

A. Lesson Context

BIG PICTURE of this UNIT:	<ul style="list-style-type: none"> • What is meant by the term FUNCTIONS and how do we work with them? • mastery with working with basics & applications of linear functions • mastery with working with basics & applications of linear systems • understanding basics of function concepts and apply them to lines & linear systems 		
CONTEXT of this LESSON:	Where we've been In Lessons 1-4, you practiced with basic concepts related to functions	Where we are Connecting to Linear Relations, we now look at different forms of equations that describe linear functions.	Where we are heading How do we apply the concept of "functions" to linear & exponential relations.

B. Lesson Objectives

- This is a DIFFERENTIATED LESSON, that will offer you the opportunity to work at the level best suited to your current level of (i) mastery & (ii) confidence.
- Choose your level on the ASSUMPTION that I AM GOING TO GIVE A POP QUIZ on Writing Linear Equations and you either (i) would need more guided practice; (ii) would like more practice, but don't necessarily need a lot of guidance or (iii) you ROCK, so bring on DIFFERENT, more challenging stuff!

C. Fast Five (Skills Review Focus)

1. Find the slope of line that passes through A(-4,12) and B(7,4).

3. If $f(x) = \frac{1}{2}(4)^{x-2}$, determine the value of $\frac{f(3) - f(1)}{3 - 1}$.

2. Write the equation of a line that is parallel to the line $y = 2 - 3x$ and passes through the point (5,-1)

4. Write the equation of a line that is perpendicular to the line $2x - 3y - 9 = 0$ and has a zero at -3.

D. Level G → Still Need Guided Assistance in Moving toward Skill Mastery

- A line that passes through the points A(-2,7) and B(3,-3). Write the equation of this line in all four forms.
- A line that passes through the points C(2,3) and D(5,8). Write the equation of this line in all four forms.
- Given the equation $f(x) = 4 - \frac{1}{2}x$, answer the following questions:
 - Evaluate $f(-12)$
 - Solve for x if $f(x) = -2$
 - State the slope and x - and y -intercepts
 - Write the equation in standard form.
 - Write the equation in point-slope form.
 - Write the equation in intercept form.
- Given the equation $2x - 3y = -8$, answer the following questions:
 - Evaluate $f(-12)$
 - Solve for x if $f(x) = -2$
 - State the slope and x - and y -intercepts
 - Write the equation in slope intercept form.
 - Write the equation in point-slope form.
 - Write the equation in intercept form.
- Given the equation $y - 5 = \frac{2}{3}(x - 2)$, answer the following questions:
 - Evaluate $f(-12)$
 - Solve for x if $f(x) = -2$
 - State the slope and x - and y -intercepts
 - Write the equation in standard form.
 - Write the equation in slope intercept form.
 - Write the equation in intercept form.
- Given the equation $\frac{x}{7} - \frac{y}{2} = -1$, answer the following questions:
 - Evaluate $f(-12)$
 - Solve for x if $f(x) = -2$
 - State the slope and x - and y -intercepts
 - Write the equation in standard form.
 - Write the equation in point-slope form.
 - Write the equation in slope-intercept form.
- A line passes through the point E(5,-2) and is parallel to $3x - 4y = -9$. Determine the equation of this line & express the equations in all four forms.
- A line passes through the point E(5,-2) and is perpendicular to $\frac{x}{2} - \frac{y}{4} = 1$. Determine the equation of this line & express the equations in all four forms.

E. Level IP → Still Need Independent Practice in Moving toward Skill Mastery

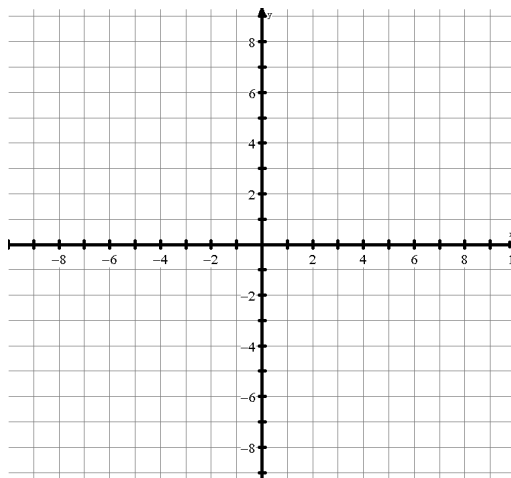
1. A line that passes through the points A(-2,7) and B(3,-3). Write the equation of this line in all four forms.
2. A line that passes through the points C(2,3) and D(5,8). Write the equation of this line in all four forms.
3. Given the equation $f(x) = 4 - \frac{1}{2}x$, answer the following questions:
- Evaluate $f(-12)$
 - Solve for x if $f(x) = -2$
 - State the slope and x - and y -intercepts
 - Write the equation in standard form.
 - Write the equation in point-slope form.
 - Write the equation in intercept form.
4. Given the equation $2x - 3y = -8$, answer the following questions:
- Evaluate $f(-12)$
 - Solve for x if $f(x) = -2$
 - State the slope and x - and y -intercepts
 - Write the equation in slope intercept form.
 - Write the equation in point-slope form.
 - Write the equation in intercept form.
5. Given the equation $y - 5 = \frac{2}{3}(x - 2)$, answer the following questions:
- Evaluate $f(-12)$
 - Solve for x if $f(x) = -2$
 - State the slope and x - and y -intercepts
 - Write the equation in standard form.
 - Write the equation in slope intercept form.
 - Write the equation in intercept form.
6. Given the equation $\frac{x}{7} - \frac{y}{2} = -1$, answer the following questions:
- Evaluate $f(-12)$
 - Solve for x if $f(x) = -2$
 - State the slope and x - and y -intercepts
 - Write the equation in standard form.
 - Write the equation in point-slope form.
 - Write the equation in slope-intercept form.
7. A line passes through the point E(5,-2) and is parallel to $3x - 4y = -9$. Determine the equation of this line & express the equations in all four forms.
8. A line passes through the point E(5,-2) and is perpendicular to $\frac{x}{2} - \frac{y}{4} = 1$. Determine the equation of this line & express the equations in all four forms.

F. Level MF → Have achieved Skill Mastery & can move my learning forward

Feel free to use the INTERNET to help you with RESEARCH as you explore these EXTENSION topics

1. PART A – Piecewise Linear Functions

$$g(x) = \begin{cases} x+3 & \text{if } x < -2 \\ -2x-3 & \text{if } x \geq -2 \end{cases}$$



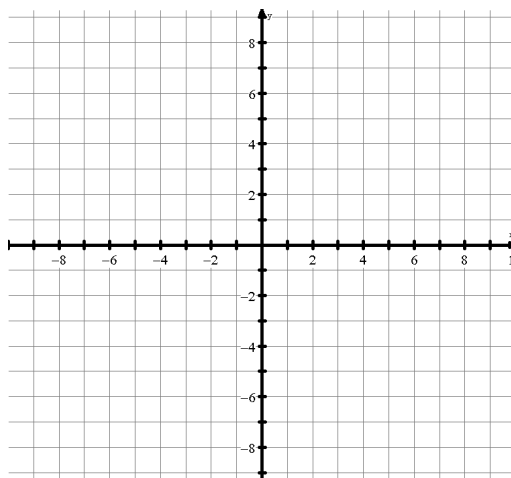
Determine $g(-4)$, $g(-2)$, and $g(2)$.

Determine the domain of $g(x)$

Graph $g(x)$.

Determine the range of $g(x)$

$$g(x) = \begin{cases} 1+x & \text{if } x < 0 \\ 5-2x & \text{if } x \geq 0 \end{cases}$$



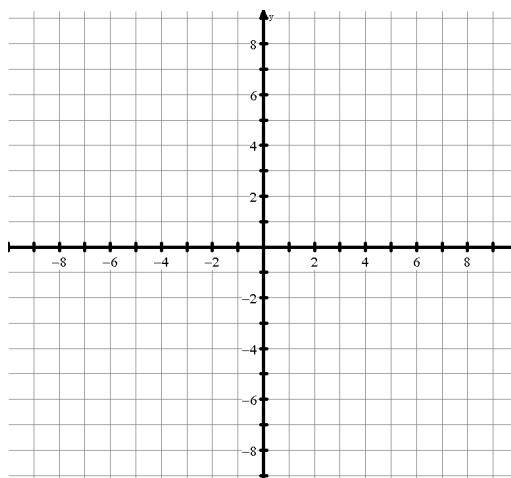
Determine $g(-1)$, $g(0)$, and $g(2)$.

Determine the domain of $g(x)$

Graph $g(x)$.

Determine the range of $g(x)$

$$f(x) = \begin{cases} -2+2x & \text{if } -4 < x < 0 \\ -\frac{1}{2}x & \text{if } x \geq 0 \end{cases}$$



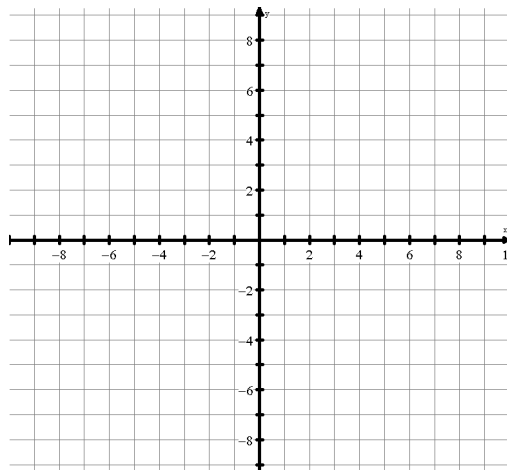
Determine $f(-1)$, $f(0)$, and $f(8)$.

Determine the domain of $f(x)$

Graph $f(x)$.

Determine the range of $f(x)$

$$a(x) = \begin{cases} 1 - x & \text{if } -6 \leq x < -2 \\ 3 & \text{if } x = -2 \\ x - 2 & \text{if } -2 < x < 4 \end{cases}$$



Determine :

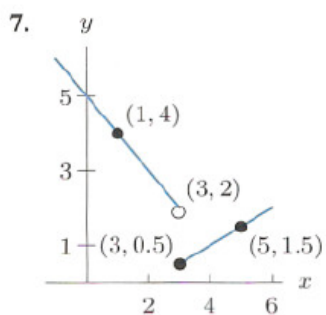
$a(-1)$, $a(2)$, and $a(3)$.

Determine the domain of $a(x)$

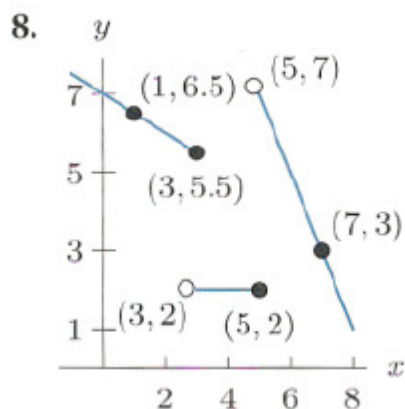
Graph $a(x)$.

Determine the range of $a(x)$

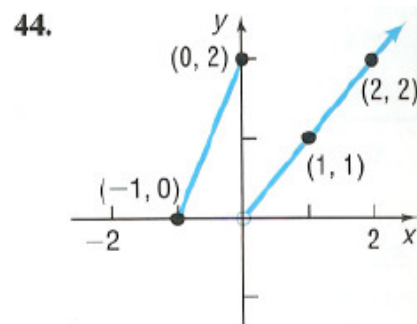
Write an equation for the function



Write an equation for the function



Write an equation for the function



2. PART B – Graphing & Solving Linear Inequalities

(a) Solve the linear inequality $3x + 5 < -2x + 3(x-4)$

(b) Use DESMOS to graph the linear inequality $y < 2x + 4$. Explain what is happening and offer an explanation as to WHY the solution appears as it does. Explain how you could ALGEBRAICALLY verify that your solution was correct

(c) Graph the linear inequality $y < 2x - 16$. DO NOT USE TECHNOLOGY!! Verify your solution.

(d) Graph the linear inequality $y \geq -x + 5$. DO NOT USE TECHNOLOGY!! Verify your solution.

(e) Graph the linear inequality $2x - 4y < 16$. DO NOT USE TECHNOLOGY!! Verify your solution.

(f) Graph the linear inequality $y - 6 < -2(x + 3)$. DO NOT USE TECHNOLOGY!! Verify your solution.

3. PART C – Solving Linear Equations Involving Absolute Value.

- Explain what the Absolute Value “function” does to an input, for example the numbers -3 and +5
- Evaluate $|-2 + 5 + 7 - 13 \times 2|$ and evaluate $(-2 + 5 + 7 - 13 \times 2)$ and explain WHY the answers are different.
- Solve $|2x + 5| = 4$ GRAPHICALLY on DESMOS and explain WHY there are two solutions.
- Explain HOW to solve the equation $|2x + 5| = 4$ ALGEBRAICALLY.
- Solve $|2x + 5| = x + 4$ GRAPHICALLY and explain WHY there are two solutions.
- Explain HOW to solve the equation $|2x + 5| = x + 4$ ALGEBRAICALLY.
- Solve the following equations involving absolute value ALGEBRAICALLY.

(i) $|-2x + 5| = x + 4$

(ii) $\left|-\frac{2}{3}x - 1\right| = x + 4$

(iii) $|2x + 5| = x - 4$

(iv) $4 - |3x - 6| = 4 - x$

CLASSWORK SCORING RUBRIC:

Understanding	Communication	Perseverance/Collaboration
<p>4 – All my work is correct and has been verified by myself & others that I am working with. I have corrected any errors that I/others found in our checking.</p> <p>I know that I now understand this concept & skill</p>	<p>4 – the work that I am presenting ALWAYS shows clear & concise key steps & accurate & proper solutions, so that other students could read & understand it.</p>	<p>4 – we stayed on task ALL the time & solved our own problems if & when they came up. We finished all the class work.</p>
<p>3 – Most of my work is correct and has been checked by myself & others that I am working with. I have corrected most of the errors that I/others found in our checking.</p> <p>I believe that I now understand most of this concept & skill</p>	<p>3 – the work that I am presenting MOSTLY shows clear & concise key steps & accurate & proper solutions, so that other students could read & understand it.</p>	<p>3 – we stayed on task MOST the time & usually solved our own problems if & when they came up. We finished all the class work.</p>
<p>2 – Some of my work is correct and has been checked by myself & others that I am working with. I have corrected some of the errors that I/others found in our checking.</p> <p>I know that I partially understand this concept & skill</p>	<p>2 – the work that I am presenting SOMETIMES shows clear & concise key steps & accurate & proper solutions, so that other students could read & understand it.</p>	<p>2 – we stayed on task SOME the time (had to be reminded occasionally) & sometimes solved our own problems if & when they came up (needed some teacher help). We had to rush to finish all the class work.</p>
<p>1 – I don't know if my work is correct or not as I have not checked my work, nor have others that I am working with. So obviously, I have not corrected any errors.</p> <p>I still know that even now I don't understand this concept & skill</p>	<p>1 – the work that I am presenting RARELY shows clear & concise key steps & accurate & proper solutions, so that other students could read & understand it.</p>	<p>1 – we were off task often & had to be reminded & rarely solved our own problems if & when they came up (needed teacher help or help from the MF group). We didn't finish all the class work.</p>