6}$

f.  $\sqrt[5]{96p^7}$

g.  $\sqrt[3]{-256ab^5}$

h.  $\sqrt{300x^8}$

## Rational Exponents

If  $n$  is the index of a radical, then  $\sqrt[n]{b} = b^{\frac{1}{n}}$

Ex 1: Rewrite each radical using a rational exponent.

a.  $\sqrt{x}$

b.  $\sqrt[3]{2a}$

c.  $\sqrt[5]{8}$

d.  $\sqrt[6]{xy}$

Radicals and Rational Exponents	
Radical Form	Rational Exponent Form
$\boxed{\phantom{0}}$ $\sqrt[n]{b^m}$ or $(\sqrt[n]{b})^m$	$\boxed{\phantom{0}}$ $b^{\frac{m}{n}}$

Ex 2: Rewrite each expression to complete the table.

$\sqrt{3^5}$	
	$(4)^{\frac{3}{4}}$
$\sqrt[5]{6}$	
	$(5)^{\frac{2}{3}}$

Ex 3: Rewrite using rational exponent form.

a.  $\sqrt[3]{27}$

b.  $\sqrt{90}$

c.  $\sqrt[4]{ab}$

Ex 4: Rewrite in radical form, then simplify.

a.  $(4)^{\frac{5}{2}}$

b.  $(8)^{\frac{4}{3}}$

c.  $(32)^{-\frac{2}{5}}$

d.  $(216)^{\frac{2}{3}}$

e.  $(64)^{-\frac{2}{3}}$

f.  $(16)^{\frac{5}{2}}$

## nth Roots and Rational Exponents Practice

**Simplify.**

1)  $\sqrt{54}$

2)  $\sqrt[3]{-81}$

3)  $\sqrt[3]{192}$

4)  $\sqrt[5]{96}$

5)  $\sqrt[4]{486}$

6)  $\sqrt[5]{-128}$

7)  $\sqrt{75v^3}$

8)  $\sqrt[4]{405x^5}$

9)  $\sqrt[5]{96x^7}$

10)  $\sqrt{18n}$

11)  $\sqrt[6]{128m^7}$

12)  $\sqrt[4]{96m}$

13)  $\sqrt[3]{-162x^8}$

14)  $\sqrt[4]{567p^3}$

15)  $\sqrt{100n^4}$

16)  $\sqrt{27x}$

**Write each expression in exponential form.**

17)  $(\sqrt[3]{5x})^2$

18)  $(\sqrt[4]{x})^3$

19)  $(\sqrt[3]{3k})^5$

20)  $(\sqrt{6v})^3$

21)  $(\sqrt[5]{3v})^7$

22)  $(\sqrt[5]{m})^6$

**Write each expression in radical form.**

23)  $(6b)^{\frac{1}{2}}$

24)  $(2v)^{\frac{7}{5}}$

$$25) \ a^{\frac{4}{5}}$$

$$26) \ (7p)^{\frac{1}{2}}$$

$$27) \ x^{\frac{1}{2}}$$

$$28) \ (6v)^{\frac{3}{2}}$$

**Simplify.**

$$29) \ 1000^{\frac{4}{3}}$$

$$30) \ 81^{\frac{5}{4}}$$

$$31) \ 64^{\frac{1}{2}}$$

$$32) \ 64^{\frac{1}{6}}$$

$$33) \ 216^{\frac{4}{3}}$$

$$34) \ (64r^6)^{\frac{1}{3}}$$

$$35) \ (v^3)^{\frac{5}{3}}$$

$$36) \ (m^9)^{\frac{2}{3}}$$

$$37) \ (49x^2)^{\frac{1}{2}}$$

$$38) \ (36b^4)^{\frac{3}{2}}$$

$$39) \ (x^6)^{\frac{1}{2}}$$

$$40) \ (36v^6)^{\frac{1}{2}}$$

$$41) \left(u^{\frac{3}{2}}\right)^{\frac{4}{3}} \cdot v$$

$$42) \ v^{\frac{1}{2}} \cdot (v^2)^{\frac{4}{3}}$$

$$43) \ x^{\frac{1}{3}}y^{\frac{1}{2}} \cdot \left(x^{\frac{1}{3}}y^{\frac{1}{2}}\right)^2$$

$$44) \ \left(yx^2 \cdot y^{\frac{1}{2}}\right)^2$$

## Solving Radical Equations

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Recall that a ROOT and a POWER are inverse operations.

Solving Radical Equations	
<p>When there is a radical on one side:</p> <ul style="list-style-type: none"> <li>• Isolate the _____</li> <li>• Identify the _____ of the radical and raise both sides of the equation to that _____, to eliminate the radical.</li> <li>• Solve</li> <li>• Check for extraneous solutions!</li> </ul>	<p>When there are radicals on both sides:</p> <ul style="list-style-type: none"> <li>• Identify the _____ of the radical and raise both sides of the equation to that _____, to eliminate both radicals.</li> <li>• Solve.</li> <li>• Check for extraneous solutions!</li> </ul>
<p>Ex 1:</p> <p>a. <math>\sqrt{x - 9} = 9</math></p>	<p>Ex 2:</p> <p>a. <math>\sqrt[3]{2 - k} = \sqrt[3]{3k + 6}</math></p>
<p>b. <math>\sqrt[4]{4p} - 1 = 1</math></p>	<p>b. <math>\sqrt[5]{1 - 2x} = \sqrt[5]{x + 8}</math></p>

Ex 3:  $\sqrt{-14 + 9a} = a$

Ex 4:  $\sqrt{5x + 1} + 3 = -3$

Ex 5:  $\sqrt[3]{2x + 4} = -2$

Ex 6:  $\sqrt{4k - 4} = k - 1$

Ex 7:  $-1 = \sqrt{v + 5} - v$

## Solving Radical Equations Practice

Date \_\_\_\_\_ Period \_\_\_\_\_

**Solve each equation. Remember to check for extraneous solutions.**

1)  $-40 = -4\sqrt{v}$

2)  $\sqrt{n} - 3 = 4$

3)  $18 = 3\sqrt{a}$

4)  $\sqrt{5v} = 5$

5)  $\sqrt[4]{r-2} = 1$

6)  $\sqrt{24-2r} = \sqrt{r-6}$

7)  $\sqrt[5]{25x} + 2 = 7$

8)  $\sqrt[3]{6a-1} = \sqrt[3]{5a}$

9)  $\sqrt{2n+10} = \sqrt{2-2n}$

10)  $\sqrt{56-x} = x$

$$11) \sqrt{-1 - 2b} = b$$

$$12) \ n = \sqrt{2n}$$

$$13) \ \sqrt[3]{x+4} = \sqrt[3]{3x-4}$$

$$14) \ 11 = 9 + \sqrt[5]{5b+22}$$

$$15) \ \sqrt{-5x+11} = x-1$$

$$16) \ k = 4 + \sqrt{58-7k}$$

$$17) \ \sqrt{6n+31} - n = 4$$

$$18) \ r - 2 = \sqrt{5r-4}$$

$$19) \ x = \sqrt{3x-11} + 5$$

$$20) \ -8 = -m + \sqrt{3m-26}$$

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Solving Equations with Rational Exponents

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- Isolate the exponential expression
- Raise both sides to the \_\_\_\_\_ power, to eliminate the exponents.
- Solve
- Check for \_\_\_\_\_ solutions.

Ex 1: $p^{\frac{3}{2}} = 729$	Ex 2: $8 + n^{\frac{1}{2}} = 17$
Ex 3: $3r^{\frac{2}{3}} - 2 = 10$	Ex 4: $(11a + 4)^{\frac{1}{2}} = 9$
Ex 5: $2 + (9n)^{\frac{1}{4}} = 5$	Ex 6: $-3(x - 27)^{\frac{3}{2}} = -1029$

## Solving Equations with Rational Exponents Practice Date \_\_\_\_\_ Period \_\_\_\_\_

**Solve each equation.**

1)  $216 = b^{\frac{3}{2}}$

2)  $2 = b^{\frac{1}{6}}$

3)  $x^{\frac{6}{5}} = 64$

4)  $v^{\frac{3}{2}} = 729$

5)  $-8 - 3n^{\frac{2}{3}} = -56$

6)  $(r - 18)^{\frac{1}{4}} = 3$

7)  $729 = (-3 - 28r)^{\frac{3}{2}}$

8)  $3 + (x - 13)^{\frac{1}{3}} = 7$

$$9) \ (3n + 76)^{\frac{3}{2}} = 64$$

$$10) \ v^{\frac{3}{2}} - 10 = 502$$

$$11) \ -508 = -a^{\frac{3}{2}} + 4$$

$$12) \ -1 - 3r^{\frac{3}{2}} = -2188$$

$$13) \ -3r^{\frac{3}{2}} - 7 = -1543$$

$$14) \ -5b^{\frac{3}{2}} = -1715$$

$$15) \ (v - 1)^{\frac{1}{3}} = 3$$

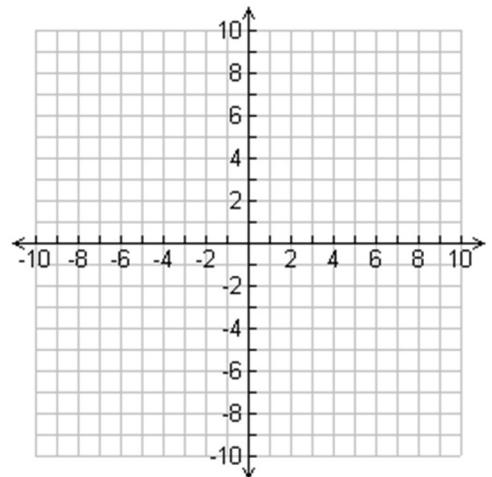
$$16) \ -3v^{\frac{3}{2}} - 6 = -1035$$

## Graphing Square Root and Cube Root Functions

## Square Root Function

$$f(x) = \sqrt{x}$$

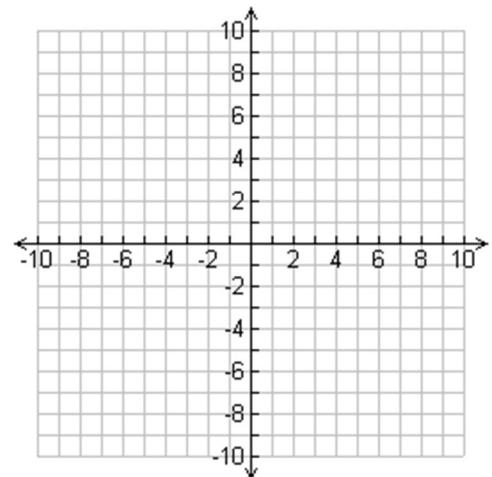
$x$	$y$
-2	
-1	
0	
1	
2	
3	
4	
9	



## Cube Root Function

$$f(x) = \sqrt[3]{x}$$

$x$	$y$
-2	
-1	
0	
1	
2	
3	
4	
9	

Transformational Form of a Function  $y = f(x)$ 

$$y = \pm a f(x - h) + k$$

$a < 0$ reflection $\uparrow$ across x-axis	$0 <  a  < 1$ shrink $ a  > 1$ stretch	$-h$ shift right $\rightarrow$ $+h$ shift left $\leftarrow$	$+k$ shift up $\uparrow$ $-k$ shift down $\downarrow$
---------------------------------------------------	-------------------------------------------	----------------------------------------------------------------	----------------------------------------------------------

Ex 1: Describe the transformations on the function  $f(x) = \sqrt{x}$  to obtain the graph of  $g(x)$ .

- a.  $g(x) = -\sqrt{x}$       b.  $g(x) = \sqrt{x-2}$       c.  $g(x) = 3\sqrt{x} + 5$       d.  $g(x) = \frac{1}{2}\sqrt{x+1}$

Ex 2: Describe the transformations on the function  $f(x) = \sqrt[3]{x}$  to obtain the graph of  $h(x)$ .

a.  $h(x) = -2\sqrt[3]{x - 1}$

b.  $h(x) = \sqrt[3]{x + 4} - 3$

c.  $h(x) = -\sqrt[3]{x} + 9$

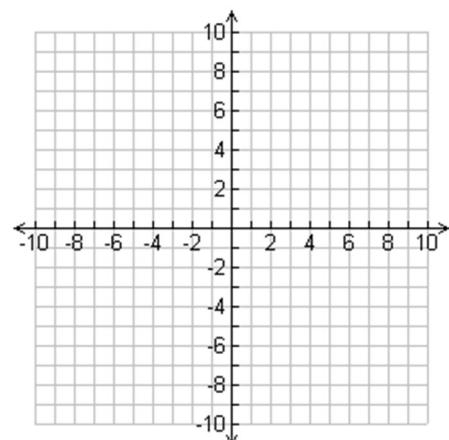
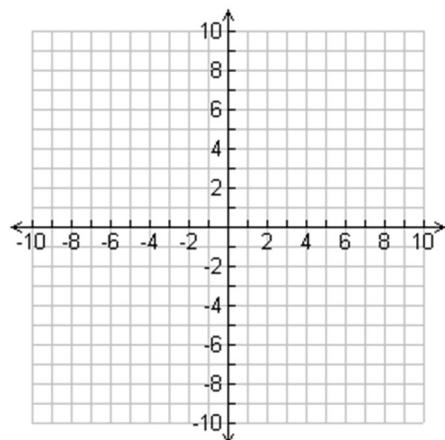
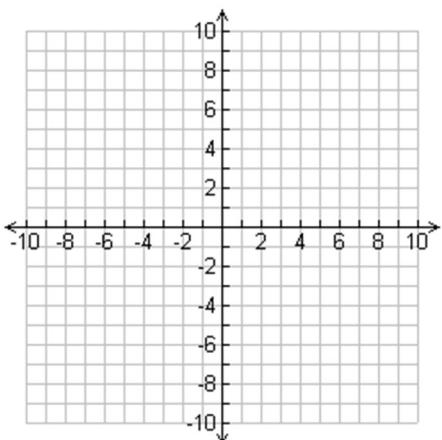
Parent Function	Transformed Functions	
$y = \sqrt{x}$	$y = \sqrt{x} + 3$	$y = \sqrt{x + 3}$

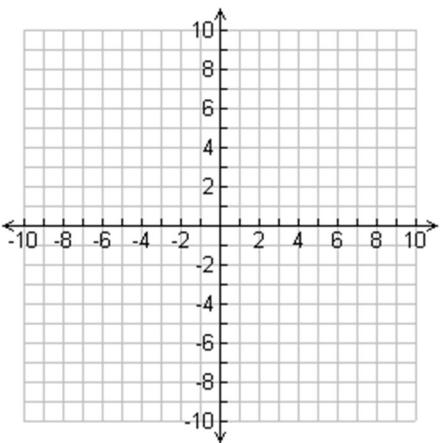
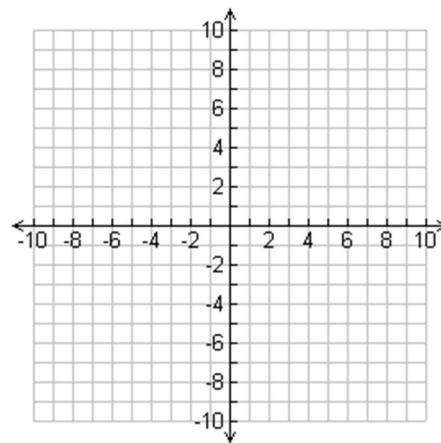
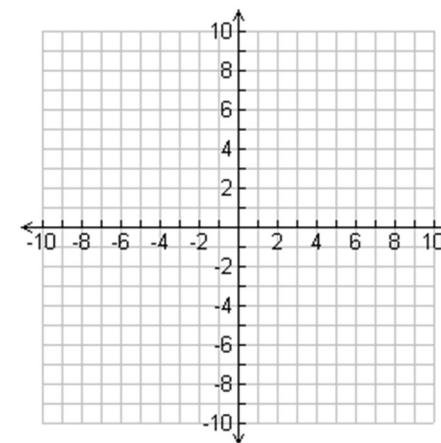
Graph each function and describe the transformations.

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

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

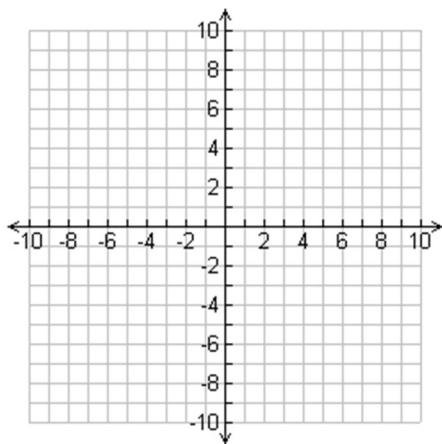
c.  $\sqrt{x + 2} - 5$



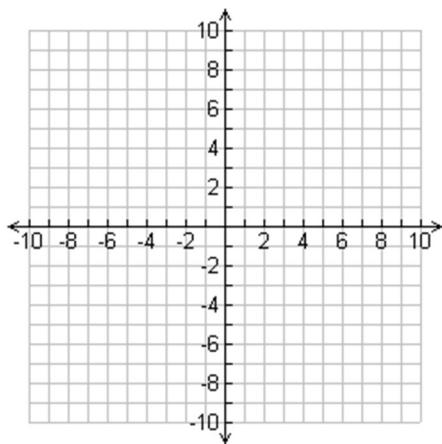
Parent Function	Transformed Functions	
$y = \sqrt[3]{x}$	$y = \sqrt[3]{x} - 3$	$y = \sqrt[3]{x - 3}$
		

Graph each function and describe the transformations.

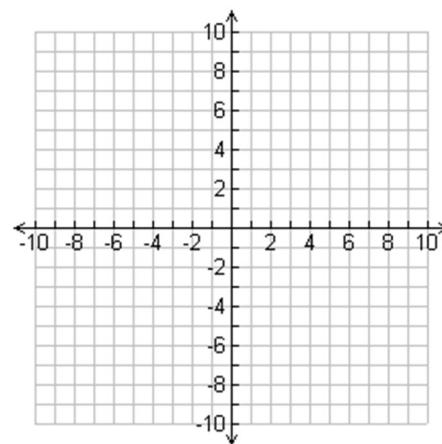
a.  $y = \sqrt[3]{x - 5} + 2$



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



c.  $3\sqrt[3]{x + 4}$

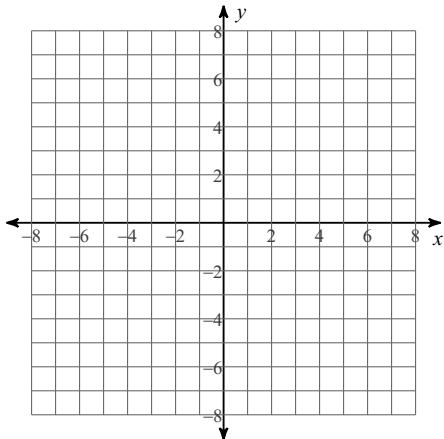


## Graphing Square Root and Cube Root Functions

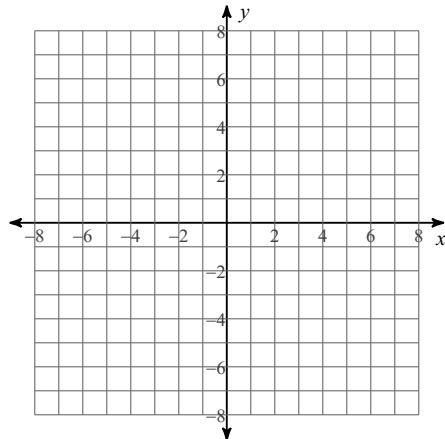
Date \_\_\_\_\_ Period \_\_\_\_\_

**Sketch the graph of each function.**

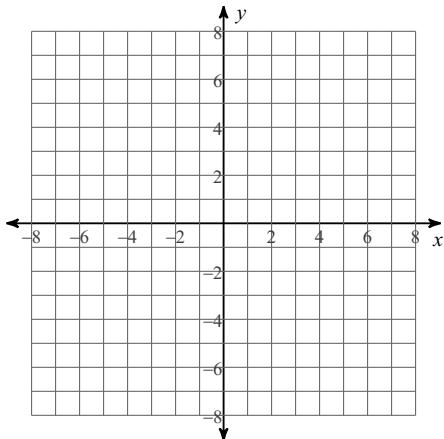
1)  $y = \sqrt{x}$



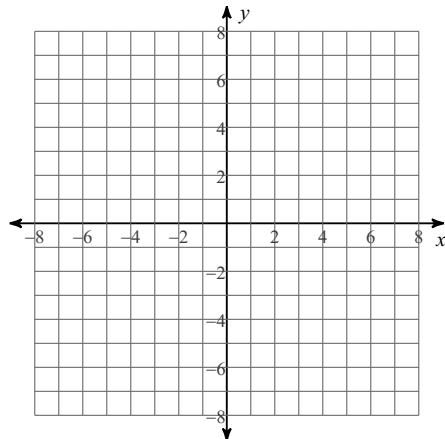
2)  $y = \sqrt{x-2} - 4$



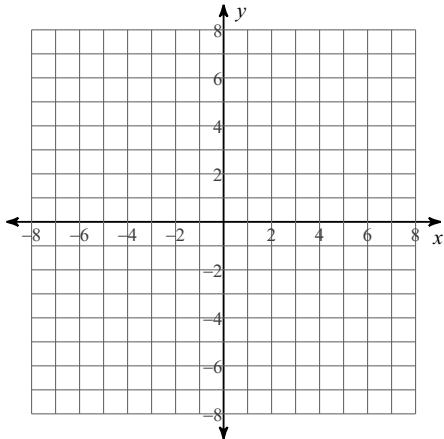
3)  $y = \sqrt{x+1} - 1$



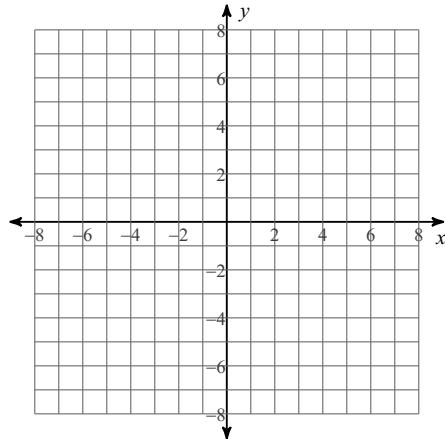
4)  $y = \sqrt{x-3} + 1$



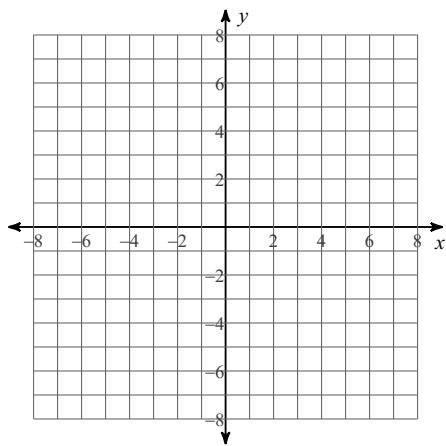
5)  $y = 4\sqrt{x-4}$



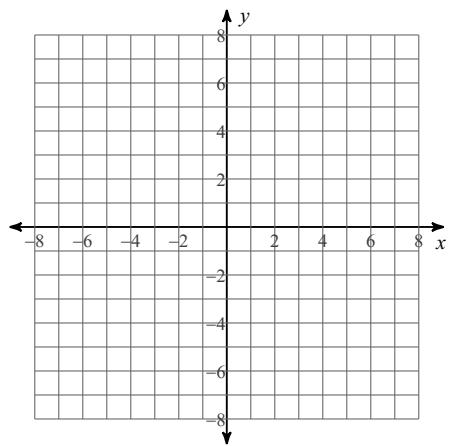
6)  $y = 3\sqrt{x}$



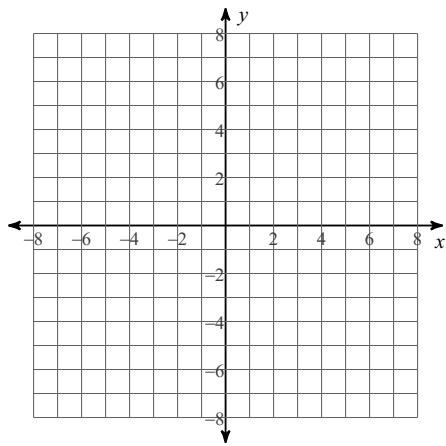
7)  $y = \sqrt[3]{x}$



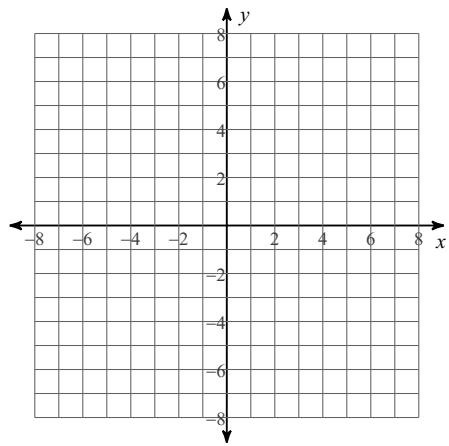
8)  $y = \sqrt[3]{x + 5}$



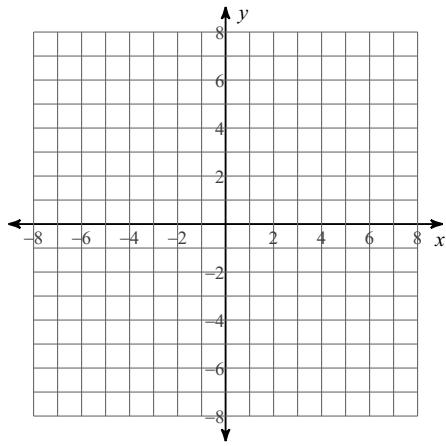
9)  $y = \sqrt[3]{x - 3} + 5$



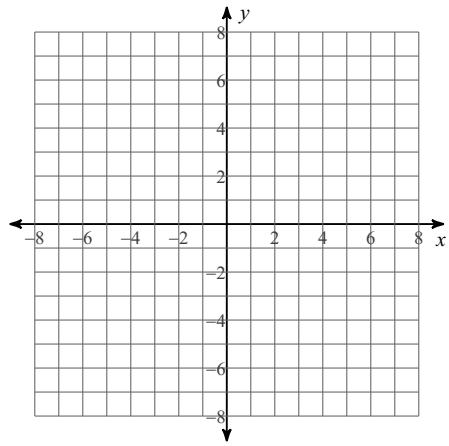
10)  $y = \sqrt[3]{x + 1}$



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



12)  $y = \sqrt[3]{x - 1}$

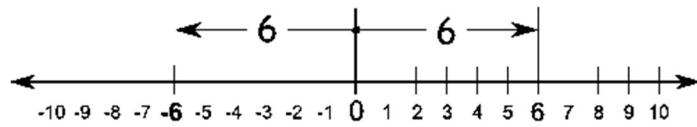


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Solving Absolute Value Equations

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The absolute value of a number is its distance from zero on the number line.



$$|-6| = 6 \quad \text{and} \quad |6| = 6$$

because -6 is SIX units from 0... and 6 is SIX units from 0

Ex 1: If  $|x| = 4$ , what is  $x$ ?

To solve absolute value equations:

1. Isolate the \_\_\_\_\_.
2. Set up \_\_\_\_\_, one for each direction on the number line.
3. Solve. An absolute value equation will always have \_\_\_\_\_ solutions or none!
4. Check for extraneous solutions.

Ex 2: Solve

a. $ x - 5  = 7$	b. $5 x  = 25$
c. $ x + 10  - 3 = -9$	d. $2 x - 4  = 16$
e. $-3 2x + 1  = -21$	f. $4 x + 12  + 8 = 64$

## Solving Absolute Value Equations HW

Date \_\_\_\_\_ Period \_\_\_\_

**Solve each equation.**

1)  $|-1 + v| = 2$

2)  $|-4 + n| = 1$

3)  $\left| \frac{r}{2} \right| = 2$

4)  $\left| \frac{x}{3} \right| = 3$

5)  $|x + 2| = 2$

6)  $|-4x| = 16$

7)  $|n - 9| = -11$

8)  $|7x + 4| = 17$

$$9) |2 + 8r| = 82$$

$$10) |10k + 1| = 49$$

$$11) |7n + 9| = -61$$

$$12) |4m + 6| = 10$$

$$13) |2p + 1| - 7 = 6$$

$$14) |8n + 9| - 5 = 12$$

$$15) |-9p - 7| - 8 = 66$$

$$16) |7 - 2x| + 6 = 9$$

$$17) \frac{|2 + 5n|}{10} = 4$$

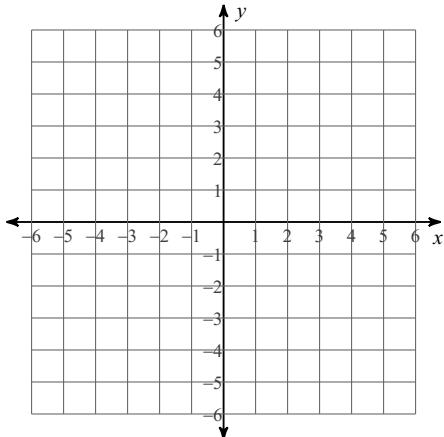
$$18) |2m - 2| - 5 = -3$$

## Graphing Absolute Functions

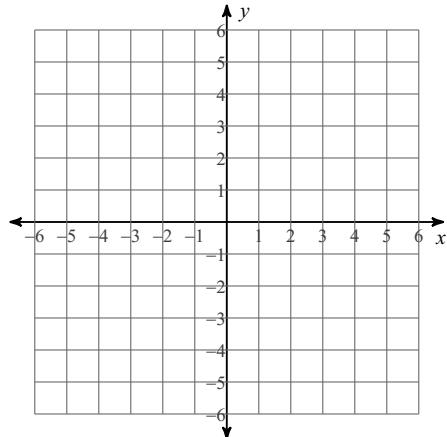
Date \_\_\_\_\_ Period \_\_\_\_

**Graph each equation.**

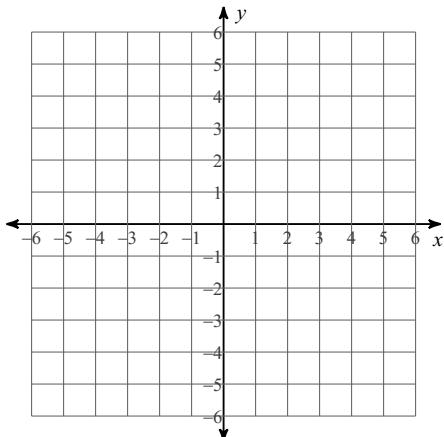
1)  $y = |x + 4|$



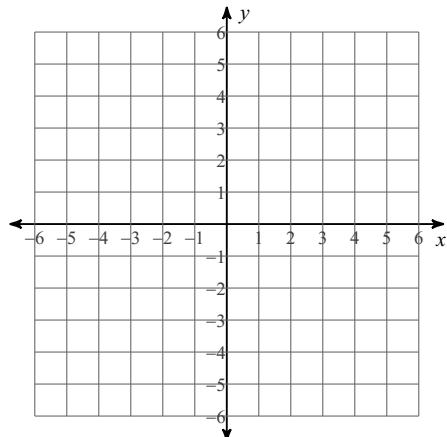
2)  $y = |x| + 2$



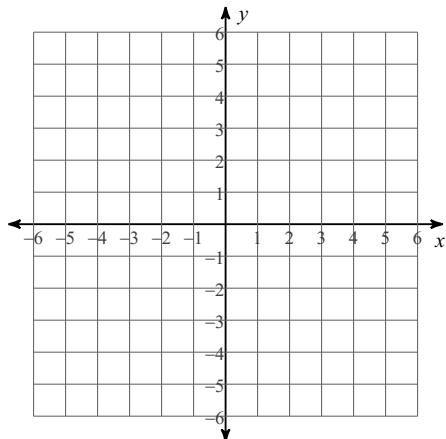
3)  $y = -|x + 3|$



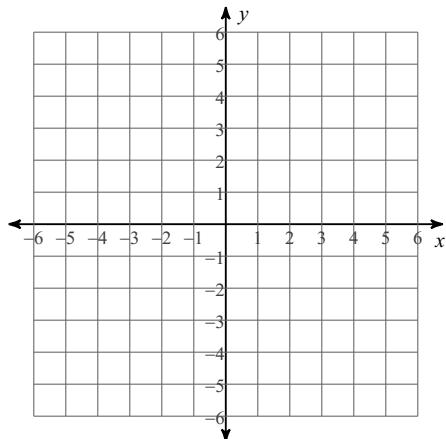
4)  $y = 3|x + 1|$



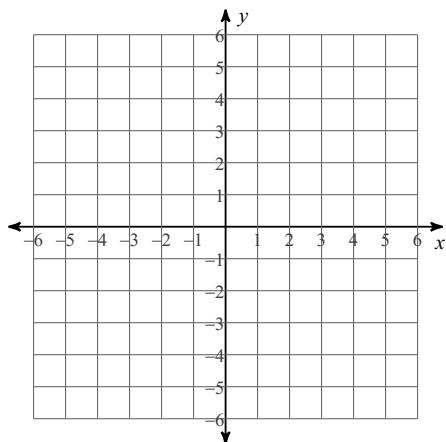
5)  $y = |x| - 4$



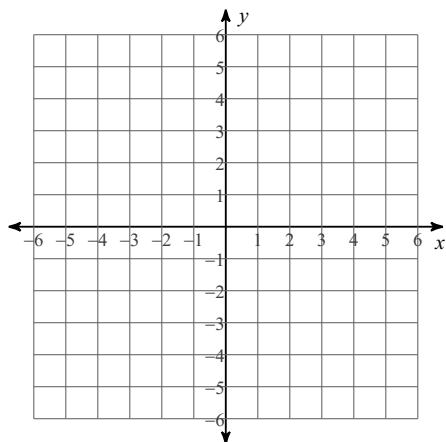
6)  $y = |x - 3|$



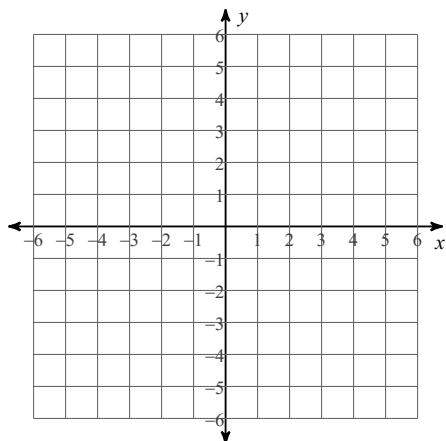
7)  $y = |x - 1|$



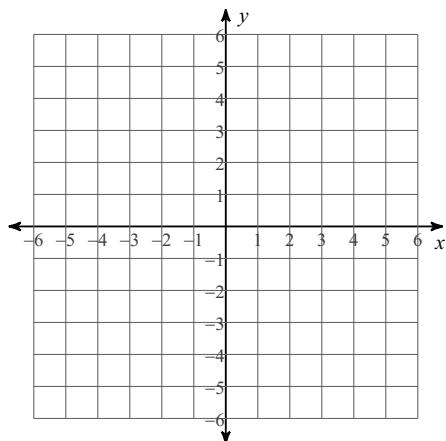
8)  $y = |x| + 1$



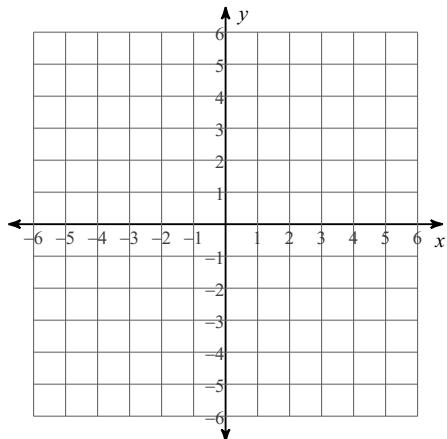
9)  $y = |x + 4| - 2$



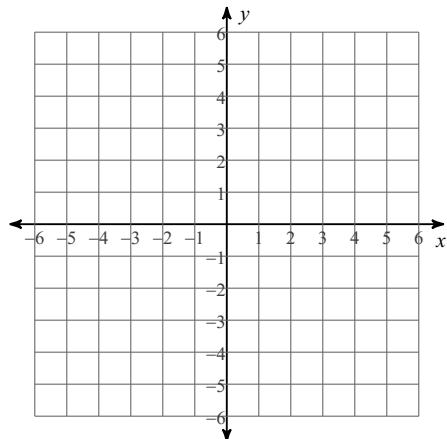
10)  $y = |x - 2| + 4$



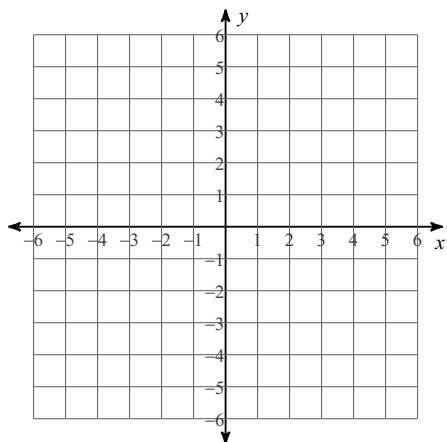
11)  $y = |x + 3| - 3$



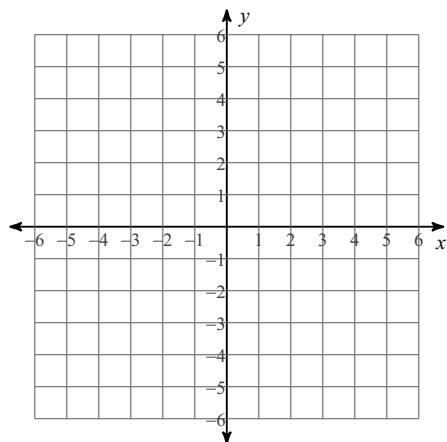
12)  $y = |x + 1| + 3$



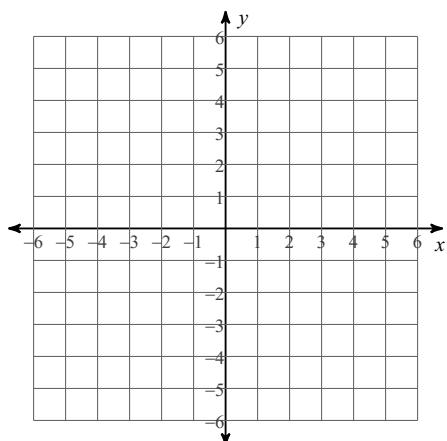
13)  $y = -|x - 4|$



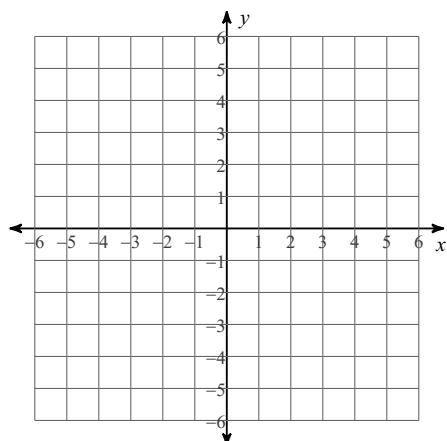
14)  $y = -|x + 2| - 1$



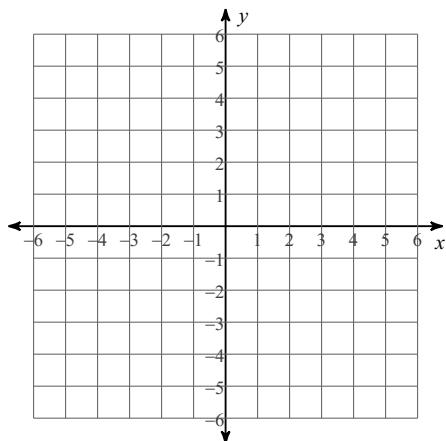
15)  $y = 3|x + 1| - 3$



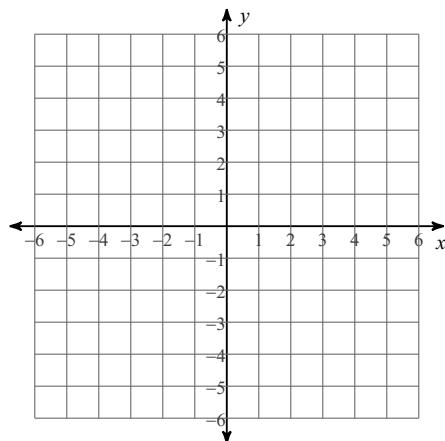
16)  $y = 2|x - 2| + 3$



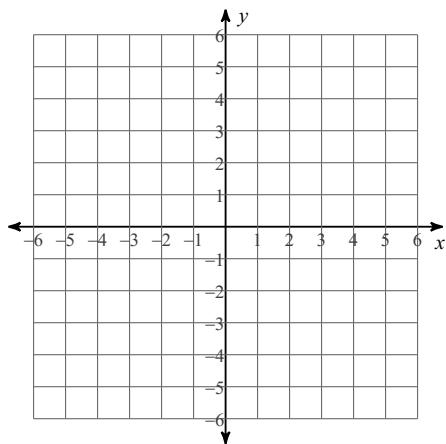
17)  $y = 2|x + 4| - 3$



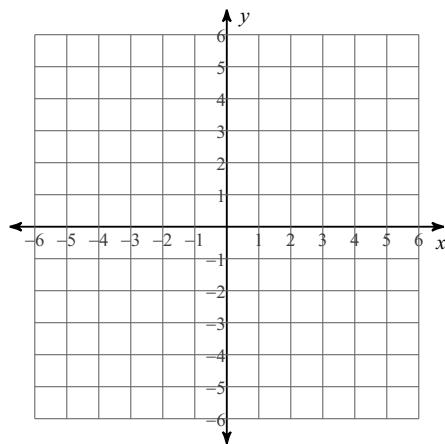
18)  $y = 3|x - 3| + 1$



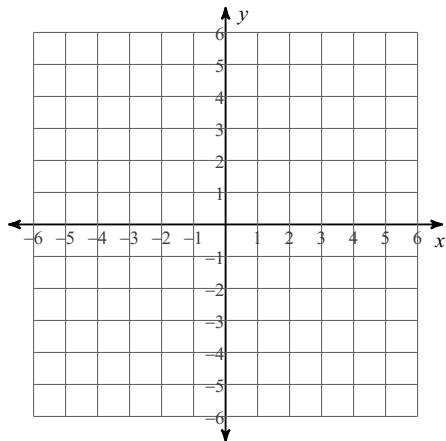
19)  $y = -2|x + 2| - 2$



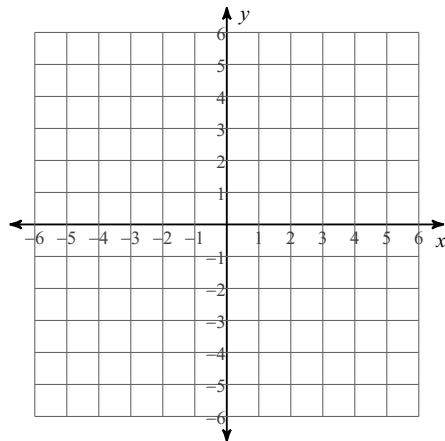
20)  $y = -3|x - 4| + 3$



21)  $y = 3|x + 1| - 4$

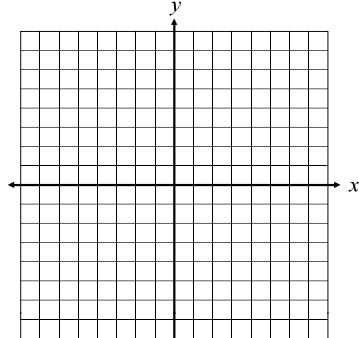
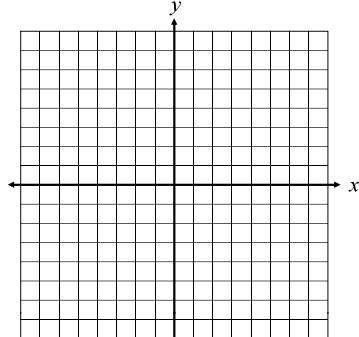


22)  $y = -2|x - 4| - 3$



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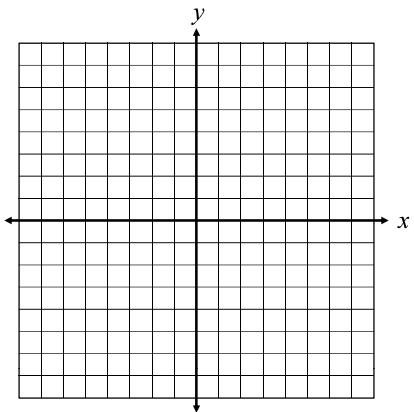
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Main Ideas/Questions	Notes/Examples
<b>PIECEWISE FUNCTIONS</b>	
Evaluating Piecewise Functions	<p>1. Given <math>f(x) = \begin{cases} x^2 - 1 &amp; \text{if } x &lt; -2 \\ 5x + 3 &amp; \text{if } x \geq -2 \end{cases}</math>, find each value.</p> <p>a) <math>f(-5)</math>      b) <math>f(-2)</math>      c) <math>f(7)</math></p> <p>2. Given <math>g(x) = \begin{cases} \frac{1}{2}x + 3 &amp; \text{if } x \leq -4 \\ -x - 1 &amp; \text{if } -4 &lt; x &lt; 1 \\ 2x^3 + 9 &amp; \text{if } x \geq 1 \end{cases}</math>, find each value.</p> <p>a) <math>g(2)</math>      b) <math>g(-1)</math>      c) <math>g(-6)</math></p>
Graphing Piecewise Functions	<p><b>Graph each piecewise function, then identify the domain and range.</b></p> <p>3. <math>f(x) = \begin{cases} x &amp; \text{if } x \leq -3 \\ -2x + 1 &amp; \text{if } x &gt; -3 \end{cases}</math></p> <p><math>D = \underline{\hspace{5cm}}</math></p> <p><math>R = \underline{\hspace{5cm}}</math></p>  <p>4. <math>g(x) = \begin{cases} -3x - 7 &amp; \text{if } x &lt; -1 \\ -5 &amp; \text{if } x \geq -1 \end{cases}</math></p> <p><math>D = \underline{\hspace{5cm}}</math></p> <p><math>R = \underline{\hspace{5cm}}</math></p> 

5.  $g(x) = \begin{cases} -\frac{5}{2}x - 1 & \text{if } x < 2 \\ x + 2 & \text{if } x > 2 \end{cases}$

$D =$  \_\_\_\_\_

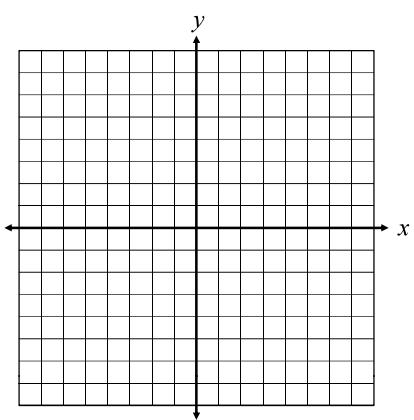
$R =$  \_\_\_\_\_



6.  $g(x) = \begin{cases} -1 & \text{if } x \leq -5 \\ -x - 3 & \text{if } -5 < x < 1 \\ 6 & \text{if } x \geq 1 \end{cases}$

$D =$  \_\_\_\_\_

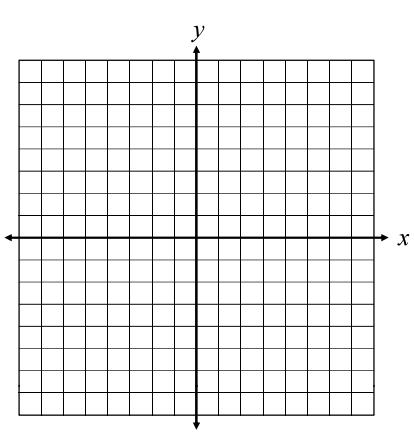
$R =$  \_\_\_\_\_



7.  $f(x) = \begin{cases} 2x & \text{if } x \leq -2 \\ -1 - x & \text{if } -2 < x < 4 \\ -3 & \text{if } x \geq 4 \end{cases}$

$D =$  \_\_\_\_\_

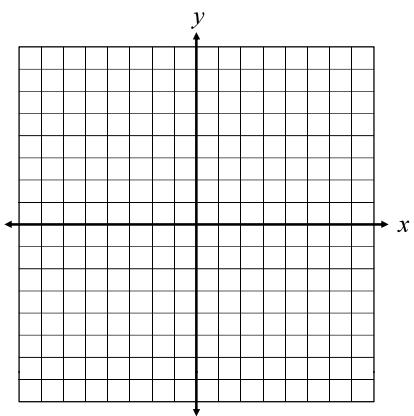
$R =$  \_\_\_\_\_



8.  $h(x) = \begin{cases} -3x & \text{if } x < 0 \\ -\frac{1}{2}x - 1 & \text{if } 0 \leq x < 6 \\ x - 7 & \text{if } x > 6 \end{cases}$

$D =$  \_\_\_\_\_

$R =$  \_\_\_\_\_



Name: \_\_\_\_\_

**Unit 3: Parent Functions & Transformations**

Date: \_\_\_\_\_ Bell: \_\_\_\_\_

**Homework 1: Piecewise Functions & Greatest Integer Functions****\*\* This is a 2-page document! \*\***

**Given**  $a(x) = \begin{cases} |x - 8| & \text{if } x \leq -6 \\ 2x - x^2 & \text{if } -6 < x \leq 1, \text{ find each function value.} \\ -4x + 7 & \text{if } x > 1 \end{cases}$

1.  $a(8)$

2.  $a(1)$

3.  $a(-7)$

4.  $a(-3)$

5.  $a\left(-\frac{1}{2}\right)$

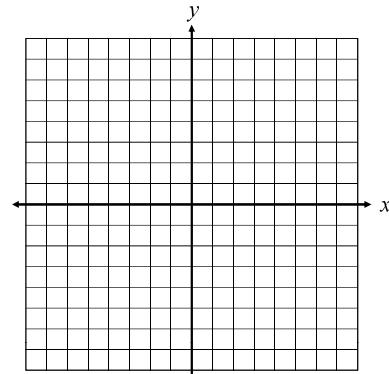
6.  $a\left(\frac{9}{4}\right)$

**Graph each function. Identify the domain and range.**

7.  $f(x) = \begin{cases} 5x - 2 & \text{if } x < 1 \\ x - 7 & \text{if } x \geq 1 \end{cases}$

$D = \underline{\hspace{2cm}}$

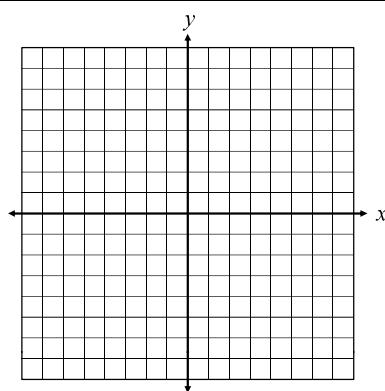
$R = \underline{\hspace{2cm}}$



8.  $g(x) = \begin{cases} -x & \text{if } x < -5 \\ 3 & \text{if } x > -5 \end{cases}$

$D = \underline{\hspace{2cm}}$

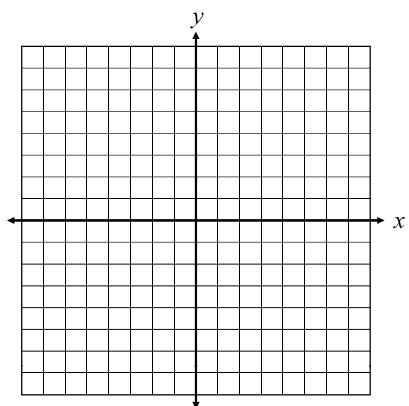
$R = \underline{\hspace{2cm}}$



**9.**  $h(x) = \begin{cases} \frac{4}{3}x - 2 & \text{if } x < 0 \\ 3 & \\ -x + 1 & \text{if } x \geq 0 \end{cases}$

$D =$  \_\_\_\_\_

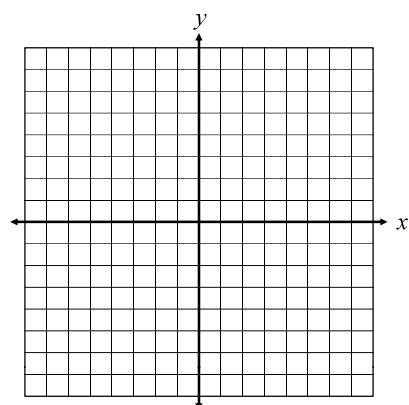
$R =$  \_\_\_\_\_



**10.**  $p(x) = \begin{cases} -3x + 7 & \text{if } x \leq 3 \\ x & \text{if } 3 < x < 5 \\ -1 & \text{if } x \geq 5 \end{cases}$

$D =$  \_\_\_\_\_

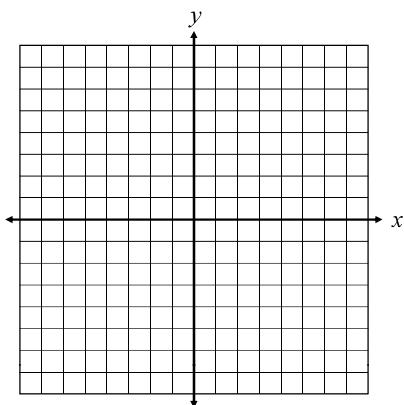
$R =$  \_\_\_\_\_



**11.**  $k(x) = \begin{cases} x + 4 & \text{if } x < -1 \\ 5 & \text{if } -1 < x < 2 \\ -\frac{1}{2}x + 1 & \text{if } x \geq 2 \end{cases}$

$D =$  \_\_\_\_\_

$R =$  \_\_\_\_\_



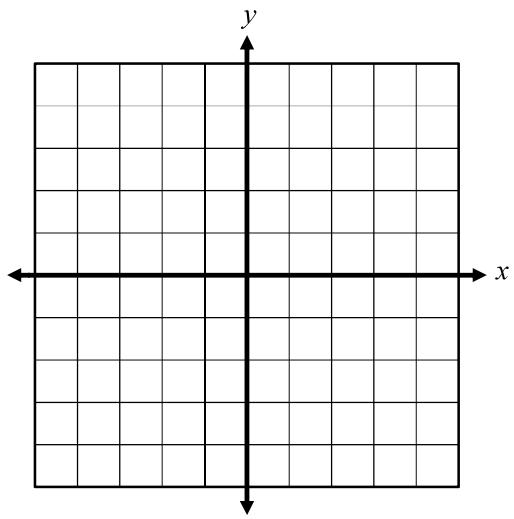
**12.**

$$f(x) = \begin{cases} x - 2 \\ |x| \\ -x + 4 \end{cases}$$

$D =$  \_\_\_\_\_

$R =$  \_\_\_\_\_

$x$	$y$



Name \_\_\_\_\_

Date \_\_\_\_\_

1. Solve. What would be the second step in solving the equation?

$$13 = (2 - x)^{\frac{4}{5}} - 3$$

2. What exponent would be used to eliminate the rational exponent in the equation?

$$(5x - 8)^{\frac{3}{8}} = -27$$

3. Arrange the steps of solving for x in the correct order.

$$5 + (4x)^{\frac{3}{4}} = -59$$

	Divide both sides by 4.
	$x = 64$
	Subtract 5 from both sides.
	Raise both sides to the $\frac{4}{3}$ power.

4. Ashley's answer is  $x = 129$  and  $x = -114$ . What mistake, if any, did she make?

$$\sqrt[5]{2x - 15} = 3$$

$2x - 15 = 243$	$2x - 15 = -243$
$2x = 258$	$2x = -228$
$x = 129$	$x = -114$

5. Simplify. What expression will remain under the radical?

$$\sqrt[6]{384x^{10}g^{18}}$$

6. What is the sixth root of 729?

7. Simplify.

$$\sqrt[3]{-54f^{14}}$$

8. Which is not written correctly in rational exponent form?

$$\left(\sqrt[4]{9}\right)^5$$

- a.  $9^{\frac{4}{5}}$
- b.  $3^{\frac{5}{2}}$
- c.  $9^{\frac{5}{4}}$
- d. They are all correct.

9. Rewrite in radical form. Do not simplify.

$$(-64)^{\frac{7}{2}}$$

10. Solve for h.

$$\sqrt[3]{h+5} = \sqrt[3]{4h}$$

11. Solve. Which of the solutions is extraneous and would not be included in the final answer?

$$\sqrt{x+83} = x - 7$$

12. Solve for x.

$$-|3x-5| - 4 = -10$$

13. Solve for r.

$$\frac{|-3x-4|}{3} = 12$$

Use the piecewise function below to answer questions 14-16.

$$g(x) = \begin{cases} -3x + 2, & \text{if } x \leq -2 \\ |x+1|, & \text{if } -2 < x \leq 4 \\ 5, & \text{if } x > 4 \end{cases}$$

14. Evaluate for  $g(7)$ .

15. Evaluate for  $g(-2)$ .

16. Evaluate for  $g(0)$ .

17. Describe the transformations applied to the parent function.

$$y = -\frac{1}{2}\sqrt{x} + 6$$

18. Describe the transformations applied to the parent function.

$$y = 5\sqrt[3]{x-4} - 7$$

19. Describe the transformations applied to the parent function.

$$y = -|x+2| + 4$$

20. Which points would be included on this piecewise function? (Select all that apply.)

$$g(x) = \begin{cases} 4x^2 - 1, & \text{if } x \leq -3 \\ |x|, & \text{if } -3 < x \leq 7 \\ 17, & \text{if } x > 7 \end{cases}$$

- a.  $(-2, 2)$
- b.  $(0, -1)$
- c.  $(7, 17)$
- d.  $(-4, 63)$
- e.  $(-3, 3)$
- f.  $(8, 17)$