Guided Notes

Chapter 2

Functions, Equations, and Graphs



**Unit Essential Questions**

Does it matter which form of a linear equation that you use?

How do you use transformations to help graph absolute value functions?

How can you model data with linear equations?

Standard: [A2. F.BF.A.1](https://drive.google.com/file/d/0B7nJhvJFpsTjVGF2VURxMXVId2s/view#p15) Write a function that describes a relationship between two quantities

Objective: Students will identify, interpret, and graph relations and functions.

**2.1 Part 1: Relations and Functions**

**Warm Up**

Graph and label each ordered pair on the coordinate plane.

1. A (-4, -8) 2. B (3, 6) 3. C (1, 0) 4. D (0, 1)



**Key Concepts**

 **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - a set of pairs of input and output values.**



**Examples**

1. When skydivers jump out of an airplane, they experience free fall. At 0 seconds, they are at 10,000ft, 8 seconds, they are at 8976ft, 12 seconds, they are at 7696ft, and 16 seconds, they are at 5904ft. How can you represent this relation in four different ways?

**Key Concepts**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** - the set of all inputs (*x*-coordinates)

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** - the set of all outputs (*y*-coordinates)

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** - a relation in which each element in the domain corresponds to exactly one element of the range.

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** - if any vertical line passes through **more than one point** on the graph of a relation, then it is ***not*** a function.

**Examples**

1. Determine whether each relation is a function. State the domain and range.

a) {(0, 1), (1, 0), (2, 1), (3, 1), (4, 2)} b) {(1, 4), (3, 2), (5, 2), (1, -8), (6, 7)}

 c) {(1, 3), (2, 3), (3, 3), (4, 3), (5, 3)} d) {(4, 9), (4, 3), (4, 0), (4, 4), (4, 1)}

1. Use the vertical line test. Which graphs represent a function?



 4. Create a relation that: a) is not a function b) is a function

**Challenge/Early finishers** do Think About a Plan task on page 30 for extra credit.

**Exit ticket:** Express the relation {(2,1), (3,2), (3, 4), (4, 7), (5, -1)} using mapping diagram and graph. Is this relation a function?

Standard: [A2. F.BF.A.1](https://drive.google.com/file/d/0B7nJhvJFpsTjVGF2VURxMXVId2s/view#p15) Write a function that describes a relationship between two quantities.

Objective: Students will evaluate functions and write the relationship between input and output using ordered pairs, and create functions to describe real life problems.

**Section 2.1 Part 2: Relations and Functions**

**Warm Up**

1. Can you have a relation that is not a function? If yes, give an example.

2. Can you have a function that is not a relation? If yes, give an example.

**Key Concepts**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** - an equation that represents an output value in terms of an input value. You can write the function rule in function notation.

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** - *x*, represents the input value.

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** - *y*, represents the output value. (Call dependent because it depends on the input value)

**Examples**

1. Evaluate the function for the given value of *x*, and write the input *x* and output *f* (*x*) in an ordered pair.

*f* (*x*) = −2*x* + 11 for *x* = 5, -3, and 0

1. Write a function rule to model the cost per month of a long-distance cell phone calling plan. Then evaluate the function for given time the cellphone is used.

Monthly service fee: $4.99

Rate per minute: $.10

Time used: 2.5 hours

**White board activity** #1-4 page 29

**Challenge/Early finishers** do #5 for extra credit.

**Exit ticket:** Create three coordinate points given the function f(x)= -5x+1 and the x values -4, -2 and 0

Standards: **A2.F.BF.A.1** Write a function that describes a relationship between two quantities.**A2.F.BF.A.1a** Determine an explicit expression, a recursive process, or steps for calculation from a context.

Objective: Students will be able to graph linear equations. Students will be able to write equations of line in y intercept form.

**2.3: Linear Functions and Slope-Intercept Form**

**Warm Up**

Evaluate each expression for *x* = –2, and 0.

1. f(x) = 2*x* + 7 2. f(x) = 3*x* – 2

**Key Concepts**

 **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** - the rate of change



 POSITIVE NEGATIVE ZERO UNDEFINED

    

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**\_\_\_\_\_\_\_\_- a function whose graph is a line

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** - represents a linear function where a solution is any ordered pair (x,y) that makes the equation true.

***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*** - the point in which a line crosses the y-axis

Any number of a form (0,n) is a y intercept

***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*** - the point in which a line crosses the x-axis

Any number of a form (n,0) is a x intercept

**Slope Intercept Form**

 *y* = m*x* + b  m = slope; b= y-intercept

**Examples**

1. Find the slope of the line through the points:

a. (3, 0) and (5, 8) b. (1, –4) and (2, –5) c. (–2, 7) and (8, –6)

1. What is an equation of the line that has a slope of 1/5 and the y-intercept is (0, -3)?
2. Write the equation in slope-intercept form and then find the slope and y-intercept of

–7*x* + 2*y* = 8.

1. Graph the equation *y* = 2x + 1. 5. Graph the equation y= -3/2 +4



 **6. Graph the equation y= 5x 7. Graph the equation y=-1/2 x -3**



**White board activity** #1-5 page 37

**Challenge/Early finishers** do #6 for extra credit.

**Exit ticket: Graph y = -3/4x +5**

**Objectives: Students will be able to create and graph linear functions in all three forms:**

**y- intercept, point slope and standard form. Students will be able to create functions parallel or perpendicular to some given lines.**

Standards:

[A2.F.BF.A.1](http://www.tennessee.gov/assets/entities/education/attachments/std_math_algebra_II.pdf) Write a function that describes a relationship between two quantities.

[A2.F.BF.A.1a](http://www.tennessee.gov/assets/entities/education/attachments/std_math_algebra_II.pdf) Determine an explicit expression, a recursive process, or steps for calculation from a context.

[A2.F.BF.A.1b](http://www.tennessee.gov/assets/entities/education/attachments/std_math_algebra_II.pdf) Combine standard function types using arithmetic operations.

**2-4 More Linear Functions**

**Warm up**

**Graph a function -2x + 3y = 6. Write it in y-intercept form then graph.**

**Vocabulary**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** - the slopes of these lines are **equal.**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** - the slopes of these lines are **negative reciprocals** of each other.

Examples of negative reciprocals : 1/3 🡪 \_\_\_\_\_ -2/3 🡪 \_\_\_\_\_\_ -1 🡪 \_\_\_\_\_\_ 5 🡪 \_\_\_\_\_\_

**Formulas**

* point-slope form of a line is $y-y\_{1}=m(x-x\_{1})$
* standard form of a linear equation is $Ax+By=C$
* m =$-\frac{A}{B}$, *y*-intercept = $\frac{C}{B}$, *x*-intercept = $\frac{C}{A}$

**Examples**

1. Write the equation of the line that passes through (-6, 2) with a slope of $\frac{2}{3}$.

a) y-intercept form b) point slope form c) standard form

1. Write the equation of the line through (-3, 2) and (5, 8).

a) y-intercept form b) point slope form c) standard form

1. Write the equation $y= \frac{3}{4}x-5$ in standard form. Use **integer** coefficients.
2. What is the equation of the line in point-slope form?
3. Find the x- and y-intercepts of $2x+3y=-12$.
4. What is the equation of the line **parallel** to $y=2x-3$ through (1, -3) in slope-intercept form?
5. What is the equation of the line **perpendicular** to $y= \frac{2}{3}x-1$ through (-2, 4) in slope-intercept form?

**HOMEWORK!!! Complete your assignment on a separate sheet of paper. Show all Work**

1. Write an equation for each line in slope-intercept form
2. slope = -3, through (1, -4) **b**. slope = $\frac{1}{2}$ , through (2, 3)
3. What are the intercepts of $3x+y=6$? Graph the equation.
4. If the intercepts of a line are (*a*, 0) and (0, *b*), what is the slope of the line?
5. Write the equation of the line through (1, 9) and (6, 2) in point-slope form?
6. Write an equation of each line in standard form with integer coefficients.
7. $y=-7x-9$ b. $y=-\frac{3}{5}x+3$
8. Write an equation for the line shown in standard form.

**Standard:** ■ **A2.A.REI.D.6 (formerly A.REI.11)** Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the approximate solutions using technology. ★*Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.*

## **Objectives;** Students will graph and find solutions of absolute value functions using a variety of strategies. The students will apply translations, stretches, compressions, and reflections to the absolute value function

**2.7: Absolute Value Functions and Graphs**

**Students will be able to graph absolute value functions**

**Warm Up**

Solve each absolute value equation.



**Key Concepts**

**Graph of Absolute Value Function **

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** - the line that divides a figure into two parts that are mirror images

**\_\_\_\_\_\_\_\_\_\_** - a point where the function reaches a maximum or minimum value

**Guided practice**

1. Graph the absolute value functions:

 *a) y* = |*x*| - 4 b) y= |*x-3*| c) y= -2|*x*|



**Summary**



**Group practice**

1. Graph each absolute value function.

a. y = |x + 2| + 3 b. y = 1/2|x|

 

**Key Concepts**

**General Form of the Absolute Value Function**

y = a |x-h| + k

Stretch/Compression Factor is |a|, Vertex is (h, k), Axis of Symmetry is x = h

**Examples**

1. Without graphing, identify the vertex, axis of symmetry, and transformations of

*f(x)* = -3|*x* – 1| + 4 from the parent function *f(x)* = |*x*|.



1. Write an absolute value equation for the given graph.

**White board activity** #1-3 page 53

**Challenge/Early finishers** do #4 for extra credit.

**Exit ticket: Graph** = |x + 1|- 3