desmos Science Mom Lesson 1

Unit 8.1, Lesson 2: Notes Name ____________________________________

Learning Goal(s):

There are three phrases that describe the movements we have been exploring more precisely.

Match each phrase with a definition.

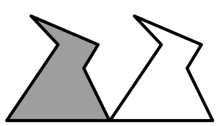
A. Moves every point to a point directly on the opposite side of a line. ____ Translation

B. Moves every point around a center by an angle in a specific direction. ____ Rotation

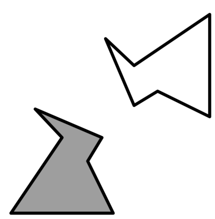
C. Moves every point in a figure a given distance in a given direction. ____ Reflection

Describe how to move each shaded polygon to the unshaded one using these new words.

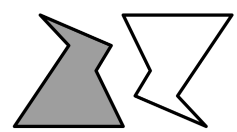
1.



2.



3.



Summary Question

How can you tell the difference between a reflection, a translation, and a rotation?

desmos Science Mom Lesson 2

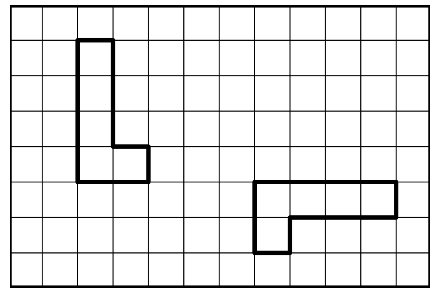
Unit 8.1, Lesson 3: Notes Name ____________________

Learning Goal(s):

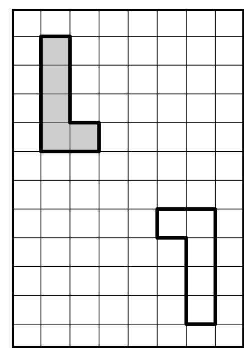
You often need a sequence of transformations to transform a pre-image onto an image.

The pre-image is translated to the right 5 units, then rotated $90°$ clockwise about its bottom-left corner.

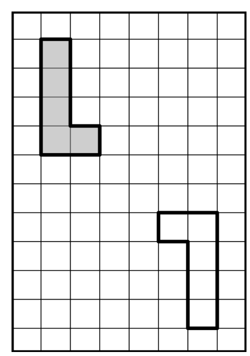
Label the pre-image and the image on the grid.



Draw or describe a series of **reflections** to transform the shaded pre-image onto the unshaded image.

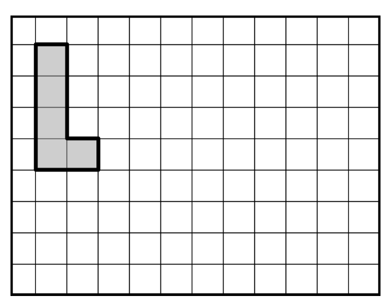


Draw or describe a series of **rotations** to transform the shaded pre-image onto the unshaded image.



Summary Question

Draw an image that you cannot create using only one transformation. Explain your thinking.



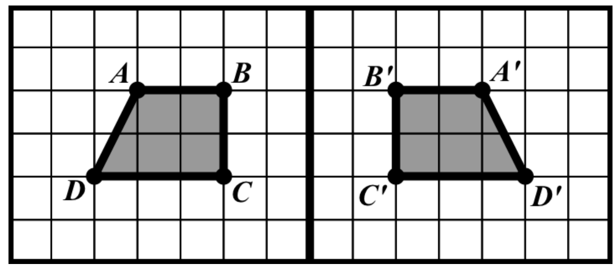
desmos Science Mom Lesson 3

Unit 8.1, Lesson 4: Notes Name ___________________________

Learning Goal(s):

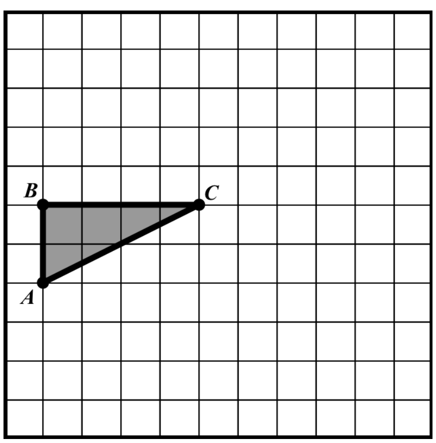
Grids can help us be more precise when describing translations, rotations, and reflections.

Explain what the prime symbol ($'$) means in terms of transformations.

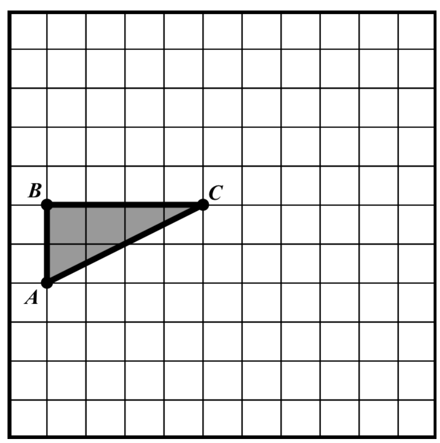


Draw the result of each transformation.

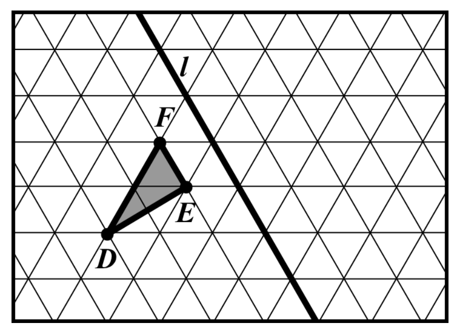
Translate triangle ABC 4 units up and 2 units to the right.



Rotate triangle ABC 90° clockwise using center C.



Reflect triangle DEF using line l.



Summary Question

What are some important things to remember when performing transformations on a grid?

desmos Science Mom Lesson 4

Unit 8.1, Lesson 5: Notes

Name ______________________________

Learning Goal(s):

Definition

Facts/Characteristics

Corresponding Points

Examples

Non-Examples

What are the coordinates of point A after each transformation?

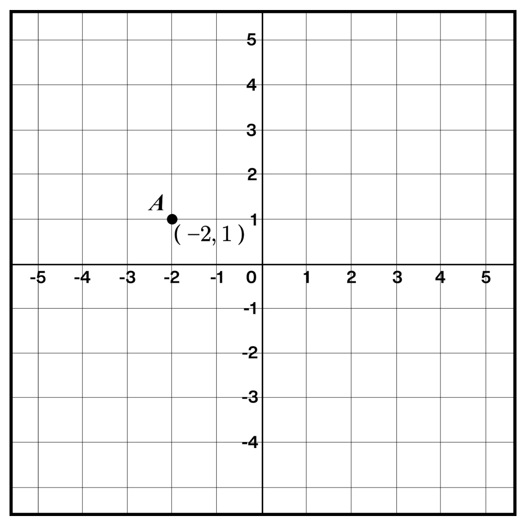
Reflect across the x-axis:

Reflect across the y-axis:

Translate right 3 units and down 2 units:

Rotate $180°$ with center $(0, 0)$:

Rotate $90°$ with center $(0, 0)$:



Summary Question

What happens to the coordinates of a point after a rotation? A translation? A reflection?

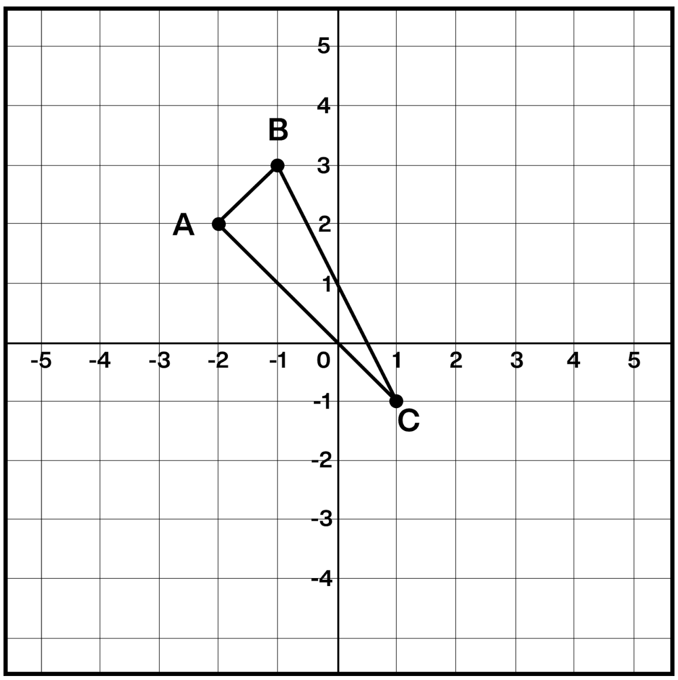
desmos Science Mom Lesson 5

Unit 8.1, Lesson 6: Notes Name ______________________________

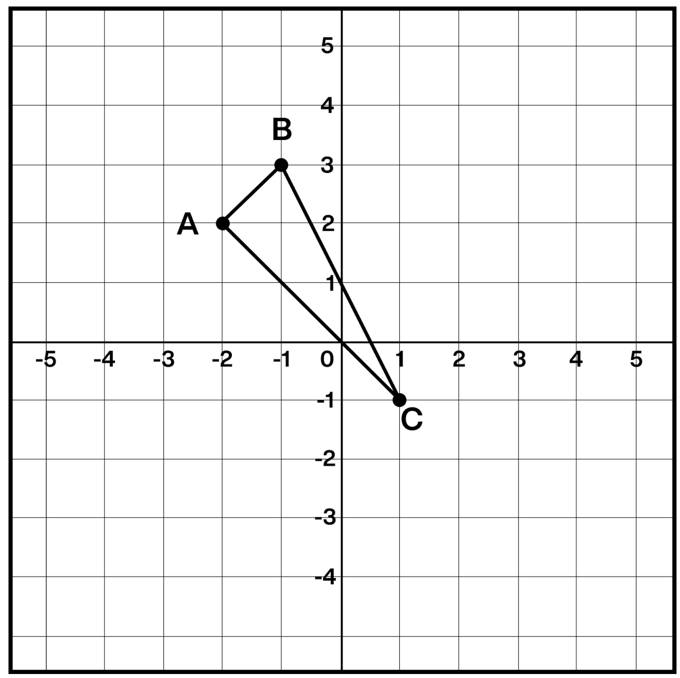
Learning Goal(s):

When we perform a sequence of transformations, the order of the transformations can be important.

1. Translate triangle ABC up 2 units and then reflect it over the x-axis.



2. Reflect triangle ABC over the x-axis and then translate it up 2 units.



Triangle $A'B'C'$ ends up in different places when the same transformations are applied in the opposite order!

Summary Question

How are coordinates useful when describing and drawing transformations?

Unit 8.1, Lesson 8: Notes Name ______________________________

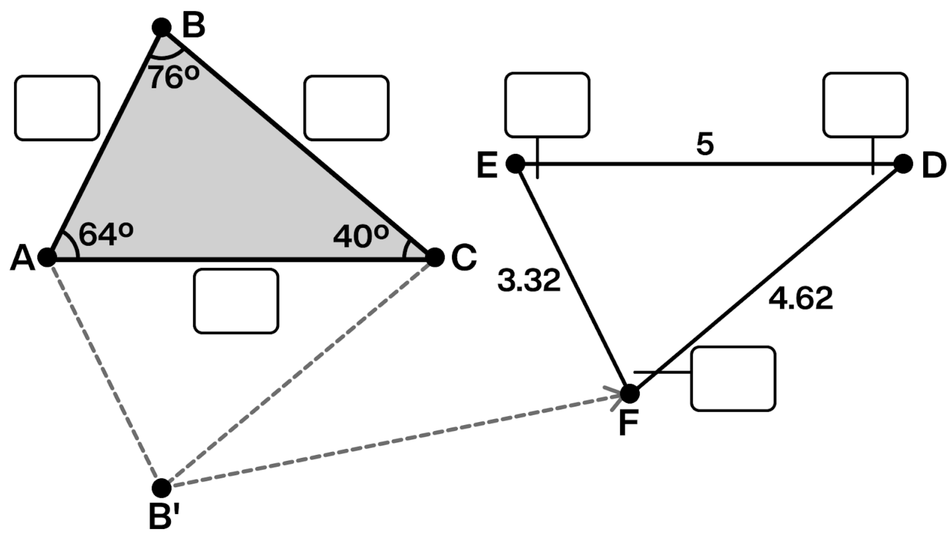
Learning Goal(s):

Definition	Facts/Characteristics
Rigid Transformation	
Examples	Non-Examples

With a rigid transformation, corresponding parts in polygons have the same ______________.

Triangle EFD was made by reflecting triangle ABC across a horizontal line and then translating.

Fill in all of the missing measurements in the diagram.



Summary Question

How can you use measurements to decide if two figures will match up after a sequence of rigid transformations?

desmos Science Mom Lesson 7

Unit 8.1, Lesson 9: Notes Name ________________________________

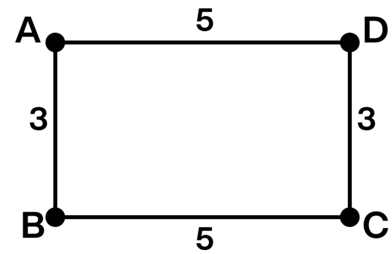
Learning Goal(s):

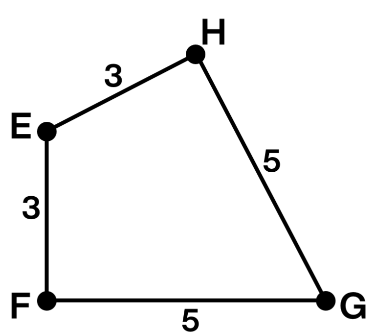
To show two figures are congruent, you align one with the other using a sequence of

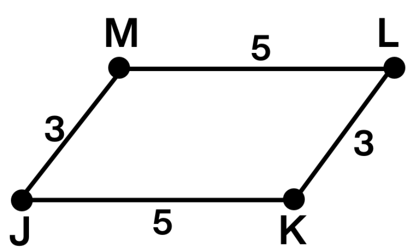
______________________________. Distances between __________________________ on

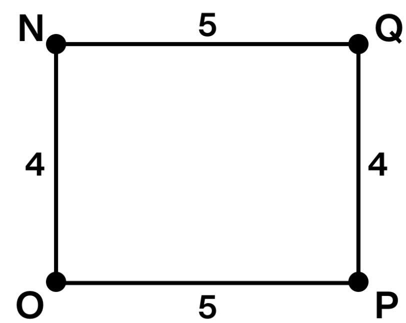
congruent figures are always equal.

Explain why each figure below is **not** congruent to $ABCD$.









Summary Question
What are some ways you can check if two figures are congruent?

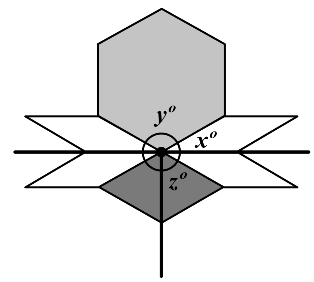
Unit 7.7, Lesson 2: Notes Name ______________________________

My Notes

1.1 Draw an example of *complementary angles*.

1.2 Draw an example of *supplementary angles*.

2.1 Select **all** of the true equations.

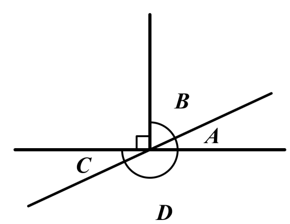


- ☐ $x + y = 180$
- ☐ $x + z = 90$
- ☐ $2x + y = 180$
- ☐ $2x + 2z = 180$
- ☐ $x + y + z = 180$

2.2 Choose one equation that is **not true.** Explain why it is not true.

3. Angle $A = 25°$. A and B are *complementary angles*.

What is the measure of angle B?



Summary

- ☐ I can describe what complementary and supplementary angles are.
- ☐ I can determine unknown angles using what I know about complementary and supplementary angles.
- ☐ I can connect an angle diagram with an equation that represents it.

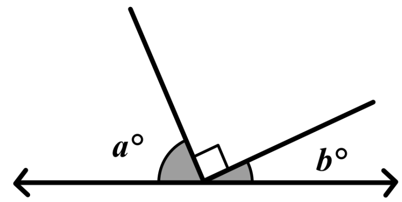
Unit 7.7, Lesson 3: Notes Name ____________________

My Notes

1.1 Draw an example of *vertical angles*.

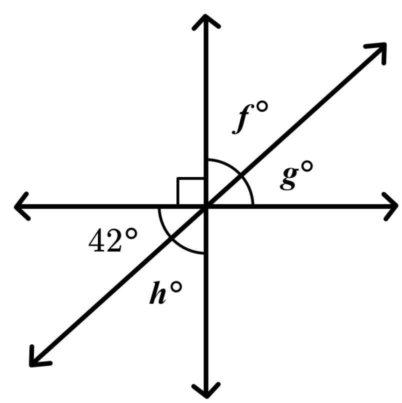
1.2 Label each angle with an estimate of its measure.

1.3 Explain why the shaded angles are not *vertical.*



2.1 Determine the values of f, g, and h.

2.2 Explain how you figured out the value of angle f.



Summary

☐ I can describe what vertical angles are.

☐ I can write and use equations to determine unknown angles.

Unit 8.1, Lesson 10: Notes Name ____________________________________

Learning Goal(s):

Definition

Facts/Characteristics

Vertical Angles

Examples

Non-Examples

Definition

Facts/Characteristics

Transversal

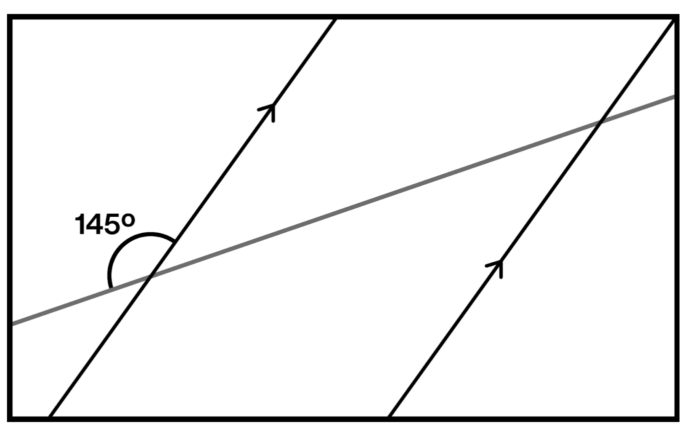
Examples

Non-Examples

Summary Task

Here is a pair of parallel lines and a transversal.

Use what you know about angle relationships to determine the measurements for all of the other angles in the diagram.

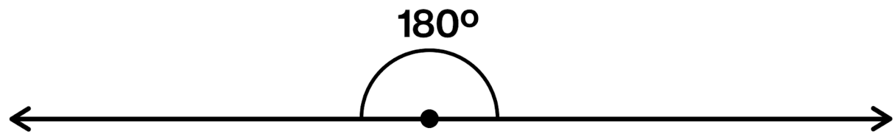


desmos Science Mom Lesson 11

Unit 8.1, Lesson 11: Notes Name ______________________________

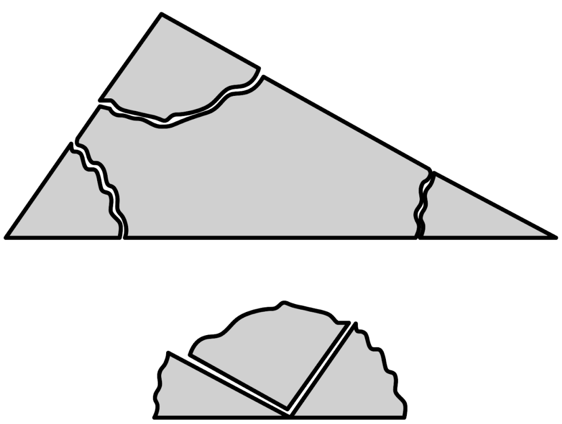
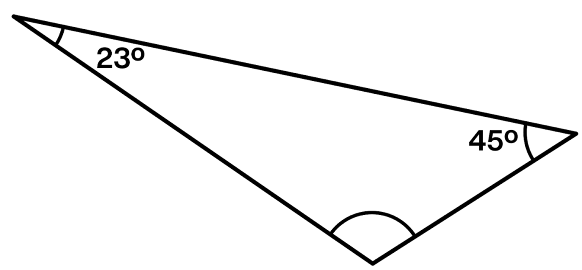
Learning Goal(s):

A $180°$ angle is called a **straight angle** because when it is made with two rays, the rays point in opposite directions and form a line.



If we experiment with angles in a triangle, we find that the sum of all three angle measures in a triangle also forms a line.

The angles in a triangle add up to _______° !

Mark the angles (or use color) to show the corresponding angles in each diagram.	Show how you can find the missing angle measure in this triangle.
	

Summary Question

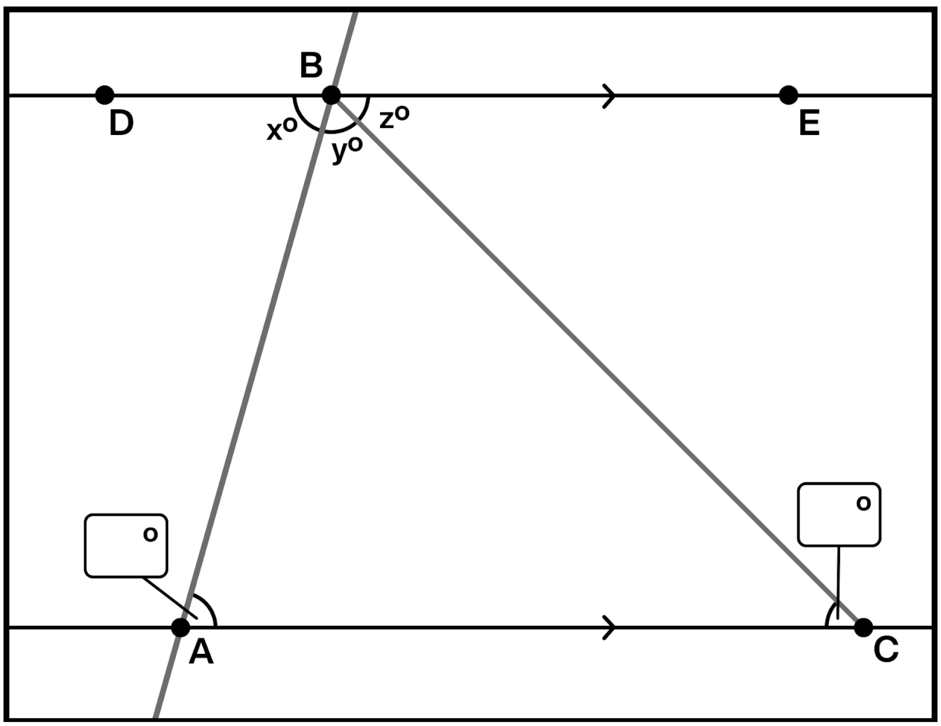
How can you use the measures of two angles in a triangle to find the measure of the third angle?

Unit 8.1, Lesson 12: Notes Name ______________________________

Learning Goal(s):

Using parallel lines and angle relationships, we can understand why the angles in a triangle always add to $180°$. Here is triangle ABC. Line DE is parallel to AC and contains B.

Label the missing angles using x, y, or z to show which angles have the same measures.



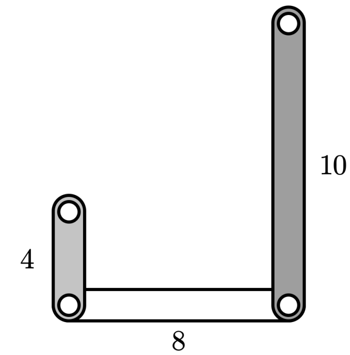
Summary Question

How does this diagram show that the angles in a triangle add up to $180°$?

Unit 7.7, Lesson 5: Notes Name ______________________________

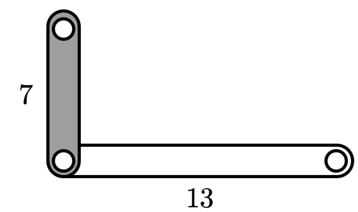
My Notes

1. Will these side lengths form a triangle? Explain your thinking.



2.1 What is one possible third length that would form a triangle?

Explain how you know.



2.2 What is a length that would be too long? Too short?

Too long: _______ Too short: _______

Explain one of your answers.

Summary

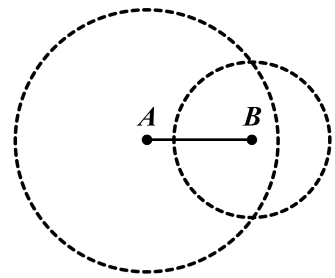
☐ I can decide whether or not three side lengths will make a triangle.

Unit 7.7, Lesson 6: Notes Name ______________________

My Notes

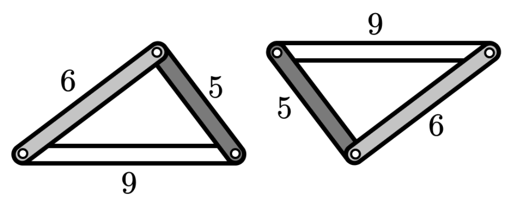
Amanda began to draw a triangle with side lengths 5, 2, and 6 units.

1.1 What does each circle in Amanda's drawing represent?



1.2 Explain or show how she can complete the triangle.

2. Emika built two triangles with side lengths 5, 6, and 9 units. Explain how you know these two triangles are *identical copies*.



How many nonidentical triangles can be made using these lengths:

3.1 4.5, 8, and 10 units

3.2 9, 11, and 21 units

Summary

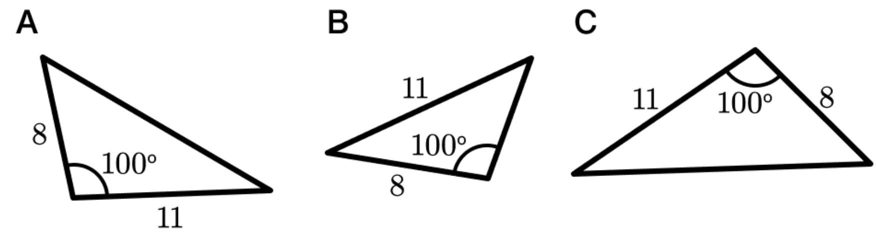
- ☐ I can explain what it means for shapes to be identical copies.
- ☐ I can determine whether you can make zero, one, or more than one shape given a set of side lengths.

desmos **Science Mom Lesson 15**

Unit 7.7, Lesson 7: Notes Name ____________________

My Notes

1. Which of the triangles below are identical?



Explain your thinking.

2.1 Mariana and Jamir are both drawing triangles that have a 5 cm side, a $60°$ angle, and a $45°$ angle. Will Mariana's and Jamir's triangles be identical?

Show or explain your thinking.

2.2 What information would Jamir need about Mariana's triangle in order to be sure she was creating an identical triangle?

Summary

☐ I can build triangles given three measurements.

☐ I can explain why there is sometimes more than one possible triangle given three measurements.

My Notes

Draw a triangle using each set of measurements. Explain your steps.

1.1 Side lengths 2 cm, 4 cm, and 5 cm.

Drawing **My Steps**

1.2 One 4 cm side, one $40°$ angle, and one $90°$ angle.

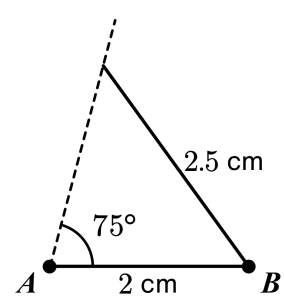
Drawing **My Steps**

2. Here are the steps Axel took to draw this triangle:

Step 1: Draw a 2 cm line.

Step 2: Draw a $75°$ angle at point A.

Step 3: Draw a 2.5 cm line from point B to the dotted line.



Draw a different triangle with the same three measurements.

Summary

☐ I can use a ruler and a protractor to draw triangles that match a description.

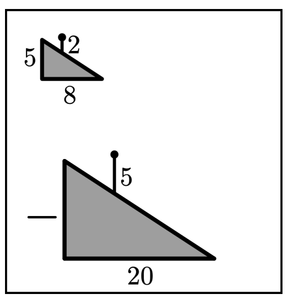
desmos Science Mom Lesson 17

Unit 7.1, Lesson 2: Notes Name ____________________________________

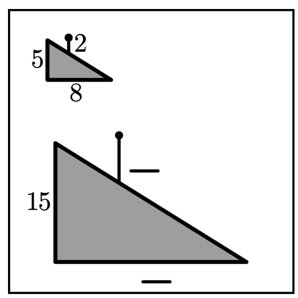
My Notes

1. What is a **scale factor**? Draw an example.

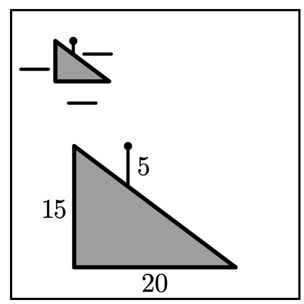
2. Fill in measurements so that the large robot is a scaled copy of the small robot. Then, identify the scale factor from the small robot to the large robot.



Scale factor: _____



Scale factor: _____



Scale factor: _____

Summary

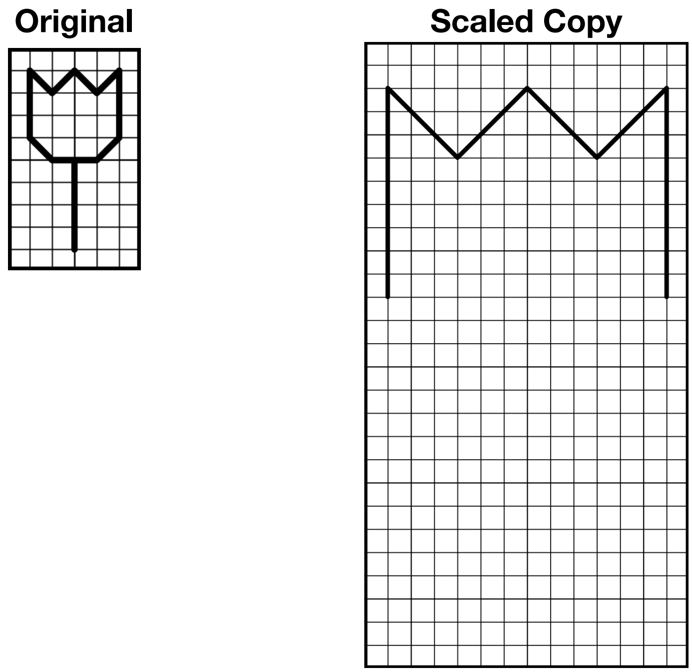
- ☐ I can explain what *scale factor* is.
- ☐ I can explain the proportional relationship between lengths in an original figure and in a scaled copy.

Science Mom Lesson 18

Unit 7.1, Lesson 3: Notes Name ______________________________

My Notes

1. Draw the rest of the figure using a scale factor of 3.



What is the length of the original stem? ______ grid units.

What is the length of the scaled stem? ______ grid units.

2. What do you keep in mind when drawing a scaled copy?

Summary

☐ I can draw a scaled copy of a figure using a given scale factor.

Unit 7.1, Lesson 6: Notes

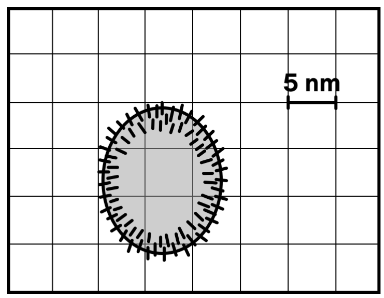
Name ______________________________________

My Notes

1. In your own words, describe what a **scale** is.

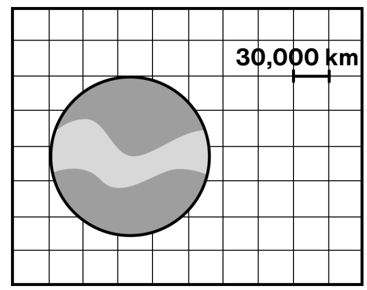
2. Estimate the diameter of the objects below.

Flu Virus



Diameter: ______________

Jupiter



Diameter: ______________

3. Choose one object from Problem 2 and explain how you estimated its diameter.

Summary

☐ I can explain what a scale is.

☐ I can interpret the scale of a drawing.

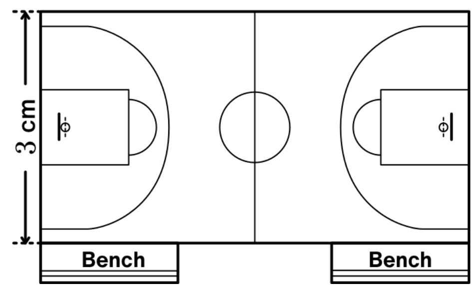
Unit 7.1, Lesson 7: Notes Name ___________________________

My Notes

1. What are some characteristics of **scale drawings**?

2. Remy used the scale 2 cm to 10 m to create a scale drawing of a basketball court.

Explain what the numbers in the scale mean.



3. The width of the court in Remy's scale drawing is 3 centimeters. Explain how to use the scale from Problem 2 to determine the width of the actual court.

Summary

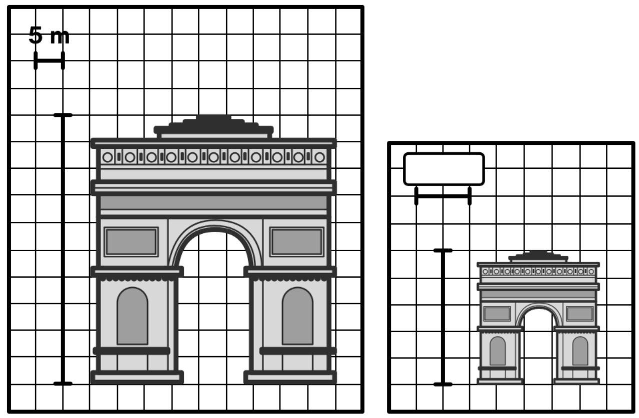
☐ I can use a scale drawing and a scale to calculate actual and scaled distances.

☐ I can determine actual areas from a scale drawing.

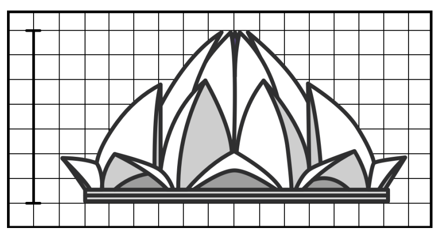
Unit 7.1, Lesson 9: Notes Name ____________________

My Notes

1. Complete the scale by filling in the blank with the number of meters the segment represents. Explain your thinking.



2. Here is a scale drawing of the Lotus Temple.
The scale of this drawing is 1 unit to 5 meters.



Write a **different** scale that will produce . . .

2.1 . . . a larger drawing. ____________________

2.2 . . . a smaller drawing. ____________________

2.3 . . . a drawing that is the same size. ________________

Summary

- ☐ I can calculate a distance on one scale drawing based on another drawing with a different scale.
- ☐ I can determine the scale of a scale drawing.
- ☐ I can decide whether two scales will create scale drawings of the same size.

desmos Science Mom Lesson 22

Unit 8.2, Lesson 1: Notes Name ______________________________

Learning Goal(s):

Definition

Facts/Characteristics

Dilation

Examples

Non-Examples

Definition

Facts/Characteristics

Similar Figures

Examples

Non-Examples

Summary Question

How can you check if two figures are similar?

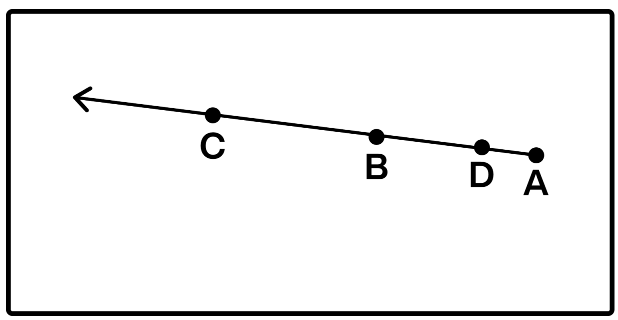
Unit 8.2, Lesson 2: Notes Name ______________________________

Learning Goal(s):

Definition	Facts/Characteristics
Scale Factor	
Examples	Non-Examples

If A is the center of dilation, how can we find which point is the dilation of B . . .

- . . . with a scale factor of 2?



- . . . with a scale factor of $\frac{1}{3}$?

Summary Question

How do you use a ruler to apply a dilation?

desmos **Science Mom Lesson 24**

Unit 8.2, Lesson 3: Notes Name ______________________________

Learning Goal(s):

Square grids can be useful for showing dilations. Instead of using a ruler to measure the distance between the points, we can count grid units.

Sometimes the square grid comes with coordinates. The coordinate grid gives us a convenient way to name points, and sometimes the coordinates of the image can be found using arithmetic.

Compared to the pre-image, a dilation with . . .

- . . . a scale factor **less than** 1 makes the image ____________________ .
- . . . a scale factor **greater than** 1 makes the image ____________________ .
- . . . a scale factor **equal to** 1 makes the image ____________________ .

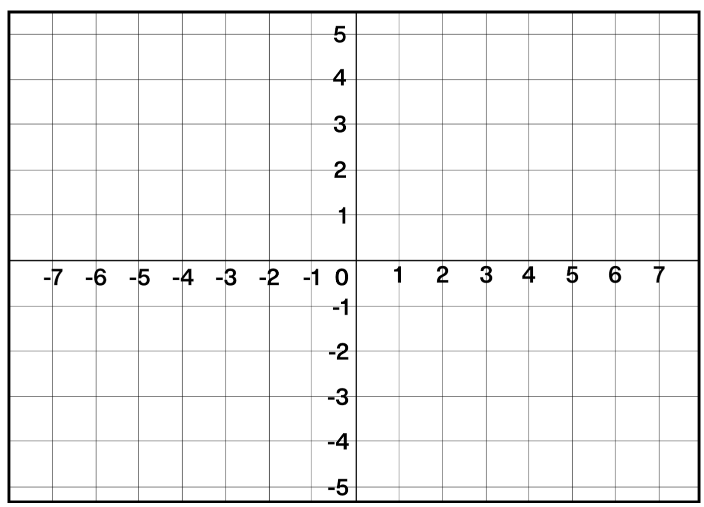
To make a dilation of triangle JKL with center $(0, 0)$ and a scale factor of 2:

- Graph triangle JKL with coordinates:

$J\,(-1, -2)$, $K\,(3, 1)$, and $L\,(2, -1)$

- Use the scale factor to find the coordinates of the image:

$J'\,(\quad,\quad)$, $K'\,(\quad,\quad)$, and $L'\,(\quad,\quad)$



Summary Question

What stays the same between a pre-image and its dilations?

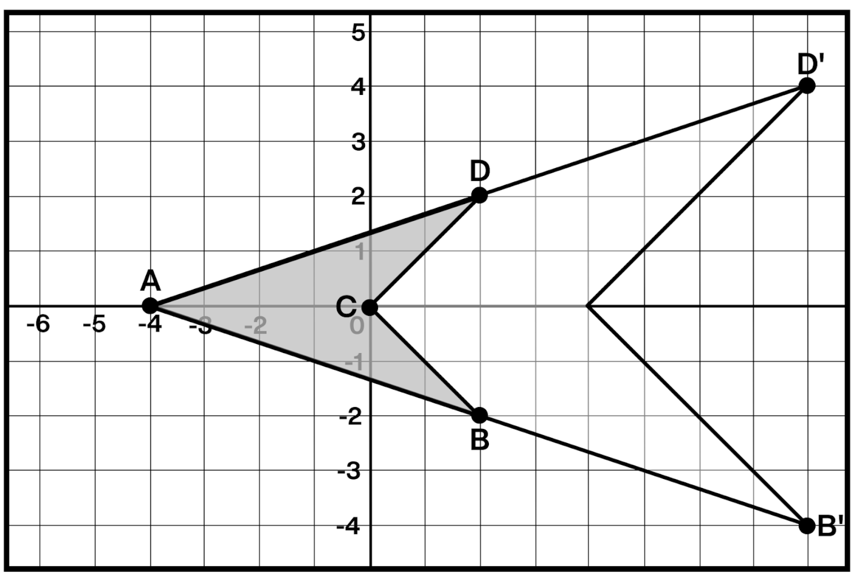
Unit 8.2, Lesson 4: Notes Name ____________________________________

Learning Goal(s):

One important use of coordinates is to communicate geometric information precisely. Let's consider a quadrilateral $ABCD$ in the coordinate plane. Performing a dilation of $ABCD$ requires three vital pieces of information:

1. The ____________________________ of A, B, C, and D.
2. The coordinates of the ______________________________________.
3. The ________________ ________________________ of the dilation.

With this information, we can dilate the vertices A, B, C, and D and then draw the corresponding segments to find the dilation of $ABCD$. Without coordinates, describing the location of the new points would likely require sharing a picture of the polygon and the center of dilation.



Summary Question

How are coordinates useful when describing and drawing dilations?

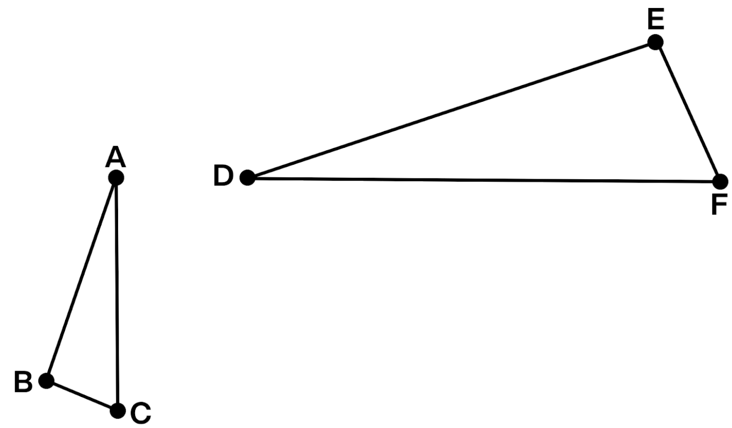
desmos Science Mom Lesson 26

Unit 8.2, Lesson 5: Notes Name ______________________________

Learning Goal(s):

Two figures are similar if one figure can be transformed into the other by a sequence of translations, rotations, reflections, and dilations. There are many correct sequences of transformations, but we only need to describe one to show that two figures are similar.

Let's show that triangle ABC is similar to triangle DEF.



One way to get from ABC to DEF follows these steps:

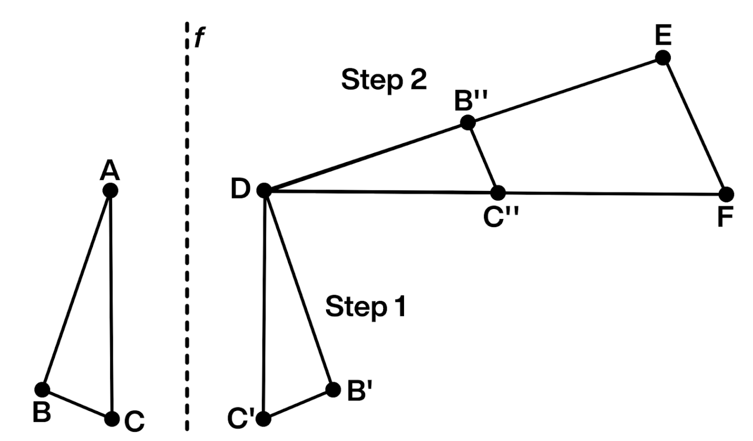
Step 1: Reflect across line ________ .

Step 2: Rotate _______°

__________________ around point _____ .

Step 3: Dilate with center ________ and a

scale factor of _______ .



Summary Question

How can you apply a sequence of transformations to one figure to get a similar figure?

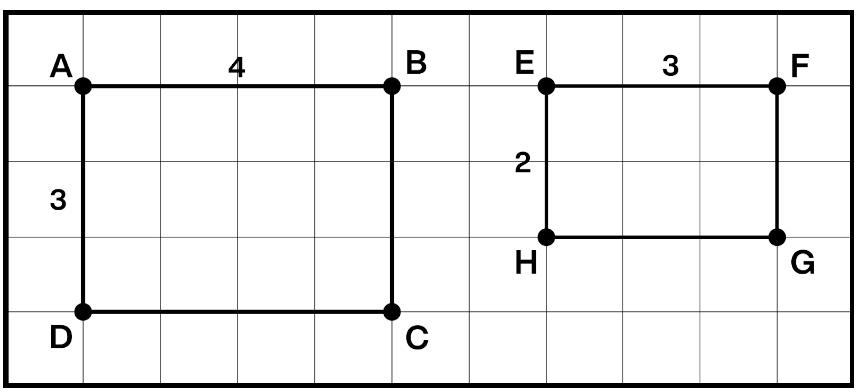
Unit 8.2, Lesson 6: Notes Name ______________________________

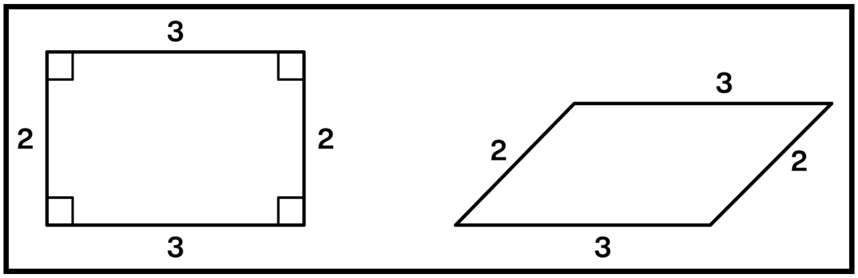
Learning Goal(s):

Two polygons are similar when:

- Every angle and side in one polygon has a ________________ part in the other polygon.
- All pairs of corresponding angles have the ____________ ________________________.
- Corresponding sides are related by a single ____________ _____________________. Each side length in one figure is multiplied by the scale factor to get the ____________________ side length in the other figure.

Summary Question
Are these pairs of polygons similar? Explain how you know.





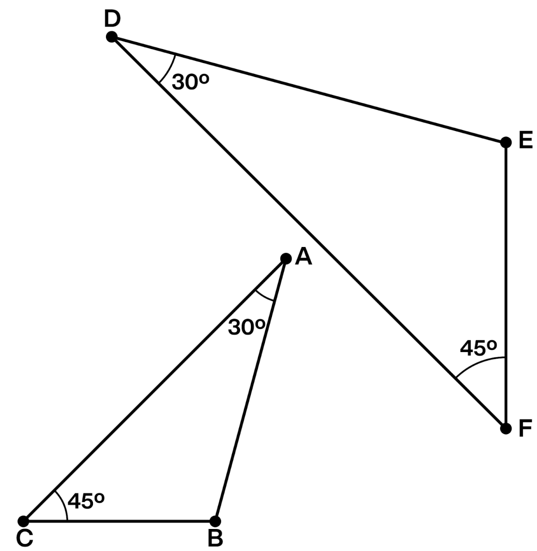
Unit 8.2, Lesson 7: Notes Name ______________________________

Learning Goal(s):

To show that two triangles are similar, we must show that

there are two pairs of _________________________

__________________________ _______________.

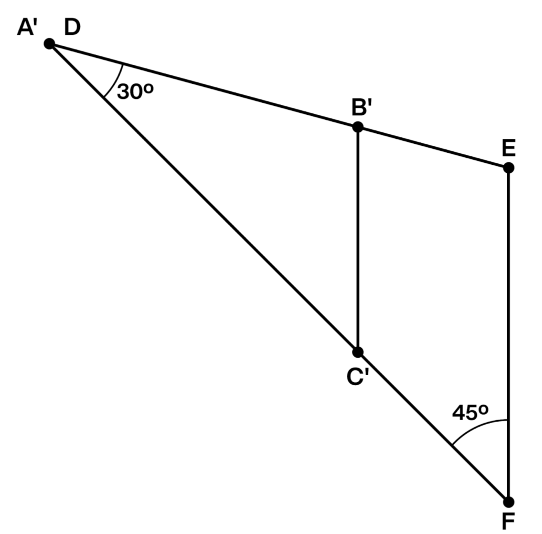


Triangle ABC and triangle DEF both have a $30°$ angle and a

$45°$ angle.

Step 1: Translate A to D and then _______________ so that the two $30°$ angles are aligned.

Step 2: Dilating $A'B'C'$ with center ________ and the appropriate scale factor will move _____ to _____. This dilation also moves ______ to _____, showing that triangles ABC and DEF are similar.



Summary Question

Why are two congruent corresponding angles enough to be able to tell if two triangles are similar?

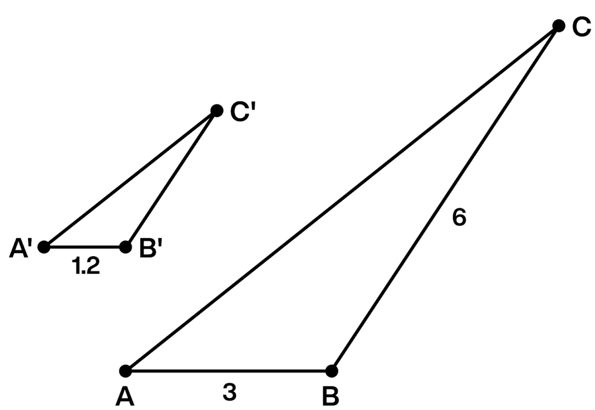
Unit 8.2, Lesson 8: Notes Name ______________________________

Learning Goal(s):

The ratio of two sides in one polygon is the same as the ratio of the corresponding sides in a similar polygon.

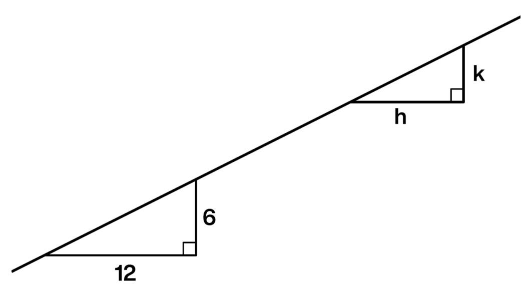
We can use this fact:

1. To calculate missing lengths in similar polygons.



Triangles $A'B'C'$ and ABC are similar. Find the length of segment $B'C'$.

2. To know the ratio of two sides of a triangle without measurements using the measurements of a similar triangle.



The two triangles shown are similar. Find the value of $\frac{k}{h}$.

Summary Question

How can the lengths of corresponding sides within similar triangles be helpful in finding unknown side lengths?

Science Mom Lesson 30

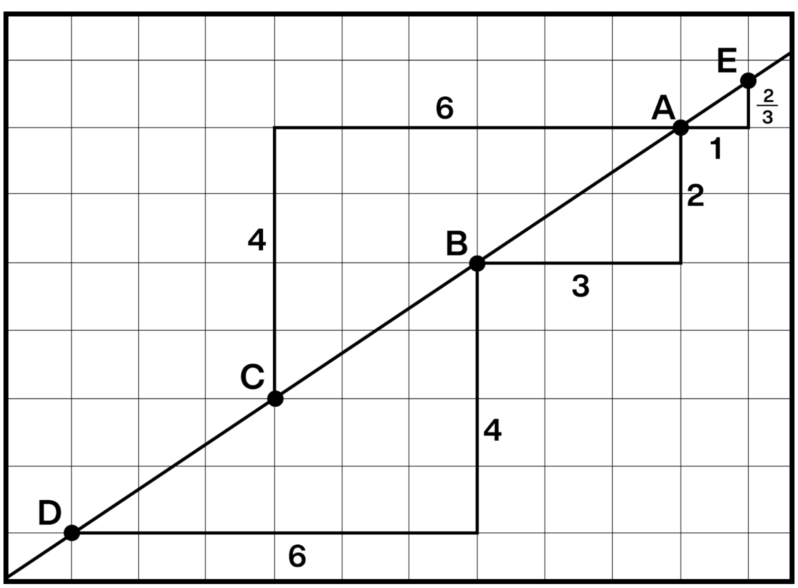
Unit 8.2, Lesson 9: Notes

Name ____________________________________

Learning Goal(s):

Definition	Facts/Characteristics
Slope	
Examples	Non-Examples

Here is a line drawn on a grid. There are also four right triangles.
Show how the slope is calculated using the slope triangles between each pair of points:



Points A and B:

Points D and B:

Points A and C:

Points A and E:

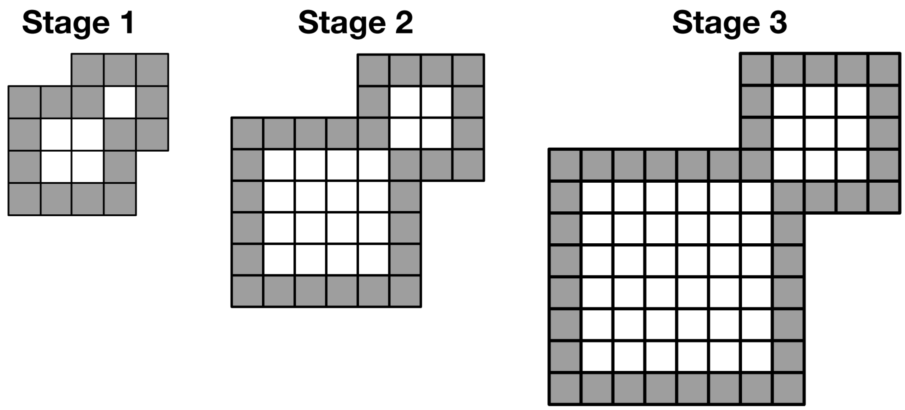
Summary Question

What do all of the right triangles drawn along the same line have in common?

Unit 7.6, Lesson 1: Notes Name ____________________

My Notes

Here is a pattern. The tiles around the edge are called border tiles.



1. Enter the missing information in the table.

Stage	Border Tiles
1	16
2	28
3	

2. Predict how many border tiles are used in Stage 4. Explain how you know.

3. Will there be a stage with 100 border tiles? Explain.

Summary

☐ I can use patterns to determine unknown values.

Unit 7.6, Lesson 3: Notes Name ______________________

My Notes

A drive-in movie theater charges $\$6.00$ per car, plus a fee for each person in the car. A family of 3 came in one car and paid $\$22.50$ total.

1. Select the tape diagram that best matches this situation.

Diagram A

22.5

$x+6$	$x+6$	$x+6$

Diagram B

22.5

x	x	x	6

2. Write an equation to represent this situation.

3. How much was the fee for each family member?

4. Describe how you can tell from the tape diagram that your solution makes sense.

5. Describe how you can tell from the equation that your solution makes sense.

Summary

- ☐ I can connect tape diagrams, equations, and stories.
- ☐ I can write an equation to represent a tape diagram or a story.

Unit 7.6, Lesson 4: Notes Name ____________________

My Notes

1. Deiondre bought a juice for $\$3$ and 2 sandwiches that cost x dollars each. Altogether, the items cost $\$11.50$. Complete each section below.

Tape Diagram	**Equation**
Solution	**Meaning of Solution**

2. Describe the similarities and differences between the tape diagrams of the equations below.

$2x + 3 = 11.5$ $\qquad$ $2(x + 3) = 11.5$

Similarities:

Differences:

Summary

- [ ] I can connect a situation to a tape diagram, equation, and solution.
- [ ] I can write an equation to represent a situation and use a tape diagram to answer a question about it.

Unit 7.6, Lesson 5: Notes

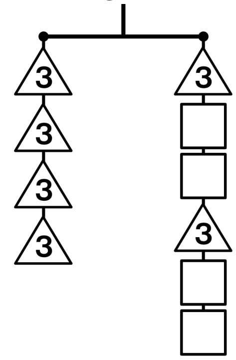
Name ______________________________

My Notes

1. Complete the table so Hanger A stays balanced.

Weight of Triangle (lb.)	Weight of Square (lb.)
3	

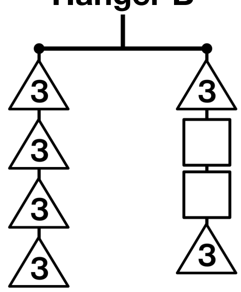
Hanger A



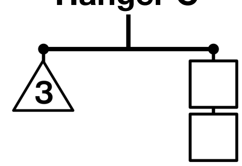
2. Describe how you figured out the weight of each square.

3.1 If Hanger A is balanced, which of these hangers will also be balanced?

Hanger B



Hanger C



3.2 Explain how you know.

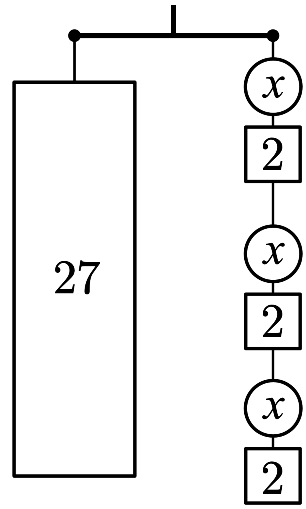
Summary

- [ ] I can figure out an unknown value in a hanger diagram and explain my strategy.
- [ ] I can make moves to keep a hanger balanced.

Unit 7.6, Lesson 6: Notes Name ______________________________

My Notes

1.1 What is the value of x?



Anand and Darius used equations to figure out the value of x.

Anand	**Darius**
$27 = 3(x + 2)$	$27 = 3x + 6$
$9 = x + 2$	$21 = 3x$

1.2 Why did Anand write $9 = x + 2$?

1.3 Why did Darius write $21 = 3x$?

2. What is the value of x in the equation $4x + 11 = 14$?

Summary

☐ I can connect balancing moves on hangers to solving equations.

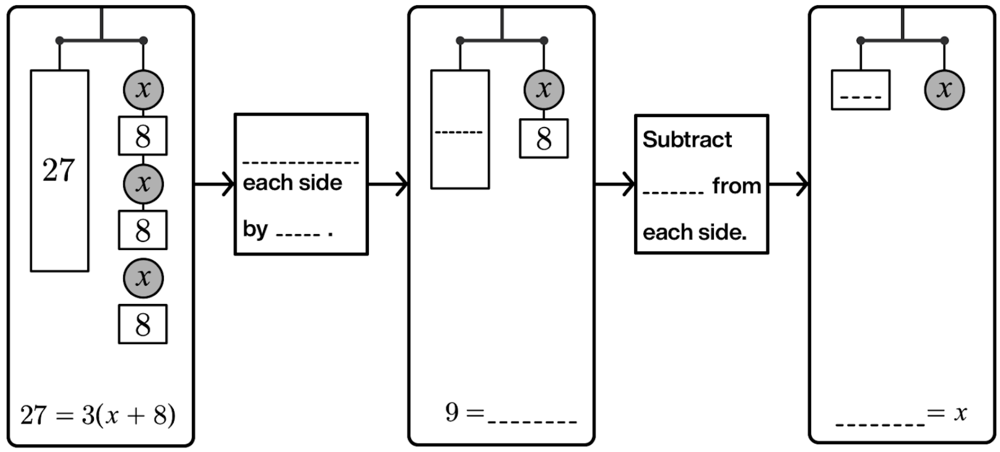
☐ I can solve equations with positive numbers.

desmos Science Mom Lesson 36

Unit 7.6, Lesson 7: Notes Name ______________________

My Notes

1. Solve each equation by filling in the blanks.



Solve each equation and show your reasoning.

2.1 $-4x + 3 = 23$

2.2 $-3(x - 7) = 33$

Summary

☐ I can solve equations with positive and negative numbers and explain my strategy.

Unit 7.6, Lesson 8: Notes Name ______________________________

My Notes

1. Complete the missing information in each puzzle.

Puzzle 1

	a	-5
2	-----	-----

Factored: $2(a-5)$

Expanded: ______________

Puzzle 2

	-----	-----
1/3	$6x$	-15

Factored: ______________

Expanded: $6x-15$

2.1 List two different first steps you could take to solve the equation $5(x-1)=55$.

2.2 Dyani solved the equation below.

$5(x-1)=55$
$5x-5=55$
$5x=60$
$x=12$

What was their first step?

2.3 Solve the equation $5(x-1)=55$ using a different first step.

Summary

- ☐ I can expand and factor expressions.
- ☐ I can solve equations that involve expanding.
- ☐ I can compare different strategies for solving the same equation.

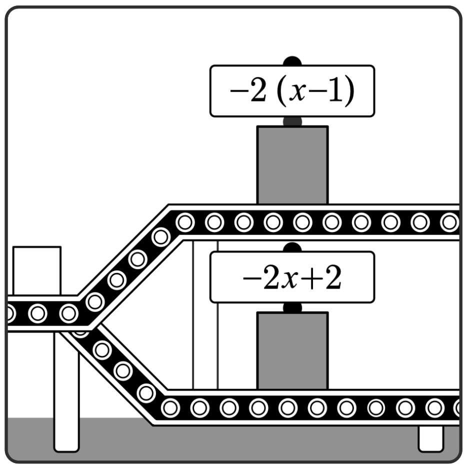
Unit 7.6, Lesson 9: Notes

Name ______________________________

My Notes

1. Describe what an *equivalent expression* is in your own words.

Here are two number machines.



2.1 When will these number machines have equal outputs?

Always / Sometimes / Never

2.2 Explain your thinking.

3. Select **all** of the expressions equivalent to $10 - 25x$.

- ☐ $25x - 10$
- ☐ $5\,(2 - 5x)$
- ☐ $-25x + 10$
- ☐ $25x + (-10)$
- ☐ $-5\,(5x - 2)$

4. Write an equivalent expression for $-4x + 14$.

Summary

- ☐ I can write equivalent expressions.
- ☐ I can explain whether or not two expressions are equivalent.

desmos Science Mom Lesson 39

Unit 7.6, Lesson 10: Notes Name ______________________

My Notes

1. How many **terms** does the expression $5x - 10 + 3x + 6$ have? Explain how you know.

2. Mai collected the squares by adding across each row. Write each of her sums using the fewest number of terms.

$5(x-2)$	$3x+6$
$-11x$	$-3(x+2)$

Top sum:

Bottom sum:

3. Ayaan collected the squares by adding down each column. Write each of his sums using the fewest number of terms.

$5(x-2)$	$3x+6$
$-11x$	$-3(x+2)$

Left sum:

Right sum:

Summary

☐ I can write equivalent expressions with fewer terms.

Unit 7.6, Lesson 11: Notes Name ____________________

My Notes

1.1 Hamza wrote several steps to solve the equation below. Describe each of the steps in words. The first is done for you.

$-2 + 6(3x - 5x) = 46$

$6(3x - 5x) = 48$ Add 2 to each side.

$6(-2x) = 48$ ____________________

$-12x = 48$ ____________________

$x = -4$ ____________________

1.2 What are some other first steps Hamza could have taken to solve the equation $-2 + 6(3x - 5x) = 46$?

2. Solve the equation $12 - 2(x - 3) = -8$.

Summary

☐ I can add and expand expressions to help me solve equations.

☐ I can compare and contrast different strategies for solving the same equation.

Unit 7.6, Lesson 12: Notes Name ____________________

My Notes

Use a visual representation or an equation to answer each question.

1.1 DeAndre and Valeria are planning a fundraiser for the running club. The decorations cost $\$10$. If 20 people attend, how much will DeAndre and Valeria need to charge each person to have a final total of $\$300$?

1.2 Anika and Rafael are planning a fundraiser to raise money for the soccer team. Each of the 20 people who attend will be served a dinner that costs $\$10$. How much will Anika and Rafael need to charge each person to have a final total of $\$300$?

1.3 For each problem, how were your visual representations or equations similar? How were they different?

Summary

- [ ] I can write and solve equations that represent situations.
- [ ] I can connect an equation, a visual, and a description of a situation.

Unit 8.4, Lesson 3: Notes Name ______________________________

Learning Goal(s):

An equation tells us that two expressions have equal value. For example, if $4x + 9$ and $-2x - 3$ have equal value, we can write the equation $4x + 9 = -2x - 3$.

In order to figure out what number x is so that $4x + 9$ is equal to $-2x - 3$, we can use moves that keep both sides balanced. Complete each step in the table:

$4x + 9 = -2x - 3$	We can subtract 9 from both sides of this equation and keep the equation balanced.
	We can add $2x$ to each side of the equation and maintain equality.
	If we divide the expressions on each side of the equation by 6, we will also maintain the equality.

We just figured out that when x is ____, $4x + 9$ is equal to $-2x - 3$.

Let's check if it works.

$4x + 9$ $4(\quad) + 9$	$-2x - 3$ $-2(\quad) - 3$

Summary Question

How are balanced moves on a hanger similar to solving an equation?

desmos **Science Mom Lesson 43**

Unit 8.4, Lesson 4: Notes Name ____________________________________

Learning Goal(s):

Each step we take when solving an equation results in a new equation with the _____________ solution as the original. This means we can check our work by ___________________ the value of the ________________ into the original equation.

Say we solve the following equation:	When we replace x with 3 in the original equation . . .
$2x = -3(x+5)$ $2x = -3x + 15$ $5x = 15$ $x = 3$	$2x = -3(x+5)$ $2(\quad) = -3(\quad + 5)$ . . . we get a statement that isn't true!

This tells us we must have made a mistake somewhere.
Checking our original steps carefully, we made a mistake when distributing -3.

After fixing it, we now have:	Let's replace x with ____ in the original equation to make sure we didn't make another mistake.
$2x = -3(x+5)$	$2x = -3(x+5)$ $2(\quad) = -3(\quad + 5)$

This equation is true, so $x =$_____ is the solution to the equation $2x = -3(x+5)$.

Summary Question
What is the relationship between an equation and its solution?

desmos Science Mom Lesson 44

Unit 8.4, Lesson 1: Notes Name ____________________________________

Learning Goal(s):

Here is a number machine. We put a number into this machine and 18 came out.
There are different ways that we can determine what number went in.

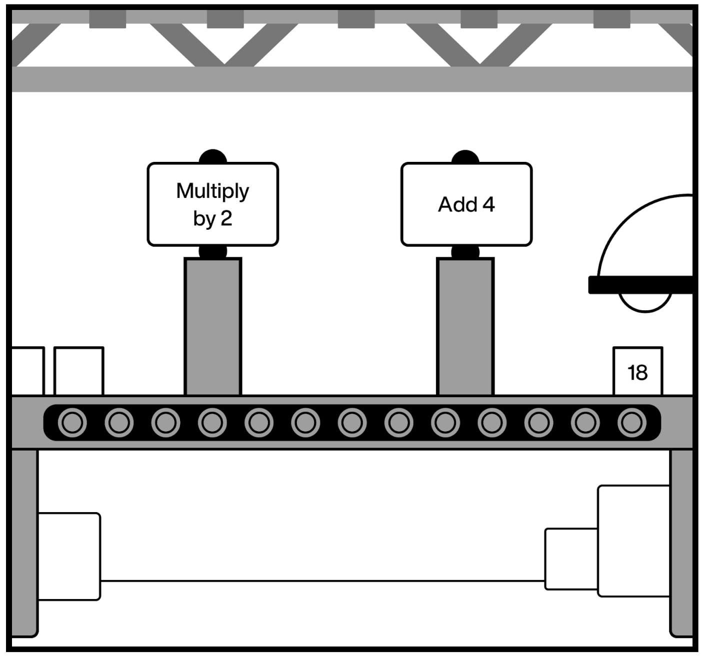
1. We can work backwards one step at a time:

   If we ended with 18, then before we added 4, the number must have been _____ .

   This number was the result of multiplying by 2, so before we multiplied by 2, the number must have been _____ .

2. We can write and solve an equation:

   $$2x + 4 = 18$$



How are working backwards and solving an equation similar?

How are working backwards and solving an equation different?

Summary Question
What are some ways to find the input when you are given the output in number machine problems?

desmos **Science Mom Lesson 45**

Unit 8.4, Lesson 6: Notes Name ____________________________________

Learning Goal(s):

Sometimes we are asked to solve equations with a lot of things going on. For example:	$x - 2(x+5) = \frac{3(2x-20)}{6}$
Before we start distributing, let's take a closer look at the fraction on the right side. The expression $2x - 20$ is being multiplied by ____ and divided by ____, which is the same as dividing by ____, so we can rewrite the equation as:	$x - 2(x+5) = \frac{2x-20}{2}$
Now it's easier to see that all the terms in the numerator on the right side are divisible by ___, which means we can rewrite the right side again:	$x - 2(x+5) =$ ___ - ___
At this point, we could ______________ and then collect like terms on each side of the equation. Another choice would be to **use the structure of the equation**. Both the left and the right side have something being subtracted from x. But, if the two sides are equal, that means the "something" being subtracted on each side must also be equal. The equation can be rewritten with less terms, like:	$2(x+5) = 10$
When we finish the steps, we have:	$2(x+5) = 10$

Summary Question

How does pausing and thinking about the structure of an equation help when solving the equation?

desmos Science Mom Lesson 46

Unit 8.4, Lesson 7: Notes Name ___________________________________

Learning Goal(s):

An equation is a statement that two expressions have an equal value. The equation $2x = 6$ . . .

. . . is a true statement if x is _____. . . . is a false statement if x is _____.

The equation $2x = 6$ has one and only one solution because there is only one number, 3 , that you can double to get 6 .

Some equations are *true no matter what* the value of the variable is. For example: $2x = x + x$ is always true because doubling a number will always be the same as adding the number to itself. Equations like $2x = x + x$ have an ______________ number of solutions. We say it is true for _______ values of x. Sometimes we make allowable moves and get an equation like this: $8 = 8$ This statement is true, so the original equation must be true no matter what value x has.	Some equations have *no solutions*. For example: $x = x + 1$ has no solutions because no matter what the value of x is, it can't equal one more than itself. Equations like $x = x + 1$ have ________ solutions. We say it is __________ true for any value of x. Sometimes we make allowable moves and get an equation like this: $8 = 9$ This statement is false, so the original equation must have no solutions at all.

Summary Question

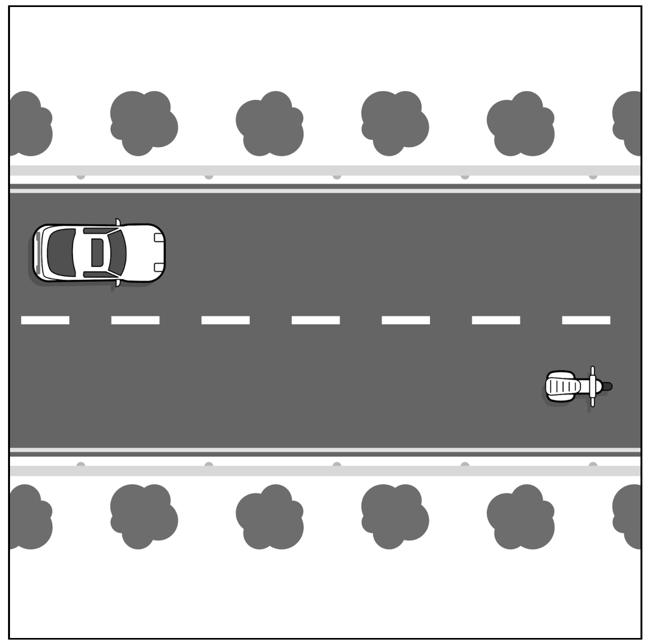
What does it mean for an equation to have no solutions, one solution, or infinitely many solutions?

Unit 8.4, Lesson 8: Notes Name ____________________________________

Learning Goal(s):

Imagine a car traveling on a road at a constant speed of 16 meters per second. We can represent the distance the car travels with the expression __________________, where t represents the number of seconds the car has been traveling.

Now imagine, at the same time, there is a scooter traveling at 9 meters per second and is 42 meters ahead of the car. We can represent the distance the scooter travels with the expression _______________, where t represents the number of seconds the scooter has been traveling.



Since the car is behind the scooter and is traveling at a faster rate, at some point, the vehicles will meet . . . but when? Asking when the two vehicles will meet is the same as asking when __________________ is equal to __________________.

$$16t = 9t + 42$$

Solving for t gives us ___________, which means ____.

Summary Question

If two quantities are changing, how can you determine when they will be the same?

desmos **Science Mom Lesson 48**

Unit 6.7, Lesson 6: Notes

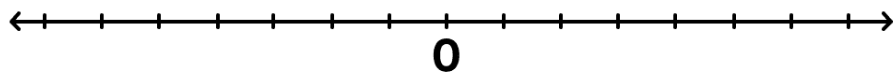
Name ______________________________

My Notes

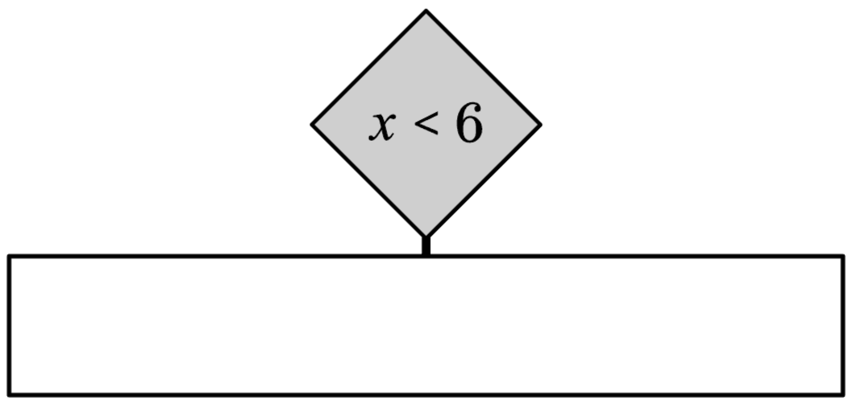
1.1 Circle all the values of x that make the inequality $x < 6$ true.

5.9   –6   6.1   0   100

1.2 Create a graph to represent the inequality $x < 6$.



1.3 Write a sign that could be represented by this inequality.



2. Match each sentence with an inequality.

______ I spent less than 3 hours on my homework.	A. $x > 3$
______ This game is for kids over 3 years old.	B. $x = 3$
______ This recipe uses 3 cups of flour.	C. $3 > x$

Summary

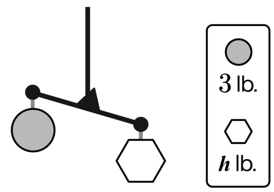
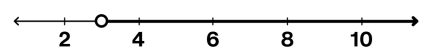
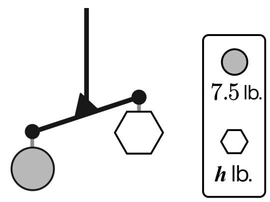
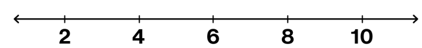
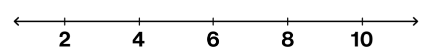
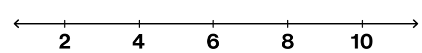
☐ I can show the same information about an inequality using words, symbols, and a number line.

Unit 6.7, Lesson 7: Notes

Name ______________________________

My Notes

Complete the table so that each row shows the same relationship.

Hanger	Inequality	Graph
		
		
	$h < 6.5$	
	$6.5 < h$	

Summary

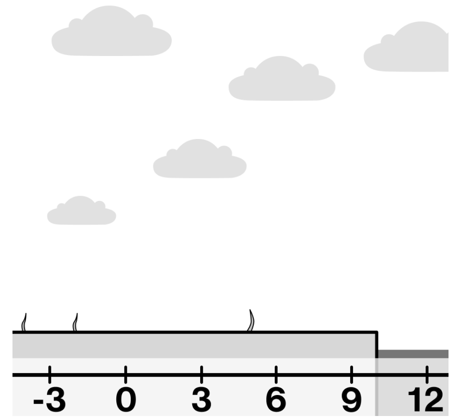
☐ I can write and interpret inequalities to describe unbalanced hangers.

desmos Science Mom Lesson 50

Unit 6.7, Lesson 8: Notes Name ______________________

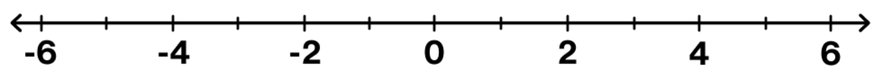
My Notes

1.1 Write an inequality so that all the blades of grass are solutions and the water has no solutions.



1.2 Write three other solutions to the inequality you wrote.

2.1 Plot all of the solutions to $-2 < x$ on the number line.



2.2 Is -2 a solution to $-2 < x$? ________ Explain how you know.

2.3 How many solutions does the inequality $-2 < x$ have? ______

Explain how you know.

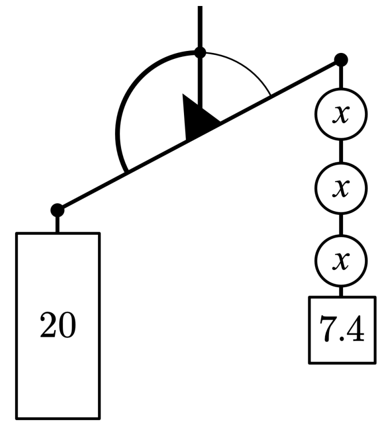
Summary

- ☐ I can draw and label a number line diagram that represents the solutions to an inequality.
- ☐ I can explain how many solutions an inequality can have.
- ☐ I can justify whether or not a value is a solution to a given inequality.

Unit 7.6, Lesson 14: Notes Name ____________________

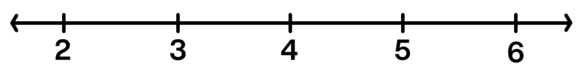
My Notes

This hanger represents the inequality $20 > 3x + 7.4$.



1.1 What are the solutions to this inequality?

1.2 Graph the solutions on the numberline.



1.3 Jasmine and Terrance tried to solve this inequality. Here are their solutions:

Jasmine	**Terrance**
$x < 4.2$	$4.2 < x$

Who is correct? Explain how you know.

2. Solve the inequality $2(x + 7.5) \le 18$.

Summary

☐ I can figure out the solutions to an inequality.

☐ I can explain the difference between the solution to an equation and the solutions to an inequality.

desmos Science Mom Lesson 52

Unit 7.6, Lesson 15: Notes Name ______________________________

My Notes

Koharu is making candies for a party. She plans to give 10 candies to her sister and then include 5 candies in each gift bag. She has enough ingredients to make 100 candies.

1.1 Solve the inequality $10 + 5x \le 100$.

1.2 Explain what the solutions to the inequality mean.

Koharu gets $\$75$ for her birthday. She plans to save it and add more money each month until her next birthday. Her goal is to have more than $\$300$ saved a year from now.

2.1 Write an inequality where x represents how much Koharu should save each month to reach this goal.

2.2 Solve the inequality you wrote and explain what the solutions mean.

Summary

- ☐ I can figure out the solutions to an inequality.
- ☐ I can explain the difference between the solution to an equation and the solutions to an inequality.

Unit 7.6, Lesson 16: Notes Name ________________________________

My Notes

Here's an inequality: $3(10 - 2x) < 18$.

Ava solved the equation $3(10 - 2x) = 18$ and calculated $x = 2$.

1.1 Choose a value for x that is greater than 2 and substitute it into $3(10 - 2x) < 18$.

1.2 Choose a value for x that is less than 2 and substitute it into $3(10 - 2x) < 18$.

1.3 What are the solutions to the inequality?

1.4 Graph the solutions on this number line.

2. Tyrone is solving the inequality $5 - 0.5x \geq 3$.
He says that the solutions to the inequality are $x \leq 4$.

Is this correct? Explain how you know.

Summary

- ☐ I can solve an inequality with positive and negative numbers and graph the solutions.
- ☐ I can test values to decide which inequality symbol makes sense.

Unit 7.6, Lesson 17: Notes Name ___________________________

My Notes

A restaurant has a water dispenser with 500 ounces of water. Each cup of water they serve is 12 ounces. The restaurant likes the water dispenser to have at least 100 ounces of water in it at all times.

1.1 Write an inequality that describes the problem.

1.2 Solve your inequality.

1.3 Explain what the solutions to the inequality mean in this situation.

Cho and their three siblings plan to order lunch from a restaurant. They each order juice for $\$2.50$ per person. If Cho has $\$52$ to pay for lunch, how much can each person spend on their meal?

2.1 Write an inequality that describes the problem.

2.2 Solve your inequality.

2.3 Explain what the solutions to the inequality mean in this situation.

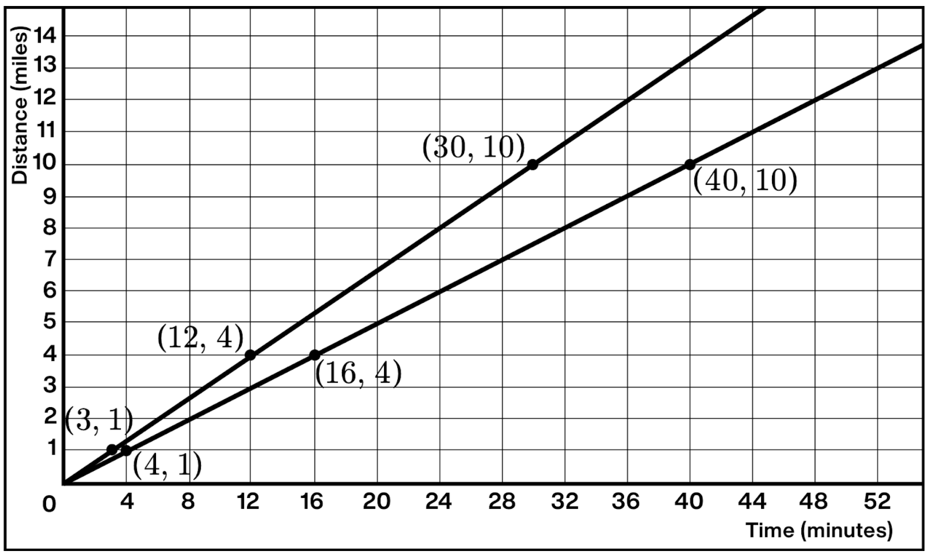
Summary

- ☐ I can explain whether or not fractions or negative numbers make sense as solutions to an inequality.
- ☐ I can write and solve an inequality to answer a question about a situation.

Unit 8.3, Lesson 1: Notes Name ___________________________

Learning Goal(s):

Here are the graphs showing Jasmine and Sothy's distance on a long bike ride. Jasmine rides 4 miles every 16 minutes, and Sothy rides 4 miles every 12 minutes.



Which graph goes with which rider?	Who rides faster?
Jasmine and Sothy start a bike trip at the same time. How far have they traveled after 24 minutes?	How long will it take each of them to reach the end of the 12-mile bike path?

Summary Question

How can you graph a proportional relationship from a story?

Unit 8.3, Lesson 2: Notes Name ____________________________

Learning Goal(s):

Definition

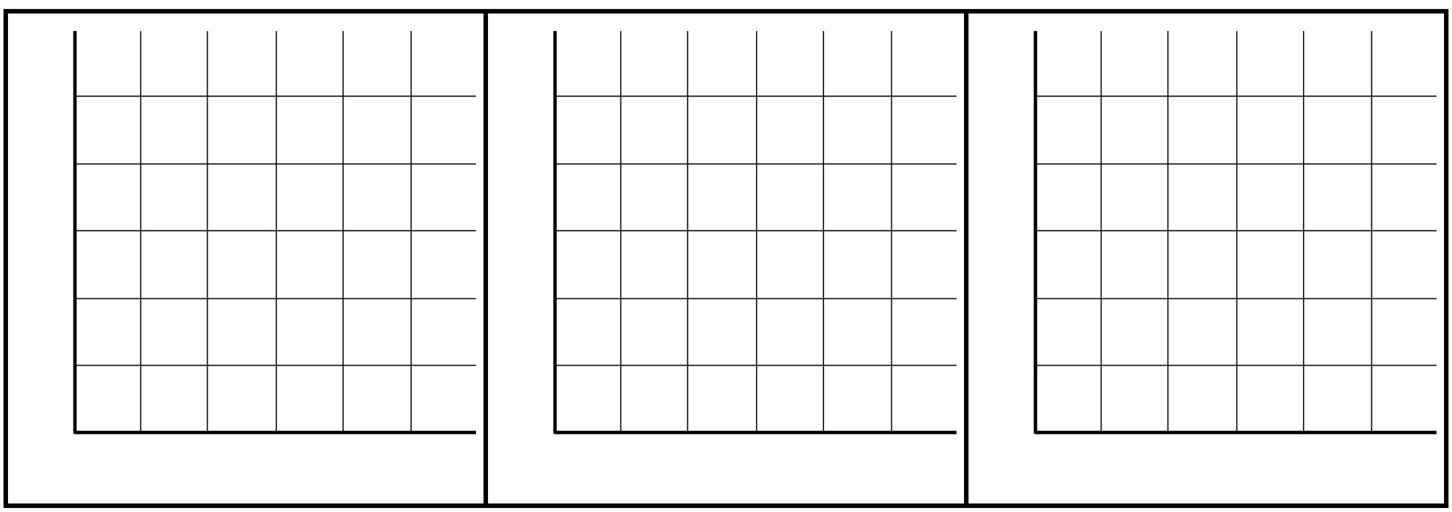
Facts/Characteristics

Rate of Change

Examples

Non-Examples

Sketch the graph of the proportional relationship $y = 3x$ by scaling the axes three different ways.



Summary Question

How can you tell when two graphs have the same proportional relationship?

Unit 8.3, Lesson 3: Notes Name ___________________________

Learning Goal(s):

When two proportional relationships are represented in different ways, we compare them by finding a common piece of information.

Terrance's earnings are represented by the equation $y = 14.5x$, where y is the amount of money he earns, in dollars, for working x hours.

The table shows some information about Jaylin's pay.

Time Worked (hours)	Earnings (dollars)
7	92.75
4.5	59.63
37	490.25

How much does Terrance get paid per hour?

How much does Jaylin get paid per hour?

After 20 hours, how much more does the person who gets paid a higher rate have?

Summary Question

How can you determine the rate of change of a proportional relationship from . . .

. . . a table? . . . a graph? . . . an equation?

Unit 8.3, Lesson 4: Notes Name ______________________________

Learning Goal(s):

Definition

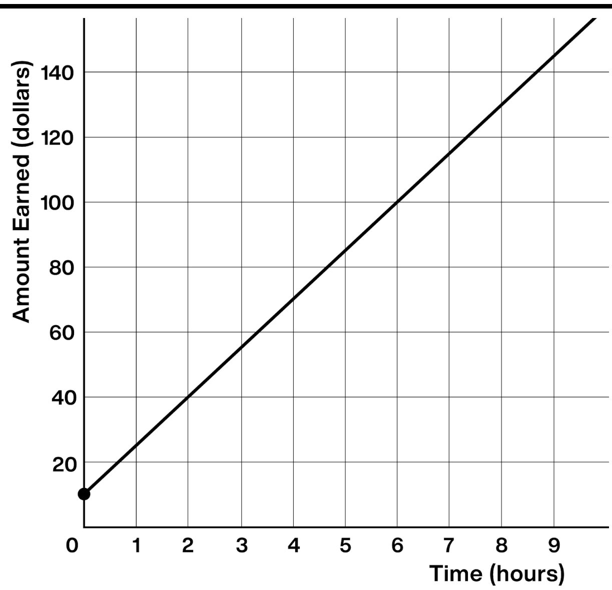
Facts/Characteristics

Linear Relationship

Examples

Non-Examples

Aniyah starts babysitting. She charges $\$10$ for traveling to and from the job, and $\$15$ per hour. Here is a graph of Aniyah's earnings based on how long she works.



Show how to figure out the rate of change using the graph.

Summary Question

How can you find the rate of change of a linear relationship?

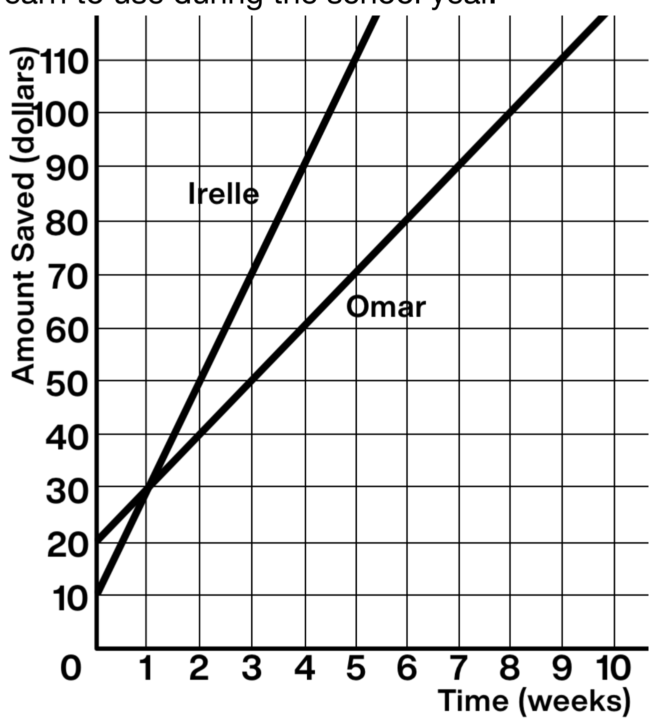
Unit 8.3, Lesson 5: Notes Name ____________________________________

Learning Goal(s):

Definition	Facts/Characteristics
Vertical Intercept	
Examples	Non-Examples

Omar and Irelle decide to save some of the money they earn to use during the school year.

Here are graphs of how much money they will save after 10 weeks if they each follow their plans.



How much money does Omar have to start?	How much money does Irelle have to start?
How much money does Omar plan to save per week?	How much money does Irelle plan to save per week?

Summary Question

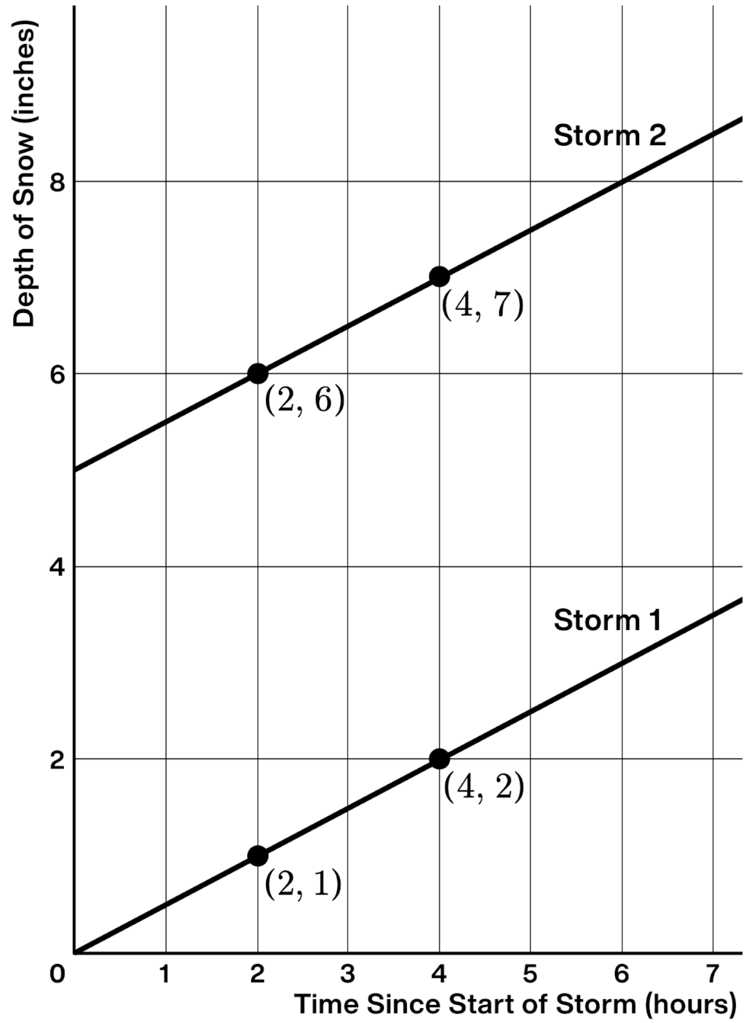
How can you find the vertical intercept and the slope from a graph?

desmos Science Mom Lesson 60

Unit 8.3, Lesson 6: Notes Name ______________________________

Learning Goal(s):

Snow fell at the same rate for two separate snow storms. During the storms, Raven measured the depth of snow on the ground for each hour.



The depth of snow on the ground for Storm 1 is a ____________________ relationship because there were 0 inches of snow on the ground at the start of the storm.

What is the equation representing Storm 1?

The depth of snow on the ground for Storm 2 is a ____________________ relationship because there were 5 inches of snow on the ground at the start of the storm.

What is the equation representing Storm 2?

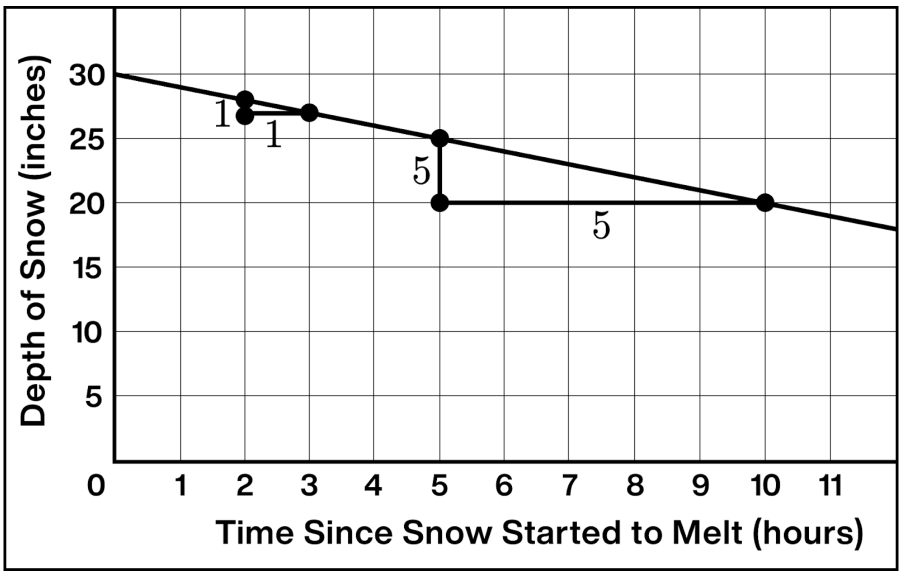
Summary Question

How do you use a graph to write the equation of a line using $y = mx + b$?

Unit 8.3, Lesson 7: Notes Name ___________________________________

Learning Goal(s):

The snow on the ground was 30 inches deep. On a warm day, the snow began to melt. The graph shows the relationship between the time since the snow started to melt and the depth of the snow.



The slope of this graph is ________ since the rate of change is ______ inches of snow per ________ .

This means that the depth of snow __________________________ at a rate of _____ inch per hour.

The vertical intercept is ______________.

This means that the snow was _____ inches deep when the time since snow started to melt was ______ hours.

Summary Task

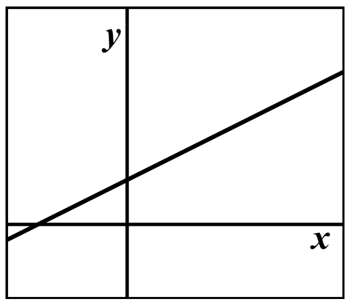
Give an example of a different situation that would have a negative slope when graphed. Explain how you know the slope would be negative.

Unit 8.3, Lesson 8: Notes Name ______________________________

Learning Goal(s):

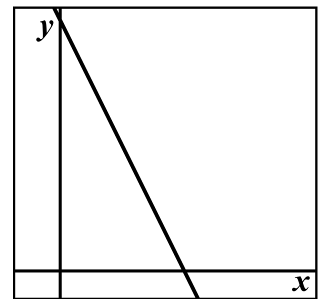
From left to right, if the graph increases, then the slope is

________________ .

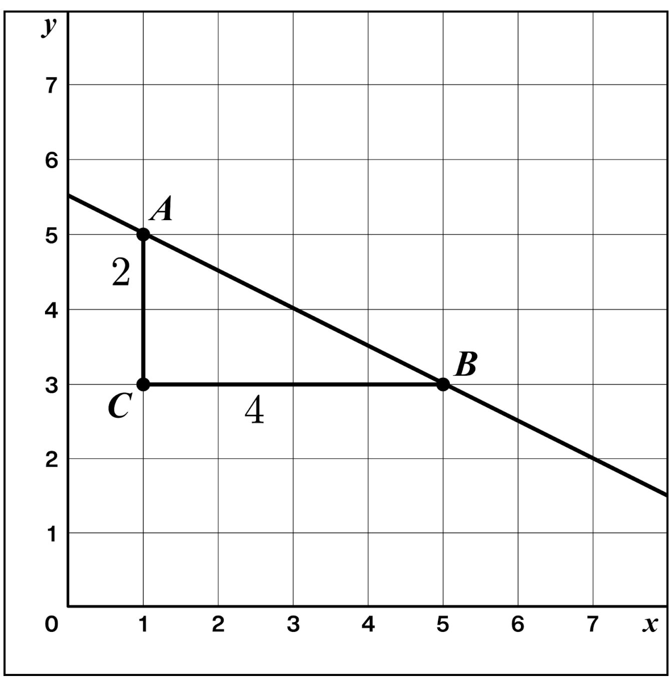


From left to right, if the graph decreases, then the slope is

________________ .



Now we know two different ways to find the slope of a line:



1. We learned earlier that one way to find the slope of a line is by drawing a slope triangle.

Using the slope triangle shown here, the slope of the line is:

2. We can also compute the slope of this line using two points.

Using the points $A = (1, 5)$ and $B = (5, 3)$, the slope of the line is:

Summary Question

How can you calculate slope using two points on a line?