Sweet Algebra

Common Core Standard:

Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

7.EE.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple **equations** and **inequalities to solve problems by** reasoning about the quantities.

Standards for Mathematical Practice:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
4. Model with mathematics.
6. Attend to precision.
7. Look for and make use of structure.

Student Will be Able To:

- Translate words into algebraic expressions.
- Write and solve an equation to model a situation.
- Use the arithmetic from a problem to generalize an algebraic solution.
- Solve multi-step equations.

Materials:

- *Sweet* Algebra Handout
- 11 brown paper lunch bags.
- Individually wrapped candies (optional)

Advance Preparation:

- Students need prior exposure to solving multi-step equations.
- The brown paper lunch bags must be labeled. Write the variable *X* on the teacher bag. The rest of the bags will be numbered 1 through 10.
- Fill the bags with the given amounts of candies (if you choose to use actual candy):

  Teacher's Bag: 6 Bag 1: 16 Bag 2: 18 Bag 3: 16 Bag 4: 19

  Bag 5: 8 Bag 6: 3 Bag 7: 19 Bag 8: 12 Bag 9: 20 Bag 10: 14

  Securely close the bags and display them in the room where students can see them. Do not let the students touch the bags.

Directions:

1. Each student will have his/her own Sweet Algebra Handout to complete but this task works best when students work as a group.

2. Introduce the task by explaining that the number of candies in the teachers bag is represented by the variable *x*. Students are given clues to determine the number of candies in each of the other 10 bags on the Sweet Algebra Handout.
3. Have students complete Part I of the handout.
4. Have students complete Part 2 of the handout using the expressions from Part 1 so that they can solve for *x* (the number of candies in the teacher's bag)
5. When students know the value of *x*, they should go back to Part I and use the expressions to determine the amount of candies in each bag.

Questions to Pose:

Before:

- What are similarities/differences between expressions and equations?
- What is the meaning of the equal sign?
- Where do you find expressions within equations?
- *x* is the variable representing the number of candies in the teacher's bag. Why might the term "variable" be misleading in this situation?

During:

- By looking at the expressions representing bag #6 and bag #2, can you determine which bag contains more candy? Explain.
- By looking at the expressions representing bag #4 and bag #7, can you determine which bag contains more candy? Explain why this is different than comparing bag #6 to bag #2
- What does solving for *x* mean for this task?
- How will you know you have solved an equation correctly in Part 2? How can solving two or more equations in Part 2 help you know you have solved an equation correctly?

After:

- How did knowing the value of *x* help you complete the task?
- What are similarities/differences between expressions and equations? How were they combined to help complete this task?

Possible Misconceptions/Suggestions:

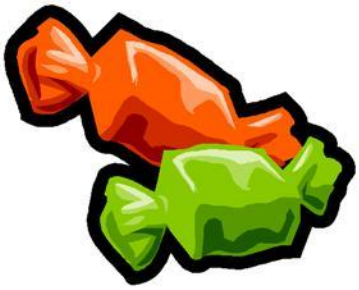
Possible Misconceptions	**Suggestions**
Students may want to use variables in addition to *x*.	Lead students to write all expressions in relation to the number of candies in the teacher's bag, *x*.

Special Notes:

- If you decide to put candies in each of the 11 brown paper lunch bags, you will need a total of 151 candies. You can let groups pick the bag they want and share the candies once they have completed. Some teachers let the groups pick based on the order they finish. You may decide not to put candies in the bags and just use them as props.
- In Part 2, students are only required to write 3 of the possible 5 equations and then only required to solve 2 of those equations. You may want to require more based on the ability of your students.

Solutions: See Key

Sweet Algebra



Part 1: How many candies are in each bag?
Candy Clues: Write an algebraic expression for each clue.

x	The teacher has x number of candies in his/her bag.
$2x + 4$	Bag #1 contains four more than twice the number of candies in the teacher's bag
$3x$	Bag #2 contains three times the number of candies in the teacher's bag
$x + 10$	Bag #3 contains 10 more candies than the teacher's bag
$4x - 5$	Bag #4 has 5 less than 4 times the number of candies as the teacher
$\frac{2x+4}{2} = x + 2$	Bag #5 has half as many candies as Bag #1
$\frac{1}{6}(3x) = \frac{1}{2}x$	Bag #6 has $\frac{1}{6}$ the number of candies in Bag #2
$3x + 1$	Bag #7 has one more than three times the number of candies in the teacher's bag
$x + 6$	Bag #8 contains four less candies than Bag #3
$2(x + 4) = 2x + 8$	Bag #9 has twice the sum of the amount of candies in the teacher's bag and four
$.5x + 6$	Bag #10 has six more than 50% of the candies in bag #3

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Part 2: How many candies are in the teacher's bag?

Edible Equations: Write at least three algebraic equations that you can use to find the number of candies in the teacher's bag using the clues below.

The total number of candies in Bags #3, #5, and #9 is 44.

$$x + 10 + x + 2 + 2(x + 4) = 44$$
$$4x + 20 = 44$$
$$4x = 24$$
$$x = 6$$

The total number of candies in Bags #2, #4, and #8 is 49.

$$3x + 4x - 5 + 2x = 49$$
$$9x - 5 = 49$$
$$9x = 54$$
$$x = 6$$

The difference in the amount of candy in Bag #7 and Bag #1 is 3.

$$3x + 1 - (2x + 4) = 3$$
$$3x + 1 - 2x - 4 = 3$$
$$x - 3 = 3$$
$$x = 6$$

Bag #7 and Bag #4 have the same number of candies.

$$3x + 1 = 4x - 5$$
$$6 = x$$

Bag #9 has one more piece of candy than Bag #4.

$$2(x + 4) = 4x - 5 + 1$$
$$2x + 8 = 4x - 4$$
$$12 = 2x$$
$$6 = x$$

Solve two equations to find the number of candies in the teacher's bag.

Which bag would you want? Explain why.
Bag #9 because it has the most candies. Each equation above shows that the teacher's bag has 6 candies. Bag #9 has twice the sum of the amount of candies in the teacher's bag and four. Expressed algebraically: $2(6+4) = 20$