Secondary Math 1

Text & Reference Manual

Term 1

(includes: Grading Policies, Scope and Sequence, Targets and Study Guide).

This is a booklet to help bridge the,gap between parents, students and teacher

Name: Key

Teacher: _____ **Class Period:** _____

Term 1: August 22nd – October 18th

Study Guide Grades	
Unit 1: Linearity Review Study Guide	
Unit 2: Equations Study Guide	
Unit 3: Inequalities Study Guide	

Secondary Math 1—Disclosure Document 2017—2018

Secondary Math 1 includes Algebra mixed with Geometry concepts. **STUDENTS MUST DO THEIR HOMEWORK IF THEY EXPECT SUCCESS FROM THIS CLASS**. Math is challenging. Expect to work.

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We are very accessible by email and will always respond as soon as receiving the message. If we do NOT respond within one day, please email us again as we probably didn't get it. **Skyward does not always link to email**. We will not ignore your email and want to help you and your child.

Class Needs

*3-Ring 1.5" Binder (Dedicated to only Math)
*Dividers (4)
  Notes/Vocabulary
  Booklets
  Tests/EMT's/Quizzes
  Assignments
  (We will ask that a parent or guardian perform a periodic binder check. This will help parents know what is expected and what is lacking.)
*Pencils (**Work in pen will NOT be accepted**)
*Small pencil sharpener (Opt)
*Red Pen (Opt)
*Compass and Protractor. Each student MUST have these tools. Compasses can be purchased at the school for $4.

General Rules

School rules will be enforced.
No electronic devices or accessories (Will be confiscated by teacher.)
Cheating will not be tolerated. This means "sharing" homework. Students will receive an automatic zero for cheating.
No Gum, Food or Drinks (Except for clear water in bottles.)
No Bathroom/Drink Breaks (except for emergencies).
NO work in pen accepted—EVER. (Notes OK.)

Grade Breakdown.

100-93%	A	89-87%	B+	82-80%	B−	76-73%	C	69-67%	D+	62-60%	D−
92-90%	A−	86-83%	B	79-77%	C+	72-70%	C−	66-63%	D	59-0%	F

Grading

The following categories are broken down below.

Assignments:	30%
Quizzes:	10%
Unit Tests (UT):	35%
Term Final:	15%
Participation:	10%

Quizzes—10% of grade
Given most days to review content. Students can correct answers to earn ½ of the missed points back.

Assignments—30% of grade
*Assignments are expected to be accurate & **FULLY** completed. Failure to do so will result in points docked. If assignments are less than 80% correct, students will be required to **Re-Do** (**RD**) the assignment. **Not Done (ND)** incomplete assignment.

*Assignments are expected to be **ON TIME** (at the **beginning of class**). Turning in assignments at the END of class counts as being late! Failure to do so will also result in point docked.
Beginning of Class with 80%+ Accurate: 100%
  RD & turned in before EMT: 100%
  RD & turned in after EMT: 80%
End of day with 80%+ Accurate: 90%
Late, turned in before **UT** with 100% Accurate: 70%
Late, turned in after **UT** with 100% Accurate: 50%
Late, after the term final – 0%

*Teacher will mark on the top of the paper.
***All assignments must be done in pencil and show work. If students do not show their work, credit will NOT be awarded.**

Unit Test's—35% of grade
Students must pass **EVERY** Unit Test with a minimum of 80%. Students can retest, but retakes will be averaged. 1st retake: 75% minimum average. 2nd retake: 70% minimum average. etc.

***To retake any test, ALL missing assignments related to that unit must be completed and turned in. Students must correct all missed test questions for test corrections. Additional work may be required if the retake is not passed.**

Term Final—15% of grade
Each term will end with a final test that is cumulative in nature. **There are no re-takes for a Term Final**.

Participation—10% of grade
Participation is based on how well students ask/answer questions, interact in large & small groups, comment appropriately in class, and contribute to the lesson.

Explanation of Policies and Grading

End of Unit Test is to assess for proficiency. If students do not pass a Unit Test, they are not proficient in that essential area. Students must show competency in all areas to pass the term. Students should work to pass on their first attempt to achieve the best grade possible. Quiz grades and study guides will indicate problem areas to correct before the Unit Test.

Homework is aptly named as students will **"work"** through this at home. Some questions help students practice; some help students think about the content. Students who do the homework the night it is assigned have time to email and/or come in for help. Please encourage your student to establish this study habit. Math is challenging, but we will do all we can to make sure students are properly prepared for class. Students WILL BE SUCCESSFUL if they do their part.

Students will **work in groups**. Please do not request that a student not be required to work in a group. If there is a problem with the group dynamic, this can be addressed and/or changed accordingly. Please make us aware of any problems as soon as possible. Please email us that you have read this document for 5 extra credit points by September 8th. We encourage homework study groups and pizza makes math more fun.

Study Guides are VERY effective and are a summation of each unit. Students should begin working on them right away to become familiar with the content and complete portions as they are introduced or become familiar with the material. They should NOT wait until the night before it is due.

Class work is based on the core focusing on application rather than algorithm. While algorithms provide quick math answers, we want students to process and apply math understanding. Please do not quickly supply the algorithm as this will bypass the learning process. Algorithms are valuable, but students will understand them better and retain them longer through the development process. This is also reflective of the 8 Mathematical Practice Standards outlined in the Utah core listed on the school math site http://www.schools.utah.gov/CURR/mathsec/Core/HighSchoolStandards.aspx

Students can change any failing grade throughout the year. If a grade is not made up within one term, the highest grade awarded will be a D–. Students who do not pass all four terms will be expected to attend **summer school as this could lead to deficient math skills and not graduating from high school**.

Daily openers get students thinking about math and **cannot be made up**. If a student misses an opener because of an excused absence, the grade will be excused. If the absence is unexcused or if the student is tardy, the quiz will count as a zero towards the final grade. Students can correct a quiz and earn at least half of their missing points each day. **This must be done on the day of the quiz BEFORE leaving class.** If the quiz is not turned in, it will receive a zero. No student should ever receive less than 50%.

Students will **not** be allowed to leave class unless it is an emergency. They should not disrupt a lesson to ask to leave. Although school hall passes might be given to students, this does not grant a pass from class.

We update and post grades within two school days. If an assignment is late, the posting may also be late. We will not usually take the time in class to return assignments. **Students must retrieve their work from their class basket.** Since all assignments should be kept in their binders, students should check and bring to our attention any posting discrepancies.

Class, group work, and videos may be posted to the Internet possibly resulting in your student's image being posted in a podcast. If you would prefer that your child's likeness not be used, please contact us.

There are many ways you can help and we welcome the involvement and interaction. If you have any ideas or suggestions, we would love to discuss them with you. Every student who works hard will learn. Some will struggle more than others. That is expected. Math should be challenging and fulfilling. Our goal is for every student to reach his or her potential every year.

Thank you

_____ _____

Parent/Guardian Signature Student Signature

Please review the following policies for Secondary Math 1:

Initial below that you and your student understand the following:

_____ I understand that my student must pass every Unit Test with an 80% or better in order to receive a passing grade.

_____ I understand that practice tests for each Unit Test are **available online** to help prepare for the tests.

_____ I understand that my student may retake any Unit Test as many times as necessary to show understanding of the essential standards in the core.

_____ I understand that traditional textbooks are available upon request.

_____ I understand that unless there are extenuating circumstances, term finals may not be retaken for a higher score.

_____ I understand that homework turned in after the due date will receive a penalty to credit unless excused by the teacher because of absence or other extenuating circumstances.

_____ I understand that homework will no longer be accepted for credit after the assigned day of the term final.

_____ I understand that any failing grade can be made up to a passing grade until the last week of term 4. Missing tests may be taken after the end of any term as needed.

_____ I understand that if my student damages a class-provided supplies or materials a fee will be assessed.

_____ I understand that my student will complete the study guides included in this packet as part of the homework requirement:

I have read and understand the disclosure document.

_____ _____

Parent Signature Student Signature

Mathematical Practice Standards

The Standards for Mathematical Practice in Secondary Mathematics I describe mathematical habits of mind that teachers should seek to develop in their students. By the end of the year, students should demonstrate each of the following:

1. **Make sense of problems and persevere in solving them.** Explain the meaning of a problem and look for entry points to its solution. Analyze givens, constraints, relationships, and goals. Make conjectures about the form and meaning of the solution, plan a solution pathway, and continually monitor progress asking, "Does this make sense?" Consider analogous problems, make connections between multiple representations, identify the correspondence between different approaches, look for trends, and transform algebraic expressions to highlight meaningful mathematics. Check answers to problems using a different method.

2. **Reason abstractly and quantitatively**. Make sense of the quantities and their relationships in problem situations. Translate between context and algebraic representations by contextualizing and decontextualizing quantitative relationships. This includes the ability to decontextualize a given situation, representing it algebraically and manipulating symbols fluently as well as the ability to contextualize algebraic representations to make sense of the problem.

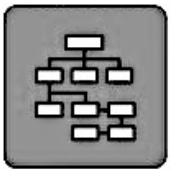
3. **Construct viable arguments and critique the reasoning of others.** Understand and use stated assumptions, definitions, and previously established results in constructing arguments. Make conjectures and build a logical progression of statements to explore the truth of their conjectures. Justify conclusions and communicate them to others. Respond to the arguments of others by listening, asking clarifying questions, and critiquing the reasoning of others.

4. **Model with mathematics.** Apply mathematics to solve problems arising in everyday life, society, and the workplace. Make assumptions and approximations, identifying important quantities to construct a mathematical model. Routinely interpret mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

5. **Use appropriate tools strategically.** Consider the available tools and be sufficiently familiar with them to make sound decisions about when each tool might be helpful, recognizing both the insight to be gained as well as the limitations. Identify relevant external mathematical resources and use them to pose or solve problems. Use tools to explore and deepen their understanding of concepts.

6. **Attend to precision**. Communicate precisely to others. Use explicit definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose. Specify units of measure and label axes to clarify the correspondence with quantities in a problem. Calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context.

7. **Look for and make use of structure.** Look closely at mathematical relationships to identify the underlying structure by recognizing a simple structure within a more complicated structure. See complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, see 5 – 3(x – y) 2 as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.



8. **Look for and express regularity in repeated reasoning.** Notice if reasoning is repeated, and look for both generalizations and shortcuts. Evaluate the reasonableness of intermediate results by maintaining oversight of the process while attending to the details.

Our goal is to help your student to develop and improve each of the above skills beyond simple algorithmic manipulation.

SECONDARY MATH 1 SCOPE AND SEQUENCE 2017-2018 (TERM ONE)

****SUBJECT TO CHANGE****

TERM 1 : Aug 22nd – Oct 18th

UNIT 1—Linearity

Assn	Learning Objective	A Day	B Day	Done	Core Std
OA	Class Procedures, Pre-Assessment & Growing Dots	Aug-22	Aug-23		A.CED.1
1A	Ready, Set and Go – Overview	Aug-24	Aug-25		A.CED.1
1B	Slippery Slopes - Slopes	Aug-28	Aug-29		A.CED.1
1C	Interceptions – X and Y intercepts	Aug-30	Aug-31		A.CED.1
1D	Words—Writing Equations from story problems	Sept-1	Sept-5		G.GPE.5b
1E	Train Tracks - Parallel and Perpendicular	Sept-6	Sept-7		G.GPE.5
1R	Linearity Review	Sept-8	Sept-11		
2B4A	Unit 1 Linearity Unit Test (give 2B4A review for solving equations)	Sept-12	Sept-13		

UNIT 2—Writing and Solving Equations

Assn	Learning Objective	A Day	B Day	Done	Core Std
2A	Solving Equations	Sept-14	Sept-15		A.SSE.1
2B	It's Hip 2B Square	Sept-18	Sept-19		A.REI.4
2C	Translating	Sept-20	Sept-21		A.SSE.1
2D	Writing Story Problems	Sept-22	Sept-25		A.CED.3
2E	Literal Equations and Review	Sept-26	Sept-27		A.CED.4
2R	Unit 2 Review	Sept-28	Sept-29		A.SSE.2
	Unit 2 Equation Test	Oct 2	Oct 3		

UNIT 3—Solving Inequalities

Assn	Learning Objective	A Day	B Day	Done	Core Std
3A	> < Solving one-variable (flipping the sign)	Oct 4	Oct 5		A.CED.1
3B	Solving two-variable inequalities	Oct 6	Oct 9		A.CED.1
T1R	Unit 3 QUIZ and then Term 1 Review	Oct 10	Oct 11		
	Term 1 Final (DEAD Day is the day of the term final)	Oct 12	Oct 13		
	Fall Break (Oct 19-22—Prof. Dev. Day Oct 23)				

LAST DAY TO TURN IN HOMEWORK FOR CREDIT is the day of the in-class term final.

TERM 1 ENDS OCTOBER 18th

Unit 1: Linearity Study Guide

SHOW YOUR WORK FOR FULL CREDIT. NO WORK, NO CREDIT. NO WORK IN PEN.

Targets	Sample Question	Rate your knowledge			Homework
		☹	:/	☺	
Intercepts	Given the following equation, graph and or table determine the y and x-intercepts.				1A, 1C, 1D, 1R
Compare slopes from a combination of equations, graphs, and or tables.	Determine the slope from the following equation, graph and or table. Describe and compare. Explain.				1A, 1B, 1D, 1R
Write equations from story problems in slope-intercept form.	An electrician charges a $25 consultation fee plus $35 per hour for labor. Write an equation in slope-intercept form for the total cost of a job that takes h hours.				1A, 1B. 1D, 1R
Understand parts of slope-intercept equations	Write an equation in slope-intercept form of the line with slope 2 and y-intercept -2.				1A, 1B, 1C, 1D, 1R
Write an equation for parallel lines	Write an equation in slope-intercept form for a line parallel to $y = -\frac{3}{4}x + 3$ through the point $(1, 2)$				1B, 1E, 1R
Write an equation for perpendicular lines	Write an equation in slope-intercept form for a line perpendicular to $y = -3x + 2$				1B, 1E, 1R

Vocabulary and Terms:

Slope: Rate of change, $\Delta y/\Delta x$, $(y_2-y_1)/(x_2-x_1)$, rise/run

Slope-Intercept Form: $y =$ mx+b m is slope b is y-intercept

y *and* x makes the coordinate point (x, y)

To be in slope-intercept form, **"y" must be isolated** and with a coefficient equal to 1

Y-Intercept: where x equals 0 and crosses y-axis. Written as (0, b)

X-Intercept: where y equals 0 and crosses x-axis. Written as ~~(_____, $-(\frac{b}{m})$)~~ Correction $(-(\frac{b}{m}), 0)$

Describe the Slopes of Parallel Lines: Slopes are the same.

Describe the Slopes of Perpendicular Lines: Slopes are negative reciprocals of each other.

The headings of a 4-Column Tables are Indep Var (x) pattern Depar (y) Short hand

Dependent Variable: Affected by the independent variable.

Independent Variable: Not affected by any other variable.

Scale on a coordinate grid: The value of each tic-mark on the x & y axis. or grid line

Find the Equation in Slope/Intercept Form of a Line ***from a Table***

1. Find the slope from the table using $\frac{Change\ in\ y}{change\ in\ x}$ *or* $\frac{\Delta y}{\Delta x}$
2. This will be the m value in the equation $y = mx + b$.
3. Find the y-intercept from the table by extending the table to find y, where x = 0.
4. This will be the b value.
5. Plug each of the values into the y= mx+b form of the equation.

➢ **Find the equation of the line from the table on the right.**

$9 = 5(2) + b$

$-1 = b$

$y = 5x - 1$

$m = 5$

X	Y
2	9
4	19
5	24

2 < > 10

Find the Slope-Intercept Equation ***From two given points***

TABLE METHOD:

1. Put the points in a table leaving space for points above and below.
2. Find the slope from the table using $\frac{Change\ in\ y}{change\ in\ x}$ *or* $\frac{\Delta y}{\Delta x}$
3. This will be the __m__ value in the equation $y = mx + b$.
4. Find the y-intercept from the table by extending the table to find y, where x = 0.
5. This will be the __b__ value.
6. Plug each of the values into the y=__mx+b__ form of the equation.

➢ **Find the Slope-Intercept Equation from the two points $(1, 9)$ and $(-1, 3)$ using the table method.**

x	y
1	9
-1	3

$m = 3$

$3 = 3(-1) + b$

$3 = -3 + b$

$6 = b$

$y = 3x + 6$

EQUATION METHOD:

1. Find the slope by determining the difference between the y-coordinates of the two points (the __rise__) and the difference in the __x__-coordinates (the RUN).
2. Put the __rise__ in the numerator position and the RUN in the __denominator__ position and simplify, if needed, this is the m (slope) value of the equation $y = mx + b$.
3. Then use the values from one of the given points (x, y) and the slope m and replace the corresponding variables in the equation $y =$ __mx+b__. Solve for b. This is the __y__-intercept.
4. With the value for m and the value for b, write the equation $y = mx + b$ replacing m and b with the determined values.

Correction

EX: Find the equation from the two points $(1, -3)$ *and* $(6, 7)$.

Slope: $\frac{\Delta y}{\Delta x} = \frac{10}{+5} = +2$

$y = +2x + b$

Choose a set of points to use.

$-3 = +2(1) + b$

$-2 = -2$

$-5 = -1 = b$

$y = +2x - 1 - 5$

$y = 2x - 5$

➢ **Find the Slope-Intercept Equation from the two points $(-1, 4)$ and $(4, -2)$ using the equation method.**

x	y
-1	4
4	-2

$m = -2$

$4 = -2(-1) + b$

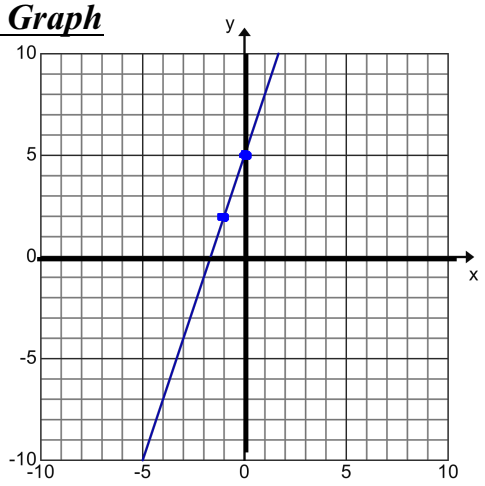
$2 = b$

$y = -2x + 2$

Find the Slope-Intercept Form of the Equation of a line ***from a Graph***

1. Find the slope of the line on the graph using $\frac{rise}{run}$
2. This will be the __m__ value in the equation $y = mx + b$.
3. Find the y-intercept of the graph
4. This will be the __b__ value in the equation
5. Plug each of the values into the $y = mx + b$ form of the equation.

IF the y-intercept doesn't go through an exact point. Make a table like above to find the equation.



➢ **Find the equation of the graph on the grid at the right.**

$m = \frac{3}{1}$ $y\text{-int}(0, 5)$

$y = 3x + 5$

Find Equation in Slope-Intercept Form *Given the Slope and a Point*

TABLE METHOD:

1. Put the point in a table leaving space for points above and below.
2. Determine the Rise (the numerator) and the RUN (the denominator) of the slope.
3. Use the slope to count back to the y-intercept (b) in the table (where x = 0)
4. Place the slope and the y-intercept in the equation, y = mx + b.

➢ **Find the equation of the line given a slope of 7 and the point (3, 5).**

Correction

EX: Find the equation with a slope of $\frac{-2}{3}$ and point $(4, -5)$.

Slope: $\frac{-2}{3} = \frac{\Delta y}{\Delta x} = \frac{-2\ is\ rise}{3\ is\ run}$

X	Y
0	−11
2	−8
4	−5

2< 2< >3 >3

$y = \frac{-2}{3}x - 11$

$y = \frac{3}{2}x - 11$

EQUATION METHOD:

1. Put the slope into the m position in the equation $y = mx + b$.
2. Put the coordinate (X, Y) into the correct places in the equation.
3. Solve the equation for b.
4. Plug the given slope and the b values into the equation.

➢ **Find the equation given the slope of 4 and the point (5, –2).**

$m = 4$, point $(5, -2)$

$-2 = 4(5) + b$

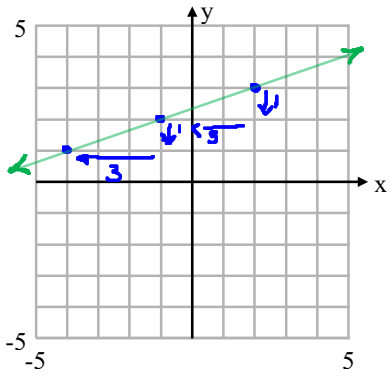
$-22 = b$

$y = 4x - 22$

Graph a Line *Using One Point and the Slope*

1. Find the given point on the grid.
2. Write the slope as a fraction. (If a whole number, the denominator is 1.)
3. The numerator is the RISE (amount the y-value goes up or down).
4. The denominator is the RUN (amount x-value goes left or right).
5. Count and plot the Rise and RUN from the original point.
6. Connect these points.

➢ **Draw a line passing through the Point (2, 3) with a Slope of $-\frac{1}{3}$.**



Graph a Line *Using Two Points*

Plot Both Points and Connect the Points with a Line

➢ **Draw the line passing through (–1, 2) and (3, 4)**

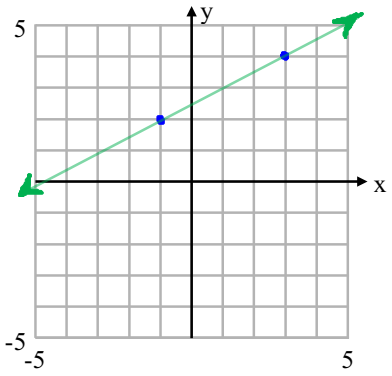
What will be the equation? $y = \frac{1}{2}x + 2\frac{1}{2}$ OR $y = \frac{1}{2}x + \frac{5}{2}$

$m = \frac{2}{4} = \frac{1}{2}$

$2 = \frac{1}{2}(-1) + b$

$2 = -\frac{1}{2} + b$

$2\frac{1}{2} = b$



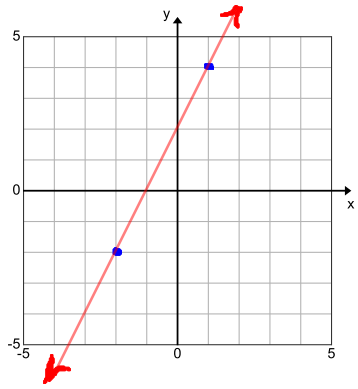
Graph a Line *Using the Slope/Intercept Form*

EQUATION METHOD:

1. Write the equation in y = $mx + b$ form.
2. The m represents the slope of the line and the b represents the y-intercept.
3. Locate the y-intercept (0, b) on the y-axis.
4. If the m value is an integer, place the number over 1 to make a fraction.
5. Count the numerator value (the RISE) up/down according to whether it is positive or negative.
6. Count the denominator value (the RUN) left/right according to whether it is positive or negative.
7. This point will be another point on the line on the graph. Connect these points to make the line.

FIND NEW POINTS METHOD:

1. Choose any value for x.
2. Plug that Value into the equation.
3. Solve for *y*.
4. This (*x*, *y*) will be your first point on the line.
5. Repeat steps 1-3 with a new *x* value.
6. This new (*x*, *y*) will be the second point on the line.
7. Connect these points to make your line.



➢ **Draw the line from the equation $y = 2x + 2$ using either method.**

$x = 1$
$y = 2(1) + 2$
$y = 4$
$(1, 4)$

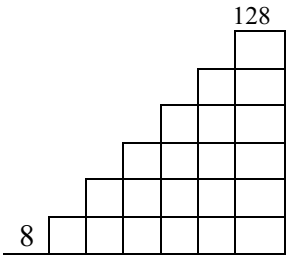
$x = -2$
$y = 2(-2) + 2$
$y = -4 + 2$
$y = -2$
$(-2, -2)$

Find the Equation in Slope/Intercept Form ***from a Story Problem***

- Delete any non-pertinent information (distractors).
- Hint: Draw an actual picture of the story problem to help visualize what is happening.
- Define what the independent and dependent (*x* and *y*) variables represent.
- Organize the information in a table.
- Find the equation from the table (see steps above).

Example: The snowiest day in the city of Bitterton ended with 128 inches of snow on the ground. When the storm started, there were 8 inches already on the ground. It snowed for a total of 6 hours. Write the equation that represents the number of inches that fell per hour.

~~The snowiest day in the city of Bitterton~~ ended with 128 inches of snow ~~on the ground~~. When the storm started, there were 8 inches ~~already on the ground~~. It snowed for a total of 6 hours. Determine the independent and dependent variables. Write the equation ~~that represents the number of inches that fell per hour~~.



X or *h*	Y or *t*
0	8
6	128

The variables will be *h* (number of hours) and *y* (TOTAL INCHES of SNOW)
Independent Variable: h, Dependent Variable: y.
Rate of Change is: $\frac{120 inches}{6 hours}$ *or* $\frac{20 inches}{1 hour}$
The y-intercept is (0, 8), since there were 8" when the storm started.
The equation is $y = 20x + 8$ *or* $t = 20h + 8$

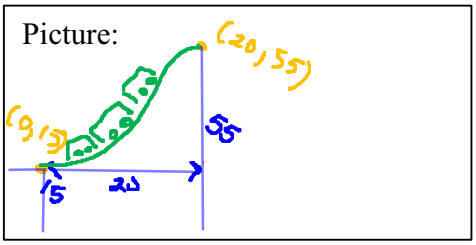
➢ **Solve the following:** ~~You are supervising the construction of a roller coaster for young children. The platform to board the ride~~ is 15 feet off the ground. 20 feet up ~~the track the car will be~~ 55 feet off the ground. **Write an equation for the line for the change in elevation for the track. Show your work.**

X or h Independent Variable	Y or V Dependent Variable
0	15
20	55

20 (0, 15) (20, 55) 40

The variables will be
h = horizontal distance
V = vertical distance
Rate of Change is: $\frac{40}{20} = \frac{4}{2} = \frac{2}{1}$

Picture:



The y-intercept is: (0, 15), since it's where the children board the roller coaster.

The equation is: V = 2X + 15

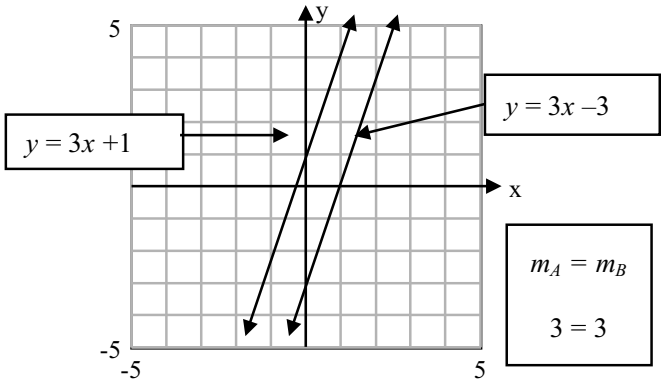
Creating Slope-Intercept Form(SI) ***from an Equation not in SI Form***

1. Simplify the equation as much as Possible.
2. Solve for y where y will be **isolated** on one side of the Equation.
3. The y value must have a coefficient of **POSITIVE** 1.
4. Write your simplified information in the form $y = mx + b$. The order of the variables is important. Don't Mix them up.

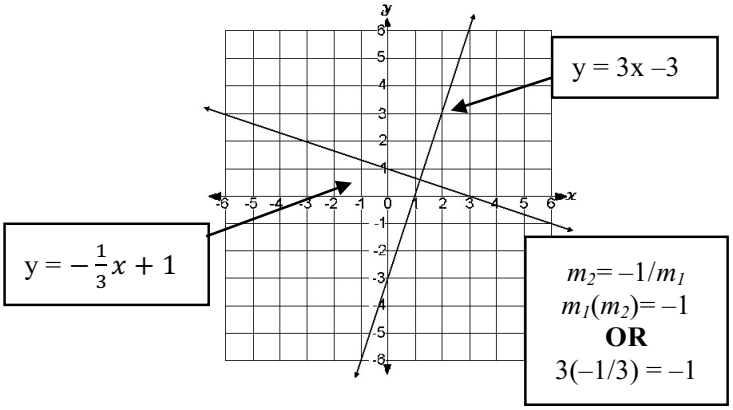
$9x - 5y - 19 = 21$
$+19 = +19$
$9x - 5y = 40$
$-9x \quad = -9x$
$-5y = -9x + 40$
$-5 \quad -5$
$1y = 9/5x - 8$

The Slope of ***Parallel and Perpendicular Lines***

Parallel Lines have slopes that are equal. (They always go in the same direction.)



Perpendicular Lines have slopes that are negative reciprocals (multiply to equal -1). They move in exact opposite directions at 90 degrees.



➢ **Find the slopes to determine whether the lines are parallel, perpendicular, or neither.**

a) $y - 4x = 5$ $m = 4$
$y + 4x = 5$
$y = \frac{1}{2}(x + 5)$ $m = 4$
$y = 4x + 20$
Parallel

b) $y = 4x - 3$ $m = 4$
$y + 4 = -\frac{1}{4}x + 1$ $m = -\frac{1}{4}$
Perpendicular

c) $y = -\frac{3}{6}x - 6$ $m = -\frac{1}{2}$
$y - 3 = 2(x + 4)$ $m = 2$
$y - 3 = 2x + 8$
$y = 2x + 11$
parallel

➢ **Find the equations that are parallel and perpendicular to the line passing through a given point.**

Example: $y = 2x - 5$, point $(3, -1)$
PARALLEL
Start with $y = 2x + b$
Insert point:
$-1 = 2(3) + b, so\ b = -7$
Write equation with slope and y-int.
$\boldsymbol{y = 2x - 7}$
PERPENDICULAR
Negative reciprocal slope, so $m = -\frac{1}{2}$
$-1 = -\frac{1}{2}(3) + b, so\ b = \frac{1}{2}$
$\boldsymbol{y = -\frac{1}{2}x + \frac{1}{2}}$

a) $y = \frac{1}{5}x - 2$, point $(-3, -1)$
PARALLEL: $m = \frac{1}{5}$
$-1 = \frac{1}{5}(-3) + b$
$-1 = -\frac{3}{5} + b$
$-\frac{2}{5} = b$
$y = \frac{1}{5}x - \frac{2}{5}$
PERPENDICULAR:
$m = -5$
$-1 = -5(-3) + b$
$-1 = 15 + b$
$-16 = b$
$y = -5x - 16$

b) $y = 3x + 1$, point $(-3, 4)$
PARALLEL:
$m = 3$ $4 = 3(-3) + b$
$4 = -9 + b$
$13 = b$
$y = 3x + 13$
PERPENDICULAR:
$m = -\frac{1}{3}$ $4 = -\frac{1}{3}(-3) + b$
$4 = 1 + b$
$3 = b$
$y = -\frac{1}{3}x + 3$

Unit 2: Writing and Solving Equations Study Guide

SHOW YOUR WORK FOR FULL CREDIT. NO WORK, NO CREDIT. NO WORK IN PEN.

Targets	Sample	Rate your knowledge			
		👎	👍	👍	Assn
Writing equations using variables	Ten plus eight times a number equals eleven times that number minus six.				2C, 2D, 2R
Manipulate equations by solving for different variables.	Given y = d(t + s), solve for t.				2A, 2B, 2D, 2R
Solve basic equations including exponents.	$x^2 - 16 = 2x^2 - 9$				2B, 2D, 2R
Justify steps to solve equations using: mathematical properties.	Explain each of the steps when solving 3x – 7 = 6x + 4				2A, 2B, 2C, 2R
Simplify square roots less than 100	Find the lowest Integer Radicand $\sqrt{72}$.				2B, 2C, 2D, 2R
Simplify equations with square roots.	Solve for x if $\sqrt{5x^2 - 5} = 20$				2B, 2C, 2D, 2R

Simplify equations w/absolute val. Solve for x: $8|x+2| = 16$

Vocabulary

Reflexive Property: $8 = 8$

Distributive Property of Multiplication (over addition/subtraction) $2(x+8) = 2x + 2 \cdot 8$

Addition Property of Equality: $x = 8$, $x+2 = 8+2$

Multiply Property of Equality: $x = 8$, $2x = 2 \cdot 8$

Order of Operations: PEMDAS

Radical: $\sqrt{\ }$

Radicand: $\sqrt{x}$

----nomial: # of TERMS in an expression. The prefix (mono, bi, tri) tells how many terms there are.

Slope/Y-Intercept form is convenient since it shows you the slope and the y-intercept.

Writing Equations from a Description using Variables.

Look for key words to decode the description.

Word	Usual Meaning	Example
3 Added to a number or 3 and a number	Something + 3	x + 3
3 Times a Number	Multiplied by 3	3x
3 Less than a Number	Subtracting 3	x – 3
Into 3 equal groups	Divide by 3	x/3
Is 3 or totals 3	Equal to	= 3

Translate each part of the expression using the key word phrases and then rewrite the phrase using algebra. For example: Ten plus eight times a number equals eleven times that number minus six.

Ten plus (**10 +**) eight times a number (**8a)** is 6 less than eleven times that number (**11a)**.

Rewrite as **10 + 8a = 11a – 6**

Same Number

Solve for the variable.

- **Translate the expression.** Two times the quantity of a number and three is five less than the number.

$2n + 3 = n - 5$

Creating Slope-Intercept (SI) Form from an Equation not in SI Form.

1. Simplify the equation as much as possible.
2. Solve for y where y will be **isolated** on one side of the equation.
3. The y value must have a coefficient of **POSITIVE** ____.
4. Write your simplified information in the form $y = mx + b$. The order of the variables is important. Don't mix them up.

$$9x - 5y - 19 = 21$$
$$+19 = +19$$
$$9x - 5y = 40$$
$$-9x = -9x$$
$$-5y = -9x + 40$$
$$\frac{-5y}{-5} = \frac{-9x}{-5} + \frac{40}{-5}$$
$$1y = 9/5x - 8$$

Literal Equations

To solve for a certain variable, you can solve for that variable by using the Order of Operations. The formula $rt=d$ stands for rate times time equals distance. This formula is "solved for" d where the problem might give the rate and the time and you can solve for how far you can go (the distance). You can adjust this equation by adding "b" which would mean that you got a head start. (This would be your y-intercept.)

$$d = rt + b$$
$$-b = -b$$
$$d - b = rt$$
$$r = r$$
$$\frac{d - b}{r} = t$$

You might be given the speed and the distance and head start and need to solve for the time instead. Here, you need to solve for t. You do this by following the steps to the right.

d d r

If a story problem says that a man has traveled 120 miles and then travels another 165 miles at 55 mph, how much more time did he drive? 3 hours

120 + 165
285

You know that the rate (slope) is 55. He began at 120 miles (b), the time (x) is unknown, and the total distance (y) is 285. Written in slope-intercept form, you get $285 = 55t + 120$. In order to figure how long (time t) he traveled, you solved for t.

$$285 = 55t + 120$$
$$-120 = -120$$
$$165 = 55t$$
$$55 = 55$$
$$3 = t$$

To solve for find time, your work might look like this:

- Solve for w: $V = \frac{1}{3}lwh$

$$\left(\frac{3}{1}\right)V = \frac{1}{3}lwh\left(\frac{3}{1}\right)$$
$$\frac{3V}{lh} = \frac{lwh}{lh}$$
$$\frac{3V}{lh} = w$$

Solving for Different Variables

1. Circle the variable you want to solve for.
2. Follow the same steps you would to solve if you had numbers instead of letters.
   a. Draw the line at the equal sign to organize your equation and simplify.
   c. If you want/need to get rid of a fraction, you can multiply every term by the Reciprocal. (See step two to the right.)
   d. Subtract or add to isolate the variable on one side of the equal sign.
   e. Multiply or divide to make the variable have a coefficient of +1.

Solve for x:

$$(3x) + y = \frac{4}{5}x - 7$$
$$5(3x + y) = 5\left(\frac{4}{5}x - 7\right)$$
$$15x + 5y = 4x - 35$$
$$-4x - 5y = -4x - 5y$$
$$\frac{11x}{11} = \frac{-5y - 35}{11}$$
$$1x = -\frac{5}{11}y - \frac{35}{11}$$

If you have fractions, you can get rid of the fraction first by multiplying every term by the Reciprocal.

Solve for the given variable and state the properties.

- Solve for h: $\frac{ab}{2} = 2(3 - h)$

$$\frac{ab}{2} = 3 - h$$
$$-3 \quad -3$$
$$\frac{ab}{2} - 3 = -h$$
$$-\frac{ab}{2} + 3 = h$$

- Solve for g: $2r + \frac{1}{3}g = 4t$

$$-2r \quad -2r$$
$$\left(\frac{3}{1}\right)\frac{1}{3}g = (4t - 2r)\left(\frac{3}{1}\right)$$
$$g = 12t - 6r$$

Using Properties to Solving Equations

These properties will be necessary to solving equations. The first four properties of equality allow us to add, subtract, multiply and divide variables. They also formally express that we can perform the same operation on both sides without changing the values of the variables.

Another property that we will use is Distributive Property of Multiplication over Addition and Subtraction.

Properties of Equality	Property	Example(s)
Addition Property of Equality	If a = b and c = d, then a + c = b + d	If x = 2 and y = 3, then x + y = 5 If x = 3 and 2 = 2, then x + 2 = 5
Subtraction Property of Equality	If a = b and c = d, then a - c = b - d	If x = 5 and y = 12, then y - x = 7 If x = 14 and 12 = 12, then x - 12 = 2
Multiplication Property of Equality	If a = b and c = d, then ac = bd	If x = 8 and y = 9, then xy = 72 If x = 2 and 5 = 5, then 5x = 10
Division Property of Equality	If a = b and c = d ? 0, then a/c = b/d and a/b = c/d	If x = 6 and y = 2, then x/y = 3 and x/6 = y/2 If 5x = 15, and 5 = 5, then x = 3
Reflexive Property of Equality	a = a	15 = 15 x = x

Example:

$8x + 2y = -16$	Given
$-8x \quad = -8x$	Reflexive Property
$2y = -8x - 16$	Additive Property of Eq.
$+2 = +2$	Reflexive Property
$y = -4x - 8$	Multiplicative Property of Equality

Solve the following equation for y and use the properties listed above to justify each step.

- $2(y - 6) + x = 18 - 4y$

$2y - 12 + x = 18 - 4y$

$+4y + 12 - x = +12 + 4y - x$

$\frac{6y}{6} = \frac{20 - x}{6}$

$y = \frac{1}{6}(20 - x)$

Given

Reflexive w/ APE

Reflexive w/ DPE

Simplifying Roots

1. Split the Radicand (the number under the radical) into its prime numbers $\sqrt{20} = \pm\sqrt{2 * 2 * 5}$
2. Any factor that repeats itself will indicate a perfect square $\sqrt{2 * 2} = 4$--perfect square
3. Pull that root out and put it in front of the radical sign that keeps what's left. $\pm 2\sqrt{5}$
4. Look for any more repeated factors.
   a. If there is another repeated factor, pull it out and multiply it by the other number in front of the radical. (See above)
   b. If no more factors Repeat, write the answer with a radical.
5. If you are looking for a cube root, the radical will have an *index* of 3 above and to the left of the Radical
   a. In this case, you will look for 3 numbers to repeat under the radical. ($\sqrt[3]{40} = \sqrt[3]{2 * 2 * 2 * 5} = \pm 2\sqrt[3]{5}$)

Simplify the following to have the lowest integer radicand. Show your work. The first is done for you.

Example: *if* $x = \sqrt{8} = \sqrt{2 * 2 * 2}$ *or* $\sqrt{4} * \sqrt{2}$ then $x = \pm 2\sqrt{2}$

- $\sqrt{54}$

$\sqrt{2 \cdot 27}$

$\sqrt{2 \cdot 3 \cdot 9}$

$\sqrt{1 \cdot 3 \cdot 3 \cdot 3}$

perfect Square

$3\sqrt{2 \cdot 3} = 3\sqrt{6}$

- $\sqrt{525}$

$5 \cdot 105$

$5 \cdot 5 \cdot 21$

$5 \cdot 5 \cdot 3 \cdot 7$

$5\sqrt{21}$

- $\sqrt{1000}$

$5 \cdot 200$

$5 \cdot 5 \cdot 40$

$5 \cdot 5 \cdot 5 \cdot 8$

$5 \cdot 5 \cdot 5 \cdot 4 \cdot 2$

$5 \cdot 5 \cdot 5 \cdot 2 \cdot 2 \cdot 2$

$5 \cdot 2\sqrt{5 \cdot 2}$

$10\sqrt{10}$

Adding and Subtracting Square Roots

There are just a few things to remember. First, simplify radical terms and then combine like radical terms.

Example: $2\sqrt{2} + \sqrt{5} - 6\sqrt{2} = -4\sqrt{2} + \sqrt{5}$

Solving Equations with Absolute Value

Remember that the absolute value is the "distance" from zero.

Step 1: Isolate the absolute value expression.
Step 2: Set the quantity inside the absolute value notation equal to + and – the quantity on the other side of the equation.
Step 3: Solve for the unknown in both equations.

$$|5x - 6| + 8 = 32$$
$$-8 = -8$$
$$|5x - 6| = 24$$

$$(5x - 6) = 24 \; or \; -(5x - 6) = 24$$
$$5x - 6 = 24 \qquad 5x - 6 = -24$$
$$5x = 30 \qquad 5x = -18$$
$$x = 6 \; or \; x = -\frac{18}{5}$$

Solve the following equation:

➢ $\frac{1}{2}|2x - 6| = 12$

$|2x - 6| = 24$
$2x - 6 = 24$ or $2x - 6 = -24$
$2x = 32$ $\qquad 2x = -18$
$x = 16$ or $x = -9$

Solving Equations with Exponents

You will solve equations with exponents the same as an equation without. You just need to think about what is the inverse operation to squaring or cubing, etc.

Examples:

$2x^2 - 144 = 0$
$2x^2 = 144$
$x^2 = 72$
$\sqrt{x^2} = \sqrt{72}$
$x = \pm 6\sqrt{2}$

$2x^3 - 144 = 0$
$2x^3 = 144$
$x^3 = 72$
$\sqrt[3]{x^3} = \sqrt[3]{72}$
~~$x = \pm 2\sqrt[3]{9}$~~

$x = 2\sqrt[3]{9}$

Solve the following equation:

➢ $5x^2 - 8 = 4(x^2 + 3)$

$5x^2 - 8 = 4x^2 + 12$
$\sqrt{x^2} = \sqrt{20}$
$x = \pm 2\sqrt{5}$

20
2 · 10
2 · 2 · 5

Unit 3 Linear Inequalities & Systems Study Guide

SHOW YOUR WORK FOR FULL CREDIT. NO WORK, NO CREDIT. NO WORK IN PEN.

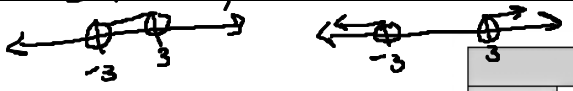
Targets	Sample	Rate your knowledge and understanding			
		Ugh	So-So	YEP	Assn Ref.
Writing a linear inequality from a story problem (1 variable)	Sam has $25 in the bank to buy gifts 9 weeks away. If he wants to spend at least $70, how much should he save weekly?				3A
Writing a linear inequality from a story problem (2 variables)	Sam spends $25 on wrapping paper for gifts for his friends. If he spends at least $7 per gift, how much will he spend?				3B
Solve Multi-step Inequalities in context.	Alan's troop is selling popcorn for a trip. Each camper starts with a credit of *at least* $25. Each box sells for $3.75.				3B
Solve the inequality for y.	$x + 2y < 1 + 3x$				3A

Vocabulary:

Inequality: Has more than one possible solution, Uses $<, >, \leq, \geq$

Solution Set: A set of solutions

Compound Inequality: $-3 < x < 3$, $-3 < x$ & $x > 3$



Inequality Symbols				
Symbol	<	>	≤	≥
Key Phrases	• is less than • is fewer than	• is greater than • is more than	• is less than or equal to • is at most • is no more than	• is greater than or equal to • is at least • is no less than

Writing Inequalities

Translate each part of the inequality by looking for key word phrases. Write the phrase using algebra.

For example:

The sum of six and twice a number is fewer than nine and three times the number.

6 + 2n < 9 + 3n

- A number decreased by 7 is more than twice the number minus two. Write the inequality and then find the solution set. $n - 7 > 2n - 2$

- The school is running a carnival to make money. Tickets sell for $0.50 each, and they need to buy supplies for the carnival that cost $50. How many tickets must they sell to raise at least $200 in profit? Write an inequality and then find the solution. $200 \geq .5x + 50$

Solving Inequalities

Steps to Solve Inequalities are similar to solving equations.

1. Simplify each side of the inequality, if necessary.
   a. Use the distributive property.
   b. Combine like terms.
2. Add or subtract on both sides of the equation to isolate the variable.
3. Multiply or divide both sides to solve for the variable. **NOTE**: If you multiply OR divide by a negative number, you must switch the inequality.
4. Check your answer – "Plug the value of x into the original inequality to check your answer."

Example:

Solve the following inequality for x	$2(x - 1) + 4x < 3x + 7$
Step 1a Use the distributive property	$2x - 2 + 4x < 3x + 7$
Step 1b Combine like terms	$6x - 2 < 3x + 7$
Step 2 Subtract 3x from both sides	$-3x \quad = -3x$
	$3x - 2 < 7$
Step 2 Add 2 to both sides	$+2 = +2$
	$3x < 9$
Step 3 Divide both sides by 3	$3 = 3$
	$x < 3$

Check with an equal sign:
$2(\_\_ - 1) + 4\_\_ = 3\_\_ + 7$
$2(3 - 1) + 4(3) = 3(3) + 7$
$6 - 2 + 12 = 9 + 7$
$16 = 16$ ✓

Remember: if you multiply or divide by a negative number, you must "flip" the inequality **.**

Solve each of the inequalities.

- $5 < 4a - 7$

$\frac{12}{4} < \frac{4a}{4}$

$3 < a$

- $8x < 15 + 11x$

$-11x \quad -11x$

$\frac{-3x}{-3} < \frac{15}{-3}$

$x > -5$

- $8y + 3 \geq 7y + 7$

$y \geq 4$

Compound Inequalities Don't worry about the rest of this.

A compound inequality is an equation with two or more inequalities joined together with either "and" or "or". When two inequalities are joined with and, they are often written simply as a double inequality.

These inequalities can be solved with two methods.

$$8 < m + 6 \text{ and } m + 6 < 14$$

$8 < m + 6$ and $m + 6 < 14$
$2 < m$ $\quad$ $m < 8$
$m > 2$ and $m < 8$
$2 < m < 8$

$$8 < m + 6 < 14$$

To solve the inequality, isolate the variable by subtracting 6 from all 3 parts.

$8 < m + 6 < 14$
$-6 \quad -6 \quad -6$
$2 < m < 8$

- **Solve the following by making a table, graph, and equation.**

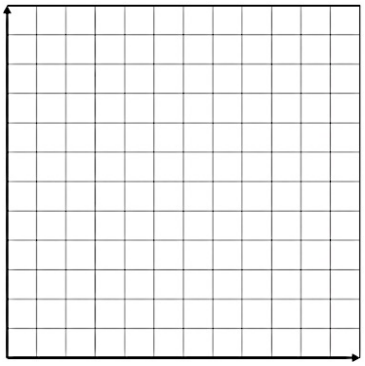
The scouts are going to a museum. The cost of entry is $3 for every per son. They know that there will be 4 chaperones, but they do not know how many scouts will be coming on the outing. **For the story find the following** showing how much money they have to collect. Hint: Start with chaperone cost even if no scouts go.

A. Table:

B. Define your variables.

C. Equation

D. Graph (label and scale the axes)



E. Write how your equation would change if there were no more than 4 chaperone