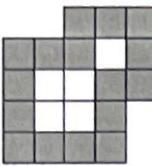


## My Notes

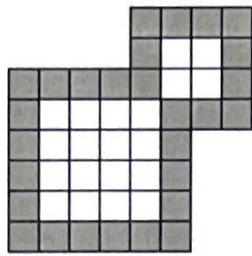
Look at one row to the next what do you go up by → that's what you multiply by. Then figure out what you add.

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

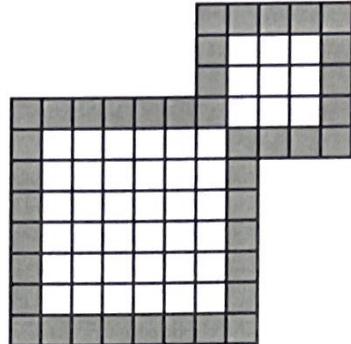
Stage 1



Stage 2



Stage 3



1. Enter the missing information in the table.

Stage	Border Tiles
$1 \times 12 + 4 = 16$	
2	28
3	40

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

$$\boxed{52}$$

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

$$\begin{array}{r}
 100 \\
 - 4 \\
 \hline
 96 \\
 \div 12 \\
 \hline
 8
 \end{array}$$

## Summary

You can work backwards by undoing the operations in order

## My Notes

Aba bought a loaf of bread and some apples. Her receipt is below.

Bread	(1 @ \$2.25)	\$2.25
Apples	(3 @	\$
Total:		\$6.00

← this only shows up one time

1.1 Which tape diagram represents the receipt?

Diagram A

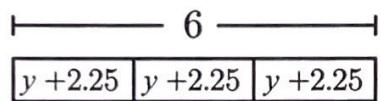
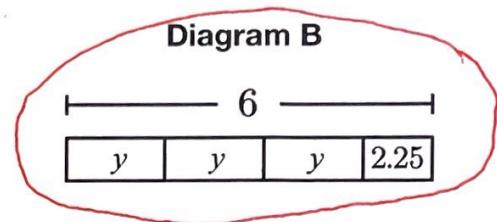


Diagram B

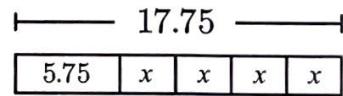


1.2 What is the price of an apple?

$$6 - 2.25 = \frac{3.75}{3} = 1.25$$

2. Tell a story that this diagram could represent.

Aba bought Boba for 5.75 and then she bought 4 croissants for some price. The total was 17.75.



## Summary

Subtract the values that are given first then divide

- I can connect a tape diagram to a story.
- I can use a tape diagram to figure out an unknown value.

## 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.

- Select the tape diagram that best matches this situation.

Diagram A

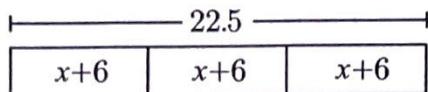
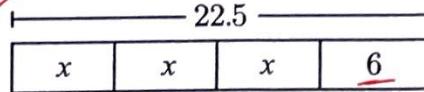


Diagram B



- Write an equation to represent this situation.

$$3x + 6 = 22.5$$

- How much was the fee for each family member?

$$\frac{3x}{3} = \frac{16.5}{3}$$

$$x = \$5.50$$

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

Match how many unknowns you have and how many numbers there are

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

The total tells us how much it equals. Count how many x's there are and count how many times the numbers show up

## Summary

Count how many x's and how many numbers show up and make sure they match

I can connect tape diagrams, equations, and stories.

I can write an equation to represent a tape diagram or a story.

## Warm-Up

A.  $100 = 8(x + 9)$

D.  $9x + 63 = 100$

B.  $9(x + 7) = 100$

E.  $100 = 72 + 8x$

C.  $100 = 8x + 72$

F.  $(x + 7) \cdot 9 = 100$

1. Select two equations that have something in common. How are the two equations alike?

A & C

8 multiplied by x is  $8x$  and 8 multiplied by 9 is  $72$  so the answer is  $100 = 8x + 72$

2. Create two groups so that the equations in each group have something in common.

Group 1 equations: AEC

(List the letters representing the equations.)

All the equations in this group . . .

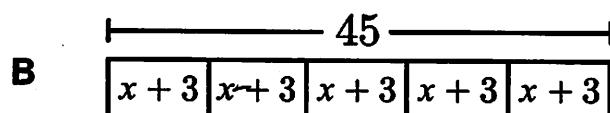
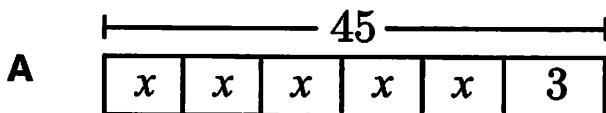
Group 2 equations: BDF

(List the letters representing the equations.)

All the equations in this group . . .

## Activity 1: Which Diagram?

For each situation, choose the diagram that best represents it. Then write an equation, determine the solution, and explain what the solution means in the situation.



1. A postal worker weighs 5 identical cardboard packages and a 3-pound plastic box. Altogether, they weigh 45 pounds.

## Which diagram?

(A) or B

### Solution

$$x = 8.4$$

## **Equation**

$$5x + 3 = 45$$

## **Meaning of Solution**

Each x is 0.4

2. Tyani is making 5 gift bags. Each bag contains  $x$  pencils. Tyani adds 3 more pencils to each bag. Altogether, the gift bags contain 45 pencils.

## Which diagram?

A or (B)

## Equation

$$5(x+3) = 45$$

## **Meaning of Solution**

3. A national park charges \$3 for each car that enters and also a fee for each person that enters. A family of 5 enters the park in 1 car and pays a total of \$45.

## Which diagram?

A or B

### Solution

## **Equation**

$$5 \times 9 = 45$$

## **Meaning of Solution**

Each person

Costs \$8.40

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## Unit 7.6, Lesson 4: Seeing Structure

Name(s) \_\_\_\_\_

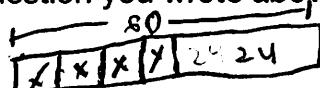
### Activity 2: Write Your Own

Natalia's family wants to inflate a total of 60 balloons for a party. Yesterday, they inflated 24 balloons. Today, they want to split the remaining balloons equally between 4 family members.

- 1.1 Write a question that you could figure out using this information and whose answer is not already given.

How many balloons does each member inflate?

- 1.2 Answer the question you wrote above. Make a tape diagram if it is helpful.



$x = 9$  balloons each

- 1.3 Write an equation for this situation and use it to check your solution.

$$4x + 24 = 60 \quad 4(1) + 24 = 60 \\ 36 + 24 = 60$$

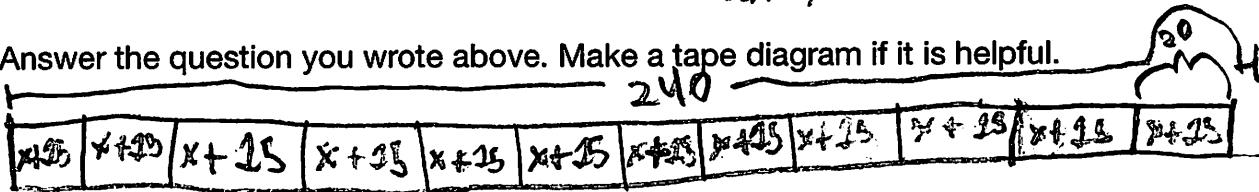
$$\cancel{15} \quad 60 = 60 \checkmark \quad \times$$

An art class charges each student \$15 to attend, plus a fee for supplies. The instructor hopes to collect \$240 total from the 12 students who attend the class.

- 2.1 Write a question that you could figure out using this information and whose answer is not already given.

How much are the supplies for each student?

- 2.2 Answer the question you wrote above. Make a tape diagram if it is helpful.



- 2.3 Write an equation for this situation and use it to check your solution.

$$12(x + 15) = 240$$

$$12x + 180 = 240$$

$$12x = 60$$

$$x = 5$$

### Are You Ready for More?

Write your own problem that can be solved with a tape diagram. Then swap problems with a classmate and solve your classmate's problem.

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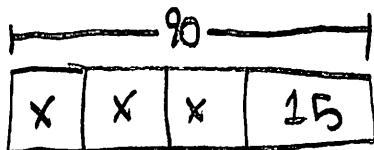
## Unit 7.6, Lesson 4: Seeing Structure

Name(s) \_\_\_\_\_

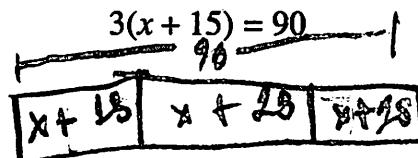
### Lesson Synthesis

- Sketch a tape diagram for each equation.

$$3x + 15 = 90$$



$$3(x + 15) = 90$$



- Describe how the tape diagrams are similar and different.

Total is 90

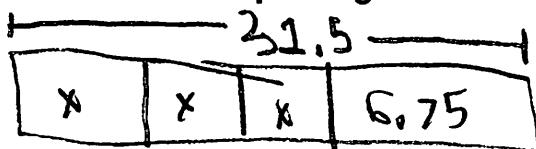
Both have 3x's

One has 15 and another has  $45 \cdot 3 = 45$

### Cool-Down

Deiondre bought a keychain for \$6.75 and 3 shirts that cost  $x$  dollars each. Altogether, the items cost \$31.50. Complete each section below.

Tape Diagram



Equation

$$3x + 6.75 = 31.5$$

Solution

$$31.5 - 6.75 = 24.75 \div 3 = 8.25$$

$$x = 8.25$$

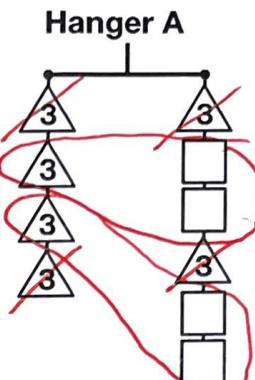
Meaning of Solution

The 3 shirts cost  
\$8.25 dollars each

## My Notes

1. Complete the table so Hanger A stays balanced.

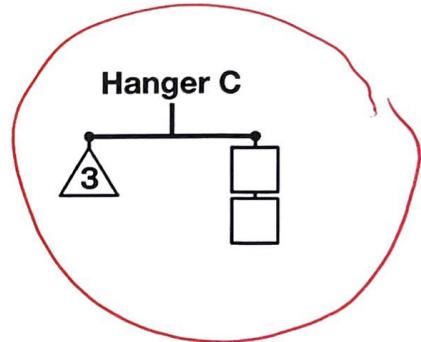
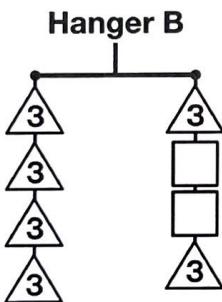
Weight of Triangle (lb.)	Weight of Square (lb.)
3	1.5



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

Canceled  $\triangle$  from both sides first. Then divided the squares by the weight of the remaining triangles

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



- 3.2 Explain how you know.

Because each square weighs 1.5 so 2 weigh 3 lbs

## 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.

## My Notes

1.1 What is the value of  $x$ ?

$$\frac{21}{3} = \frac{3x}{3}$$

$$\boxed{7 = x}$$

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

Anand

$$\frac{27}{3} = \frac{3(x+2)}{3}$$

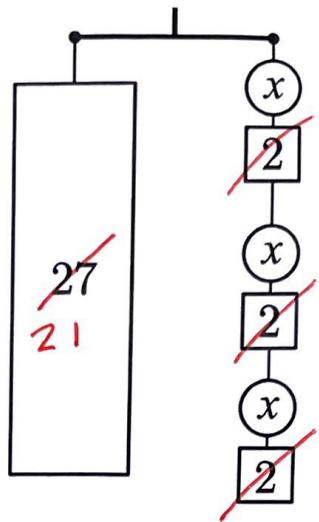
$$9 = x + 2$$

Darius

$$27 = 3x + 6$$

$$21 = 3x$$

$$27 = 3(x+2)$$



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

*He divided both sides by 3 first*

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

*He subtracted 6 from both sides first*

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

$$\begin{array}{rcl} -11 & & -11 \\ \hline 4x & + & 3 \\ \hline & & \boxed{x = \frac{3}{4}} \end{array}$$

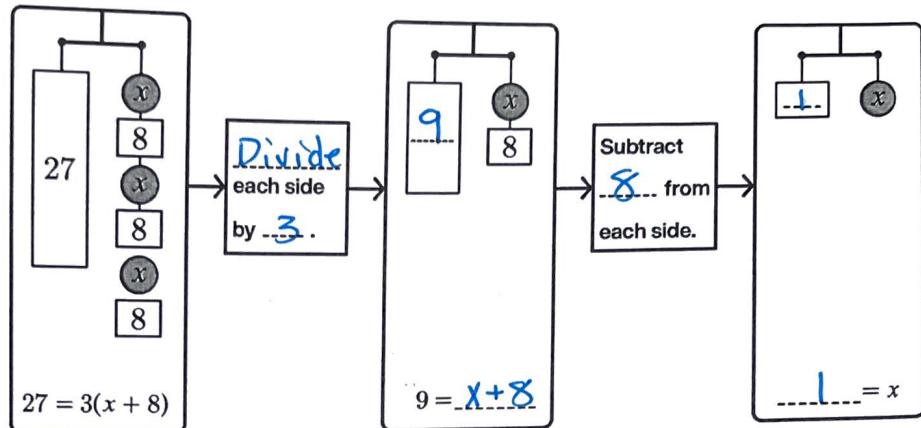
## Summary

*When solving, leave the x for last*

- I can connect balancing moves on hangers to solving equations.
- I can solve equations with positive numbers.

## My Notes

1. Solve each equation by filling in the blanks.



Solve each equation and show your reasoning.

2.1  $-4x + 3 = 23$

$$\begin{array}{r} -4x + 3 = 23 \\ -3 \quad -3 \\ \hline -4x = 20 \\ -4 \quad -4 \\ \hline x = -5 \end{array}$$

2.2  $\frac{-3(x - 7)}{-3} = \frac{33}{-3}$

$$\begin{array}{r} x - 7 = -11 \\ +7 \quad +7 \\ \hline x = -4 \end{array}$$

## Summary

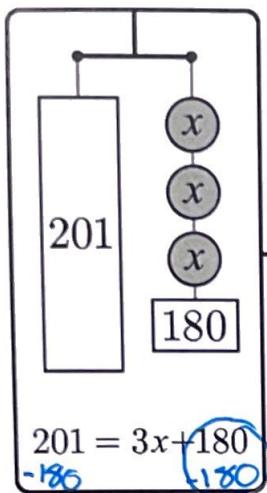
Check your answer by substituting back into the original equation

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

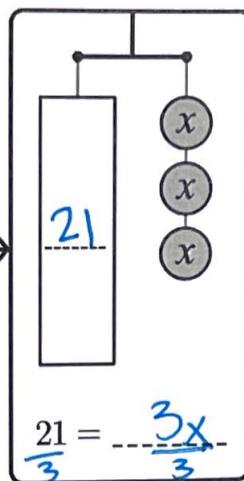
**Activity 1: Keep It True**

Solve each equation by filling in the blanks in the hangers, equations, and descriptions.

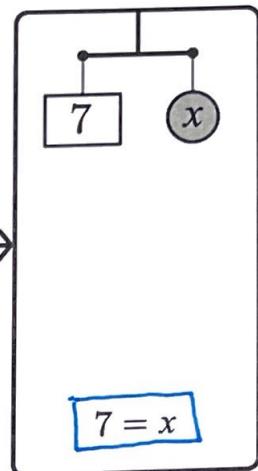
1.



Subtract 180 from each side.



Divide each side by 3.



2.

$$\begin{array}{r} 5 = 2x + 8 \\ -8 \quad\quad\quad | \\ \hline -3 = 2x \end{array}$$

Subtract 8 from each side.

Divide each side by 2.

$$-1.5 = x$$

3.

$$\begin{array}{r} 2(x-5) = -6 \\ | \\ 2 \end{array}$$

Divide each side by 2.

$$\begin{array}{r} x-5 = -3 \\ | \\ 5 \end{array}$$

Add 5 to each side.

$$x = 2$$

4. How could you check that the solutions to the equations in Problems 1–3 are correct?

Substitute your answer in for  $x$  and make sure both sides are equal

**Activity 2: Less and More Difficult**

Look through the equation cards. Without solving, select three equations that you think would be less difficult to solve and three equations that you think would be more difficult to solve.

Less Difficult to Solve

A, F, B, C

More Difficult to Solve

G, H, D, E

Explain how you decided which equations would be more difficult to solve.

Most difficult ones have fractions and decimals

**Activity 3: Solve 'em**

Select four equations to solve. At least one should be from your "less difficult" list and one should be from your "more difficult" list. Show or explain your reasoning for each equation.

Card A

$$\begin{aligned} x - (-4) &\neq -6 \\ x + 4 &\neq -6 \\ x &= -10 \end{aligned}$$

Card F

$$\begin{aligned} 50x + \cancel{\frac{200}{200}} &\neq \frac{1700}{-200} \\ 50x &= \frac{1500}{50} \\ x &= 30 \end{aligned}$$

Card B

$$\begin{aligned} \frac{2(x-1)}{2} &\neq \frac{-200}{2} \\ x-1 &\neq -100 \\ x &= -99 \end{aligned}$$

Card G

$$\begin{aligned} 8.6 + 3x &\neq 3x + 3.6 \\ 12 &\neq \frac{3x}{3} \\ 4 &= x \end{aligned}$$

## Lesson Synthesis

1. Write an equation that you think would be difficult to solve.
2. What makes the equation difficult to solve?
3. What advice would you give someone to help them solve an equation like this?

---

## Cool-Down

Solve each equation and show your reasoning.

$$1. \quad -3x - 5 = 16$$
$$\begin{array}{r} -5 \\ \hline -3x = 21 \\ \hline -3 \quad -3 \\ x = -7 \end{array}$$

$$2. \quad \frac{12}{-4} = -4(x - 2)$$
$$\begin{array}{r} -4 \\ \hline -3 = x - 2 \\ +2 \quad +2 \\ -1 = x \end{array}$$

Name \_\_\_\_\_

**My Notes**Distribute

1. Complete the missing information in each puzzle.

**Puzzle 1**

$$\begin{array}{c} a \quad -5 \\ 2 \quad \boxed{2a} \quad \boxed{-10} \end{array}$$

Factored:  $2(a - 5)$ Expanded:  $2a - 10$ **Puzzle 2**

$$\begin{array}{c} 18x \quad -45 \\ 1/3 \quad \boxed{6x} \quad \boxed{-15} \end{array}$$

Factored:  $\frac{1}{3}(18x - 45)$ Expanded:  $6x - 15$ 

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

$$\begin{array}{c|c} 5 & 5 \\ \hline x - 1 & 11 \end{array}$$

$$\begin{array}{l} 5(x - 1) = 55 \\ 5x - 5 = 55 \end{array}$$

- 2.2 Dyani solved the equation below.

$$\begin{aligned} 5(x - 1) &= 55 \\ 5x - 5 &= 55 \\ 5x &= 60 \\ x &= 12 \end{aligned}$$

What was their first step?

Distribute the  
5 times  $x$  and  
5 times  $-1$

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

$$\begin{array}{c} 5(x - 1) = 55 \\ \hline 5 \\ x - 1 = 11 \\ +1 \\ \hline x = 12 \end{array}$$

**Summary**

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

**Activity 1: Factoring Puzzles**

Complete the missing information in each puzzle.

**Puzzle 1**

$$(a \quad -6)$$

5 

5a	-30
----	-----

Factored

$5(a - 6)$

Expanded

$5a - 30$

**Puzzle 2**

$$(3a \quad -1b)$$

2 

6a	-2b
----	-----

Factored

$2(3a - 1b)$

Expanded

$6a - 2b$

**Puzzle 3**

$$(-5x \quad +3)$$

5 

-25x	15
------	----

Factored

$5(-5x + 3)$

Expanded

$-25x + 15$

**Puzzle 4**

$$2c \quad +3$$

-1 

-2c	-3
-----	----

Factored

$-(2c + 3)$

Expanded

$-2c - 3$

**Activity 2: Step by Step by Step by Step**

Here is an equation and the first steps that Sadia and Amir wrote to solve it.

Sadia

$$\frac{2(x - 9)}{2} = \frac{10}{2}$$

$x - 9 = 5$   
 $+9 \quad +9$   
 $x = 14$

Amir

$$2(x - 9) = 10$$

$2x - 18 = 10$   
 $+18 \quad +18$   
 $\frac{2x}{2} = \frac{28}{2}$   
 $x = 14$

- Are each of their first steps correct? Explain your reasoning.

Both are correct  
Sadia divided first  
Amir used the distributive property

- Finish solving each equation.

**Activity 3: Different First Steps**Solve these equations for  $x$  using both methods. Check the box when your solutions match.

1.

$$3(x + 2) = 21$$

**Expand First**

$$\begin{aligned} 3(x+2) &= 21 \\ 3x + 6 &= 21 \\ -6 & \quad -6 \\ \frac{3x}{3} &= \frac{15}{3} \\ x &= 5 \end{aligned}$$

**Divide First**

$$\begin{aligned} \frac{3(x+2)}{3} &= \frac{21}{3} \\ x+2 &= 7 \\ -2 & \quad -2 \\ x &= 5 \end{aligned}$$

5

2.

$$200(x - 0.3) = 600$$

**Expand First**

$$\begin{aligned} 200(x - 0.3) &= 600 \\ 200x - 60 &= 600 \\ +60 & \quad +60 \\ \frac{200x}{200} &= \frac{660}{200} \\ x &= 3.3 \end{aligned}$$

**Divide First**

$$\begin{aligned} \frac{200(x-0.3)}{200} &= \frac{600}{200} \\ x - 0.3 &= 3 \\ +0.3 & \quad +0.3 \\ x &= 3.3 \end{aligned}$$

□

3.

$$-10(x - 1.7) = -3$$

**Expand First**

$$\begin{aligned} -10(x - 1.7) &= -3 \\ -10x + 17 &= -3 \\ -17 & \quad -17 \\ \frac{-10x}{-10} &= \frac{-20}{-10} \\ x &= 2 \end{aligned}$$

□

**Divide First**

$$\begin{aligned} \frac{-10(x-1.7)}{-10} &= \frac{-3}{-10} \\ x - 1.7 &= 0.3 \\ +1.7 & \quad +1.7 \\ x &= 2 \end{aligned}$$

## Lesson Synthesis

- What are two possible first steps you could use when solving an equation like  $6(x + 4) = 30$ ?

Expanding or Dividing

- What are some advantages of having different ways to solve an equation?

Sometimes one way makes  
the equation simpler

---

## Cool-Down

Solve the equation. Show or explain your thinking.

$$\begin{array}{r} 8.88 = 4.44(x - 7) \\ \hline 4.44 | \quad 4.44 \\ 2 = x - 7 \\ +7 \qquad \qquad +7 \\ \hline 9 = x \end{array}$$

Name \_\_\_\_\_

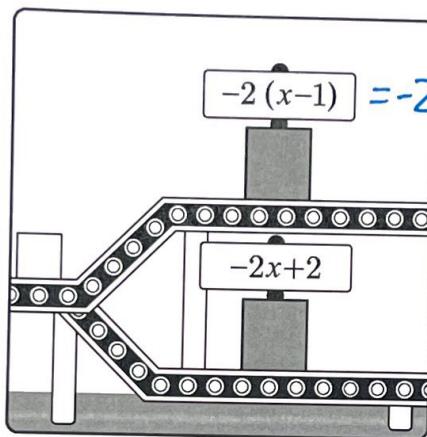
## My Notes

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

Two expressions are equivalent when the values and sigs are the same

$$\begin{aligned} \text{Ex } 8x - 15 \\ -15 + 8x \end{aligned}$$

Here are two number machines.



- 2.1 When will these number machines have equal outputs?

**Always / Sometimes / Never**

- 2.2 Explain your thinking.

If you expand the top expression, you get the bottom expression

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

$25x - 10$

$5(2 - 5x) = 10 - 25x$

$-25x + 10$

$25x + (-10)$

$-5(5x - 2) = -25x + 10$

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

$2(-2x + 7)$

$-2(2x - 7)$

$-1(4x - 14)$

## Summary

Equivalent means equal to

I can write equivalent expressions.

I can explain whether or not two expressions are equivalent.

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## Unit 7.6, Lesson 10: Notes

Name \_\_\_\_\_

### My Notes

Term = Anything separated by a + or a -

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

4 terms because they are separated by + or -

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

$5(x - 2)$	$3x + 6$
$5x - 10$	
$-11x$	$-3(x + 2)$ $-3x - 6$

Top sum:

$$5x + 3x - 10 + 6$$

$8x - 4$

Bottom sum:

$$-11x - 3x - 6$$

$-14x - 6$

Expand first  
then combine!

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

$5(x - 2)$	$3x + 6$
$5x - 10$	
$-11x$	$-3(x + 2)$ $-3x - 6$

Left sum:

$$5x - 11x - 10$$

$-6x - 10$

Right sum:

$$3x - 3x + 6 - 6$$

0

### Summary

I can write equivalent expressions with fewer terms.

## 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.

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

$6(3x - 5x) = 46$  Add 2 to each side.

$$6(-2x) = 46$$

Combine  $3x - 5x$

$$-12x = 46$$

Multiply  $6 \cdot -2x$

$$x = -4$$

Divide 46 by  $-12x$

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

Multiply 1 expand  $-2 + 18x - 30x = 46$

$$\begin{array}{rcl} -2 - 18x & = & 46 \\ +2 & & +2 \\ \hline & & x = 1 \end{array}$$

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

$$\begin{array}{rcl} 12 - 2x + 6 & = & -8 \\ \hline 18 - 2x & = & -8 \\ -18 & & -18 \\ \hline -2x & = & -26 \\ \hline -2x & = & -2 \\ \hline x & = & 13 \end{array}$$

## Summary

- I can add and expand expressions to help me solve equations.
- I can compare and contrast different strategies for solving the same equation.

## Activity 1: Roundtable

## Set 1

1.

$$\begin{array}{r} 8x - 6x - 18 = 10 \\ \hline 2x - 18 = 10 \\ + 18 \quad + 18 \\ \hline \cancel{2x} = \frac{28}{2} = 14 \end{array}$$

$$x = 14$$

2.

~~$$2(3-x) = -8$$~~

$$\underline{\underline{2(3-x) = -8}}$$

$$\begin{array}{r} 6 - 2x = -8 \\ -6 \quad -6 \\ \hline -2x = \frac{-14}{-2} = 7 \end{array} \quad x = 7$$

3.

$$\begin{array}{r} 3 + 5(x - 13) = 48 \\ \hline 3 + 5x - 65 = 48 \\ \hline -2 + 5x = 48 \\ + 2 \quad + 2 \\ \hline \cancel{5x} = \frac{50}{5} = 10 \end{array}$$

$$x = 10$$

4.

~~$$\begin{array}{r} \frac{1}{2}(5x - 8x) = -6 \\ \hline \frac{1}{2}(-3x) = -6 \\ \hline -\frac{3}{2}x = -6 \\ \hline \cancel{-\frac{3}{2}x} = \frac{12}{3} = 4 \\ \hline x = 4 \end{array}$$~~

## Reflection

What advice would you give to yourself or others when solving these types of equations?

## Set 2

5.

$$\begin{aligned} & \cancel{-3} = 26 \\ & x - 2x + 6 = 26 \\ & \cancel{-6} = \cancel{20} \\ & \frac{5}{5} = 4 \\ & x = 4 \end{aligned}$$

~~5x + 6 = 26~~

~~x - 2x = -x~~

~~-6 = -6~~

~~5 = 5~~

6.

$$\begin{aligned} & -11 + 4(5x - 7x) = -29 \\ & -11 + 20x - 28x \\ & -11 - 8x = -29 \\ & \cancel{+11} \quad \cancel{+11} \\ & \frac{-8x}{-8} = \frac{-18}{-8} = 2.25 \end{aligned}$$

$$x = 2.25$$

7.

$$\begin{aligned} & -3 + 5(2 - x) = 18 \\ & \cancel{-3} + \cancel{10} - 5x = 18 \\ & \cancel{7x} = \cancel{-3} \end{aligned}$$

$$\begin{aligned} & 7 - 5x = 18 \\ & \cancel{7} \quad \cancel{-7} \\ & \frac{-5x}{-5} = \frac{11}{-5} = -2.2 \end{aligned}$$

$$x = -2\frac{4}{5}$$

8.

$$\begin{aligned} & 11 - 6(x - \frac{1}{3}) = -5 \\ & \cancel{11} \quad \cancel{-6} \\ & (x - \frac{1}{3}) = -5 \\ & x - \frac{1}{3} = -5 \\ & x - 2 = -5 \\ & \cancel{x} \quad \cancel{+2} \\ & \frac{x}{1} = \frac{-3}{-1} = 3 \end{aligned}$$

$$x = 3$$

$$\begin{aligned} & 11 - 6(x - \frac{1}{3}) = -5 \\ & \cancel{11} \quad \cancel{-6} \\ & (x - \frac{1}{3}) = \frac{-11}{-6} = \frac{11}{6} \\ & x - \frac{1}{3} = \frac{11}{6} \\ & x - \frac{2}{6} = \frac{11}{6} \\ & \cancel{x} \quad \cancel{-\frac{2}{6}} \\ & \frac{x}{1} = \frac{\frac{11}{6}}{\frac{4}{6}} = \frac{11}{4} \end{aligned}$$

**Lesson Synthesis**

There are several ways to solve the equation  $-6 + 2(8x - 3x) = -1$ .

1. List three different first steps you could take to solve this equation.

Reduce the number of terms.  $2(8x - 3x) = 5$

$$\begin{array}{r} \underline{16x - 6x = 5} \\ \underline{10x = 5} \\ \frac{10}{10} x = \frac{5}{10} \end{array}$$

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

2. Which first step do you prefer? Explain your thinking.

Adding/Subtracting to isolate just the variables on one side with the numbers on the other.

**Cool-Down**

Saanvi and Ichiro each started solving Equation 3 for  $x$ .

$$3 + 5(x - 1) = 48$$

$$x = 10,$$

The result of Saanvi's first step was:

$$\begin{aligned} 5(x - 1) &= 45 \\ 5x - 5 &= 45 \end{aligned}$$

One of them made an error. Who was it and what was the error?

The result of Ichiro's first step was:

$$\begin{array}{r} 3 + 5x - 1 = 48 \\ \underline{-3} \quad +1 \quad -3 \\ 45 \\ \hline 5x = 46 \\ \hline x = 9.2 \end{array}$$

Ichiro. Because he forgot to multiply the  $-1$  by 5.

# desmos

## Unit 7.6, Lesson 13: Notes

Name Deshawn

### My Notes

Inequality

$<$ ,  $>$ ,  $\leq$ ,  $\geq$

Lots of possible answers

Equal sign =

There is only one answer

$$x < \# \quad \text{---} \quad \#$$

The  $x$  is less than  $\#$

$$x > \# \quad \text{---} \quad \#$$

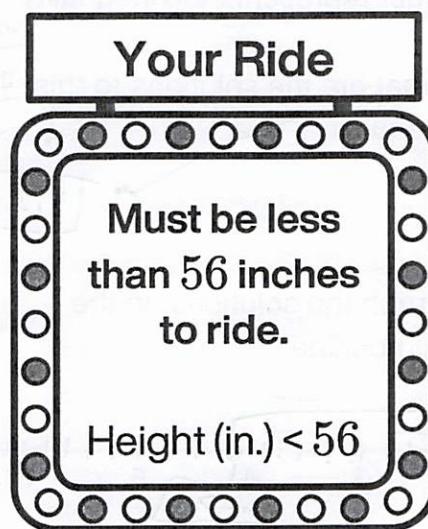
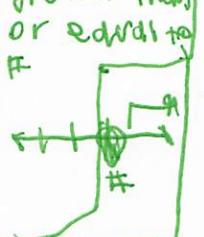
$x$  is greater than  $\#$ .

$x$  is less than or equal to  $\#$

$$\# \quad \text{---} \quad \#$$

$$x \geq \#$$

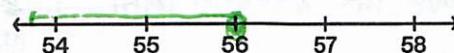
It's greater than or equal to  $\#$



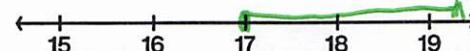
- 1.1 Darryl is 56 inches tall. Can he go on the carousel?

No because it's not less than 56

- 1.2 Make a graph on the number line to represent the possible heights for this ride.



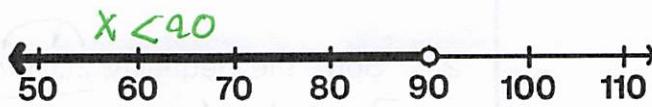
- 2.1 Make a graph on the number line to represent the solutions to  $x \geq 17$ .



- 2.2 How can you tell whether 17 is included in the inequality?

Because the  $\geq$  includes a line underneath the arrow showing an equals to.

3. Write an inequality that represents this graph:



Open circle  $\Rightarrow$  no equals line

- Filled circle tells us an extra line in inequality  
Summary  
it includes the solution.
- Open circle is not an extra line, it is not equal to the number where the circle is

I understand and can use the symbols  $\leq$  and  $\geq$ .

I can graph inequalities on a number line.

## My Notes

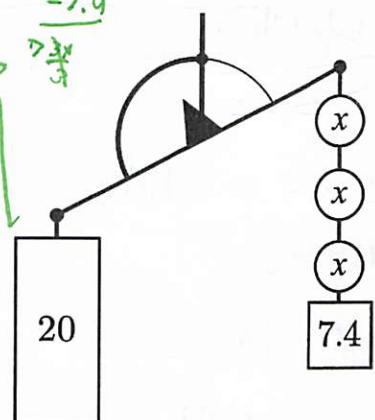
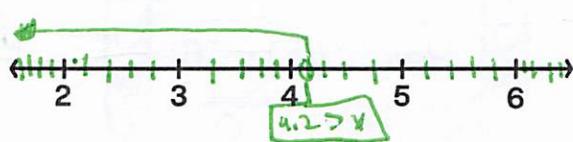
- ① Draw a line
- ② If you can expand, combine like terms
- ③ Find the operations
- ④ Solve by using opposite operations.
- ⑤ Leave the  $x$ -term until the end.

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

- 1.1 What are the solutions to this inequality?

$$\begin{array}{r} -7.4 \\ -7.4 \\ \hline 22.6 \\ \xrightarrow{-3x} \\ 4.2 > x \end{array}$$

- 1.2 Graph the solutions on the numberline.



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

Jasmine

$$x < 4.2$$

Terrance

$$4.2 < x$$

Who is correct? Explain how you know.

Jasmine flipped the ~~inequality~~ which is equal to the answer

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

$$\begin{array}{r} 2x + 15 \leq 18 \\ -15 \quad -15 \\ \hline 2x \leq -3 \\ \frac{x}{2} = -1.5 \end{array}$$

$$x \leq -1.5$$

- Solve like it's an equation,
- You'll have more than 1 answer.

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.

## My Notes

① Find the important info in the problem.

Look for key words:

- "In each" = multiplication
- "and" = add
- numbers

② Solve like it's an equation.

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  $10 + 5x \leq 100$ .

$$\begin{array}{rcl} -10 & & -10 \\ \hline 5x & \leq & 90 \\ \hline x & \leq & 18 \end{array}$$

1.2 Explain what the solutions to the inequality mean.

It means she can make at most 18 gift bags.

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.

$$75 + 12x > 300$$

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

$$\begin{array}{rcl} 75 + 12x > 300 \\ -75 & & -75 \\ \hline 12x & > & 225 \\ \hline x & > & 18.25 \end{array}$$

• Look for key words/numbers.

• Solve like it's an equation.

## 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.

**Activity 1: Maia's Magazines**

Maia has a job where she earns \$19 per week, plus \$3 for every magazine subscription that she sells. She wants to use the money she earns to buy soccer equipment.

This week, Maia wants to buy a new ball. The cheapest ball she wants costs \$43.

1. Write and solve an equation to determine how many magazine subscriptions Maia needs to sell to make \$43.

$$\begin{aligned} 19 + 3 \cdot x &= 43 \\ \frac{19 + 3x}{19} &= \frac{43}{19} \\ 3x &= \frac{24}{3} = 8 \end{aligned}$$

$$x = 8$$

She needs  
to sell 8 magazine

2. List other numbers of magazine subscriptions Maia could sell and still buy the ball.

$$9, 10, 11, 12, \dots, 8, \dots, \infty$$

3. Write an inequality to represent all the number of subscriptions Maia could sell and still buy the ball.

$$\begin{aligned} 19 + 3x &\geq 43 \\ \frac{19 + 3x}{3} &\geq \frac{43}{3} \\ x &\geq \frac{24}{3} = 8 \end{aligned}$$

$$x \geq 8$$

The following week, Maia earns \$37. She wants to use it to buy soccer shorts and 5 pairs of socks. The shorts she wants cost \$22.05. Each pair of socks cost the same amount.

4. What is the price of each pair of socks if Maia spends exactly \$37 on the socks and shorts? (In Maia's city, there is no sales tax.) Write and solve an equation if it is helpful.

$$\begin{aligned} 22.05 + 5x &= 37 \\ -22.05 &\\ \hline 5x &= \frac{14.95}{5} = 2.99 \end{aligned}$$

$$x = \$2.99$$

5. Write an inequality to represent all the sock prices that Maia could afford.

$$\begin{aligned} 22.05 + 5x &\leq 37 \\ -22.05 &\\ \hline 5x &= \frac{14.95}{5} = 2.99 \end{aligned}$$

**Activity 2: Bao's Budgeting**

Bao has \$175 saved in a bank account. He wants to know how much money he can take out each month if he wants to have at least \$25 in the account a year from now.

1. Circle the inequality that represents Bao's situation.

A.  $175 - 12x \leq 25$       B.  $175 + 12x \leq 25$       C.  $175 - 12x \geq 25$       D.  $175 + 12x \geq 25$

$$X \leq 12.50$$

2. What does 12 represent?

the months

3. What does  $x$  represent?

about -\$12.50

4. Bao and his friend try to solve the inequality. Bao's answer starts with  $x \leq$ . His friend's answer starts with  $x \geq$ . Which symbol makes sense for this situation?

Explain your thinking.

Bao. Because it tells us it's a limit.  
Whenever you're dividing the negative variable, change the symbol

5. Solve the inequality you chose and explain what it means.

$X \leq 12.50$  means he can take up to \$12.50 a month.

Bao is considering getting a part-time job. Instead of taking money **out** of his account **each month**, he would put money **in**. His account still has \$175, and his goal is to have \$1000 in the account a year from now.

6. Write an inequality where  $x$  represents how much Bao should put **in** each month to reach his goal.

~~$175 + 12x \geq 1000$~~

$$\begin{aligned} 175 + 12x &\geq 1000 \\ 175 & \\ 12x &\geq 825 \\ \frac{12x}{12} &\geq \frac{825}{12} \\ x &\geq 68.75 \end{aligned}$$

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

$$X \geq \$68.75$$

## Lesson Synthesis

Tay has a \$30 gift card to CoffeeBucks. They spend \$2.50 on a tasty beverage every school day. Tay wants to know how many beverages they can buy using the gift card.

Explain why Tay's inequality  $30 - 2.50x \geq 0$  represents this situation.

$$x \leq 12$$

## Cool-Down

It is currently  $14^\circ\text{C}$  outside and the temperature is dropping  $4$  degrees every hour. Zahra will only stay outside if it is  $-10^\circ\text{C}$  or warmer.

1. Solve the inequality  $14 - 4h \geq -10$ .

$$h \leq 6$$

2. Explain what the solutions to the inequality mean.

The  $h$  tells us how many hours she can be out there.

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## Unit 7.6, Lesson 16: Notes

Name \_\_\_\_\_

### My Notes

$$\begin{array}{rcl} 3(10 - 2x) & = & 18 \\ 30 - 6x & = & 18 \\ \hline -30 & & \\ \hline -6x & = & -12 \\ \hline -6 & & \\ x & = & 2 \end{array}$$

Substitution means  
to take something out  
and replace it

$$x \rightarrow 2$$

No equal to like terms  
in open circle

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  $3(10 - 2x) < 18$ .

$$\begin{array}{rcl} 3(10 - 2(3)) & < & 18 \\ 30 - 6(3) & = & 24 \\ 30 - 18 & = & 12 \\ \hline -30 & & \\ \hline -12 & < & 18 \end{array}$$

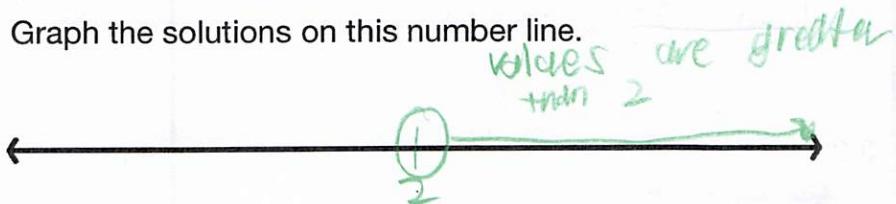
- 1.2 Choose a value for  $x$  that is less than 2 and substitute it into  $3(10 - 2x) < 18$ .

$$\begin{array}{rcl} 3(10 - 2(1)) & < & 18 \\ 30 - 6(1) & = & 24 \\ 30 - 6 & = & 24 \\ \hline 24 & < & 24 \end{array}$$

- 1.3 What are the solutions to the inequality?

The solutions for  $x$  must be greater than 2 to make the inequality true.

- 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?

$$5 - 0.5(0) \geq 3$$

$$5 - 0 \geq 3$$

$$5 \geq 3 \quad \checkmark$$

true!

Explain how you know.

When I substitute  $x=0$   
the inequality is true.

Don't forget to flip the symbol when you multiply/divide by a negative.

### 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.