

Lesson Plan
Lounge Grade 6 Algebraic Expressions

CCSSM: Grade 6

DOMAIN: Expressions and Equations

Cluster: Apply and extend previous understandings of arithmetic to algebraic expressions.

Standard: 6.EE.2 Write, read, and evaluate expressions in which letters stand for numbers.

- a. Write expressions that record operations with numbers and with letters standing for numbers.
- c. Evaluate expressions at specific values for their variables.

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DOMAIN: Expressions and Equations

Cluster: Reason about and solve one-variable equations and inequalities.

Standard: 6.EE.5 Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.

Standard: 6.EE.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.

Clarification: The clarification is an explanation of the indicator and objective and how these math concepts appear in the puzzle.

Materials and/or Set Up: *Interactive Resource 1, Clue Cards-Set 1, Clue Cards-Set 2, Clue Cards-Set 3, Interactive Resource 2, Activity 1, Activity 2, Clue Cards-Set 4, Clue Cards-Set 5, Activity 3, Clue Cards-Set 6, Clue Cards-Set 7, Puzzle Mat, Counters (about 30 counters for each group of four students), Assessment*

Relevant Vocabulary: expression, variable, evaluate, value

Note to Teacher – Students should have attempted Levels 1 and 2 of the Lounge puzzle before this lesson is implemented. The Clue Card sets should be duplicated and cut apart before they are distributed.

In the implementation of this lesson, it is recommended that the *Interactive Resources* be projected to encourage a rich and active discussion of the math strategies and concepts.

Activities:

1. Display *Interactive Resource 1*. Facilitate a class discussion and have the students describe their strategies for determining the values of the different colored eyes.
2. Divide the students into groups of four. Distribute **Clue Cards–Set 1** to each group. Explain that each member of the group should receive one of the clue cards. Each person will be responsible for their clue as the group members work together, using the clues to determine the values of the three eyes. (*green = 1, blue = 4, pink = 2*)

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3. Repeat this activity using **Clue Cards–Set 2** and **Clue Cards–Set 3**.
(Set 2: green = 7, blue = 6, pink = 9) (Set 3: blue = 7, green = 4, pink = 6)
4. Facilitate a class discussion to allow the students to share strategies they used to solve each set of clues. Have students compare the strategies used with the clue cards to strategies used to solve the Lounge puzzle.
5. Ask students to explain the differences between playing the puzzle at level 1 and at level 2. (In level 2, the player can not use three of the same eye.) Display **Interactive Resource 2**. Have the students continue to work in their groups to determine the value of the blue, green, and pink eyes. (green = 6, blue = 3, pink = 1)
6. Using **Activity 1**, have students work in pairs to complete it. (1. blue = 5, green = 4) (2. blue = 4, pink = 3) (3. pink = 5, green = 9)
7. Using **Activity 2**, explain to the students that the pictures of the eyes have been replaced with letters being used to represent them; B is used for the blue eye, G for the green eye, and P for the pink eye. In the last problem, an additional variable, R, is used. (Introduce the word *variable* as the name given to each of these symbols (the eyes) and letters.) Ask students: What does the word “vary” mean? (Connect the idea that the symbols (eyes or letters) represent values which vary, or change, from problem to problem.)
8. Have students complete **Activity 2** with a partner. (1. $B = 2, G = 4, P = 6$; 2. $B = 5, G = 1, P = 4$; 3. $B = 2, G = 3, P = 6, R = 1$)

Differentiation Suggestions:

- Pair students who are successful with the Lounge puzzle to complete **Clue Card – Sets 4 and 5**. (Set 4: pink = 4, blue = 7, green = 2) (Set 5: green = 9, blue = 5, pink = 8)
- Students who are excelling should complete **Activity 3** independently. ($B = 4, G = 2, P = 5, R = 3$; $B = 5, G = 7, P = 2, R = 4$; $B = 8, G = 5, P = 7, R = 4$; Challenge: $G + G + R = 14$)
- Allow students who are having difficulty with the Lounge Puzzle to use the **Clue Cards – Sets 6 and 7**. Provide each group a **Puzzle Mat** and a set of **counters**. The counters and the puzzle mat may be used with the “guess and check” strategy to solve the puzzle. Students should place the number of counters on each eye of the puzzle mat to represent their “guess.” They may also use counters to “evaluate” the expressions on their clue cards by showing that each expression results in the number of counters corresponding to the given value. (Set 6: $b = 2, g = 3, p = 7$; Set 7: $b = 6, g = 3, p = 4$)

Assessment:

- Distribute the **Assessment** resource sheet.

Answers:

1. 35

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2. 27
3. $B(p = 1 \text{ and } q = 2)$

Follow Up:

- Have students return to the puzzle to apply what they learned in the lesson. Ask: Did the lesson help you to clarify the math in the puzzle? How? What other strategies could you have used to help you solve the puzzle? Additionally, check student game progress through the Administrator's Tool to determine students' level of understanding.
- Provide the students with this scenario:

As a cashier, you need to give a customer \$0. 86. The customer requested 3 quarters for the vending machine; what other coins should you give them? Use as few coins as possible. (*1 dime and 1 penny*)

What are the other possible combinations for the number and type of coins you could give the customer in the above scenario? (*Accept all correct answers. Possible answers include: 3 quarters, 2 nickels, 1 penny; 2 quarters, 3 dimes, 1 nickel, 1 penny; 8 dimes, 1 nickel, 1 penny*)

In the above scenario, if you do not have any QUARTERS, what are the possibilities for giving change? (*Accept all correct answers. Possible answers include: 8 dimes, 1 nickel, 1 penny; 5 dimes, 6 nickels, 1 penny; 86 pennies*)

Real World Connection:

- Provide students with this scenario:

Jack went to Burger Barn on Monday and purchased 2 burgers and 1 soda for \$8. On Tuesday, he returned and bought 1 burger and 2 sodas for \$7. How much was each burger and each soda? (*burger price = \$3, soda price = \$2*)

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Interactive Resource 1



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Clue Cards – Set 1

$$\text{Pink Cell} + \text{Green Cell} = 3$$

$$\text{Green Cell} + \text{Green Cell} = \text{Pink Cell}$$

$$\text{Pink Cell} + \text{Blue Cell} = 6$$

$$\text{Blue Cell} = 4$$

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Clue Cards – Set 2

$$\text{Blue Eye} + \text{Green Eye} = 13$$

$$\text{Pink Eye} + \text{Green Eye} = 16$$

$$\text{Pink Eye} + \text{Blue Eye} = 15$$

$$\text{Blue Eye} + \text{Blue Eye} = 12$$

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Clue Cards – Set 3

$$\text{Blue Cell} + \text{Blue Cell} + \text{Blue Cell} = 21$$

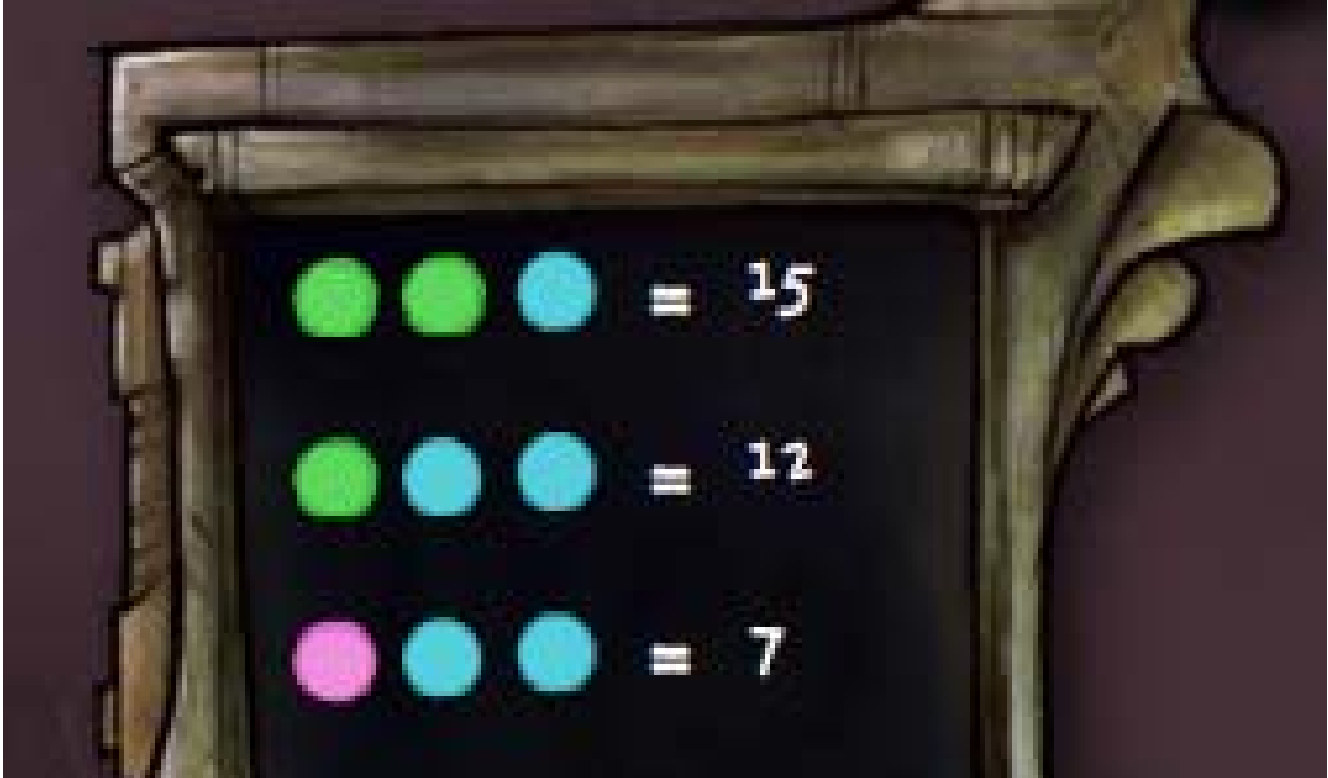
$$\text{Blue Cell} + \text{Green Cell} + \text{Green Cell} = 15$$

$$\text{Blue Cell} + \text{Green Cell} + \text{Purple Cell} = 17$$

$$\text{Green Cell} + \text{Purple Cell} + \text{Purple Cell} = 16$$









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





Interactive Resource 2











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Activity 1

1.  +  +  = 13
 +  +  = 14
 = _____  = _____

2.  +  +  = 11
 +  +  = 10
 = _____  = _____

3.  +  +  = 19
 +  +  = 23
 = _____  = _____

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Activity 2

1. $B + B + B = 6$

$$G + B + G = 10$$

$$P + G + G = 14$$

$$P + G + B = 12$$

VALUES: $B =$; $G =$; $P =$

2. $B + B + G = 11$

$$G + G + B = 7$$

$$G + G + P = 6$$

$$P + G + B = 10$$

VALUES: $B =$; $G =$; $P =$

3. $P + G + G = 12$

$$G + P + B = 11$$



$$B + B + G = 7$$




$$G + P + R = 10$$




VALUES: $B =$; $G =$; $P =$; $R =$




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Clue Cards – Set 4

 $+$  $+$  $= 10$

 $+$  $+$  $= 15$

 $+$  $+$  $= 12$

 $+$  $+$  $= 11$

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Clue Cards – Set 5

$$\text{Pink Cell} + \text{Green Cell} + \text{Green Cell} = 26$$

$$\text{Blue Cell} + \text{Green Cell} + \text{Green Cell} = 23$$

$$\text{Pink Cell} + \text{Pink Cell} + \text{Blue Cell} = 21$$

$$\text{Blue Cell} + \text{Green Cell} + \text{Pink Cell} = 22$$

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Activity 3

1. $B + B + G = 10$

$$B + B + P = 13$$

$$B + P + G = 11$$

$$G + G + R = 7$$

VALUES: $B =$; $G =$; $P =$; $R =$

2. $G + P + P = 11$

$$B + P + P = 9$$

$$G + B + B = 17$$

$$B + B + R = 14$$

VALUES: $B =$; $G =$; $P =$; $R =$

3. $P + G + B = 20$

$$P + B + B = 23$$

$$P + G + G = 17$$

$$B + P + R = 19$$

VALUES: $B =$; $G =$; $P =$; $R =$

Challenge: Write an expression that produces a final value of 14.

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Clue Cards – Set 6

$$\text{Blue Circle} + \text{Green Hexagon} = 5$$

$$\text{Blue Circle} + \text{Purple Circle} = 9$$

$$\text{Purple Circle} + \text{Green Hexagon} = 10$$

$$\text{Purple Circle} + \text{Purple Circle} = 14$$

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Clue Cards – Set 7

$$\text{Green Cell} + \text{Green Cell} + \text{Green Cell} = 9$$

$$\text{Green Cell} + \text{Green Cell} + \text{Blue Cell} = 12$$

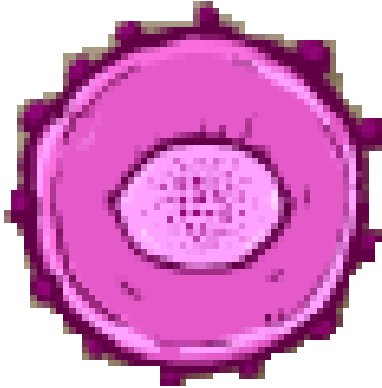
$$\text{Green Cell} + \text{Pink Cell} + \text{Pink Cell} = 11$$

$$\text{Green Cell} + \text{Pink Cell} + \text{Blue Cell} = 13$$

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Puzzle Mat

Pink



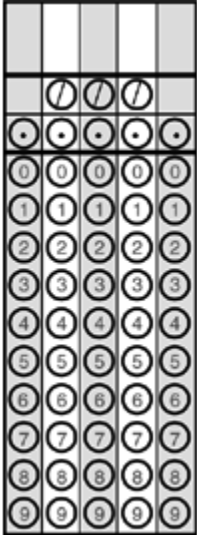
Green



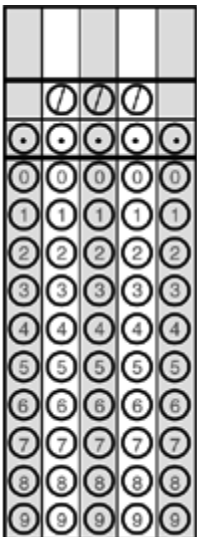
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Assessment

1. What is the value of the expression $8x + 3$ when x is 4?



2. If $a = 5$, evaluate the expression $8 + 3a$.



3. If the expression $p + q + q$ has a value of 5, which of the following could be the values of p and q ?
- A. $p = 1$ and $q = 5$
 - B. $p = 1$ and $q = 2$
 - C. $p = 2$ and $q = 1$
 - D. $p = 3$ and $q = 2$