Precalculus Prerequisite Packet

Entering into Precalculus means entering into your first year of college preparatory mathematics. There is a major shift in expectations for students to be able to recall many skills at a moment's notice. Certain concepts that have been taught to you over the previous years are assumed to be mastered. If you do not have these skills, you will find that you will consistently get problems incorrect next year as you make mistakes. It is frustrating for students who spend much of their homework time relearning algebra concepts in addition to learning how to tie the concepts together. This prerequisite packet is intended for you to brush up and possibly relearn these topics.

Use www.khanacademy.org to find specific math related topics with accompanying videos.

Name _____

1: Exponent Rules

Simplify the following

1. $(-2^2)^3$

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

3. $(3x^2y)^{-3}$

4. $\frac{y^{-4}}{5x^{-2}}$

5. $\frac{x^{-1}y}{xy^{-2}}$

6. $\frac{3xy^9}{2y^{-2}} \cdot \frac{-7y}{42x^5}$

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2: Simplifying Radicals

Simplify and rationalize the following.

1. $\sqrt{80}$
2. $\sqrt[4]{32}$
3. $\sqrt[3]{54x^3}$
4. $\frac{3}{\sqrt{8}}$
5. $\sqrt{\frac{4}{75}}$
6. $4\sqrt{3}\cdot\sqrt{21}$

3: Factoring by GCF

Factor the following completely

1. $3x^4-9x^2$
2. $49xy+28x-14y$
3. $18x^3y^5-12x^4y^2$

4: Factoring Quadratic Expressions

Factor the following completely

1. x^2-3x+2
2. x^2+5x-6
3. $2x^2+5x-3$
4. $3x^2-8x+4$
5. $3x^2+17x+10$
6. $10x^2-19x+6$

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5: Special Factoring

$$a^2+2ab+b^2=(a+b)^2 \qquad a^3+b^3=(a+b)(a^2-ab+b^2)$$
$$a^2-2ab+b^2=(a-b)^2 \qquad a^3-b^3=(a-b)(a^2+ab+b^2)$$
$$a^2-b^2=(a+b)(a-b)$$

Factor the following completely

1. $4x^2-20x+25$
2. $49x^2+42xy+9y^2$
3. $16x^4-81$
4. x^3-8
5. $125x^3+y^3$
6. $64-27y^6$

6: Factoring through Synthetic Division

Use synthetic division to factor as indicated.

1. $x^3-4x^2+2x+1=(x-1)(\quad)$
2. $2x^3+5x+7=(x+1)(\quad)$
3. $x^4-3x^3+x^2+x+2=(x-2)(\quad)$
4. $4x^4+3x^2-1=(2x-1)(\quad)$

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7: Solving Quadratic Equations by Factoring

Factor to solve for x.

1. $x^2+5x+6=0$

2. $8x^2-6x-5=0$

3. $11x^2-14x-16=0$

8: Function Names

Match the following equations to their description.

_____1.	$f(x)=\frac{2}{3}\lvert 4x+5\rvert-3$	A.	Linear Function
_____2.	$f(x)=\frac{2}{3}\sqrt[3]{4x+5}-3$	B.	Quadratic Function
_____3.	$f(x)=\frac{2}{3}\cdot\frac{1}{4x+5}-3$	C.	Absolute Value Function
_____4.	$f(x)=\frac{2}{3}(4x+5)^4-3(4x+5)^2-2$	D.	Cubic Function
_____5.	$f(x)=\frac{2}{3}(4x+5)^3-3$	E.	Cube Root Function
_____6.	$f(x)=\frac{2}{3}(4x+5)-3$	F.	Square Root Function
_____7.	$f(x)=\frac{2}{3}(4x+5)^2-3$	G.	Rational Function
_____8.	$f(x)=\frac{2}{3}\sqrt{4x+5}-3$	H.	Polynomial Function

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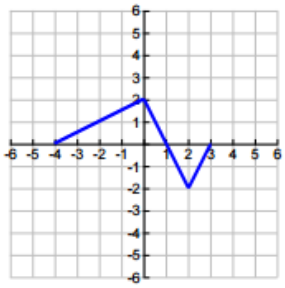
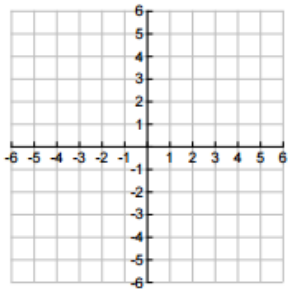
9: Function Transformation

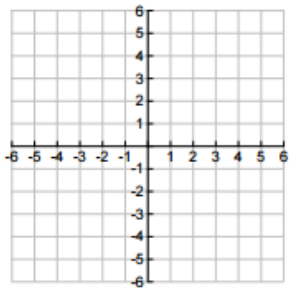
Use the graph of $y = f(x)$ at the right to sketch the following transformations.



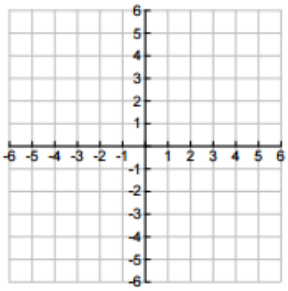
1. $y = 2f(x)$



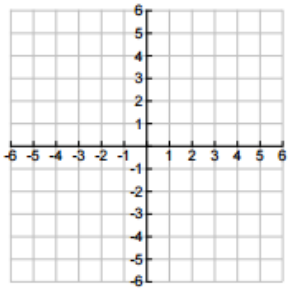
2. $y = -f(x)$



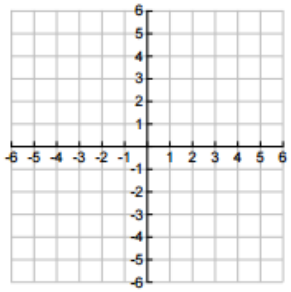
3. $y = f(x-1)$



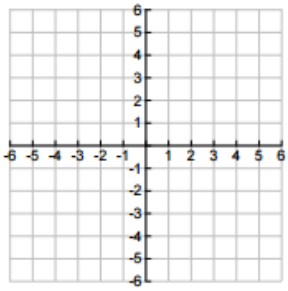
4. $y = f(x)+2$



5. $y = f(-x)$



6. $y = -2f(x+2)+1$



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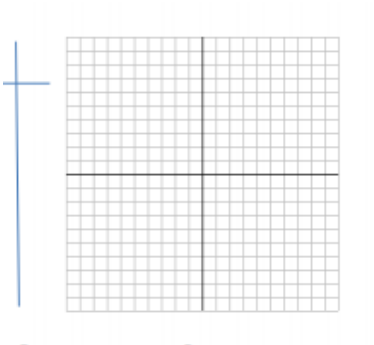
10: Graphing Parent Functions using T-Charts

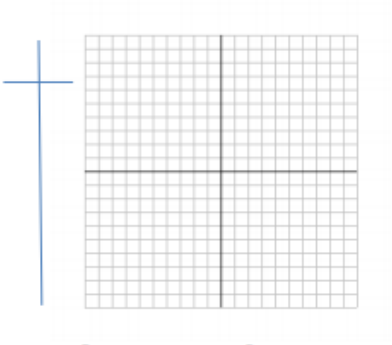
Graph the following using a T-Chart with "smart" values. State the Domain and Range of each function.

1. $f(x)=x^2$



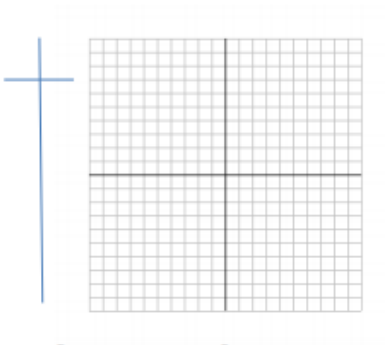
D: R:

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



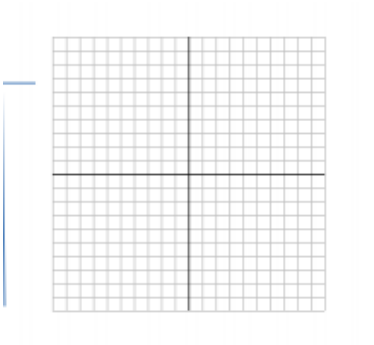
D: R:

3. $f(x)=|x|$



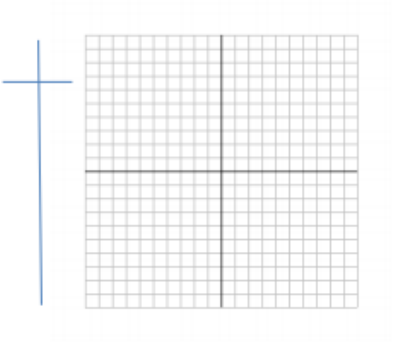
D: R:

4. $f(x)=x^3$



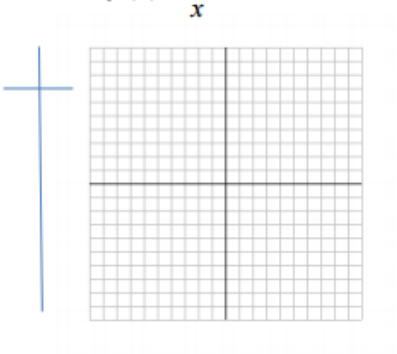
D: R:

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



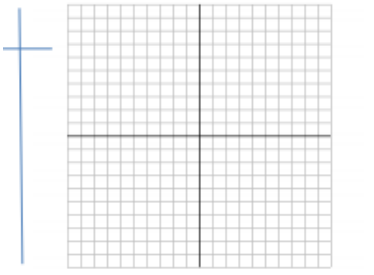
D: R:

6. $f(x)=\frac{1}{x}$



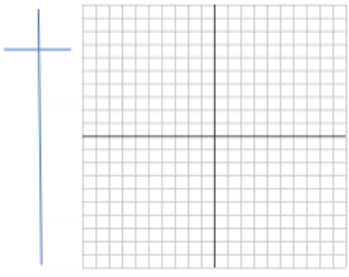
D: R:

7. $f(x)=x$



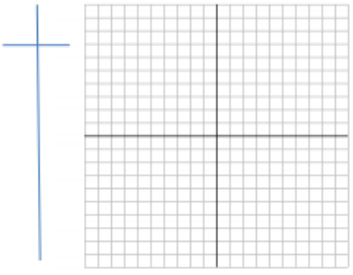
D: R:

8. $f(x)=2^x$



D: R:

9. $f(x)=\log_2 x$



D: R:

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11: Distance and Midpoint Formulas

Find the distance between the two points. Then find the midpoint between the two points.

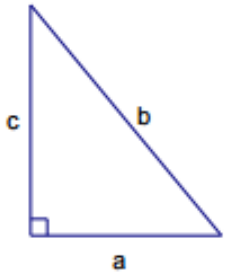
1. $(-2,5);\ (6,-1)$

2. $\left(\frac{3}{2},-\frac{1}{2}\right);\ \left(-\frac{3}{2},\frac{7}{2}\right)$

3. $\left(\frac{5}{2},-\frac{3}{2}\right);\ (1,-4)$

12: Pythagorean Theorem

Use the diagram at the right to answer the following questions. Be sure to simplify.



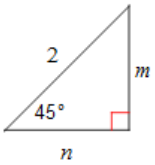
1. Find b if $a = 4\sqrt{5}$, $c = 2$

2. Find c if $a = 2\sqrt{3}$, $b = 6$

3. If $a = c$, and $b = 10$, find a

Find the missing side lengths. Leave your answers as radicals in simplest form.

4.



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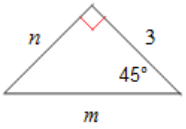

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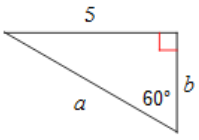

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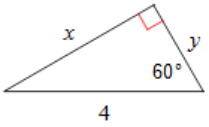

8.

