**8th Grade Math Unit Plan**

Objective of Unit: be able to create functions through tables, pictures, graphs, equations and verbally.

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Executive summary

This unit will be used for 8th grade algebra. It is a set for 15 class periods that run for 50 minutes. The focus of this unit will be on Minnesota 8th grade algebra standards: 8.2.1 ***Represent real world and mathematical situations using equations and inequalities involving linear expressions. Solve equations and inequalities symbolically and graphically. Interpret solutions in the original Context.*** As well as Standard:8.2.2 ***Understand the concept of function in real-world and mathematical situations, and distinguish between linear and nonlinear functions. Recognize linear functions in real world and mathematical situations; represent linear functions and other functions with tables, verbal descriptions, symbols and graphs; solve problems involving these functions and explain results in the original context.*** And also STANDARD 8.2.4  ***Represent real-world and mathematical situations using equations and inequalities involving linear expressions. Solve equations and inequalities symbolically and graphically. Interpret solutions in the original context.***

All of these lessons incorporate the 5 points of Algebra; concrete/pictorial representation, verbal description, table, graph and formulas which each lesson will focus on having students show these 5 points.

We will start by finding patterns around us, growing letters and identifying what makes them grow. They will then move into growing other types of patterns and relating those patterns to formulas. Students will deepen their knowledge of function as they explore arithmetic and geometric sequences. Identifying arithmetic sequences to linear functions and geometric sequences to exponential functions is an important part of this lesson. We will use excel to graph our tables. We will use these tools to help visualize the data and what this is telling us. When complete students will be able to describe, draw, create a table, graph and create formulas for both real-world and mathematical situations.

**Minnesota Math Standards Covered**

Standard [8.2.1](http://scimathmn.org/stemtc/821) Understand the concept of function in real-world and mathematical situations, and distinguish between linear and nonlinear functions

Benchmark: 8.2.1.1 **Functions** Understand that a function is a relationship between an independent variable and a dependent variable in which the value of the independent variable determines the value of the dependent variable. Use functional notation, such as *f*(*x*), to represent such relationships.

*For example*: The relationship between the area of a square and the side length can be expressed as *f(x)=x2*. In this case, *f(5)=25*, which represents the fact that a square of side length 5 units has area 25 units squared.

Benchmark: 8.2.1.2 **Linear Functions** Use linear functions to represent relationships in which changing the input variable by some amount leads to a change in the output variable that is a constant times that amount.

*For example*: Uncle Jim gave Emily $50 on the day she was born and $25 on each birthday after that. The function *f(x)=50+25x* represents the amount of money Jim has given after *x* years. The rate of change is $25 per year.

Benchmark: 8.2.1.3 **Linear Functions: Equations & Graphs** Understand that a function is linear if it can be expressed in the form *f(x)=mx+b* or if its graph is a straight line.

*For example*: The function *f(x)=x2* is not a linear function because its graph contains the points (1,1), (-1,1) and (0,0), which are not on a straight line.

Benchmark: 8.2.1.4 **Arithmetic Sequences** Understand that an arithmetic sequence is a linear function that can be expressed in the form *f(x) = mx+b*, where *x* = 0, 1, 2, 3,....

*For example*: The arithmetic sequence 3, 7, 11, 15, ..., can be expressed as *f(x) = 4x + 3.*

Benchmark: 8.2.1.5 **Geometric Sequences** Understand that a geometric sequence is a nonlinear function that can be expressed in the form *f(x) = abx,* where

*x* = 0, 1, 2, 3,....*For example*: The geometric sequence 6, 12, 24, 48, ... , can be expressed in the form *f*(*x*) = 6(2*x*)

STANDARD 8.2.2

Recognize linear functions in real-world and mathematical situations; represent linear functions and other functions with tables, verbal descriptions, symbols and graphs; solve problems involving these functions and explain results in the original context.

Benchmarks: 8.2.2.1 Represent Linear Functions

8.2.2.2 Graphs of Lines

8.2.2.3 Coefficients & Lines

8.2.2.4 Arithmetic Sequences

8.2.2.5 Geometric Sequences

STANDARD 8.2.4 Represent real-world and mathematical situations using equations and inequalities involving linear expressions. Solve equations and inequalities symbolically and graphically. Interpret solutions in the original context.

Benchmarks:8.2.4.1 Linear Equations to Represent Relationships

8.2.4.3 Linear Equations & Lines

8.2.4.4 Linear Inequalities to Represent Relationships

**Day 1 (\*1, 2, & 3 works cited)**

**Lesson Overview:** This lesson will look at students past knowledge of ratios, probability and math terms. We will discuss how teachers know if a student is

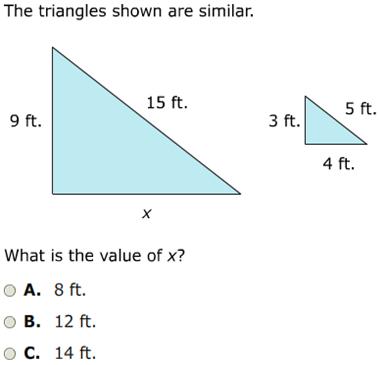
learning by using pre and post tests and also recall using excel for graphing data.

**Objective:** By the end of the day students will be recall how to graph using excel.

**Launch:** As students come into class they will pick up a prior knowledge quiz, for me to assess what their prior knowledge is on ratios and probability.

After: Ask students,“How do teachers know if students are learning or not?”Talk about pre and posttests.

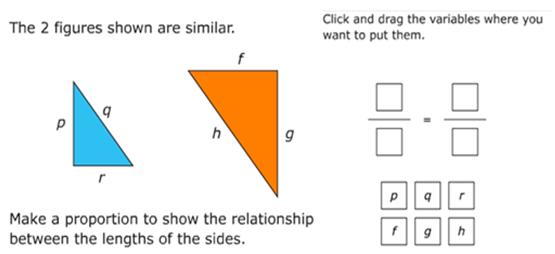
Pre-test (prior knowledge)



***Answer:*** *b*

Source: Minnesota [Grade 7 Mathematics Modified MCA-III Item Sampler](http://education.state.mn.us/mdeprod/idcplg?IdcService=GET_FILE&dDocName=019304&RevisionSelectionMethod=latestReleased&Rendition=primary) Item, 2011, Benchmark 7.3.2.2

3.



*Possible answers: (The numerators and denominators can be flipped around, and left side could be written on right side.)*

*rp*=*fg*;*qp*=*hg*;*rq*=*fh*

Source: Minnesota [Grade 7 Mathematics MCA-III Item Sampler](http://education.state.mn.us/mdeprod/idcplg?IdcService=GET_FILE&dDocName=019304&RevisionSelectionMethod=latestReleased&Rendition=primary) Item, 2011, Benchmark 7.3.2.2

7.

Find the area of the following shapes after the transformations have been made.

|  |  |
| --- | --- |
| **1.** | A square has an area of 19. If the side length is increased by a factor of 5, what is the new area of the square?  New area = |
| **2.** | A square has an area of 22. If the side length is increased by a factor of 2, what is the new area of the square?  New area = |

***Answers:*** *1) 475 (19 × 5 × 5)*

*2) 88 (22 × 2 × 2)*

A jar contains five red, three green, two purple and four yellow marbles. A marble is chosen at random from the jar. After replacing it, a second marble is chosen. What is the probability of choosing a purple and a red marble?

A. 598

B. 21

C. 398

D. 249

Answer: A

6. A quality inspector examines a sample of 25 strings of lights and finds that 6 strings of lights are defective. What is the best prediction of the number of defective strings in a delivery of 1000 strings of lights?

A. 6 lights

B. 25 lights

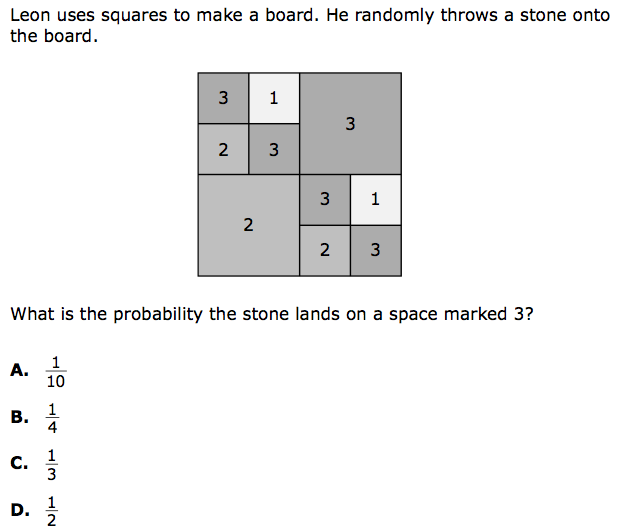
C. 24 lights

D. 240 lights

Answer: D

Taken from [MCA 2011 review data and probability](http://teresaweise.wordpress.com/2011/04/18/april-18th-click-on-this-title-again-to-see-a-better-view/)

7.



Answer: D

1. On his mathematics test, Carlos had 20 correct out of 25 problems. Which of the following is NOT another way of expressing 20 out of 25?

A. 54 B. 0.80 C. 80% D. 45

***Answer:*** *D*

*DOK Level: 2*

Source: FCAT (Florida Comprehensive [Assessment](http://scimathmn.org/stemtc/glossary/1#term8) Test) grade 7, released August, 2006

2. An equation is shown.

*n = 1 ÷* 17

Which describes *n*?

A. Integer

B. Irrational

C. Rational

D. Whole

***Answer:*** *C*

*DOK Level: 2*

Source: Minnesota MCA Series III Mathematics' Item Sampler, Grade 7

3. Which one of the following numbers is **not** rational?

A. 7/16 B. 7/1 C. 7/0 D. 0.7

***Answer:*** *C*

**Explore:** Upon completing pre-assessment students will grab a laptop/chromebook with others who have completed their quiz as they turn them in. Given a [data list](https://docs.google.com/document/d/1vdMQN4bD1ng2xfjFgzNV81XPtbtxWqf2qxAW3I5e0Qs/edit?usp=sharing) create a line graph in excel (recalling from 7 grade where they learned to create graphs)

[teacher example excel graph](https://docs.google.com/spreadsheets/d/1jhUowhbSx_xRVpjV9dW6bUw_MdFTShxizvlrvF9kuKU/edit?usp=sharing)

**Share:** Groups share their graphs through projector. Will also discuss how teachers know if a student is learning by using pre and post tests.

Exit: Assessment: Pretest (on what they will be learning)

Pre and Post Test

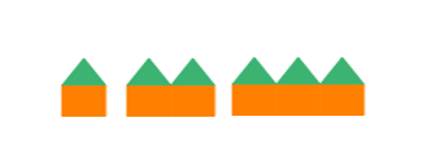
Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Give a real-world example of what the algebraic expression *N + 3* means. Make a table with five ordered pairs.

# 

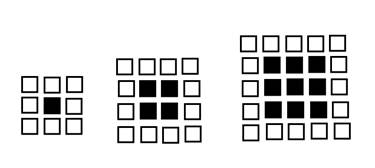
2. Using variables and showing your work, find how many houses are on each island.

3. Based on the pattern below, draw the 5th house in the sequence. Make a table with five ordered pairs, and construct a graph.



4. Choose a letter, make it grow, and draw the first few stages. Construct a table of ordered pairs, then write a recursive or explicit formula, and identify which kind of formula you chose.

5. Using the pattern below, draw the 4th stage of growth. Write a recursive and explicit formula, and explain how you got them.



6. Admission to the state fair is $8 for adults and $7 for students. Write two equivalent expressions if two adults and two students go to the fair. Then find the total admission cost.

7. You used P minutes on month on your cell phone. The nets month you used 75 fewer minutes. Write an expression in simplest form.

8. A community center offers a canoeing day trip. The canoeing fee is $80 per person. The cost of food is an additional $39 per person. Find the total cost for a family of four.

**Day 2 Growing letters (WC \*7)**

**Standard: 8-2.1** Understand the concept of function in real-world and mathematical situations, and distinguish between linear and nonlinear functions

**Standard: 8-2-2** Recognize linear functions in real-world and mathematical situations; represent linear functions and other functions with tables, verbal descriptions, symbols and graphs; solve problems involving these functions and explain results in the original context.

**Lesson overview:** After assessing students the previous day and students recalling how to graph with excel, today they will be looking for patterns through growing letters on graph paper. Today will encompass drawing the M, day 3 students will share their drawings day 4 will write recursive and explicit formulas followed by graphing and discussing arithmetic and Geometric sequences.

**Objective:** By the end of the day students will be able to grow the letter M on graph paper and explain to their peers how it grows.

**Launch:**  Starter question on board: How do you grow a garden? What will you need? (Discuss with students growing a garden.) Today instead of plants we are going to grow a letter garden. Give example using letter T.

(use table for end of day)

|  |  |
| --- | --- |
| T | blox |
| 1 | 6 |
| 2 | 9 |
| 3 | 12 |
| 4 | 15 |
| 5 | 18 |

**Explore:** Create letter garden. Grow the letter M : with a partner, using graph paper grow the letter M any way you like.

1. Must grow it in a consistent manner, (refer to example using T)
2. Can start any size/way but must grow
3. Be prepared to explain how your letter grows

**Share:** Each group will show how their letter grows (show different ones)

**Exit/summary:** Using your explanation of how your M grew create a table showing how your letter grew at least 5 times.

**Day 3 Candy Box & Letter Garden Cont.(day 2 of 4)(WC #10)**

**Standard: 8-2.1** Understand the concept of function in real-world and mathematical situations, and distinguish between linear and nonlinear functions

**Standard: 8-2-2** Recognize linear functions in real-world and mathematical situations; represent linear functions and other functions with tables, verbal descriptions, symbols and graphs; solve problems involving these functions and explain results in the original context.

**Overview:** Today we will continue with our letter gardens, by first comparing candy boxes. As a class we will construct a formula using a graph and table of comparing the candy boxes with one getting 5 more. Following that Students will pick up where we left off finishing their tables sharing them with the class and together as a class we will construct formulas from our tables.

**Learning target**: By the end of today students will be ready to grow a letter of their choice using all 5 points of algebra.

**Launch:** Candy Box: hand out 2 boxes of wrapped (so can’t see in) boxes of candy to two of first people in the door. On the board have question, “how many pieces candies could be in the boxes?” have students discuss with their elbow partner what they think(they can pass the boxes around, do not open). Discuss as a class. Give one of the boxes 5 more pieces of candy and ask how many does each student have now? Discuss. Make a table of how many each student “could have”. Guide students to recognize n as student with just box (or other variable) and n+5 for student with box and 5 more. Discuss key concepts with students. They should all agree that one box has five more than the other box, and that there are a number of different possibilities. On the board, record a prediction table with student names and guesses for each box. Check to see that all guesses follow the rule that one box has 5 more than the other. If the rule is not followed have students help adjust the guess. Next, discuss how a letter can stand in place of a value that is unknown. If we called the amount of candy in box one *N*, what could we call the amount in box two that has five more pieces of candy? Guide them that this is their explicit formula (A formula that allows direct computation of any ***term*** for a sequence; as a class guide them to the recursive formula.)

**Explore:** Yesterday we grew our m and started to create table of your letters growth.

With your partner relook at your growing M and your Table, how did your letter grow. What pattern do you see in your letter’s growth? (Give example back to T of it growing by 3.)

**Share:** From previous day students will be sharing their table and growth. As each group shares have students copy down other groups tables and as a class come up with an explicit and a recursive formula.

**Summarize:** How did our letters grow? Tomorrow we will look at graphing our letters.

**Day 4** Letter garden Cont (day 3 of 4)

**Standard: 8-2.1** Understand the concept of function in real-world and mathematical situations, and distinguish between linear and nonlinear functions

Benchmark: 8.2.1.1 **Functions** Understand that a function is a relationship between an independent variable and a dependent variable in which the value of the independent variable determines the value of the dependent variable. Use functional notation, such as *f*(*x*), to represent such relationships.

**Standard: 8-2-2** Recognize linear functions in real-world and mathematical situations; represent linear functions and other functions with tables, verbal descriptions, symbols and graphs; solve problems involving these functions and explain results in the original context.

**Overview:** As we continue with our growing letters students will be graphing their tables, recalling that independent variables got on the x-axis and dependent variables go on the y-axis.

**Learning Target:** By the end of class students will be able to use their tables and formulas to draw a graph on paper and on excel, and recall what independent and dependent variable are.

**Launch:** As students come in hand out graph paper.

Ask “How many of you have parents or guardians who buy your clothes? If they didn’t buy them how would you get them ?(do you have a job? Most no) So you are dependent on your parents. In graphing we have dependent and independent variables. But you can’t just put them anywhere. A good way to remember is Dry Mix Dry =Dependent, responding y-axis Mix =manipulated, independent, x-axis.

**Explore:** With partner have students graph 5 groups data. Discuss with partner how graphs compare (straight lines/ parabolas etc).

**Share:** Share graphs, many may be linear, discuss what that means.

**Extension:** Graph using excel

**Day 5** Arms in class problem

**Standard: 8-2.1** Understand the concept of function in real-world and mathematical situations, and distinguish between linear and nonlinear functions

Benchmark: 8.2.1.4 **Arithmetic Sequences** Understand that an arithmetic sequence is a linear function that can be expressed in the form *f(x) = mx+b*, where *x* = 0, 1, 2, 3,....

*For example*: The arithmetic sequence 3, 7, 11, 15, ..., can be expressed as *f(x) = 4x + 3.*

Benchmark: 8.2.1.5 **Geometric Sequences** Understand that a geometric sequence is a nonlinear function that can be expressed in the form *f(x) = abx,* where

**Standard: 8-2-2** Recognize linear functions in real-world and mathematical situations; represent linear functions and other functions with tables, verbal descriptions, symbols and graphs; solve problems involving these functions and explain results in the original context.

**Overview**: Today we are taking a break from our letter gardens instead we will look at arms and how the # of arms increase as students enter the room. Continuing to focus on the 5 points of algebra

**Launch:** Have students come into classroom one at a time, As students come in class have them add themselves to list on board of # people and number of arms in room. Do this for the first 15 people.

**Explore:** With partners verbalize, create a table, draw, graph and create formula to show the pattern of arms in class.

**Share:** Have pairs share with another pair and then each group share with the class.

**Summarize:** Discuss type of graph we see (linear) relate back to some of our letter M’s. When do we see linear (when we are adding something); What do we call this sequence? (Arithmetic) What makes it arithmetic? With each person add 2 arms. Difference is the same/same amount added each time. Could we subtract and still be arithmetic? (yes) What if we multiply or divide? (no) What would this be?(geometric)

**Extension:** Graph data using excel

**Day 6 Build own letter (letter garden day 4/4)**

**Standard: 8-2.1** Understand the concept of function in real-world and mathematical situations, and distinguish between linear and nonlinear functions

**Standard: 8-2-2** Recognize linear functions in real-world and mathematical situations; represent linear functions and other functions with tables, verbal descriptions, symbols and graphs; solve problems involving these functions and explain results in the original context.

**Overview:** Students will be doing similiar to what we did in growing our letter garden, this time they will choose a letter of their own.

**Launch:**  Take out your letter garden (2 sided graph paper) Our M is a little lonely. Today you are going to grow your letter garden a little more, but we want a diverse garden so you are going to choose a different letter to grow, try and grow it differently than you grew your M.

**Explore:** Choose a letter On their own. (monitor student’s progress)

1. Make it grow in a pattern (consistent growth of any kind)
2. Make a table of the stage and number of boxes
3. Write a recursive and explicit formula
4. Graph the function

**Share:** Have each student share their letter & table and explain how it grew. Have students write down each others tables as they go (teacher can make a master of all tables) They won’t share their formula yet.

**Exit:** Looking at your own graph, what type of graph do you have? What does this tell you about your formula? Tomorrow we will continue to look at each others letters and write formulas for each others letters.

**Day 7 Letter garden Cont**

**Overview:** Continuing with our letter garden today students will practice writing recursive and explicit formulas for their classmates letters. Depending on class size if it is a large class break groups into predetermined groups (divide up groups based on their letters so each group has different letters/letter growth)

**Objective:** By the end of the day students given a table or data be able to write explicit and recursive formulas, as well as graph the data and explain what they mean.

**Launch/explore:** When students arrive they will need to find their group based on the number next to their name and table with that number. Hand print out of everyone’s letter “tables” grouped into sections. Each group is assigned a section to complete (their own letters are not in these “section” so they won’t have their formula to share with their group, yet!) As a group come up with recursive and explicit formulas for the given tables, graph and be able to explain how the letter grew

**Share:** Groups will share their “sections” with the class explaining how they came up with their formula’s and what their graph shows.

**Exit Ticket:** Go through letters and write A for arithmetic, G for geometric or N for neither, What type of graph gives us arithmetic?(linear)

**Day 8** **Building a Bigger House (WC # 7 & 10)**

**Overview:** Today we will continue looking at patterns by building bigger houses. They will start with simple adding to show an arithmetic pattern. They will begin to recognize the seed is the intercept and the amount it grows by is the slope. This lesson will lead into the next where they will see squared growth.

**Standard**: 8-2.2 Recognize linear functions in real-world and mathematical situations; represent linear functions and other functions with tables, verbal descriptions, symbols and graphs; solve problems involving these functions and explain results in the original context.

8.2.1.4 Arithmetic Sequences

Understand that an arithmetic sequence is a linear function that can be expressed in the form *f(x) = mx+b*, where *x* = 0, 1, 2, 3,....

**Objective**: By end of day students will be able to represent arithmetic & Geometric sequences using equations, tables,graphs and verbal descriptions.

**Launch:** Tell students today you are all moving out and building your first home. You don’t have much of anything so you start small. (build first house on board(starting with 3 blocks), Soon you out grow this house and have to build a new house same style just bigger. (build this house together by adding 3 more) Yet again you outgrow your home build the next step. (walk around and observe how students build their next house) Now you will continue to build your house and eventually you have to have the biggest house which will be the 5th house you build but you won’t have enough blocks to build it. The builder needs to know how many blocks it will take. Have enough pattern-block triangles and squares for each student to make the first four houses in the pattern. Students should work individually on this activity. Students need to build the first four houses from the sequence, and then complete the following tasks.

Explore:

For each house

1. For each house, determine the total number of pieces needed. How many squares and triangles are needed for a given house? Organize your information in some way.
2. Describe what house 5 would look like. Draw a sketch of this house.
3. Predict the total number of pieces you will need to build house 15. Explain your reasoning.
4. Write a rule that gives the total number of pieces needed to build any house in this sequence

Material needed: squares and triangles.

[Page 74 black master](https://drive.google.com/open?id=0B4LYQMGXtYtkUXhJdWE4bjVzLU0)

Share: Students should explain how they were able to find a pattern. Did they notice changes from one pattern to the next? Did they organize information in a table? Did they add three each time to make a recursive formula? Do they talk about the number of blocks, or the number of squares and triangles? Challenge students to describe the rule using words, then symbols. Can they come up with an explicit formula?

Exit/extension: Graph your table. Is it Linear? What type of sequence might it be arithmetic or geometric?

**Day 9** Building and even bigger house

**Overview:** yesterday students built homes that grew wider by 3 blocks, today they will build houses that grow both wider and taller. Leading to an explicit formula that is quadratic.

**Launch/explore:** You own a modest home, but recently your sister has moved in with you so you need to build a bigger home, except you need to be on different floors so you now need to build up and out(demonstrate with doc cam of). Seems every time you finish you need a bigger house, I have completed 2 more houses now you need to construct the 4 home with a partner today.

Materials

Square and triangle blocks

[Visual of first 3 stages](https://drive.google.com/open?id=0B4LYQMGXtYtkVl9RMWZhMHV2VGM)

For each house

1. For each house, determine the total number of pieces needed. How many squares and triangles are needed for a given house? Organize your information in some way.
2. Describe what house 5 would look like. Draw a sketch of this house.
3. Predict the total number of pieces you will need to build house 15. Explain your reasoning.
4. Write a rule that gives the total number of pieces needed to build any house in this sequence

Share: Have each group share a different part of what they did (table, picture, graph, formula, and verbal description).

|  |  |
| --- | --- |
| House | # blocks |
| 1 | 2 |
| 2 | 8 |
| 3 | 18 |
| 4 | 32 |

Summarize: Discuss what students “saw”, what parts are growing? What does the formula tell us? Lead them to quadratic formula. Guide them to see that half of the second difference is what n is multiplied by in the explicit formula.

**Day 10** Rocket ship (WC #8)

**Overview:** Students describe "what they see" in shape patterns as algebraic expressions and equations. Write linear equations for the change.

**Materials:**  
 Pattern blocks

[Rocket page](https://drive.google.com/open?id=0B4LYQMGXtYtkUFJJQjZMVUJYSjA)

[Practice](https://drive.google.com/open?id=0B4LYQMGXtYtkdHpBYlBkZ0lpcDg)

[Exit ticket](https://drive.google.com/open?id=0B4LYQMGXtYtkcUdVRDBKZmd0MkU)

**Launch**: NASA has hired our class to build a missile. They have the prototype built but want to build different stages of an even bigger one. (hand out [Rocket page](https://drive.google.com/open?id=0B4LYQMGXtYtkUFJJQjZMVUJYSjA) )

1) How many total pieces would be needed to make a stage 4 missile?

2) Draw the fifth stage. How many pieces make up this stage?

3) What observations do you see that would help you describe the number of pieces needed to build a higher missile stage?

4) Determine how many pieces would be needed to make a Stage 25 missile without constructing it.

5) Write an equation that can be used to compute the number of pieces of any stage in the missile pattern. Explain how you know the equation will always work.

However students solve it, it is a perfect moment for students to explain their thinking

**Explore:** (Have orange square tiles for #1, flat toothpicks for #2 AND Yellow hexagon for #3 on hand for students to use) hand out [Practice](https://drive.google.com/open?id=0B4LYQMGXtYtkdHpBYlBkZ0lpcDg) sheet. They can use the tiles and toothpicks to explore the patterns. Students will work with partners.

**Share:** Students will share with class what they saw, and how the patterns changed.

**Exit**: [Exit ticket](https://drive.google.com/open?id=0B4LYQMGXtYtkcUdVRDBKZmd0MkU) Is a chance for students to show individually what they understand. It will help guide me to know if we need to continue further on this topic tomorrow.

**Day 11 Island Construction (WC #7, & 10)**

Standards: 8-2.1 Represent real world and mathematical situations using equations and inequalities involving linear expressions. Solve equations and inequalities symbolically and graphically. Interpret solutions in the original context.

Standards: 8-2.2 Recognize linear functions in real-world and mathematical situations; represent linear functions and other functions with tables, verbal descriptions, symbols and graphs; solve problems involving these functions and explain results in the original context.

**Materials:** Building Houses p.51 (Navigating Through Algebra 3-5, Series 5, 2008), Building Houses p. 83, small counters

**Launch:** “I just bought three islands and I’m going to make a resort. Bridges connect the islands, but I need to know how many houses to build. The architect figured out how many houses I could build, but instead of telling me houses per island, he combined the totals between the islands and wrote. “How many houses go on each island?”

**Explore:** Allow students to work on the problem and see what solutions they discover. Show them how to go about finding and checking their answers, recording so they won’t repeat incorrect solutions. Ask about the strategies students used to find the answer. Give them p.83 and allow them to work in small groups.

**Share:** Allow students to discuss relationships and strategies to solve for the three problems.

**Summarize:** “Did anyone find a different way to solve the island problem?” “What did this problem make you think and talk about?”

**Extension:** Give students a problem with four islands if finished early, or without the total number houses.

**Day 12 Balance Scales(WC #6)**

**Standards: 8-2.1** Represent real world and mathematical situations using equations and inequalities involving linear expressions. Solve equations and inequalities symbolically and graphically. Interpret solutions in the original context.

**Standards: 8-2.2** Recognize linear functions in real-world and mathematical situations; represent linear functions and other functions with tables, verbal descriptions, symbols and graphs; solve problems involving these functions and explain results in the original context.

**STANDARD 8.2.4**  Represent real-world and mathematical situations using equations and inequalities involving linear expressions. Solve equations and inequalities symbolically and graphically. Interpret solutions in the original context.

**Overview:** Students will be connecting real world situations to concept of linearity. Through the development of tables and graphs and equations they will be able to come up with a solution to their situation.

**Learning Objective**: By the end of the class students will be able to create a mathematical analysis using tables, graphs for fundraising their trip to D.C.

Materials: Black master copy [Fundraising](https://drive.google.com/file/d/0B4LYQMGXtYtkUUY4cUhiNGlkYXc/view?usp=sharing) PG 84 navigating through algebra 6-8

Launch: In the spring many of our math club is going on a trip to Washington DC, and we are looking ahead to the school valentine dance as well. But we are in need of money to do both things. The club has decided to have a car wash to raise money for both of these projects. Total cost of sponges, rags, soap, buckets and other materials needed will be $117.50.

The usual cost of a car wash is $4.00. The club needs you to prepare an analysis of this situation that includes a graph , table.

Explore: With a partner create a table and graph of the amount of $ the club will make washing cars.(when students have completed this then hand out the question guide [Fundraising](https://drive.google.com/file/d/0B4LYQMGXtYtkUUY4cUhiNGlkYXc/view?usp=sharing) ) Complete answers together

Share: Have students share their tables and graphs and discuss what their final analysis(good bad, share #’s) is on the car wash as a fundraiser and why .

Exit/Extension:

1. For linear equation )eg y=2x or y=2-3x) choose any two points and compute the ratio of the vertical change to the horizontal change from one point to the other.

2. Given 2 pts (eg (2,6) and (0,4)) Plot the points on a coordinate grid and draw

the line that passes through them

1. Determine the slope of the line
2. Mark and label at least 3 other points on this line
3. Make a table using these points. How does the pattern in the table relate to the slope of the line?
4. Locate the y-intercept for the line.

**Day 13 Balance scales (WC # 7, 9 & 5)**

Standards: 8-2.1 Represent real world and mathematical situations using equations and inequalities involving linear expressions. Solve equations and inequalities symbolically and graphically. Interpret solutions in the original context.

Overview: Today students will go to the computer lab and use an online program that lets them “balance” equations.

**Materials:** Algebra Scales p.44 (Navigating Through Algebra 3-5, Series 5, 2008), Algebra Scales p.81 (Navigating Through Algebra 3-5, Series 5, 2008), computer lab. \*must use computer lab or “real” laptops that have Java installed. [Geology equations](https://drive.google.com/open?id=0B4LYQMGXtYtkYjhpMFRSaWpUZzQ) page

**Launch:** “Ever use a balance scale to measure?” Show them a balance scale and how it works. “How could you measure different objects if I didn’t have weights?” Use the computer lab and allow students to play with the following [link](http://nlvm.usu.edu/en/nav/frames_asid_201_g_4_t_2.html?open=instructions) or <http://illuminations.nctm.org/activitydetail.aspx?id=33> Bring the students together again in the room and draw a balance scale on the board. Place some different problems on the scale and talk about which way the scale would tilt.

**Explore:** Have students complete [Geology equations](https://drive.google.com/open?id=0B4LYQMGXtYtkYjhpMFRSaWpUZzQ) or p.81 with a partner.

**Share:** Allow students to talk about how they solved the problems. 1. What are you actually doing to the equation when you remove a rock from both sides of the pan balance?

[Subtracting 1 from both sides of the equation, which creates an equivalent equation that has the same unknown value.]

2. What are you actually doing to the equation when you remove a crate from both sides of the pan balance?

[Subtracting 1 *x* from both sides of the equation, which creates an equivalent equation that has the same unknown value.]

**Summarize:** “What are some good strategies for finding the values of the shapes?” “**Extension:** Have students create their own problems and answer keys. Trading with a partner to solve.

**Day 14 Review(WC #6)**

**Overview:** Today students will have a chance to ask questions, work on situations to prepare for test tomorrow.

**Launch:** Take out the problems you created at the end of the day yesterday. Trade with the person across from you. Complete 2 equations, creating a balance scale, Table & graph.

**Explore: hand out** [**Missing Values**](https://drive.google.com/open?id=0B4LYQMGXtYtkTzUybWhreVV0RkU) sheet. First have students work on alone, then turn to a partner and discuss.

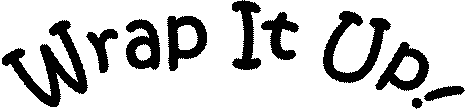
**Share**: Question and answer time on review

**Day 15 Post Test**

**Launch:** Today we see all that you have learned in this unit by taking a post test. It’s very similar to the one you took at the beginning of the unit, but take your time and relate the activities we’ve done to the questions.”

**Explore:** Hand out Post Test. **(same as pretest at start of unit)**

**Summarize:** Give students the “wrap it up” survey

**Extension:** Wrap it up survey for those who didn’t finish.

*Use this sheet to wrap up your ideas, thoughts and questions about the last assignment/test.*

***One thing I remembered was…***

*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

***One thing I liked was…***

*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

***One thing I wasn’t sure of was…***

*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

***One thing I still have questions about is…***

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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|  |
| --- |
| 23. Margaret is planning to landscape her yard. She determines that the average price per plant is $13.95. She also needs to buy a $27 bag of mulch.  The equation *C* = $13.95*p* + 27 can be used to determine her total cost *C* for the number of plants purchased *p* .  What is Margaret’s total cost if she buys 12 plants? |
| |  |  | | --- | --- | |  | A. $194.40 | |  | B. $215.40 | |  | C. $245.40 | |  | D. $208.35 | |

|  |
| --- |
| 27. Two triangles are similar. The height of the first triangle is 10 cm, and its base is 60 cm. If the second triangle has a base of 4 cm more than twice its height, what are the dimensions of the second triangle? |
| |  |  | | --- | --- | |  | A. Height: 3 cm; base: 8 cm | |  | B. Height: 1 cm; base: 5 cm | |  | C. Height: 2 cm; base: 12 cm | |  | D. Height: 1 cm; base: 6 cm | |

|  |
| --- |
| 29. Find the missing value in the table when *f*(*x*) = 2*x* + 7. |
| |  |  | | --- | --- | |  | A. 23 | |  | B. 25 | |  | C. 27 | |  | D. 29 | |

|  |
| --- |
| 39. Olivia uses 8 liters of ginger ale in a punch mix that serves 40 people. If she is catering a party tomorrow where she needs to have 125 servings of punch, how much ginger ale does she need? |
| |  |  | | --- | --- | |  | A. 2 liters | |  | B. 2.5 liters | |  | C. 3 liters | |  | D. 25 liters | |

|  |
| --- |
| 40. If the cost of calls with phone company ABC represents a proportional relation, which list shows the cost of calls that last 1 minute, 2 minutes, 3 minutes, and 4 minutes? |
| 44. Miguel bought 4 pretzels for $2.88. At the same rate, how much would 10 pretzels cost? |
| |  |  | | --- | --- | |  | A. $5.00 | |  | B. $7.20 | |  | C. $28.80 | |  | D. $6.88 | |

**Other possible test questions**

1. Gloria, Peyton, Ryan, and Santos each grew a crystal for a school project. They measured and recorded the heights of their crystal in millimeters, as shown below.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Height(mm) |  |  |  |
| Student | start | Day 1 | Day 2 | Day 3 |
| Gloria | 0 | 2 | 6 | 12 |
| Peyton | 0 | 1 | 2 | 6 |
| Ryan | 0 | 4 | 8 | 12 |
| Santos | 0 | 4 | 12 | 14 |

Which student’s crystal grew proportionally over time?

**A** Gloria

**B** Peyton

**C** Ryan

**D** Santos

2. A pattern of equations is shown below.

1% of 800 = 8

2% of 400 = 8

4% of 200 = 8

8% of 100 = 8

16% of 50 = 8

Which statement best describes this pattern of

equations?

**A** When the percent is doubled and the other

number is halved, the answer is 8.

**B** When the percent is doubled and the other

number is doubled, the answer is 8.

**C** When the percent is increased by 2 and the

other number remains the same, the answer

is 8.

**D** When the percent remains the same and the

other number is increased by 2, the answer

is 8.

3. A bag of mixed Yummy Gummies contains

26% green, 34% red, 24% blue, and 16%

yellow gummies. Carla put 250 mixed

gummies in a bowl. Write a proportion that can be

used to find y, the total number of yellow

gummies in the bowl?

Which fraction is between and ?

**F 1/2**

**G3/5**

**H. 5/7**

**J. ⅞**

**4. Rae’s recipe for lemon-lime punch calls for the following ingredients:**

**• 1 quart of apple juice**

**• 234**

**cups of lemon-lime soda**

**• 64 ounces of pineapple juice**

**• 2 quarts of cold water**

**• 14**

**cup of lemon juice**

**What is the smallest container that will hold all the ingredients?**

**A A 4-quart container**

**B A 5-quart container**

**C A 6-quart container**

**D A 7-quart container**

**5. Break 88 into two parts such that each part is in the same ratio as ¾ is to ⅔**

**6. Through successive iterations of H2i, find recursive and explicit formulas for the patterns and ID arithmetic and geometric sequences.**

**H2i blocks**

**1 7**

**2 22**

**3 45**

**4 76**