## Resources Aligning with New Brunswick Curriculum

Grade Level:	6, 7, 8, 9
Outcomes:	PR4 Demonstrate an understanding of equality
Purpose:	Unit Starter, Warm-Up, Inquiry-Based Activity, Discrepant Event
Topics:	Equality, Building Equations, Solving Equations, Variables

#### **GETTING STARTED**

NB – I would be useful if students are already familiar with variables as representations of unknown numbers prior to beginning this activity.

- Group students heterogeneously in pairs. Present activity "1.1 How many are in the bag?" Stress to students that they are to find as many strategies as possible to solve how many candies are in the bag. They can optionally be provided poster paper or whiteboard to present their solution strategies following the activity.
- 2. As students are completing the activity, circulate the classroom to observe student strategies. Target strategies include (a) pictorial representation of the equation and (b) symbolic (i.e., using numbers and perhaps even variables). Some students may remove units or variables from each side of the equation to perhaps make it easier to solve. Flag these groups of students using these target strategies to later present in front of their peers.
- 3. Allow the flagged student groups to present the target strategies. Ask probing or clarifying questions to highlight the concepts of equality and variables:
  - If you removed a candy from one side of the balance, why was it necessary to remove from the other?
  - What strategies did you use to avoid having to draw bags of candy?
  - How could you verify your answer?

#### WORKING ON IT

 Explicitly teach students how to use algebra tiles to represent the problem in activity 1.1 How many candies are in the bag? Discuss the benefits of using tiles to represent the problem instead of drawing gummies and bags. See image below for guidance: \*Optional\* Students may benefit from using rulers to represent a balance. Teachers may also use algebra tile kits, focussing on positive (orange) tiles only.



Show how to represent removing tiles from the balance by circling groups of tiles and drawing an arrow to show that they are being removed (see image below). Represent symbolically by including operations and numbers next to your groups of tiles that are removed. Ensure that variables (i.e. bags) are represented by a letter, such as "x".
\*Tip\* Some educators use dots to represent units and sticks to represent variables. This accelerates the process of drawing each step.



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3. Review the algebraic/symbolic representation of how the equation was solved next to the pictorial with algebra tiles. Verify your response by replacing "x" with your answer.



- 4. Allow students to practice by solving 2-3 equations using the **Algebra Tile Application**. Alternatively, should more examples be required, the teacher can model additional problems using the site.
- 5. Provide students activity **1.2 Algebra Tile Exit Slip**

### **CONSOLIDATION & PRACTICE**

- Review and discuss 1.2 Algebra Tile Exit Slip, focussing on equality and the two strategies students used: symbolic and pictorial. Discuss the advantages and disadvantages of each. For example, the pictorial method visually shows equality, while the algebraic/symbolic method is much quicker.
- Model more examples using the Algebra Tile Application. Should students need more of a challenge, you can increase difficulty and teach the "zero-pair" method when dealing with negative values. See example 3 in https://www.scaffoldedmath.com/2019/06/Solving-equations-using-algebra-tiles.html
- 3. Students complete activity 1.3 Consolidation and Practice

# 1.1 How many candies are in the bag?

Each side of the scale is equal, or balanced. There is the same number of candies in each bag. Can you determine how many candies are in the bag using as many strategies as possible? Strategy 1: Strategy 2:



# 1.3 Working On It

1. A **variable** often represents an unknown number. Use variables and numbers to describe the following statements:

e.g. Five times a number	5 <i>x</i>
A. A number increased by three.	
B. Four times a number plus three	
C. Twelve less than a number	

2. Equations are equal and can be represented using algebra tiles. Use algebra tiles to represent these equations and then solve them. You may use another sheet of paper to show your work:

Α.	4x + 2 = 10	D.	4p + 3 = 2p + 9
В.	4 + 2x = 8	Ε.	5a + 4 = 2a + 7
С.	3 + 4x = 7	F.	3b + 2 = 2b + 6

We can use variables to help us solve word problems.
Zara is thinking of a number. She multiples it by 2 and then adds 5.
The result is 19 (2x + 5 = 19). Which number did she begin with?
Show as many strategies as possible to solve.

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