+

Alg2/Trig Summer Assignment 2019

This assignment is for you to practice topics learned in Algebra 1 that will be relevant in the Algebra 2/Trig curriculum. This review is especially important as you have most recently studied Geometry, where your Algebra 1 skills may have been employed with less frequency.

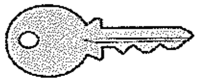
The assignment will include watching review videos and completing supplemental worksheets. You should work on the assignment throughout the summer. A topic list along with links to selected videos is outlined on the following page. The videos can also be found on YouTube under the channel MATHCamp321 (under the Algebra 2 playlist). The answer keys will be posted during the last week of August on the THS website under Mathematics Department Files. It is suggested that you review your answers and identify your questions the <u>END</u> of the summer so that the material is fresh when school resumes.

There is room for you to show all your work in the packet itself. You should bring the completed assignment along with any questions to class on the first day of school. Your questions will be reviewed during the initial class meetings. An assessment on the summer assignment will follow.

Algebra Topic	Video MATHCamp321
1. Solving Linear Equations/Literal Equations	HERE HERE
2. Solving Absolute Value Equations	HERE
3. Interval Notation	HERE
4. Solving Compound Inequalities	HERE
5. Solving Absolute Value Inequalities	HERE
6. Slope, intercepts, and writing equations in various forms (plus parallel and perpendicular)	HERE HERE
7. Graphing Linear/Absolute Value Inequalities	
8. Domain and Range (from graph and an expression)	
9. 2 by 2 Systems	
10. Calculator Fluency	
11. Rules of Exponents	HERE HERE
12. Polynomial operations: Add, subtract, distribute, FOIL, clamshell.	HERE HERE
13. Factoring	HERE HERE
14. Composition of Functions (basic)	
15. Radicals - simplify and operations (square roots only)	
16. Quadratic Functions: Find vertex - -b/2a and/or complete the square	HERE
17. Solve quadratic equations by **factoring**	
18. Solve quadratic equations by **completing the square**	
19. Solve quadratic equations using the **quadratic formula**	
20. Solve quadratic equations/inequalities using a **graph**	

Algebra 2/Trig Summer Packet

Flip WS: Solving Linear Equations with Fractional Coefficients



Key Concept: to solve a linear equation with fractional coefficients.

Fill out this worksheet as you watch the corresponding video on MathCamp321.

After watching this video, you should be able to:

A) **determine** the LCD when given two or more fractions

B) **solve** a linear equation with fractional coefficients

Solve each equation with fractional coefficients as per the video.

1V. $\frac{5}{2}x+\frac{2}{3}=\frac{1}{6}(x-3)$

2V. $\frac{2}{3}-\frac{4}{5}x=\frac{3}{2}x-\frac{3}{5}$

Independent Practice:

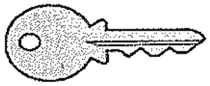
3. What is the LCD of the three fractions? $\frac{?}{4},\frac{?}{5},\frac{?}{3}$

4. Solve: $\frac{3}{4}+\frac{2}{5}x=\frac{1}{3}(x-2)$

5. Solve: $\frac{3}{2}(6x-4)=\frac{13}{2}x-6+\frac{5x}{2}$

6. Solve: $\frac{5}{3}-\frac{1}{4}x=\frac{5}{6}x-\frac{3}{4}$

Flip WS: Solving Literal Equations



Key Concept: to solve a literal equation.

Fill out this worksheet as you watch the corresponding video on MathCamp321.

<u>After watching this video, you should be able to</u>:

A) **solve** a literal equation for a specified variable

B) **identify** any restrictions in both the originally stated problem and final answer

1V. Solve the following literal equation using a 2-column proof format.

Statements	Reasons
1. $w = \dfrac{x+y+z}{z+a+b}$	1. Given
2.	2.
3.	3.
4.	4.
5.	5.
6.	6.

For questions 2-5, solve the literal equation for the indicated variable. Include any restrictions. Use the 2-column proof format (used above) only if you want to.

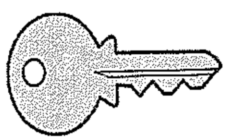
2. Solve for b_1: $A = \frac{1}{2}h\left(b_1 + b_2\right)$

3. Solve for r: $V = \frac{4}{3}\pi r^3$

4. Solve for t: $P = \sqrt{\frac{5}{t}}$

5. Solve for w: $z = \frac{2x - w}{3x + w}$

Flip WS1.4: Solving Absolute Value Equations



Key Concept: to solve an absolute value equation, you need to construct <u>two</u> new equations, disregarding the absolute value bars. For this reason, there are frequently two solutions, but beware, checking is crucial!

Fill out this worksheet as you watch the corresponding video on MathCamp321.

<u>After watching this video, you should be able to</u>:

A) **isolate** an absolute value expression

B) **negate** an algebraic expression

C) **solve** an absolute value equation using the two-case method.

D) understand the importance of **checking**

Start with this: write down the 5-step procedure addressed in the video:

1.

2.

3.

4.

5.

Solve each absolute value equation showing work as per the video.

1V. $2|x-3|+1=15$

2V. $|x+5|+12=10$

3V. $|2x-4|=x-8$

Independent Practice:

4. Solve: $|x+7|=3$

Independent Practice:

5. Solve: $-|5x|=10$

6. The equation, $|x-2|=2x-1$, yields the solutions $x=-1$ and $x=1$. Show the check for each of these solutions and decide which, if any, is the solution to the equation.

7. What is an **extraneous solution**?

For questions 8 and 9, solve, clearly showing the two cases.

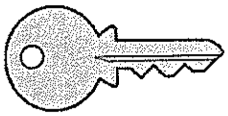
8. $-2|8-x|=-6$

9. $|x+3|=3-x$

10. Find the solutions to the absolute value equation: $-3|x-8|=6x-12$

Identify any **extraneous** solutions.

Flip WS 1.5: Interval Notation



Key Concept: the solution to an inequality can be expressed in different forms. Interval notation is the form used by many higher level math courses and is a convenient method for describing the solution set of an inequality.

After watching this video, you should be able to:
A) express an inequality using a number line, using an algebraic sentence and most importantly, by using interval notation.

Rules: Use (,) for ∞, -∞ and non-included boundaries. Use [,] for included boundaries.

1V. Interval Notation Practice – Fill out this worksheet as you watch the corresponding video on MathCamp321.

	Algebraic inequality	*Number line*	*Interval notation*	*Set-builder notation*
25V.	$x < 5$			
26V.	$x \geq -3$			
27V.	$-4 < x \leq 4$			
28V.	$x < -2$ or $x > 3$			
29V.				$\{x \mid 0 \leq x < 10\}$
30V.			$(-6, \infty)$	
31V.			$(-\infty, 4) \cup [5, \infty)$	
32V.				

Independent Practice:

2. **Multiple choice**: Give the interval over which the inequality is true: $10 < -x$

A. $(-\infty, -10)$ B. $(-10, \infty)$ C. $(-\infty, 10)$ D. $(10, \infty)$

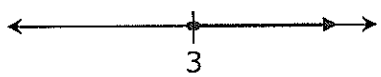
3. **Application**: Use interval notation to describe the solution set for the range in temperature in a certain city on July 4th: $71° \le t \le 94°$

4. Use interval notation to describe the solution set: $x < -4$ or $x > 20$

5. **Multiple choice**: Which grouping symbol will always be adjacent to the infinity symbol?

A. brace {,}   B. bracket [,]   C. parenthesis (,)

6. Explain why the interval shown is incorrect based on the solution set shown on the number line:

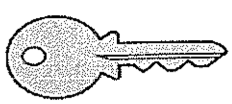


student sees↑

is the same as $(\infty, 3]$.

↑*student concludes*

Flip WS: Solving Compound Inequalities



Key Concept: to determine the solution set when more than one inequality symbol is present.

Fill out this worksheet as you watch the corresponding video on MathCamp321.

After watching this video, you should be able to:

A) **determine** the solution set to a compound inequality

B) **distinguish** between "and" and "or" compound inequalities

Start with this: write down the three key points identified as A, B, and C.

A.

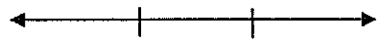
B.

C.

Using interval notation, find the solution set to each compound inequality.

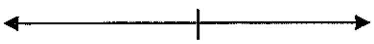
1V. $x < 3$ and $x \geq 0$

2V. $x \leq -1$ or $x > 1$

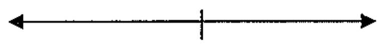


3V. $4 \leq x \leq 6$

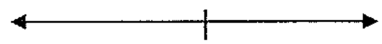
4V. $5 > x$



5V. $x < 0$ or $x > 0$



6V. $x < 0$ and $x > 0$



Independent Practice:

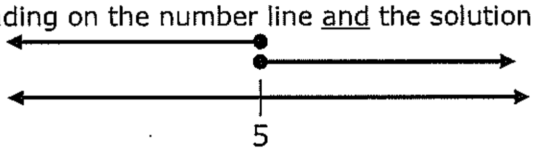
7. Classify the following compound inequality as an "and" or "or" problem: $-10 \leq x \leq 10$

8. For which classification "and" or "or" do you look for a presence of shading?

9. Does the shading on the number line and the solution suggest an "and" or "or" problem?

solution set: $(-\infty, \infty)$

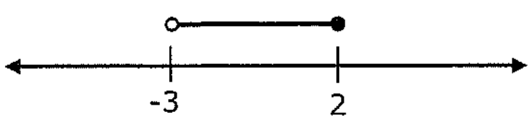
10. Does the shading on the number line and the solution suggest an "and" or "or" problem?



solution set: 5 only

Match the solution set shown on the number line with the corresponding solution set in interval notation:

_____11.



_____12.

A. $[-3, 2)$

B. $(-\infty, -3) \cup [2, \infty)$

C. $(-3, 2]$

D. $(-\infty, -3] \cup (2, \infty)$

For questions 13-16, find the interval over which the compound inequality is true. Show the word "**and**" or "**or**" in addition to your shaded number line *before* you state the solution interval.

13. $2 - x < 3$ and $x + 7 < 10$

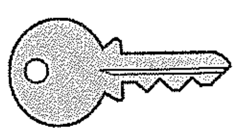
Tip: Always get the variable the left!

14. $5 \leq x - 1 < 8$

15. $6 - 2x < 20$ or $x > 1$

16. $-x + 4 \leq -3 \leq 3x$

Flip WS: Solving an Absolute Value Inequalities



Key Concept: to determine the solution set to an absolute value inequality.

Fill out this worksheet as you watch the corresponding video on MathCamp321.

After watching this video, you should be able to:

A) **determine** the solution set to an absolute value inequality

B) **use** the gimmick to distinguish between "and" and "or" absolute value inequalities

Start with this: write down the three key points identified as 1, 2, and 3.

1.

2.

3.

Solve each absolute value inequality as per the video.

1V. $|x+1|<5$

2V. $2|x+1|-3\geq 9$

3V. $|x+1|\leq 2x-3$

Independent Practice:

For questions 4 and 5, classify the absolute value inequality as "and" or "or". Do not actually solve.

4. $|x-3|<5$

5. $-4|x+3|<-20$

6. **True or false**: writing the word "and" or "or" in your solution to an absolute value inequality is *optional*.

________7. **Multiple choice**: When rewriting two new inequalities from an absolute value inequality, the second inequality should:

A. have the same inequality symbol, but negated right-hand side

B. have the opposite inequality symbol, and negated right-hand side

C. have the same inequality symbol, and same right-hand side

D. have the opposite inequality symbol, but same right-hand side

For questions 8-11, match the solution set shown on the number line with the corresponding compound inequality:

8. $|x| > 2$

9. $|x| < 2$

10. $|x| \geq 0$

11. $|x| < 0$

A. $(-2, 2)$

B. $(-\infty, -2) \cup (2, \infty)$

C. no solution

D. all real numbers

E. 0 only

For questions 12-15, find the interval over which the absolute value inequality is true. Show the word "and" or "or" in addition to your shaded number line before you state the solution interval.

12. $|x - 1| \geq 2$

13. $3|x - 2| - 3 < 9$

14. $|6 - x| < 2$

15. $|x| > 2x + 1$

Flip WS: Point-slope Form

Key Concept: to write a linear equation in **point-slope form.**

Fill out this worksheet as you watch the corresponding video on MathCamp321.

After watching this video, you should be able to:

A) **write** a linear equation in point-slope form

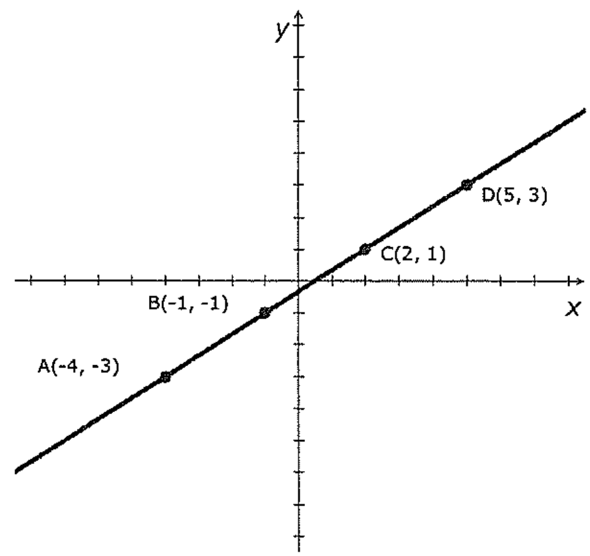
B) **understand** that a single line has infinitely many point-slope forms

C) **transform** a linear equation in point-slope form into slope-intercept form

Start with this: write down the template for point-slope form:

Point-slope form:

1V. Show the calculation to find the slope of $\overleftrightarrow{CD}$.



2V. Write the **point-slope** form using point **A.**

3V. Write the **point-slope** form using point **B.**

4V. Write the **point-slope** form using point **D.**

<u>Independent Practice</u>:

5. Using the traditional formula to calculate slope, cross-multiply and see what you get!

$$m = \frac{y - y_1}{x - x_1}$$

6. **True or false**: the following **point-slope** form is *simplified*: $y - (-5) = \frac{-3}{4}(x - (-1))$

7. Johnny is given a point, (7, 10) and a slope of -3. Does the following yield a "conventional" **point-slope** form? Why or why not? $10 - y = -3(7 - x)$

8. Write the **point-slope** form using point **C** in the line shown on the page before.

Flip WS: General Form

Key Concept: to write a linear equation in **general form.**

Fill out this worksheet as you watch the corresponding video on MathCamp321.

After watching this video, you should be able to:
1) **calculate** slope given two points
2) **use** point-slope form to write a linear equation
3) **transform** a linear equation in point-slope form into general form

Start with this: write down the template for general form:

general form:

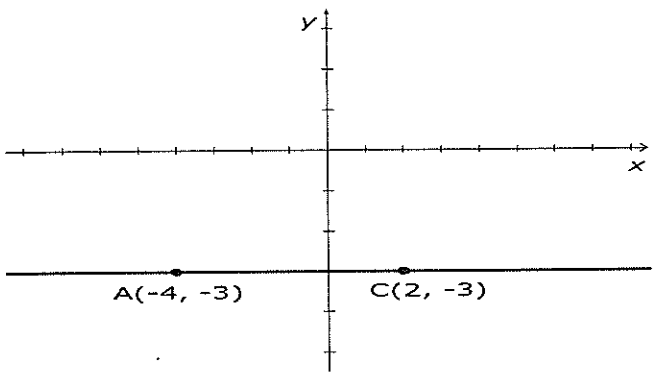
1V. Write the **general** form of the line passing through the points (5, 2) and (1, 12).

2V. Write the **general** form of the line passing through the points (-6, 1) and (-14, -5).

Independent Practice:
3. **True or false**: the template $AX + BY = C$ illustrates **general** form.

4. Manipulate $\frac{-2}{3}x + \frac{5}{2}y = \frac{7}{6}$ into **general** form.

5. Write the equation of the line shown in **general** form.



6. Write the **general** form of the line passing through the points (-2, -10) and (6, -26).

7. Johnny got a deduction on his quiz for writing the answer to a general form equation as, $6x - 4y + 18 = 0$. Why do you think he got a deduction? What would be a better answer?

Practice: Slope and Equations of Lines

Slope-Intercept Form: $y = mx + b$

Standard Form: $ax + by = c$, where *a*, *b*, and *c* are integers and $a \geq 0$.

General Form: $ax + by + c = 0$, where *a*, *b*, and *c* are integers and $a \geq 0$.

Point-Slope Form: $y - y_1 = m(x - x_1)$

Equation of a Vertical Line: $x = c$, where *c* is any real number.

Equation of a Horizontal Line: $y = c$, where *c* is any real number.

Neatly show all work. Use the indicated form. Box in your final answers.

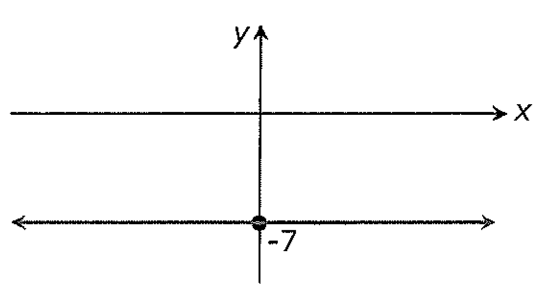
1. Write the following in **slope-intercept form**: $2x - 5y = 8$

2. Transform the following into **standard form**: $y = \frac{5}{4}x - \frac{3}{2}$

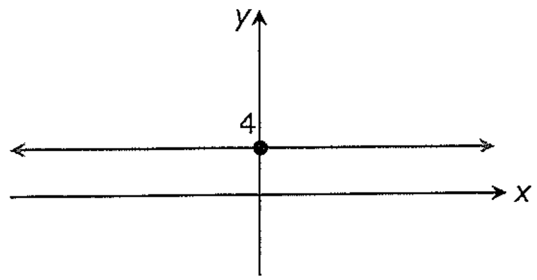
3. Manipulate the following into **general form**: $-3x + 4y = \frac{1}{2}$

4. Write the line with the following conditions into **point-slope form**: passes through $\left(-7, \frac{1}{2}\right)$ and has a slope of 9.

5. Write the equation of the line shown in **standard form**:



6. In **general form**, write the equation of the line that is perpendicular to the line shown and passes through the point (-5, 8).



7. In **general form**, write the equation of the line that passes through the points (-5, -1) and (4, 5).

8. Write the equation of the line whose y-intercept is -6 and whose x-intercept is 2 in **standard form**.

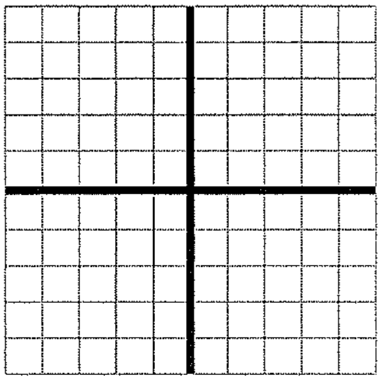
9. If line $a||b$ and line a has the equation $5x - 6y - 10 = 0$, determine the equation of line b, in **point-slope form**, if b passes though (1, -2).

Practice: Graphing Inequalities

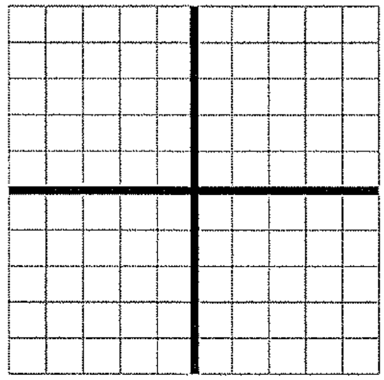
Solid or dotted? Where to shade? FLIP THE SWITCH?

A) Write the related equation and sketch.
B) Select test points in each resulting region and shade accordingly.

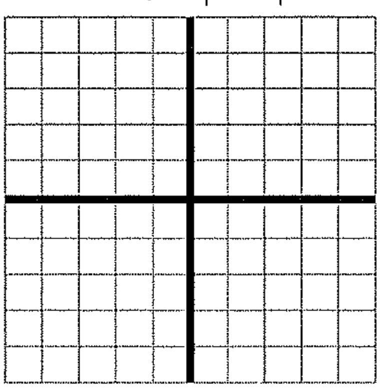
1. Sketch: $x - 2y < 4$



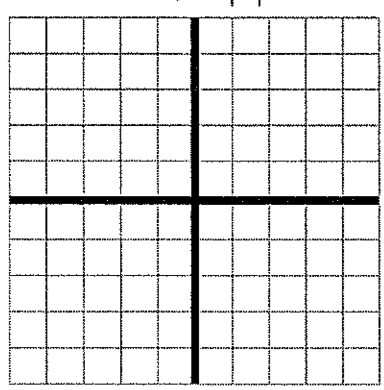
2. Sketch: $x < 4$



3. Sketch: $y \geq |x - 1| - 2$



4. Sketch: $y + |x| \leq 4$



Practice: Domain and Range from a Graph

Key Concept: to determine the domain and range given a sketch.

1. When determining the domain by analyzing a sketch, you must scan the sketch from

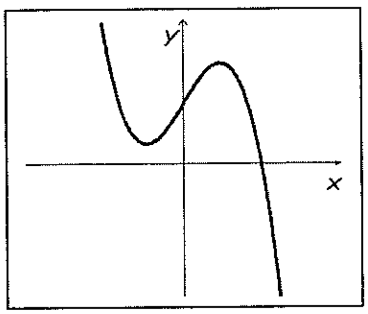
_______________ to _______________ to see where the _____-values exist.

2. When determining the range by analyzing a sketch, you must scan the sketch from

_______________ to _______________ to see where the _____-values exist.

Using interval notation, give the **domain** and **range** by analyzing the sketch.

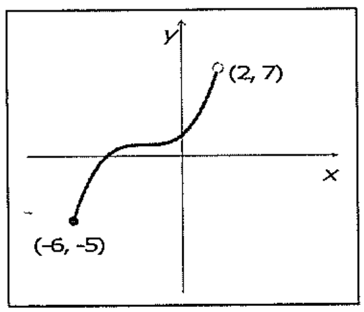
3.



D:____________________

R:____________________

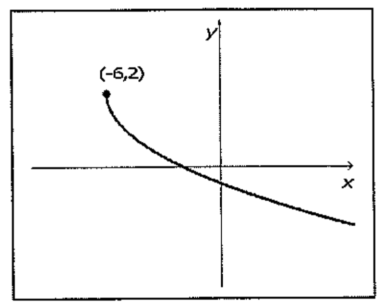
4.



D:____________________

R:____________________

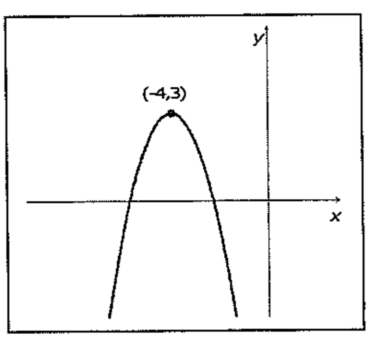
5.



D:____________________

R:____________________

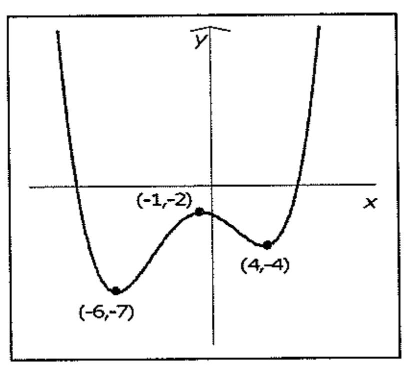
6.



D:____________________

R:____________________

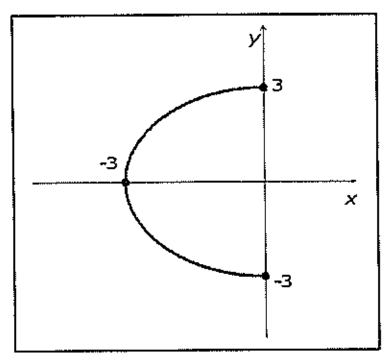
7.



D:____________________

R:____________________

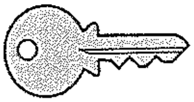
8.



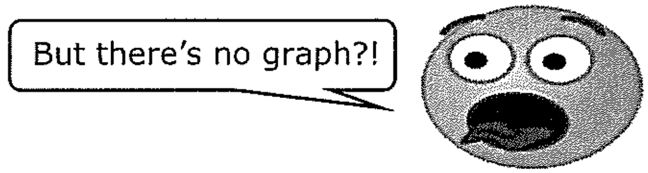
D:____________________

R:____________________

Practice: Finding Domain of an Expression



Key concept: For what value(s) of x will the given expression yield a *real* number output?



Two Rules:

1. denominator $\neq 0$
2. if $\sqrt[even]{R}$, then $R \geq 0$

Find the domain of each expression. Express solution using **interval notation.**

1. $5x^2 + 2x - 1$

2. $\dfrac{4}{x}$

3. $\dfrac{3x}{x+5}$

4. $\sqrt{x-10}$

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

6. $\dfrac{\sqrt{x-1}}{x-4}$

7. $\sqrt{x}$

8. $\dfrac{5}{x^2 - 25}$

9. $\sqrt{2-3x}$

10. $\dfrac{1}{\sqrt{8-x}}$

Practice: 2x2 Systems

I. Solve each system by **elimination**. Express your solution as an ordered pair [i.e. (-3, 6)]

1. $4x - 5y = 17$
   $3x + 4y = 5$

2. $\frac{2}{5}x + \frac{9}{5}y = 8$
   $1.2x + 3.4y = 16$

II. Solve each system by **substitution**. Express your solution as an ordered pair.

3. $2x + y = 11$
   $6x - 2y = -2$

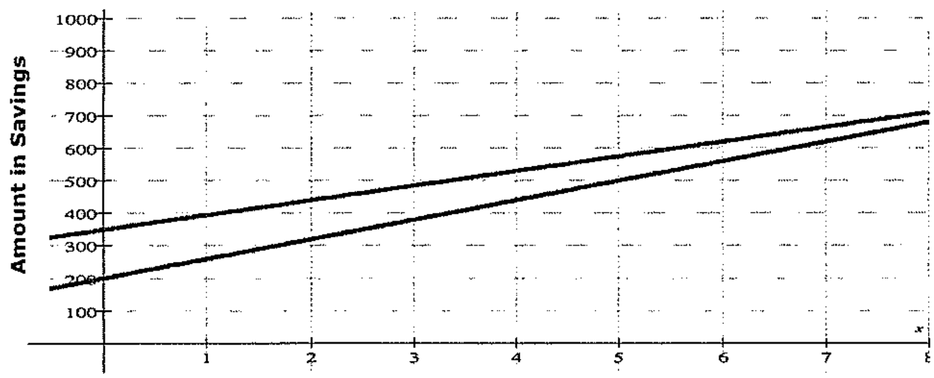
4. $6x + 3y = 12$
   $2x = 8 - y$

III. 2 x 2 Applications

For the following word problems, create a legend that defines 2 variables, set-up a system of equations and solve the system using a method of your choice. Express your solution using a complete sentence.

5. 35 lights are needed to light up the stage in The Lion King on Broadway. Only 100 watt and 150 watt fixtures are available. The total allowable wattage is 4000 watts. How many of each type of fixture will be used?

6. On January 1st, Heather has $200 in her bank account, and earns $60 per week babysitting. On January 1st of the same year, Sally has $350 in her bank account, and earns $45 per week working at Dairy Queen.



Using *slope-intercept form, (y=mx+b)*, write a linear function describing the amount of money in each girl's bank account as a function of time (in weeks).

a. Linear model for **Heather**:

b. Linear model for **Sally**:

c. In which week will the girls have the **same** amount of money in their accounts?

d. What is the amount of money in each girl's account at the week when the amounts are the same?

e. Which girl has more money after 15 weeks? How much more money does the girl with the larger account have over the girl with the lesser amount at this time?

Calculator Review

The calculator required for any level of algebra 2 is the Texas Instrument, TI-84 (either plus, silver edition, or CE is fine).

Practice Graphing Functions

Activity I:
Go to Y = screen

Let $Y_1 = 2x + 7$

Let $Y_2 = x^3 - 5x^2 + 4x - 8$ (either ^3 or MATH, option 3: ^{3})

Find a viewing window that shows where the two graphs intersect.
(press WINDOW and adjust parameters as needed)

1. Find the point of intersection, rounding to the nearest hundredth.
   (2nd, TRACE, option 5:intersect)

2. Find the x-intercept of $Y_1 = 2x + 7$ (2nd, TRACE, option 2:zero)

3. Find the x-intercept of $Y_2 = x^3 - 5x^2 + 4x - 8$ (2nd, TRACE, option 2:zero)

Go to Y = screen

Let $Y_3 = |x - 1|$ (MATH, NUM, option 1:abs)

4. Find the points (*ordered pair*) where the absolute value graph intersects Y_1 and Y_2.

Activity II:
Go to Y = screen

Let $Y_1 = 0.5x - 12$

Let $Y_2 = 0.1x + 20$

Find a viewing window that shows where the two graphs intersect.
(press WINDOW and adjust parameters as needed)

5. Find the point of intersection, rounding to the nearest hundredth.
   (2nd, TRACE, option 5:intersect)

Practice with the Fraction Template

Activity III:
Go to calculating screen (2nd, MODE)

Press ALPHA , Y =, option 1:n/d

6. Type in and evaluate: $\frac{-3+\sqrt{10}}{4}$ rounding to the nearest hundredth.

Flip WS: Monomials – Rules of Exponents

Defn.: a **monomial** is an expression that is a number, a variable, or the product of a number and a variable.
Monomials can **not** contain variables in denominators, variables with negative exponents, or variables under radicals.

Defn.: a **constant** is a monomial that contains no variables.

Defn.: a **coefficient** in the number that proceeds a variable.

Defn.: the **degree** of a monomial is the sum of its exponents.

Video 1: 5:43
Video 2: 10:03

RULES OF EXPONENTS

$x^0 = 1$	Anything raised to the power of zero equals 1. ($x \neq 0$)
$x^a \cdot x^b = x^{a+b}$	When multiplying powers of the *same* base, retain the base and **add** the exponents.
$\frac{x^a}{x^b} = x^{a-b}$	When dividing powers of the *same* base, retain the base **subtract** the exponents.
$(x^a)^b = x^{a \cdot b}$	When raising a power to a new power, **multiply** the exponents.
$(xy)^a = x^a \cdot y^a$	When several factors are raised to a power, each factor will feel the effect of the exponent.
$\left(\frac{x}{y}\right)^a = \frac{x^a}{y^a}$	When a fraction is raised to a power, both the numerator and denominator will feel the effect of the exponent.
$x^{-a} = \frac{1}{x^a}$; $x^a = \frac{1}{x^{-a}}$	When a term is raised to a negative exponent, the term is sent to the denominator, and the exponent changes sign (from negative to positive) and vice-versa.
$\left(\frac{x}{y}\right)^{-a} = \left(\frac{y}{x}\right)^a$	When a fraction is raised to a negative exponent, the fraction flips and the exponent changes sign.

For #s 1-10, simplify on your own. Check your answers by watching the video link on MATHCamp321.

1V. **[video 1]** $(-2a^3b)(-5ab^4)$

2V. **[video 1]** $\frac{s^2}{s^{10}}$

3V. **[video 1]** $\frac{10^{(x-3)(x+3)}}{10^{x^2-6}}$

4V. **[video 1]** $(b^2)^3$

5V. **[video 2]** $\left(-3c^2d^5\right)^3$

6V. **[video 2]** $\left(\frac{x}{3}\right)^{-4}$

7V. **[video 2]** $\left(\frac{-3a^{5y}}{a^{6y}b^4}\right)^5$

8V. **[video 2]** $\left(\frac{-4a^{-3}b^6}{7c^{-3}a^4}\right)^{-2}$

9V. **[video 2]** $\frac{x^0+20y^0-36}{-2\left(x^0y^0\right)}$

10V. $\left(5a^4\right)\left(-4a^6\right)\left(-a^3\right)^2-\left(-2a\right)^4\left(-a^2\right)^6$

11. Express in scientific notation:
    a. 4,560,000
    b. 0.000092

12. Evaluate using scientific notation:
    a. $\left(5\times10^3\right)\left(7\times10^8\right)$
    b. $\left(1.8\times10^{-4}\right)\left(4\times10^7\right)$

Practice: Polynomials – Operations

Defn.: a **polynomial** is a monomial or a sum of monomials.

Defn.: the **terms** are the monomials that make up a polynomial.

Defn.: a **binomial** is a polynomial with 2 terms.

Defn.: a **trinomial** is a polynomial with 3 terms.

Defn.: the **degree** of a polynomial is the degree of monomial of highest degree.

Video 1: 12:41 (#s 1-15 ODD)
Video 2: 7:14 (#s 17-23 ODD)

Simplify on your own. Check your answers by watching the video link on MATHCamp321.

1V. $(3x^2+4)-(5x-2)$

3V. $-(y^2+2y-3)+(5y^2+3y+4)$

5V. $2x(x^2-x+3)$

7V. $(2-x-3x^2)(5x)$

9V. $(2x+3)(4x+1)$

11V. $(3x-y)(3x+y)$

13V. $(3-5x)^2$

17V. $(2u-v)^3$

Flip WS: FACTORING POLYNOMIALS

Video 1 [12:14]

Video 2 [14:35]

Factoring Methods

① GCF – ★*greatest common factor*
② DOTS – *difference of two squares*
③ SOC/DOC – *sum of cubes / difference of cubes*
④ FAST – *factoring a simple trinomial - trinomial factoring w/ leading coefficient = 1*
⑤ Nobes' – *trinomial factoring w/ leading coefficient ≠1*
⑥ PST – *perfect square trinomial*
⑦ *grouping*

Factor completely. Check your answers by watching the video link on MATHCamp321.

1. $25a^6b^5c^7 - 35a^4b^5c^3 + 15a^5b^6c^4$

2V. $a^2(x-2y) - b(x-2y) - (x-2y)$

3V. $4a^2 - 81b^2$

4. $16x^4 - 25y^2$

5V. $9-(3x+2)^2$

6V. $8x^3 - 1$

(#s 6V-8V ENRICHMENT)

7V. $64y^6 + 27x^3$

8V. $1000 - 343z^3$

9V. $x^2 - 9x - 36$

10. $y^2 + 3y - 28$

11V. $z^2 + 25z + 100$

12. $a^2 - 5ab + 6b^2$

13V. $2x^2 + x - 6$

14. $10x^2 + 21x - 10$

15V. $12y^2 - 13y + 3$

16. $12x^2 + 23xy + 10y^2$

17V. $x^2 - 8x + 16$

18. $y^2 + 10y + 25$

19V. $a^2 - 18ab + 81b^2$

20. $36x^2 + 60x + 25$

21V. $xy^2 + x - 2y^2 - 2$

22. $a^3 + 3a^2b - 2ab - 6b^2$

Practice: Composition of Functions

I. Consider two parent functions: $f(x) = x^2 - 1$ and $g(x) = x + 2$
For questions 1-5, evaluate each composition, indicating *real* answers only.

1. $f(g(0)) =$

2. $g(f(0)) =$

3. $f(g(3)) =$

4. $g(g(1)) =$

5. $f(g(f(g(0)))) =$

II. Using the two parent functions from above, find each composition.

6. $f(g(x)) =$

7. $g(f(x)) =$

Practice: Rational Square Roots and Radicals

Objective: *To find square roots of numbers that have rational square roots.*

Find each square root.

1. $\sqrt{13^2}$

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

3. $\sqrt{17^2 - 8^2}$

4. $\sqrt{5^2 + 12^2}$

Quotient Property of Square Roots

For any nonnegative real numbers *a* and *b*: $\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$

5. $-\sqrt{\frac{1}{100}}$ 6. $\pm\sqrt{\frac{49}{9}}$ 7. $\sqrt{\frac{32}{50}}$ 8. $-\sqrt{\frac{125}{5}}$

Practice: Irrational Square Roots

Objective: *To simplify radicals and to find decimal approximations of irrational roots.*

•One way to calculate $\sqrt{24}$ would be to use the calculator and give a decimal approximation. For our class, we will use the nearest hundredth. $\sqrt{24} \approx 4.899$

• Another way to calculate $\sqrt{24}$ would be to use a process called **simplest radical form**.

Product Property of Square Roots

For any nonnegative real numbers *a* and *b*: $\sqrt{ab} = \sqrt{a} \cdot \sqrt{b}$

Procedure:
1. To find simplest radical form, start by making an organized list of factor pairs.
2. Pick the pair that contains the **LARGEST** perfect square.
3. Write this pair under the radical with the perfect square written first.
4. Take the square root of each factor.

$\sqrt{24}$

①	24
2	12
3	8
④	6

$$\sqrt{24} = \sqrt{4 \cdot 6} = \sqrt{4} \cdot \sqrt{6} = 2\sqrt{6}$$

Find each square root. Use simplest radical form for non-perfect squares.

9. $\sqrt{75}$ 10. $\sqrt{32}$ 11. $\sqrt{48}$

12. $\sqrt{72}$

13. $6\sqrt{45}$

14. $5\sqrt{28}$

Practice: Solving Basic Quadratic Equations

Rule: For any real numbers *a* and *b*:
if $a^2 = b^2$, then $a = \pm b$

Samples that require you to **solve** (be sure to isolate the squared term first):

15. $x^2 = 16$

16. $3a^2 = 75$

17. $c^2 = 12$

18. $d^2 - 121 = 0$

Practice: Multiplying and Dividing Radicals

Objective: *To simplify products and quotients of radicals.*

Rule: When multiplying radicals, multiply the numbers on the **OUTSIDE** together, then multiply the numbers on the **INSIDE** of the radical together and simplify if possible.

Multiply.

19. $3\sqrt{2} \cdot 5\sqrt{2}$

20. $-\sqrt{3} \cdot 2\sqrt{3}$

21. $\sqrt{2} \cdot \sqrt{50}$

22. $2\sqrt{5} \cdot 6\sqrt{8}$

23. $\left(2\sqrt{3}\right)^2$

When is a radical expression simplified?
1) no number under the radical can be simplified
2) no fractions are under a radical sign, and
3) no radicals are in a denominator.

The process by which we eliminate the radical in the denominator is called **rationalizing the denominator.**

Simplify, leaving no radical in the denominator.

24. $\frac{4}{\sqrt{6}}$

25. $\frac{1}{\sqrt{3}}$

26. $\frac{2}{\sqrt{10}}$

27. $\frac{5}{\sqrt{5}}$

28. $\sqrt{\frac{5}{12}}$

29. $\sqrt{\frac{3}{8}}$

Practice: Combining Radicals

Objective: *To combine (add and/or subtract) radicals.*

Rule: Make sure each radical is in ***simplest form*** and only combine those radicals whose radicands are '***like***.'

Combine.

30. $20\sqrt{2} - 5\sqrt{2} - 3\sqrt{2}$

31. $\sqrt{16} + 2\sqrt{25}$

32. $\sqrt{28} + \sqrt{63}$

33. $\sqrt{45} + \sqrt{80}$

Flip WS: Graphing Quadratic Functions

<u>Defn.</u>: A **quadratic function** has the form $f(x) = ax^2 + bx + c$.
ax^2 is called the **quadratic term**, bx is called the **linear term** and c is the **constant**.

- The graph of a quadratic function is called a **parabola**.
  Some of the parabolas we will study will open upwards while others will open downwards. Parabolas have an axis of symmetry which runs through the vertex and splits the parabola in half.

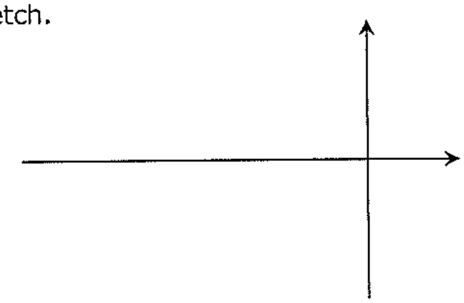
- The x-coordinate of the vertex can be found using the formula: $\frac{-b}{2a}$.

1V. Determine a, b, and c for $f(x) = x^2 + 3x - 1$.
Then determine the vertex and create a table of 5 values.
Find the y-intercept and identify the axis of symmetry. Sketch.

$a =$
$b =$
$c =$

x-coordinate of vertex ⇒

x	y



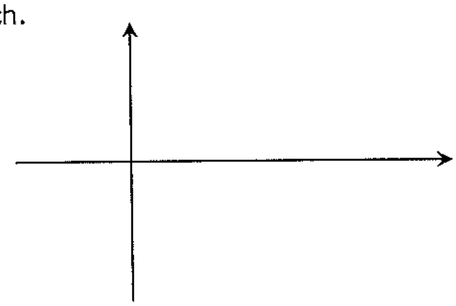
<u>Independent Practice</u>:

2. Determine a, b, and c for $f(x) = 2 - 4x + x^2$.
Then determine the vertex and create a table of 5 values.
Find the y-intercept and identify the axis of symmetry. Sketch.

$a =$
$b =$
$c =$

x-coordinate of vertex ⇒

x	y



- For $f(x) = ax^2 + bx + c$,
  if $a > 0$, then the parabola will open **upward** and the vertex will be a **minimum**.
  if $a < 0$, then the parabola will open **downward** and the vertex will be a **maximum**.

3. Consider $f(x) = -x^2 + 2x + 3$. Determine whether the function has a minimum or maximum value. Find the value of the minimum or maximum.

Practice: Solving Quadratic Equations by Factoring

Zero Product Property: for any real numbers *a* and *b*, if $ab = 0$, then either $a = 0$, $b = 0$, or both *a* and *b* equal 0.

Use **factoring** to solve to solve each quadratic equation.

1. $x(x-6)=0$
2. $x^2+10x=0$
3. $x^2=x$
4. $x^2=9$
5. $x^2-25=0$
6. $4x^2-9=0$
7. $x^2-x-6=0$
8. $x^2-8x+15=0$
9. $x^2+14x=32$
10. $3x^2-5x-2=0$
11. $6x^2+7x+2=0$
12. $2x^2-x=3$

Practice: Solving Quadratic Equations by Completing the Square

Procedure for completing the square:

❶ Manipulate the equation so that the leading coefficient is positive one.
❷ Isolate the constant.
❸ Take ½ of the coefficient of the linear term.
❹ Square the result of step 3 and add to both sides of equation.
❺ Factor the left side as a PST and square root both sides.

Use **completing the square** to solve each quadratic equation.

1. $x^2 - 6x - 1 = 0$

2. $x^2 + 2x = 7$

3. $x^2 + x - 1 = 0$

4. $2x^2 - 12x - 6 = 0$

Practice: The Quadratic Formula

If $ax^2+bx+c=0$, then $x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$

Procedure: (1) set equation = 0, (2) identify *a*, *b*, *c* and (3) use formula.

Use the **quadratic formula** to solve to solve each quadratic equation.

1. $x^2+2x-8=0$

2. $2x^2-9x+10=0$

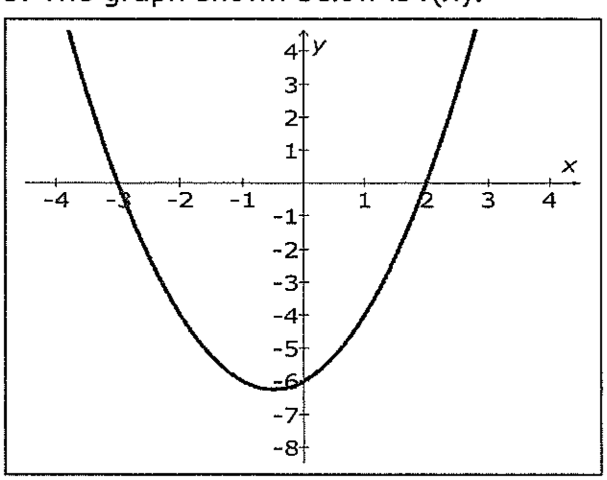
3. $x^2+2x=2$

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

Practice: Quadratic Graph Analysis

Use the graphs shown below to answer each question. Use **interval notation**, where appropriate.

5. The graph shown below is $f(x)$.



a. For which x-values does $f(x)=0$?

b. Give the interval for which $f(x)\geq 0$:

c. Give the interval for which $f(x)<0$: