

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

2: Fractional Exponents

Evaluate the following without a calculator

1. $8^{\frac{2}{3}}$

2. $4^{-\frac{1}{2}}$

3. $(\sqrt[4]{16})^2$

4. $\sqrt[3]{1000^2}$

5. $(\sqrt[3]{-27})^4$

6. $-(25^{-\frac{3}{2}})$

3: 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. $4\sqrt{3} \cdot \sqrt{21}$

4: Factoring by GCF

Factor the following completely

1. $3x^4 - 9x^2$

2. $49xy + 28x - 14y$

3. $18x^3y^5 - 12x^4y^2$

5: 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. $10x^2 - 19x + 6$

6: Special Factoring

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

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

$$a^2 - b^2 = (a + b)(a - b)$$

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. $64 - 27y^6$

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

8: Solving Linear Equations

Solve the following for the unknown variable.

1. $\frac{2x+1}{5} = \frac{3x+1}{2}$

2. $\frac{x}{2} + \frac{5x}{6} = \frac{2x}{3} + \frac{1}{12}$

3. $3(x-8) + 4x = 5x - (x+7)$

9: Solving Quadratic Equations by Factoring

Factor to solve for x.

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

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

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

10: Solving Quadratic Equations using the Quadratic Formula

For each equation, solve for the indicated expression.

1. $2x^2 - 4x - 1 = 0$ for x

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

3. $x^4 - 4x^2 + 2 = 0$ for x^2

11: Solving Radical Equations

Solve the following for x .

1. $\sqrt{x} = 3x - 1$

2. $3\sqrt{2x+1} = 7$

3. $3x^{\frac{3}{4}} - 5 = 19$

12: Solving Rational Equations

Solve the following for x

1. $\frac{3}{2x} - \frac{9}{2} = 6x$

2. $\frac{2}{3x} + \frac{2}{3} = \frac{8}{x+6}$

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

13: Solving Logarithmic Equations

Solve the following for x

1. $\log_3 3^x = 7$

2. $\log_9 x = \frac{1}{2}$

3. $2\log_3(x+1) = 4$

14: Function Notation

Given $f(x) = -x^2 + x$, answer the following questions.

1. Find $f(0)$

2. Find $f(x) = 0$

3. Find $f\left(-\frac{1}{3}\right)$

Given $f(x) = \frac{1}{3}x + \frac{7}{4}$, answer the following questions.

4. Find the zeros of $f(x)$

5. Solve $f(x) = \frac{1}{8}$

6. Find $f\left(-\frac{9}{8}\right)$

15: Function Names

Match the following equations to their description.

____ 1. $f(x) = \frac{2}{3}|4x+5| - 3$

____ 2. $f(x) = \frac{2}{3}\sqrt[3]{4x+5} - 3$

____ 3. $f(x) = \frac{2}{3} \cdot \frac{1}{4x+5} - 3$

____ 4. $f(x) = \frac{2}{3}(4x+5)^4 - 3(4x+5)^2 - 2$

____ 5. $f(x) = \frac{2}{3}(4x+5)^3 - 3$

____ 6. $f(x) = \frac{2}{3}(4x+5) - 3$

____ 7. $f(x) = \frac{2}{3}(4x+5)^2 - 3$

____ 8. $f(x) = \frac{2}{3}\sqrt{4x+5} - 3$

A. Linear Function

B. Quadratic Function

C. Absolute Value Function

D. Cubic Function

E. Cube Root Function

F. Square Root Function

G. Rational Function

H. Polynomial Function

16: Function Operations

Perform the following function operations if $f(x) = 2x^2$ and $g(x) = 3 - 4x$

1. $f(g(x))$

2. $g(f(x))$

3. $(f - g)(x)$

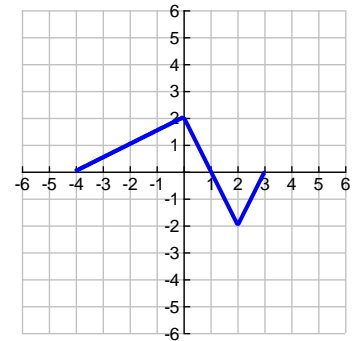
4. $f(f(x))$

5. $g(g(x))$

6. Find $g(g(x)) = 0$

17: Function Transformation

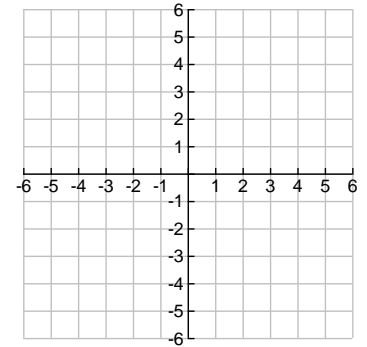
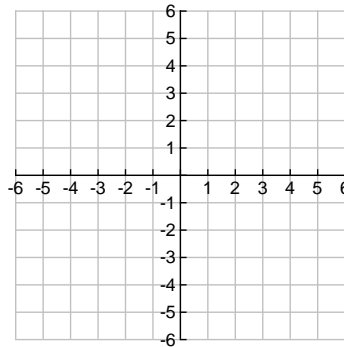
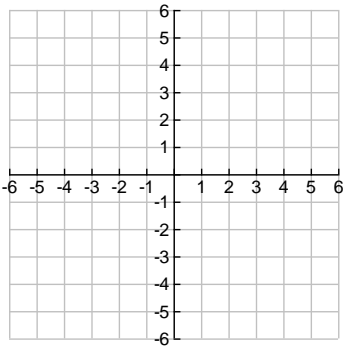
Use the graph of $y = f(x)$ at the right to sketch the following transformations.



1. $y = 2f(x)$

2. $y = -f(x)$

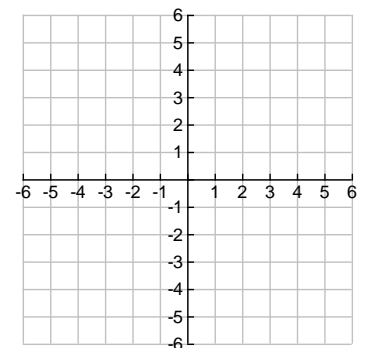
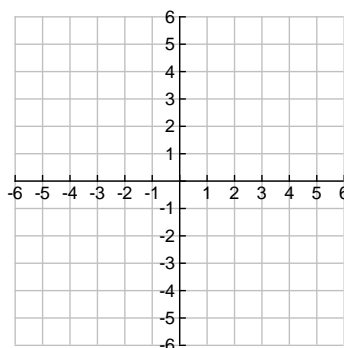
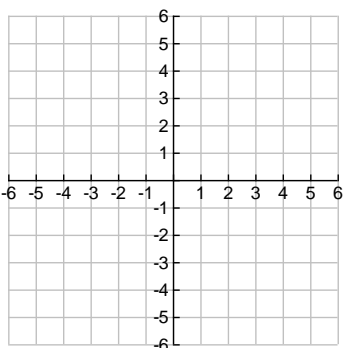
3. $y = f(x-1)$



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

5. $y = f(-x)$

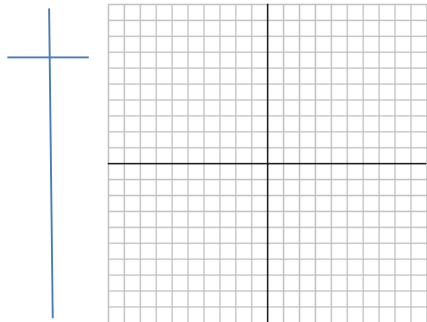
6. $y = -2f(x+2) + 1$



18: Graphing Parent Functions using T-Charts

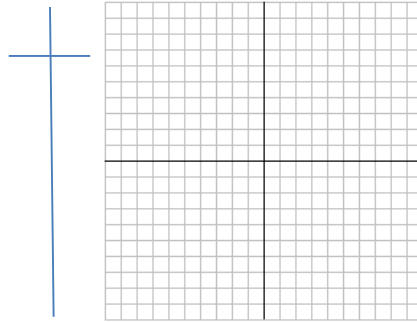
Graph the following using a T-Chart with "smart" values. State the Domain and Range of each function.

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



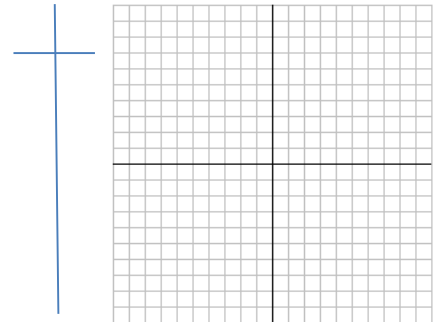
D: R:

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



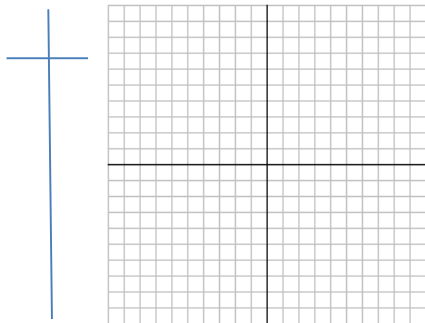
D: R:

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



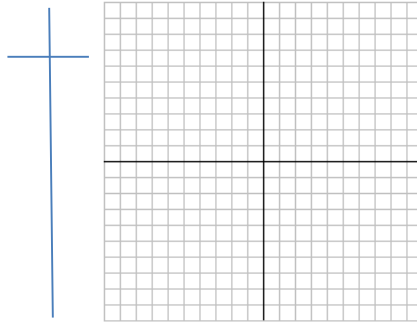
D: R:

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



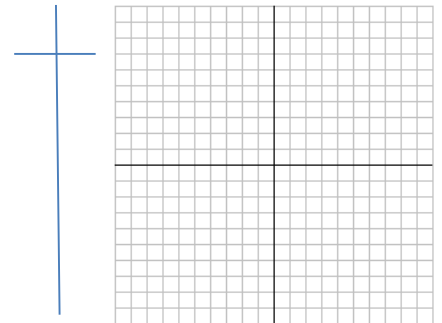
D: R:

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



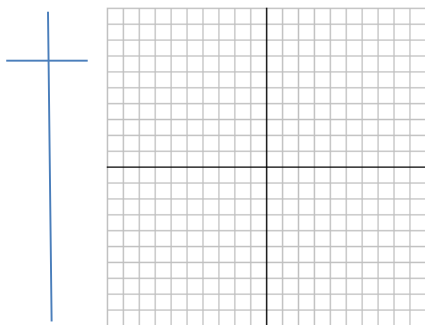
D: R:

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



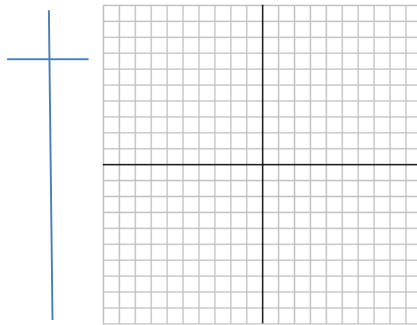
D: R:

7. $f(x) = x$



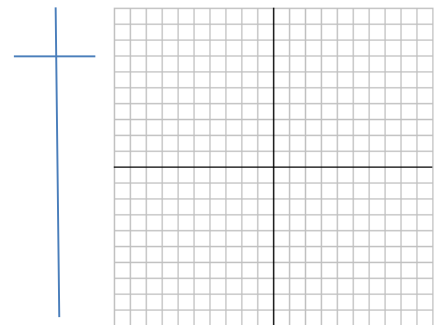
D: R:

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



D: R:

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



D: R:

19: Basic Graphing Choosing "Smart" Points

Fill in the T-chart using at least 3 smart x-values (that enable you to find exact points)

1. $f(x) = \sqrt{3-x}$



2. $f(x) = \frac{7}{x-2}$



3. $f(x) = 3^{\frac{x}{4}}$



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

21: Intercepts

Use the following equations to find the x and y intercept(s)

1. $y^2 = x + 9$

2. $9x^2 + 4y^2 = 36$

3. $\left(\frac{x+4}{2}\right)^2 + y^2 = 1$

22: Equations of Lines

Find the equation of the line that has the given characteristics. Leave your answer in the form indicated.

1. $slope = \frac{3}{4}; y\text{-int} : -\frac{2}{3}$

(Standard Form)

2. Parallel to $2x + 3y = 4$ through

$(-3, 6)$

(Slope-intercept form)

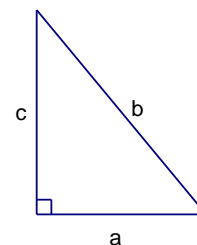
3. Perpendicular to $4x - 7y = 23$

through $\left(\frac{2}{3}, -\frac{4}{5}\right)$

(Point-Slope Form)

23: 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

24: Algebraic Errors to Avoid

Error	Correct form	Comments
$a - (x - b) \neq a - x - b$	$a - (x - b) = a - x + b$	Change all signs when distribution negative through parentheses.
$(a + b)^2 \neq a^2 + b^2$	$(a + b)^2 = a^2 + 2ab + b^2$	Don't forget middle term when squaring binomials.
$\left(\frac{1}{2}a\right)\left(\frac{1}{2}b\right) \neq \frac{1}{2}ab$	$\left(\frac{1}{2}a\right)\left(\frac{1}{2}b\right) = \frac{1}{4}(ab)$	$1/2$ occurs twice as a factor.
$\frac{a}{x+b} \neq \frac{a}{x} + \frac{a}{b}$	Leave as $\frac{a}{x+b}$	Don't add denominators when adding fractions.
$\frac{1}{a} + \frac{1}{b} \neq \frac{1}{a+b}$	$\frac{1}{a} + \frac{1}{b} = \frac{a+b}{ab}$	Use definition for adding fractions.
$\frac{x}{a} \neq \frac{bx}{a}$	$\frac{x}{b} = \left(\frac{x}{a}\right)\left(\frac{1}{b}\right) = \frac{x}{ab}$	Multiply by reciprocal of the denominator.
$\frac{1}{3x} \neq \frac{1}{3}x$	$\frac{1}{3x} = \frac{1}{3} \cdot \frac{1}{x}$	Use definition for multiplying fractions.
$1/x + 2 \neq \frac{1}{x+2}$	$1/x + 2 = \frac{1}{x} + 2$	Be careful when using a slash to denote division.
$(x^2)^3 \neq x^5$	$(x^2)^3 = x^{2 \cdot 3} = x^6$	Multiply exponents when an exponential form is raised to a power.
$2x^3 \neq (2x)^3$	$2x^3 = 2(x^3)$	Exponents have priority over coefficients.
$\frac{1}{x^2 + x^3} \neq x^{-2} + x^{-3}$	Leave as $\frac{1}{x^2 + x^3}$	Don't shift term-by-term from denominator to numerator.
$\sqrt{5x} \neq 5\sqrt{x}$	$\sqrt{5x} = \sqrt{5}\sqrt{x}$	Radicals apply to every factor inside radical.
$\sqrt{x^2 + a^2} \neq x + a$	Leave as $\sqrt{x^2 + a^2}$	Don't apply radicals term-by-term.
$\frac{a+bx}{a} \neq 1 + bx$	$\frac{a+bx}{a} = 1 + \frac{b}{a}x$	Cancel common factor, <i>not</i> common terms.
$\frac{a+ax}{a} \neq a + x$	$\frac{a+ax}{a} = 1 + x$	Factor <i>before</i> canceling.