Math 9 LG 9 Adapted Package
Solving Equations – Moving like terms across the equal sign
Watch: https://youtu.be/_xmbZvkDrCc

Review: 2x + 4x – 3

Like terms   constant

You can add and subtract like terms together:
6x + 4x
Constants are like terms that you can add together:
5 + 2

Review: 5x + 2 = 12

Ex. 1.) 8x + 6 = 4x – 14   Ex. 2.) 20 + x = 2 – 5x

LG 9 Adapted - Multi-step Algebra and Real-Life Algebra

Now that we know the basics of Algebra, we need to use our rules to solve harder problems with more steps.

More than 1 terms with variable:

Example 1:

$$5x + 6 = 7x$$

We see 2 terms with x in them. The goal of algebra is to get the variable (x) alone, so we can **start** to solve this question by **moving 5x to the right** side of the equals sign. Because 5x is positive, we will **use subtraction (opposite of addition) to remove it**.

$$5x + 6 = 7x$$
$$-5x \qquad -5x$$

$$\boxed{} = \boxed{}x$$

Now that we have x on one side, we can finish the question with division.

$$6 = 2x$$
$$\div 2 \qquad \div 2$$

$$\boxed{} = \boxed{}$$

Example 2:

$$-1 + 5x = 2x - 10$$

We see 2 terms that have x and 2 that are constants (just numbers). Move the **2x to the left** side of the equal sign to keep x positive. We need to subtract 2x from both sides.

$$-1 + 5x = 2x - 10$$
$$-2x \qquad -2x$$

$$-1 + \boxed{}x = -10$$

Now move your constants to the same side (other side from x). Do this by adding 3 to each side.

$$3x = \boxed{}$$

In order to get x by itself, we need to divide each side by 3.

$$3x = -9$$
$$\div 3 \qquad \div 3$$

$$x = \boxed{}$$

Name: TA:

Practice:

a) $5x + 24 = 9x$

Hint: Start by moving 5x to the right side.

b) $8x = 40 - 2x$

c) $6x + 5 = 3x + 20$

d) $40 - 6x = 5x + 7$

e) $-16 + 2n = -8 - 5n$

f) $4m + 8 = -13 + 7m$

Math 9 LG 9 Adapted Notes
Solving Equations – Using the distributive property (multistep)
Watch: https://youtu.be/Fov9NK9WULE

Review: $4(x + 3)$

Ex. 1.) $3x + 3 = 3(3x + 5)$ Ex. 2.) $3(x - 4) = 2(-2x + 1)$

Now that we know the basics of Algebra, we need to use our rules to solve harder problems with more steps.

Using the distributive property:

Example 1:

$$6x + 2 = 4\,(x + 3)$$

We see 2 parts that have x. But the right side has x in brackets. Let's **multiply the 4 into the x+3** in the brackets!

$$6x + 2 = 4\,(x + 3)$$

$$6x + 2 = \boxed{}\,x + \boxed{}$$

Now, let's move the 4x to the left side by subtracting it from the 6x. Then, we will move the 2 to the right as well.

$$6x + 2 = 4x + 12$$
$$-4x \qquad\quad -4x$$

$$\boxed{}\,x + 2 = \quad 12$$
$$\qquad\quad -2 \qquad -2$$

$$\boxed{}\,x = \qquad \boxed{}$$

Let's finish the question by dividing both sides by 2 to get x alone:

$$2x = 10$$
$$\div 2 \quad \div 2$$

$$x = \boxed{}$$

Example 2:

$$3(4x - 10) = -2(-x - 5)$$

Multiply the **3 into 4x – 10**
AND multiply the **-2 into the -x – 5**.

$$3(4x - 10) = -2(-x - 5)$$

$$\boxed{}\,x - 30 = \boxed{}\,x + 10$$

Now, let's move the 4x to the left side by subtracting on both sides. Then, we will move the -30 to the right by adding 30 to both sides.

$$12x - 30 = 2x + 10$$
$$-2x \qquad\quad -2x$$

$$\boxed{}\,x - 30 = \quad 10$$
$$\qquad\quad + 30 \quad + 30$$

$$10x = \boxed{}$$
$$\div 10 \qquad \div 10$$

$$x = \boxed{}$$

Name: TA:

Practice:

a) $4\left(2y+10\right)=18y$

b) $2g=3\left(8-2g\right)$

Hint: multiply the 4 into each term in the brackets.

c) $3\left(4x+2\right)=15x-6$

d) $2\left(3x+1\right)=5\left(2x-2\right)$

e) $-1+3(x+2)=5(1+8x)$

f) $4(-4+m)=-6(m-4)$

Name: TA:

Math 9 LG 9 Adapted Notes
Solving Equations - with fractions (multistep)
Watch: https://youtu.be/mcWFAegDp-A

Review: Find the lowest common denominator (LCD) for $\frac{2}{3}$ and $\frac{1}{4}$

Count by 3:

Count by 4:

You can remove any fraction by multiplying ALL terms by the LCD.

Ex. 1.) $2x = \frac{x}{3} + 5$ Ex. 2.) $\frac{x}{4} + 5 = x + \frac{1}{2}$

Dealing with simple fractions:

Example 1:

$$\frac{4x}{3} + 6 = 2x$$

That looks tricky! But, we can get rid of the fractions by **multiplying everything by 3.** This removes the fractions because 4x times 3 is 12x, then divided by the original 3 is 4x again.

$$\frac{4x}{3} + 6 = 2x$$

$$\times 3 \quad \times 3 \quad \times 3$$

$$4x + \boxed{} = \boxed{}\, x$$

Now, we solve as normal. Start by moving the 4x on the left side onto the right siding using subtraction.

$$4x + 18 = 6x$$
$$-4x \qquad\quad -4x$$

$$18 = \boxed{}\, x$$
$$\div 2 \qquad \div 2$$

$$\boxed{} = x$$

Example 2:

$$\frac{x}{4} + 5 = x + \frac{1}{2}$$

2 fractions?! Let's start by getting rid of the fractions by **multiplying everything by 4.** We do this because 2 and 4 can multiply to be the same, since 2 times 2 is 4.

$$\frac{x}{4} + 5 = x + \frac{1}{2}$$

$$\times 4 \quad \times 4 \quad \times 4 \quad \times 4$$

$$x + \boxed{} = \boxed{}\, x + \boxed{}$$

Now, let's move the 1x to the other side using subtraction. Then subtract the 2 to the other side.

$$x + 20 = 4x + 2$$
$$-1x \qquad\quad -1x$$

$$20 = \boxed{}\, x + 2$$
$$- 2 \qquad\qquad - 2$$

$$\boxed{} = 3x$$
$$\div 3 \qquad \div 3$$

$$\boxed{} = x$$

Name: TA:

a)
$$10 + \frac{x}{2} = 3x$$
Hint: start by multiplying everything by 2.

b)
$$6 + x = \frac{7x}{4}$$

c)
$$\frac{2x}{3} + 14 = 20$$

d)
$$\frac{x}{4} + 1 = \frac{3x}{4} - 3$$

e)
$$\frac{3x}{4} + 9 = 5x + \frac{1}{2}$$
Hint: start by multiplying everything by 4.

f)
$$\frac{1}{2} + x = \frac{3x}{8} + 3$$

Name: TA:

More Practice:

a) $3(x+2) = 4x - 2$ b) $2(x+3) = 4(4-2x)$

c) $4(2x+2) - 2 = 12x - 10$ d) $\dfrac{2x}{3} + 6 = 4x - 4$

e) $\dfrac{2x}{3} - 2 = \dfrac{x}{6} + 1$ f) $\dfrac{14x}{3} = 2(x+4)$

Name: _____   TA: _____

Math 9 LG 9 Adapted Notes – Word Problems 1 Step
Watch: https://youtu.be/7CH5mqhDeQM

1. Read problem 1st time
2. Read problem 2nd time:
   a. Identify the unknown (variable)
   b. underline/circle relevant words
3. Try putting an equation together – experiment!

Common words to recognize:

ADD	SUBTRACT	MULTIPLY	DIVIDE	EQUALS
Plus	Difference	Each	Each	In total
And	Minus	Rate	Per	Is
Combined	Remove	Per	Half	Are
Sum	Decreased by	Times	Divided into	Were
Together	fewer	Double	Quotient	Was
Increase by	Less than	Triple		Will be
	Take away	twice		
		product		

1. Kayla began the year with some money in her bank account. On her birthday she increased her bank balance by $20 thanks a gift from her brother. This brought her bank account balance to $95. What was the original amount in the bank account?

2. Colton and his friends charged $54 to his mom's credit card for Fortnite stuff (bad decision). In total they were able to purchase 9 skins. What was the cost of each skin?

3. Jendi had 15 pieces of sushi. Jendi divided the sushi up with an unknown number of people. Each person ended with 3 pieces of sushi. How many people shared the sushi?

Name: TA:

One-Step Word Questions:

In the real-world, algebra questions are not given to us as formulas. We need to create them from the problems we face. We will work to create formulas from word questions to apply our math skills.

Example 1:

Jacob had some **unknown amount of birthday money**. Jacob then **won $15 dollars** in a chess competition that **was added** to their birthday money. Jacob ended **up with $27 dollars**. How much birthday money did they originally have?

Step 1: Identify the unknown and give it a symbol.

"m" will represent starting money.

Step 2: What are we doing to the unknown? We are adding $15 dollars to it.

$$m + 15$$

Step 3: What does it equal in the end? It is equal to $27 dollars.

$$m + 15 = 27$$

Step 4: Solve!

$$m + 15 = 27$$

$$-15 \quad \Box$$

$$m = \Box$$

Example 2:

Ben bought some **unknown number of donuts** from the store. He then found out his siblings snuck into his room and **ate 5 of the donuts**! He was **left with 7 donuts**. How many donuts did Ben originally buy?

Step 1: Identify the unknown and give it a symbol.

"d" will represent the number of

_____

Step 2: What are we doing to the unknown? 5 donuts were lost to the siblings.

$$d - \Box$$

Step 3: What does it equal in the end? It is equal to 7 donuts left.

$$d - \Box = \Box$$

Step 4: Solve!

$$d - 5 = 7$$

$$+\Box + \Box$$

$$d = \Box$$

Example 3:

Juliet has some **unknown number of fish** in a tank. Juliet goes to the store and **buys enough fish to** <u>triple</u> **her current number of fish**. Juliet <u>now</u> **has 24 fish**. How many fish did Juliet have before buying more fish?

Step 1: Identify the unknown and give it a symbol.

"f" will represent:

_____

Step 2: What are we doing to the unknown? We are tripling it (multiplying by 3).

$$3f$$

Step 3: What does it equal in the end? It is equal to 24 fish.

$$3f = 24$$

Step 4: Solve!

$$3f = 24$$

$$\div 3 \quad \div \square$$

$$f = \square$$

Example 4:

Morina **had 15 pieces of sushi**. Morina **divided** the sushi up with an unknown number of people. **Each person ended with 3 pieces of sushi**. How many people shared the sushi?

Step 1: Identify the unknown and give it a symbol.

"p" will represent:

_____

Step 2: What are we doing to the unknown? We are using it to divide 15 pieces of sushi.

$$\frac{15}{p}$$

Step 3: What does it equal in the end? It is equal to 24 fish.

$$\frac{15}{p} = \square$$

Step 4: Solve!

$$\frac{15}{p} = \frac{\square}{1}$$

$$15 = \square\, p$$

$$\div 3 \quad \div \square$$

$$\square = p$$

Name: TA:

Practice:

1) Robert had some **unknown number of Pokémon cards** in their collection. Robert **bought 9 more cards** from the shop. Robert **now has 22 cards**. How many Pokémon cards did Robert have in the collection before buying more cards?

2) Jen earned some **unknown amount of money** from work. They **bought a new TV for a price of $600** dollars. Jen has **$500 of the work money left.** How much money did Jen earn from work?

3) A radio station had **some tickets** to a Taylor Swift concert. The radio station held a contest and divided up the tickets by **7 winners**. Each winner **ended up with 4 tickets each**. How many tickets did the radio station have for the concert?

4) Becky had **some pillows** at home for their sofas. They **bought enough to quadruple the number of pillows** they had for maximum comfort. **They now have 20 pillows**. How many pillows did they originally have?

5) Andy had **some historical dollar coins**. **Each coin now sells for 5 times** their value. Andy **sold the historical coins for $60**. How many historical coins did Andy have?

6) Sara had **33 apples** harvested from an orchard. The apples were **divided by all of Sara's friends**. **Each friend ended up with 3 apples each**. How many friends does Sara have?

Math 9 LG 9 Adapted Notes – Word Problems 2 Step
Watch: https://youtu.be/_sMkM9Qix8E

Common words to recognize:

ADD	SUBTRACT	MULTIPLY	DIVIDE	EQUALS
Plus And Combined Sum Together Increase by	Difference Minus Remove Decreased by fewer Less than Take away	Each Rate Per Times Double Triple twice product	Each Per Half Divided into Quotient	In total Is Are Were Was Will be

1. Gurveer went bowling with his friends. He paid $3 to rent shoes and $4.75 for each game of bowling. If he spent a total of $22, then how many games did Gurveer play?

2. Logan earned a total of $400 this week. This week's total was $60 less than double the amount he earned last week. How much money did he earn last week?

3. Jean rented a limousine for prom. There was a one-time charge of $100, plus an hourly rate of $45. Her total cost for the night was $347.50. How many hours did Jean rent the limo for.

Multi-Step Word Questions.

Example 1:
Max is a carpenter and creates bird houses out of wood. An order comes in for **8 bird houses**. **Each bird house needs 3 pieces of wood** in order to be built to code! Before max buys the needed wood pieces, **a neighbour donates an extra 2 pieces**. How many wood pieces are needed to complete the order?

1) Start by calling what you want (pieces of wood needed) a symbol or letter, like "w". 2 pieces of wood are given to us, so whatever we buy, we have **+2 more pieces**.

$$w + 2$$

2) Each bird house needs 3 pieces each. So we need to **divide** our wood pieces up into "piles" of **3**.

$$\frac{w + 2}{\boxed{}}$$

3) We know this needs to **equal 8** to complete the order.

$$\frac{w + 2}{3} = \boxed{}$$

4) Solve!

$$\frac{w + 2}{\cancel{3}} = 8$$

$$\times \cancel{3} \qquad \times 3$$

$$w + 2 = \boxed{}$$
$$-2 \qquad -2$$

$$w = \boxed{}$$

Example 3:

Example 2:
Kayden **had some money** at the start of the year. They **won $10 more dollars** in a school contest in the middle of the year. At the end, their parents **double their money** (after the contest) for getting proficient grades. Kayden **ends up with 3 times as much money as they had at the start**. How much money did Kayden start the year with?

1) Start by calling what you want (starting money) a symbol or letter, like "m". Kayden **added** 10 more dollars to their starting money from the contest.

$$m + \boxed{}$$

2) Kayden's parents then **doubled (x2)** their money that they had after the contest.

$$\boxed{}(m + 10)$$

3) Kayden ended with **three times (x3)** the money they start with **(m)**.

4) Solve!

$$2(m + 10) = \boxed{}m$$

$$\boxed{}m + \boxed{} = 3m$$
$$-2m \qquad\qquad -2m$$

$$\boxed{} = m$$

Example 4:

A New Year's Eve movie party was being held for **8 people**. A party room at the movie theatre **charged some money for a ticket for each person attending**, plus a room fee of 30 dollars. The **total cost** of the party (ticket and room fee) was **46 dollars**. How much did each ticket cost?

1) "t " will

represent:_____

2) Each of the 8 people needs to buy a ticket. So, 8 times "t" will give us the money from all ticket prices. This will be added with a flat $30 dollar fee.

$$8t + 30$$

3) The total price needs to come out to 46 dollars.

$$8t + 30 = \boxed{}$$

4) Solve!

$$\underline{\quad -30 \quad\quad -30 \quad}$$

$$8t = \boxed{}$$

$$\frac{}{\div\boxed{} \quad \div\boxed{}}$$

$$t = \boxed{}$$

To rent skis at a mountain resort, the renter must pay **$20 dollars**, plus **$0.50 for each hour** they use the skis. Benjamin rents skis during a trip, and the **total cost is $25 dollars**. How many hours did Benjamin ski?

1) h will represent:

_____

2) Each hour costs $0.50, so we will need to times h by 0.50. Also, the $20 dollar fee will be added to this.

$$0.50h + 20$$

3) The total price needs to add up to what Benjamin paid, which is $25 dollars.

$$0.50h + 20 = \boxed{}$$

4) Solve!

$$\underline{\quad -\boxed{} \quad\quad -\boxed{} \quad}$$

$$0.50h = \boxed{}$$

$$\div 0.50 \quad\quad \div 0.50$$

$$h = \boxed{}$$

Name: TA:

Practice:

1) Tyrell bought some **unknown number of apples** for **$4 each**. Tyrell <u>also</u> **bought $5 dollars worth** of potato chips. The total price was $17 dollars. How many apples did Tyrell buy?

2) Tifa harvested an **unknown number of tomatoes** from her garden. **4 of them** were rotten and **thrown away**. Her neighbour felt bad Tifa lost the rotten tomatoes, and **doubled her <u>remaining</u> tomatoes** for her. Tifa **ended up with 16 tomatoes**. How many tomatoes did Tifa harvest from her garden?

3) Maxene is a carpenter and creates bird houses out of wood. <u>An order</u> comes in <u>for</u> 6 **bird houses**. **Each bird house needs 4 pieces of wood** in order to be built to code! When coming back from the store, Maxene drops and breaks some pieces of wood, causing her to go back to the store and **buy 5 more pieces of wood** for replacements. How many wood pieces are needed to complete the order?

4) Kaydene **had some money** at the start of the year. **They bought an $8 movie ticket** to go see a movie with friends in the <u>middle of the year</u>. <u>At the end</u>, their parents **triple their money** for getting extending grades. Kayden **ends up with 2 times as much money as they had at the start**. How much money did Kayden start the year with?

5) Selene <u>bought a number of slices of pizza</u>. Selene **ate 3 pieces** for lunch. After lunch, Selene then **divided the rest** up equally and gave pizza to **her 4 friends** (how nice!). **Each friend got the <u>equ</u>iva<u>l</u>ent of 3 slices**. How many slices of pizza did Selene first buy?

6) A bus system **charges $2 dollars** to get on the bus. The bus also **charges an additional $0.40 for <u>each</u> bus stop** it passes. If Kiara rides on the bus and is **charged $6 dollars in <u>total</u>,** how many bus stops did the bus pass until Kiara got off?

7) A road trip to Kelowna has travel costs for the gas and food. The gas **costs 1.70 <u>per (each)</u> liter** and **Winston buys $25 of food**. The **total cost is $76 dollars**, how many liters of gas were used?

8) **4 friends** went to the swimming pool. They **each paid for tickets** that cost a crazy amount of money! The manager felt bad and **<u>refunded</u>** them a flat amount of **$20 dollars**. The **<u>total cost</u>** for the day after the $20 refund **<u>was $40 dollars</u>**. How much did each of the tickets originally cost?

9) A new game comes out and you and your sibling split the cost. The **game costs $60 dollars**. You **also** buy **2 controllers, each at a price** you forgot. You and your sibling **<u>split</u> the cost equally into 2**. **<mark>Your</mark>** personal **<u>total cost</u> is $50 dollars**. How much did each controller cost?