G8-M4-Lesson 1: Writing Equations Using Symbols

Write each of the following statements using symbolic language.

1. George is four years older than his sister Sylvia. George's other sister is five years younger than Sylvia. The sum of all of their ages is 68 years.

   Let x be Sylvia's age. Then,
   $(x+4)+(x-5)+x=68.$

   > Since I know something about Sylvia and both her brother and sister, I will define my variable as Sylvia's age.

2. The sum of three consecutive integers is 843.

   Let x be the first integer. Then,
   $x+(x+1)+(x+2)=843.$

   > I remember that consecutive means one after the next. If my first number was 5, then a numeric statement would look like this:
   > $5+(5+1)+(5+2).$
   > I need to write something similar using symbols.

3. One number is two more than another number. The sum of their squares is 33.

   Let x be the smaller number. Then,
   $x^2+(x+2)^2=33.$

4. When you add 42 to $\frac{1}{3}$ of a number, you get the number itself.

   Let x be the number. Then,
   $\frac{1}{3}x+42=x.$

   > I don't know what number a fraction of 45 is. I remember that taken away from 23 means I need to subtract the number from 23.

5. When a fraction of 45 is taken away from 23, what remains exceeds one-half of eleven by twelve.

   Let x be the fraction of 45. Then,
   $23-x=\frac{1}{2}\cdot 11+12.$

6. The sum of three consecutive odd integers is 165. Let x be the middle of the three odd integers. Transcribe the statement accordingly.

   $(x-2)+x+(x+2)=165$

   > If the middle number is odd, then I need to subtract two to get the odd integer before it, and I need to add two to get the odd integer after it.

G8-M4-Lesson 2: Linear and Non-Linear Expressions in x

Write each of the following statements as a mathematical expression. State whether the expression is linear or nonlinear. If it is nonlinear, then explain why.

1. A number added to five cubed

   Let x be a number; then, $5^3 + x$ is a linear expression.

   It is linear because it a sum of constants and x to the 1st power.

2. The quotient of seven and a number, added to twenty-five

   Let x be a number; then, $\frac{7}{x} + 25$ is a nonlinear expression. The term $\frac{7}{x}$ is the same as $7 \cdot \frac{1}{x}$ and $\frac{1}{x} = x^{-1}$, which is why it is not linear.

   I remember that $\frac{1}{x} = x^{-1}$ from the beginning of the year.

3. The sum that represents the number of hotdogs sold if 148 hotdogs were sold Thursday, half of the remaining hotdogs were sold on Friday, and 203 hotdogs were sold on Saturday

   Let x be the remaining number of hotdogs; then, $148 + \frac{1}{2}x + 203$ is a linear expression.

4. The product of 46 and a number, added to the reciprocal of the number squared

   Let x be a number; then, $46x + \frac{1}{x^2}$ is a nonlinear expression. The term $\frac{1}{x^2}$ is the same as x^{-2}, which is why it is not linear.

   I could write the expression as $\frac{1}{x^2} + 46x$ by applying the commutative property of addition.

5. The product of 12 and a number and then the product multiplied by itself seven times

   Let x be a number; then, $(12x)^7$ is a nonlinear expression. The expression can be written as $12^7 \cdot x^7$. The exponent of 7 with a base of x is the reason it is not linear.

6. The sum of seven and a number, multiplied by the number

   Let x be a number; then, $(7 + x)x$ is a nonlinear expression because $(7 + x)x = 7x + x^2$ after using the distributive property. It is nonlinear because the power of x in the term x^2 is greater than 1.

   I need to use parentheses around the sum of seven and a number.

G8-M4-Lesson 3: Linear Equations in x

1. Given that $5x - 3 = 17$ and $7x + 3 = 17$, does $5x - 3 = 7x + 3$? Explain.

   Yes, $5x - 3 = 7x + 3$ because a linear equation is a statement about equality. We are given that $5x - 3$ is equal to 17, but $7x + 3$ is also equal to 17. Since each linear expression is equal to the same number, the expressions are equal, $5x - 3 = 7x + 3$.

   > Since the left side of both expressions are equal to the same number, I can say that the expressions are equal to each other.

2. Is 5 a solution to the equation $3x - 1 = 5x + 7$? Explain.

   If we replace x with the number 5, then the left side of the equation is

   $$\begin{aligned} 3 \cdot (5) - 1 &= 15 - 1 \\ &= 14, \end{aligned}$$

   and the right side of the equation is

   $$\begin{aligned} 5 \cdot (5) + 7 &= 25 + 7 \\ &= 32. \end{aligned}$$

   Since $14 \neq 32$, 5 is not a solution of the equation $3x - 1 = 5x + 7$.

   > I need to see if the right side is equal to the left side when I replace x with the number 5. If the left side is not equal to the right side, then I know 5 is not a solution.

   > I know that a linear equation is really a question that is asking what number x will satisfy the equation.

3. Use the linear equation $11(x - 2) = 11x - 22$ to answer parts (a)–(c).

   a. Does $x = 3$ satisfy the equation above? Explain.

   If we replace x with the number 3, then the left side of the equation is

   $$\begin{aligned} 11(x - 2) &= 11(3 - 2) \\ &= 11(1) \\ &= 11, \end{aligned}$$

   and the right side of the equation is

   $$\begin{aligned} 11x - 22 &= 11 \cdot 3 - 22 \\ &= 33 - 22 \\ &= 11. \end{aligned}$$

   Since $11 = 11$, then $x = 3$ is a solution of the equation $11(x - 2) = 11x - 22$.

b. Is $x = -\frac{1}{2}$ a solution of the equation above? Explain.

If we replace x with the number $-\frac{1}{2}$, then the left side of the equation is

$$\begin{aligned} 11(x-2) &= 11\left(-\frac{1}{2}-2\right) \\ &= 11\left(-\frac{1}{2}-\frac{4}{2}\right) \\ &= 11\left(-\frac{5}{2}\right) \\ &= -\frac{55}{2}, \end{aligned}$$

I can rewrite 2 as an equivalent fraction with the same denominator as $\frac{1}{2}$.

and the right side of the equation is

$$\begin{aligned} 11x-22 &= 11 \cdot -\frac{1}{2} - 22 \\ &= -\frac{11}{2} - 22 \\ &= -\frac{11}{2} - \frac{44}{2} \\ &= -\frac{55}{2}. \end{aligned}$$

Since the right side is equal to the left side, $-\frac{1}{2}$ is a solution.

Since $-\frac{55}{2} = -\frac{55}{2}$, $x = -\frac{1}{2}$ is a solution of the equation $11(x-2) = 11x - 22$.

c. What interesting fact about the equation $11(x-2) = 11x - 22$ is illuminated by the answers to parts (a) and (b)? Why do you think this is true?

I notice that the equation $11(x-2) = 11x - 22$ is an identity under the distributive law.

I remember my teacher saying illuminated means "What do I notice?"

I think I can choose any number for x and the equation will be true.

G8-M4-Lesson 4: Solving a Linear Equation

For each problem, show your work, and check that your solution is correct.

1. Solve the linear equation $5x - 7 + 2x = -21$. State the property that justifies your first step and why you chose it.

   I used the commutative and distributive properties on the left side of the equal sign to simplify the expression to fewer terms.

$$\begin{aligned} 5x - 7 + 2x &= -21 \\ 5x + 2x - 7 &= -21 \\ (5 + 2)x - 7 &= -21 \\ 7x - 7 &= -21 \\ 7x - 7 + 7 &= -21 + 7 \\ 7x &= -14 \\ \frac{1}{7}(7)x &= \frac{1}{7}(-14) \\ x &= -2 \end{aligned}$$

The commutative property allows me to rearrange and group terms within expressions. The distributive property allows me to simplify expressions by combining terms that are alike.

Check: The left side is equal to $5(-2) - 7 + 2(-2) = -10 - 7 - 4 = -21$*, which is equal to the right side. Therefore,* $x = -2$ *is a solution to the equation* $5x - 7 + 2x = -21$.

2. Solve the linear equation $\frac{1}{7}x - 11 = \frac{1}{4}x - 14$. State the property that justifies your first step and why you chose it.

I chose to use the addition property of equality to get all of the constants on one side of the equal sign and the subtraction property of equality to get all of the terms with an x on the other side of the equal sign.

$$\frac{1}{7}x - 11 = \frac{1}{4}x - 14$$
$$\frac{1}{7}x - 11 + 11 = \frac{1}{4}x - 14 + 11$$
$$\frac{1}{7}x - \frac{1}{4}x = \frac{1}{4}x - \frac{1}{4}x - 3$$
$$\left(\frac{1}{7} - \frac{1}{4}\right)x = -3$$
$$\left(\frac{4}{28} - \frac{7}{28}\right)x = -3$$
$$-\frac{3}{28}x = -3$$
$$-\frac{28}{3}\left(-\frac{3}{28}\right)x = -\frac{28}{3}(-3)$$
$$x = 28$$

I remember that the order doesn't matter, as long as I use the properties of equality correctly. I could use the subtraction property of equality to get all the terms with an x on one side of the equal sign and then use the addition property of equality to get all the constants on the other side.

Check: The left side of the equation is $\frac{1}{7}(28) - 11 = 4 - 11 = -7$. *The right side of the equation is* $\frac{1}{4}(28) - 14 = 7 - 14 = -7$. *Since both sides equal* -7, $x = 28$ *is a solution to the equation* $\frac{1}{7}x - 11 = \frac{1}{4}x - 14$.

I need to check my answer in the original equation because I may have made a mistake when transforming the equation.

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3. Corey solved the linear equation $5x + 7 - 18x = 14 + 3x - 87$. His work is shown below. When he checked his answer, the left side of the equation did not equal the right side. Find and explain Corey's error, and then solve the equation correctly.

$$5x + 7 - 18x = 14 + 3x - 87$$
$$-13x + 7 = 3x - 73$$
$$-13x + 7 + 3x = 3x - 73 - 3x$$
$$-10x + 7 = -73$$
$$-10x + 7 - 7 = -73 - 7$$
$$-10x = -80$$
$$\frac{-10}{-10}x = \frac{-80}{-10}$$
$$x = 8$$

A strategy I used in class is to solve the linear equation and check my answer without looking at Corey's solution. I will compare my solution to Corey's to see if I find any differences.

Corey made a mistake on the third line. He added $3x$ to the left side of the equal sign and subtracted $3x$ on the right side of the equal sign. To use the property correctly, he should have subtracted $3x$ on both sides of the equal sign, making the equation at that point:

$$-13x + 7 - 3x = 3x - 73 - 3x$$
$$-16x + 7 = -73$$
$$-16x + 7 - 7 = -73 - 7$$
$$-16x = -80$$
$$\frac{-16}{-16}x = \frac{-80}{-16}$$
$$x = 5$$

G8-M4-Lesson 5: Writing and Solving Linear Equations

For each of the following problems, write an equation and solve.

The sum of the measures of complementary angles is $90°$.

1. An angle measures eleven more than four times a number. Its complement is two more than three times the number. What is the measure of each angle in degrees?

   Let x be the number. Then, the measure of one angle is $4x + 11$. The measure of the other angle is $3x + 2$. Since the angles are complementary, the sum of their measures will be $90°$.

$$4x + 11 + 3x + 2 = 90$$
$$7x + 13 = 90$$
$$7x + 13 - 13 = 90 - 13$$
$$7x = 77$$
$$x = 11$$

I'm not done yet. I need to make sure I find the measure of each angle.

   Replacing x with 11 in $4x + 11$ gives $4(11) + 11 = 44 + 11 = 55$.
   Replacing x with 11 in $3x + 2$ gives $3(11) + 2 = 33 + 2 = 35$.
   Therefore, the measures of the angles are $55°$ and $35°$.

2. The angles of a triangle are described as follows: $\angle A$ is the smallest angle. The measure of $\angle B$ is one more than the measure of $\angle A$. The measure of $\angle C$ is 3 more than twice the measure of $\angle A$. Find the measures of the three angles in degrees.

   Let x be the measure of $\angle A$. Then, the measure of $\angle B$ is $x + 1°$ and $\angle C$ is $2x + 3°$. The sum of the measures of the angles must be $180°$.

$$x + x + 1° + 2x + 3° = 180°$$
$$4x + 4° = 180°$$
$$4x + 4° - 4° = 180° - 4°$$
$$4x = 176°$$
$$x = 44°$$

The sum of the measures of the interior angles of a triangle is $180°$.

   The measures of the angles are as follows: $\angle A = 44°$, $\angle B = 45°$, and $\angle C = 2(44°) + 3° = 88° + 3° = 91°$.

3. A pair of corresponding angles are described as follows: The measure of one angle is fifteen less than four times a number, and the measure of the other angle is twenty more than four times the number. Are the angles congruent? Why or why not?

> I need to use the fact that corresponding angles of parallel lines are congruent so that I can write an equation.

Let x be the number. Then, the measure of one angle is $4x - 15$, and the measure of the other angle is $4x + 20$. Assume they are congruent, which means their measures are equal.

$$4x - 15 = 4x + 20$$
$$4x - 4x - 15 = 4x - 4x + 20$$
$$-15 \neq 20$$

Since $-15 \neq 20$, the angles are not congruent.

4. Three angles are described as follows: $\angle A$ is one-third the size of $\angle B$. The measure of $\angle C$ is equal to seven more than three times the measure of $\angle B$. The sum of the measures of $\angle A$ and $\angle C$ is $147°$. Can the three angles form a triangle? Why or why not?

> Since I don't know if the three angle measures form a triangle, I need to use the sum of the two triangles to write my equation.

Let x represent the measure of $\angle B$. Then, the measure of $\angle A$ is $\frac{x}{3}$ and the measure of $\angle C$ is $3x + 7°$.

The sum of the measures of $\angle A$ and $\angle C$ is $147°$.

$$\frac{x}{3} + 3x + 7° = 147°$$
$$\frac{1}{3}x + \frac{9}{3}x + 7° = 147°$$
$$\left(\frac{1}{3} + \frac{9}{3}\right)x + 7° = 147°$$
$$\frac{10}{3}x + 7° - 7° = 147° - 7°$$
$$\frac{10}{3}x = 140°$$
$$10x = 420°$$
$$x = 42°$$

> I need to check the sum of the three angles to see if they form a triangle.

The measure of $\angle A$ is $\left(\frac{42}{3}\right)^{\circ} = 14°$, the measure of $\angle B$ is $42°$, and the measure of $\angle C$ is $3(42°) + 7° = 133°$. The sum of the three angles is $14° + 42° + 133° = 189°$. Since the sum of the measures of the interior angles of a triangle must have a sum of $180°$, these angles do not form a triangle. Their sum is too large.

G8-M4-Lesson 6: Solutions of a Linear Equation

Transform the equation if necessary, and then solve it to find the value of x that makes the equation true.

1. $3x - (x + 2) + 11x = \frac{1}{2}(4x - 8)$

The negative sign in front of the parentheses means to take the opposite of each term inside the parentheses.

$$3x - (x+2) + 11x = \frac{1}{2}(4x - 8)$$
$$3x - x - 2 + 11x = 2x - 4$$
$$13x - 2 = 2x - 4$$
$$13x - 2x - 2 = 2x - 2x - 4$$
$$11x - 2 = -4$$
$$11x - 2 + 2 = -4 + 2$$
$$11x = -2$$
$$\frac{11}{11}x = -\frac{2}{11}$$
$$x = -\frac{2}{11}$$

I need to use the distributive property to each term inside the parentheses. It will allow me to see all the terms and collect like terms.

I need to check my answer.

Check: The left side is $3\left(-\frac{2}{11}\right) - \left(-\frac{2}{11} + 2\right) + 11\left(-\frac{2}{11}\right) = -\frac{6}{11} - \frac{20}{11} - 2 = -\frac{48}{11}$.
The right side is $\frac{1}{2}\left(4\left(-\frac{2}{11}\right) - 8\right) = \frac{1}{2}\left(-\frac{8}{11} - \frac{88}{11}\right) = \frac{1}{2}\left(\frac{96}{11}\right) = -\frac{48}{11}$. *Since* $-\frac{48}{11} = -\frac{48}{11}$, $x = -\frac{2}{11}$ *is the solution.*

2. $5(2 + x) - 4 = 81$

I need to use the distributive property to each term inside the parentheses only but not to the -4.

$$5(2 + x) - 4 = 81$$
$$10 + 5x - 4 = 81$$
$$5x + 6 = 81$$
$$5x + 6 - 6 = 81 - 6$$
$$5x = 75$$
$$x = 15$$

I can check this answer mentally.

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3. $6x + \frac{1}{3}(9x + 5) = 10x + \frac{13}{3} - (x + 1)$

$$6x + \frac{1}{3}(9x + 5) = 10x + \frac{13}{3} - (x + 1)$$
$$6x + 3x + \frac{5}{3} = 10x + \frac{13}{3} - x - 1$$
$$9x + \frac{5}{3} = 9x + \frac{10}{3}$$
$$9x - 9x + \frac{5}{3} = 9x - 9x + \frac{10}{3}$$
$$\frac{5}{3} \neq \frac{10}{3}$$

This is an untrue sentence; therefore, this equation has no solution.

This equation has no solution.

G8-M4-Lesson 7: Classification of Solutions

1. Give a brief explanation as to what kind of solution(s) you expect for the linear equation $12x + 7 = -3(9 - 5x)$. Transform the equation into a simpler form if necessary.

The coefficients of x are different and so are the constants.

$$12x + 7 = -3(9 - 5x)$$
$$12x + 7 = -27 + 15x$$

This equation will have a unique solution.

After I use the distributive property on the right side, the coefficients of x are different ($12 \neq 15$), and the constants are different ($7 \neq -27$) on each side. This means the equation will have a unique solution.

2. Give a brief explanation as to what kind of solution(s) you expect for the linear equation $18\left(\frac{1}{2} + \frac{1}{3}x\right) = 6x + 9$. Transform the equation into a simpler form if necessary.

$$18\left(\frac{1}{2} + \frac{1}{3}x\right) = 6x + 9$$
$$9 + 6x = 6x + 9$$

This is an identity under the distributive property. Therefore, this equation will have infinitely many solutions.

After I use the distributive property on the left side, the coefficients of x are the same ($6 = 6$), and the constants are the same ($9 = 9$) on each side. This means the equation will have infinitely many solutions.

3. Give a brief explanation as to what kind of solution(s) you expect for the linear equation $5(2x + 4) = 2(5x - 10)$. Transform the equation into a simpler form if necessary.

$$5(2x + 4) = 2(5x - 10)$$
$$10x + 20 = 10x - 20$$

The coefficients of x are the same, but the constants are different. Therefore, this equation has no solutions.

After I use the distributive property on both sides of the equation, the coefficients of x are the same ($10 = 10$), and the constants are different ($20 \neq -20$) on each side. This means the equation will have no solution.

G8-M4-Lesson 8: Linear Equations in Disguise

Solve the following equations of rational expressions, if possible. If the equation cannot be solved, explain why.

1. $\frac{x+5}{-2} = \frac{3-x}{7}$

$$\frac{x+5}{-2} = \frac{3-x}{7}$$
$$-2(3-x) = (x+5)7$$
$$-6+2x = 7x+35$$
$$-6+2x-2x = 7x-2x+35$$
$$-6 = 5x+35$$
$$-6-35 = 5x+35-35$$
$$-41 = 5x$$
$$-\frac{41}{5} = x$$

I can multiply each numerator by the other fraction's denominator. I put the expressions with more than one term in parentheses so that I remember to use the distributive property.

2. $\frac{12}{x-3} = \frac{4}{x+2}$

$$\frac{12}{x-3} = \frac{4}{x+2}$$
$$12(x+2) = (x-3)4$$
$$12x+24 = 4x-12$$
$$12x-4x+24 = 4x-4x-12$$
$$8x+24 = -12$$
$$8x+24-24 = -12-24$$
$$8x = -36$$
$$\frac{8}{8}x = -\frac{36}{8}$$
$$x = -\frac{9}{2}$$

I used the distributive property, and now I see that I have a linear equation that I can solve using properties of equalities that I learned earlier in the module in Lesson 4.

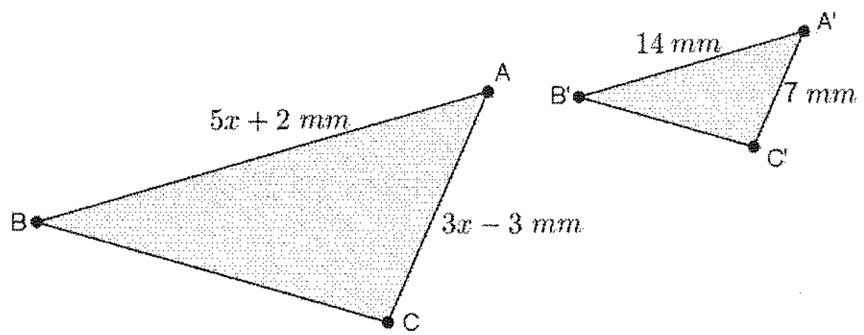
I can rewrite the fraction $-\frac{36}{8}$ as $-\frac{9}{2}$ because they are equivalent.

3. $\dfrac{\frac{1}{3}x - 2}{8} = \dfrac{4x}{9}$

$$\frac{\frac{1}{3}x - 2}{8} = \frac{4x}{9}$$
$$\left(\frac{1}{3}x - 2\right)9 = 8(4x)$$
$$3x - 18 = 32x$$
$$3x - 3x - 18 = 32x - 3x$$
$$-18 = 29x$$
$$-\frac{18}{29} = x$$

I could write the equation as $8(4x) = 9\left(\frac{1}{3}x - 2\right)$ because when I distribute, I will get $32x = 3x - 18$. When I use the properties of equalities, my answer will be the same, $x = -\frac{18}{29}$.

4. In the diagram below, $\triangle ABC \sim \triangle A'B'C'$. Determine the lengths of $\overline{AB}$ and $\overline{AC}$.



Since I know the triangles are similar, I can write a proportion using corresponding sides.

$$\frac{5x + 2}{14} = \frac{3x - 3}{7}$$
$$7(5x + 2) = 14(3x - 3)$$
$$35x + 14 = 42x - 42$$
$$35x - 35x + 14 = 42x - 35x - 42$$
$$14 = 7x - 42$$
$$14 + 42 = 7x - 42 + 42$$
$$56 = 7x$$
$$8 = x$$

I need to use my answer to determine the side lengths of the triangle.

The length of $\overline{AB}$ *is* $(5(8) + 2)\text{ mm} = 42\text{ mm}$, *and the length of* $\overline{AC}$ *is* $(3(8) - 3)\text{ mm} = 21\text{ mm}$.

G8-M4-Lesson 9: An Application of Linear Equations

1. You forward a blog that you found online to five of your friends. They liked it so much that they forwarded it on to two of their friends, who then forwarded it on to two of their friends, and so on. The number of people who saw the blog is shown below. Let S_1 represent the number of people who saw the blog after one step, let S_2 represent the number of people who saw the blog after two steps, and so on.

$$S_1 = 5$$
$$S_2 = 5 + 5 \cdot 2$$
$$S_3 = 5 + 5 \cdot 2 + 5 \cdot 2^2$$
$$S_4 = 5 + 5 \cdot 2 + 5 \cdot 2^2 + 5 \cdot 2^3$$

I will start with S_2 since $S_1 = 5$ and try to manipulate S_2 into an equation that contains S_2.

a. Find the pattern in the equations.

By adding $5 \cdot 2^2$, I can use the distributive property to get a linear equation in S_2.

$$S_2 = 5 + 5 \cdot 2$$
$$S_2 - 5 = 5 \cdot 2$$
$$S_2 - 5 + 5 \cdot 2^2 = 5 \cdot 2 + 5 \cdot 2^2$$
$$S_2 - 5 + 5 \cdot 2^2 = 2(5 + 5 \cdot 2)$$
$$S_2 - 5 + 5 \cdot 2^2 = 2S_2$$

$$S_3 = 5 + 5 \cdot 2 + 5 \cdot 2^2$$
$$S_3 - 5 = 5 \cdot 2 + 5 \cdot 2^2$$
$$S_3 - 5 + 5 \cdot 2^3 = 5 \cdot 2 + 5 \cdot 2^2 + 5 \cdot 2^3$$
$$S_3 - 5 + 5 \cdot 2^3 = 2(5 + 5 \cdot 2 + 5 \cdot 2^2)$$
$$S_3 - 5 + 5 \cdot 2^3 = 2S_3$$

By adding $5 \cdot 2$ raised to the power of the step number, I can use the distributive property to get a linear equation in terms of that step number.

I don't want to multiply out any of the terms so that I can see the pattern better.

$$S_4 = 5 + 5 \cdot 2 + 5 \cdot 2^2 + 5 \cdot 2^3$$
$$S_4 - 5 = 5 \cdot 2 + 5 \cdot 2^2 + 5 \cdot 2^3$$
$$S_4 - 5 + 5 \cdot 2^4 = 5 \cdot 2 + 5 \cdot 2^2 + 5 \cdot 2^3 + 5 \cdot 2^4$$
$$S_4 - 5 + 5 \cdot 2^4 = 2(5 + 5 \cdot 2 + 5 \cdot 2^2 + 5 \cdot 2^3)$$
$$S_4 - 5 + 5 \cdot 2^4 = 2S_4$$

b. Assuming the trend continues, how many people will have seen the blog after 8 steps?

I want to use the properties of equality to get S_8 on one side and the constants on the other side of the equal sign and use the distributive property.

$$S_8 - 5 + 5 \cdot 2^8 = 2S_8$$
$$S_8 - 2S_8 = 5 - 5 \cdot 2^8$$
$$S_8(1-2) = 5 - 5 \cdot 2^8$$
$$S_8(1-2) = 5(1-2^8)$$
$$S_8 = \frac{5(1-2^8)}{(1-2)}$$
$$S_8 = 1{,}275$$

I multiplied out on the last step.

After 8 steps, $1,275$ people will have seen the blog.

c. How many people will have seen the blog after n steps?

$$S_n = \frac{5(1-2^n)}{(1-2)}$$

I see a pattern from the work I have done.

2. The length of a rectangle is 4 more than 2 times the width. If the perimeter of the rectangle is 20.6 cm, what is the area of the rectangle?

Let x represent the width of the rectangle. Then the length of the rectangle is $4 + 2x$.

Since I know the perimeter, I will write my equation in terms of perimeter. Perimeter of a rectangle means I need to add twice the width to twice the length, $P = 2w + 2l$.

$$2(4 + 2x) + 2x = 20.6$$
$$8 + 4x + 2x = 20.6$$
$$8 + 6x = 20.6$$
$$6x = 12.6$$
$$x = \frac{12.6}{6}$$
$$x = 2.1$$

The problem asked for the area of the rectangle. Area of a rectangle means I have to multiply the length and width.

The width of the rectangle is 2.1 cm, and the length is $(4 + 2(2.1))$ cm $= 8.2$ cm, so the area is $17.22\ \text{cm}^2$.

3. Each month, Gilbert pays $42 to his phone company just to use the phone. Each text he sends costs him an additional $0.15. In June, his phone bill was $162.75. In July, his phone bill was $155.85. How many texts did he send each month?

Let x be the number of texts he sent in June.

$$42 + 0.15x = 162.75$$
$$0.15x = 120.75$$
$$x = \frac{120.75}{0.15}$$
$$x = 805$$

He sent 805 texts in June.

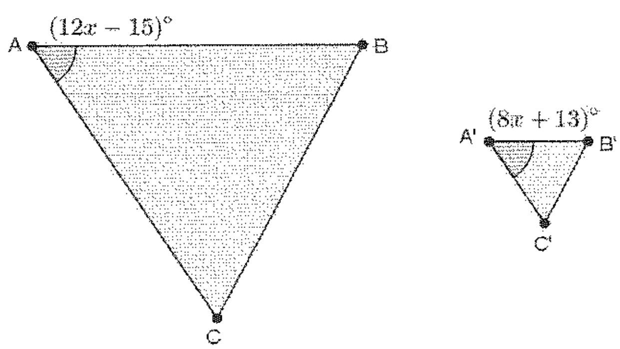
Let y be the number of texts he sent in July.

$$42 + 0.15y = 155.85$$
$$0.15y = 113.85$$
$$y = \frac{113.85}{0.15}$$
$$y = 759$$

He sent 759 texts in July.

I am using a different letter to define my variable because the number of texts for July is different than the number of texts for June since the cost was different for both months.

4. In the diagram below, $\triangle ABC \sim \triangle A'B'C'$. Determine the measure of $\angle A$.



Since the triangles are similar, the angles are equal in measure.

$$12x - 15 = 8x + 13$$
$$12x - 8x - 15 = 8x - 8x + 13$$
$$4x - 15 = 13$$
$$4x - 15 + 15 = 13 + 15$$
$$4x = 28$$
$$x = 7$$

The measure of $\angle A$ is $(12(7) - 15)^\circ = 69^\circ$.