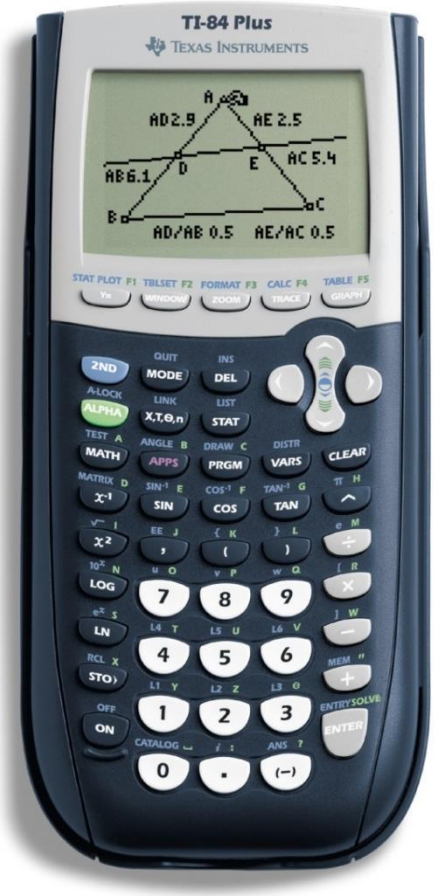
Summer Review for Students Entering Algebra 2

1. Solving Equations
2. Writing the Equation of a Line
3. Solving Systems of Linear Equations
4. Multiplying Polynomials
5. Factoring Polynomials
6. Solving Quadratic Equations
7. Radicals
8. Laws of Exponents
9. The Pythagorean Theorem
10. Absolute Value Equations
11. Domain and Range



All Algebra 2 students are required to have a TI 84-Plus Graphing Calculator for this course.

The calculator will be used throughout this course and in future math courses.

Please keep your eyes open for sales and purchase one before school begins.

This packet will be collected the 2nd day of class AND you may be given a quiz on the material, sometime within the first two weeks of school.

Solving Equations. Solve each equation. SHOW ALL WORK.

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

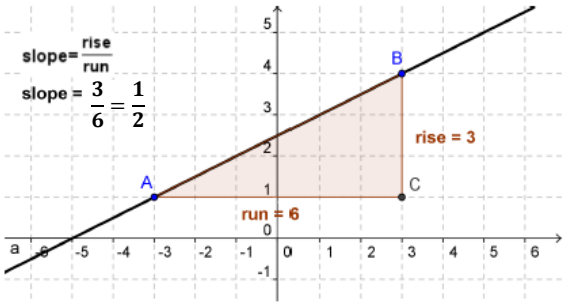
2. $3(2x - 1) + 4 = 3x + 5 + x$

3. $2(4x - 1) - 2(3x + 6) = 15$

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

Writing the Equation of a Line

SLOPE $= \frac{\Delta y}{\Delta x} = \frac{change\ in\ y}{change\ in\ x}$



EQUATION OF A LINE → $y = mx + b$

slope *y-intercept*

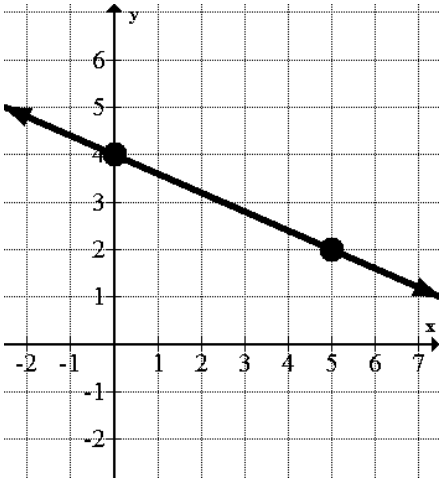
To find the equation of a line:

1) Find the slope.
2) Substitute one point and the slope into the equation of the line and solve for b.
3) Rewrite the equation, only substituting in the slope and the y-intercept.

If you are doubling up and taking Geometry and Algebra 2 at the same time, you can skip the next three problems.

WRITING THE EQUATION OF A LINE. Find the equation of each line described/shown. SHOW ALL WORK.

5.



6. Write the equation of the line with a slope of $\frac{3}{4}$, passing through the point $(8, 5)$.

7. Write the equation of the line passing through the points $(3, -1)$ and $(-2, -6)$.

EQUATION: _____ EQUATION: _____ EQUATION: _____

Solving Systems of Linear Equations→ A system of equations is two or more equations with two or more variables. There are four methods for solving systems of equations:

1) Graphing
2) Equal Values
3) Substitution
4) Elimination

There are A LOT of YouTube videos on all of these methods. If you need a refresher on one or more of these methods, please find a video or two to watch.

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SOLVING SYSTEMS OF LINEAR EQUATIONS. Solve each system of equations below using any method you choose. SHOW ALL WORK.

8. $y = 1x + 7$
$y = 2x + 2$

9. $x + y = 21$
$4x + 2y = 56$

10. $3x + 5y = -4$
$4x - 3y = -15$

Multiplying Polynomials

In Algebra 1, you learned two methods for multiplying polynomials:

1) Distributive Property (used to multiply ONE term times a polynomial)
2) Generic Rectangle (used to multiply a polynomial times a polynomial)

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MULTIPLYING POLYNOMIALS. Multiply by using the distributive property or by using a generic rectangle. SHOW ALL WORK.

11. $4x(2x-1)$ **12.** $(3x+1)(x-4)$ **13.** $(2x-3)(4x-5)$

Factoring Polynomials

In Algebra 1, you learned two methods for factoring.

1) GCF → Take out the greatest common factor
2) Diamond and Rectangle → Expression must look like ax^2+bx+c. Find the outside of the generic rectangle

EXAMPLE: Factor $3x^2+9x+6$.

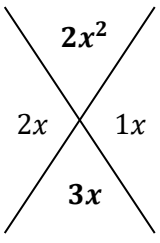
STEP 1: Take out the GCF.

$3(x^2+3x+2)$

STEP 2: Factor x^2+3x+2 using the diamond and rectangle.

	2
x^2	

STEP 1: Put ax^2 and c terms in opposite corners of the generic rectangle.



STEP 2: Multiply ax^2 and c . . . put them in top of diamond. Put bx in the bottom of the diamond. Find the two missing terms for the diamond.

$2x$	2
x^2	$1x$

STEP 3: Put the terms from the diamond into the generic rectangle. Find the outside numbers.

2	$2x$	2
x	x^2	$1x$
	x	1

STEP 4: Write the factored form.

$3(x+2)(x+1)$

If you are doubling up and taking Geometry and Algebra 2 at the same time, you can skip the next three problems.

FACTORING POLYNOMIALS. Factor completely. SHOW ALL WORK.

14. $3x^2 + x - 10$ **15.** $8x^2 + 28x + 12$ **16.** $4x^2 - 25$

Solving Quadratics

STEP 1: Make the quadratic equation = 0.
STEP 2: Factor the polynomial.
STEP 3: Use the Zero Product Property to solve for x. (Set each factor = 0)

EXAMPLE: Solve $x^2 + 7x + 15 = 3$

$-3 \quad -3$

$x^2 + 7x + 12 = 0$
$(x + 3)(x + 4) = 0$ ← Factor using a generic rectangle. (Work not shown.)

$x + 3 = 0 \qquad x + 4 = 0$
$-3 \quad -3 \qquad -4 \quad -4$

$x = -3$ or $x = -4$

SOLVING QUADRATICS. Solve the following quadratic equations. SHOW ALL WORK.

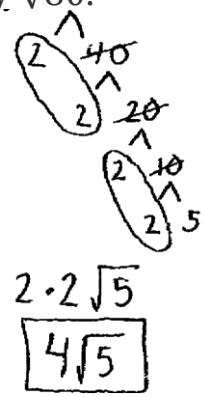
17. $x^2 + 5x + 6 = 0$ **18.** $2x^2 + 4x - 7 = -1$

Simplifying Radicals→ Simplifying a radical DOES NOT mean to turn it into a decimal.

METHOD #1: FACTOR TREES

STEP 1: Create a factor tree for the number inside the radical. (Cross out any numbers that you break down).
STEP 2: Circle numbers in PAIRS.
STEP 3: The numbers that you circle go in front of the radical (1 number per circle). The numbers that aren't crossed out or circled, stay inside the radical.
STEP 4: Multiply the outside numbers. Multiply the inside numbers.

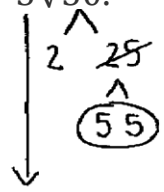
EXAMPLE: Simplify $\sqrt{80}$.



$2 \cdot 2\sqrt{5}$

$\boxed{4\sqrt{5}}$

EXAMPLE: Simplify $3\sqrt{50}$.



$3 \cdot 5\sqrt{2}$

$\boxed{15\sqrt{2}}$

METHOD #2: PERFECT SQUARES

STEP 1: Rewrite the radical as the product of a perfect square and another number.
STEP 2: Find the square root of the perfect square.

EXAMPLES:

$$\sqrt{45} = \sqrt{9 \cdot 5}$$
$$= \sqrt{9} \cdot \sqrt{5}$$
$$= 3\sqrt{5}$$

$$\sqrt{72}$$
$$= \sqrt{36} \cdot \sqrt{2}$$
$$= 6\sqrt{2}$$

If you are doubling up and taking Geometry and Algebra 2 at the same time, you can skip the next three problems.

SIMPLIFYING RADICALS. Simplify each radical. SHOW ALL WORK.

19. $\sqrt{180}$ **20.** $5\sqrt{40}$ **21.** $7\sqrt{24}$

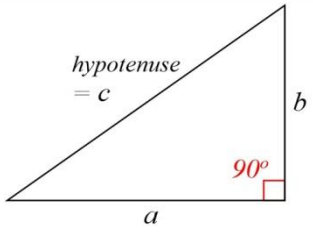
Laws of Exponents

$x^a \cdot x^b = x^{a+b}$ $\quad (x^a)^b = x^{ab}$ $\quad \frac{x^a}{x^b} = x^{a-b}$ $\quad x^0 = 1$ $\quad x^{-a} = \frac{1}{x^a}$

LAWS OF EXPONENTS: Use the laws of exponents to simplify each expression. Your final answer should NOT have negative exponents in it. SHOW ALL WORK.

22. $(3x^6y^8)(2x^4y)$ **23.** $(4x^3y^{-2})^4$ **24.** $\frac{6x^5y^{10}z^7}{2x^5y^6z^{12}}$ **25.** $\frac{(x^3y^5)(x^4y^{10})}{(x^5y^2)^3}$

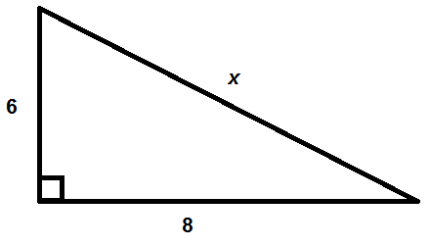
The Pythagorean Theorem → The Pythagorean Theorem can used to solve for the missing side lengths in any right triangle.



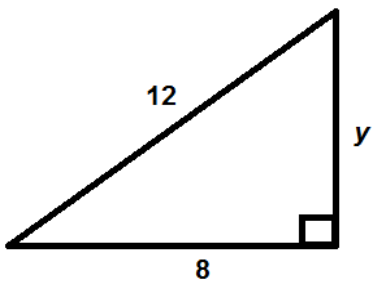
$$c^2 = a^2 + b^2$$

THE PYTHAGOREAN THEOREM. Use the Pythagorean Theorem to find the missing side of each right triangle. Write your answers in simplified radical form. SHOW ALL WORK.

26.



27.



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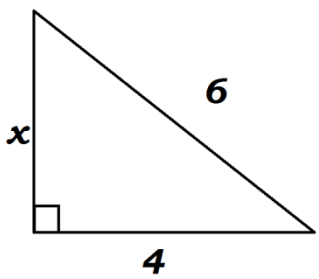


Solving Absolute Value Equations → Absolute value equations can have 0, 1, or 2 solutions.

STEP 1: "Isolate" the absolute value on one side of the equation.
STEP 2: If the absolute value equals a positive number, rewrite the absolute value equation as two equations.
- Inside = positive #
- Inside = negative #
- NEVER change the inside expression

STEP 2a: If the absolute value equals zero, set the inside equal to zero.
STEP 2a: If the absolute value equals an negative number, there is no solution.
STEP 3: Solve the equation(s).

EXAMPLE: Solve $5|2x + 3| - 6 = 29$

$$+6 \quad +6$$

$$\frac{5|2x+3|}{5} = \frac{35}{5}$$

$$|2x + 3| = 7$$

$$2x + 3 = 7 \qquad 2x + 3 = -7$$
$$2x = 4 \qquad 2x = -10$$
$$x = 2 \quad or \quad x = -5$$

SOLVING ABSOLUTE VALUE EQUATIONS. Solve each equation below. SHOW ALL WORK.

29. $|3x - 5| = 16$ **30.** $2|x + 1| - 7 = 13$ **31.** $5|2x + 7| + 12 = 7$

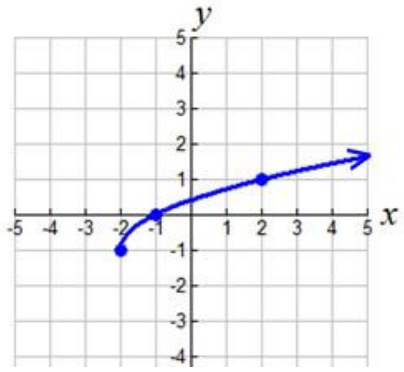
Domain and Range

DOMAIN: the input or "x" values

RANGE: the output or "y" values

DOMAIN AND RANGE. Identify the domain and range of each relation.

32.



Domain: _____

Range: _____

33.

x	*y*
-3	19
5	19
18	0
2	-6

Domain: _____

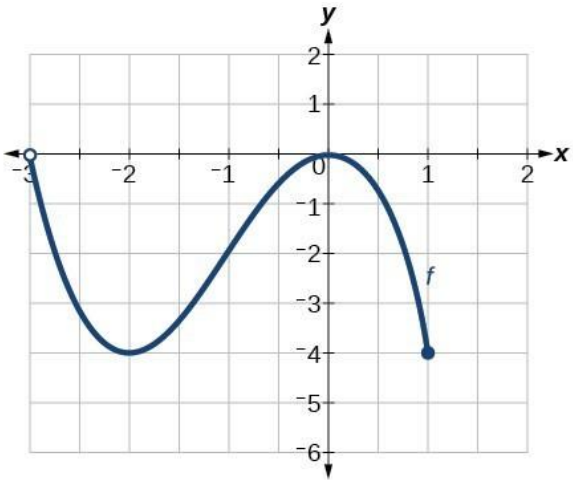
Range: _____

34. $\{(-2,0),(0,6),(2,12),(4,18)\}$

Domain: _____

Range: _____

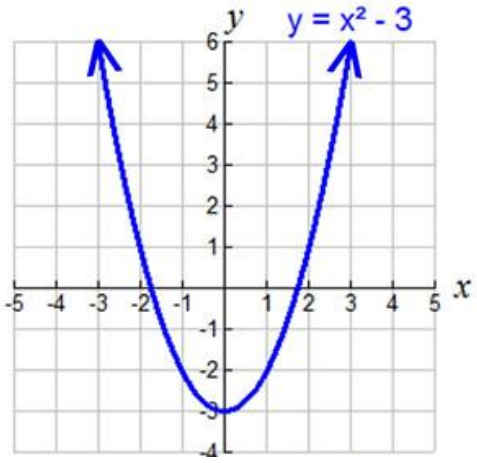
35.



Domain: _____

Range: _____

36.



Domain: _____

Range: _____

SOLUTIONS:

1. $x = \frac{20}{21}$

2. $x = 2$

3. $x = \frac{29}{2}$ *or* 14.5

4. $x = \frac{46}{9}$ *or* $5.\overline{1}$

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

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

7. $y = 1x - 4$

8. $(5, 12)$

9. $(7, 14)$

10. $(-3, 1)$

11. $8x^2 - 4x$

12. $3x^2 - 11x - 4$

13. $8x^2 - 22x + 15$

14. $(3x - 5)(x + 2)$

15. $4(2x + 1)(x + 3)$

16. $(2x + 5)(2x - 5)$

17. $x = -3$ *or* -2

18. $x = -3$ *or* 1

19. $6\sqrt{5}$

20. $10\sqrt{10}$

21. $14\sqrt{6}$

22. $6x^{10}y^9$

23. $\frac{256x^{12}}{y^8}$

24. $\frac{3y^4}{z^5}$

25. $\frac{y^9}{x^8}$

26. 10 *units*

27. $4\sqrt{5}$ *units*

28. $2\sqrt{5}$ *units*

29. $x = -\frac{11}{3}$ *or* 7

30. $x = -11$ *or* 9

31. *No solution*

32. D: -2 *and above*
R: -1 *and above*

33. D: $-3, 2, 5, \& 18$
R: $-6, 0, \& 19$

34. D: $-2, 0, 2, \& 4$
R: $0, 6, 12, \& 18$

35. D: -3 *to* 1, *incl.* 1
R: -4 *to* 0, *incl. both*

36. D: *All real #s*
R: -3 *and above*