

# 1. Algebra

Grade 8  
A-2

**Materials:**

**A friend of yours did not understand how to evaluate each of the following on a quiz.**

$$m + 3\frac{3}{4} \quad \text{when } m = 2\frac{1}{2}$$

$$5n - 12.3 \quad \text{when } n = 8.6$$

$$(p - 6) \quad \text{when } p = -15$$

1. **Write a step by step explanation to help your friend understand the process.**
2. **Your friend does not know exactly what a variable is. Explain the term variable and give several examples.**

When you have completed this station,  
place your answer sheet in your portfolio.

Label your portfolio entry.

*Please tidy up the station*

## 2. Algebra

Grade 8

A-4

**Materials:** none  
cubes or pattern blocks

1. Use the cubes or pattern blocks to demonstrate each of the following statements. Draw to record and write a mathematical expression for each one:
  - a) 5 times a number less 2
  - b) a number that is multiplied by 2 and divided by 4
  - c) a number that it multiplied by itself
  - d) half a number decreased by 3
  - e) one quarter of a number plus one half of that number
  
2. Use the cubes or pattern blocks to demonstrate each of the following mathematical expressions. Draw to record and write a statement for each one:
  - a)  $\frac{n}{2} + 4$
  - b)  $\frac{n + 4}{2}$
  - c)  $0.07t$
  - d)  $2(l+w)$
  - e)  $(b - 4) \div 3$
  
3. Make up a matching question for a test that requires students to match written expressions, drawings and mathematical expressions. Remember your work needs to be clear and organised neatly.

When you have completed this station,  
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### 3. Algebra

Grade 8  
A-4

**Materials:** stacks of filing trays  
string of beads  
pictures of fences

**Examine the filing trays.  
Notice how they are put together  
using riser rods.**

1. How many riser rods are needed for a stack of 3 trays?
2. How many riser rods are needed for a stack of 6 trays.
3. Write an expression for the numbers of riser rods ( $r$ ) needed in terms of the number of trays ( $t$ ).

**Examine the strings of beads.  
Notice how they are put together using  
colors to create a pattern.**

4. How many dark colored beads were used to make one pattern on the shorter string?
5. How many dark colored beads were used to make two patterns on the longer string?
6. Write an expression to represent the number of dark beads in terms of the number of patterns created.

**Examine the pictures of fences.  
Notice how they are put together using  
the boards to create a pattern.**

7. Make up at least three questions (as above) for two of the patterns that are available. Include the answers to your questions.

When you have completed this station,  
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## 4. Algebra

Grade 8  
A-4

**Materials:** toothpicks

1. **Construct an equilateral triangle using the toothpicks.  
Record by drawing on your answer sheet.**
2. **Using the toothpicks, construct another equilateral triangle that has sides that are twice as long as your first triangle.  
Record by drawing on your answer sheet.**
3. **Repeat number 2 making the triangle still larger.  
Record by drawing on your answer sheet.**
4. **Examine the relation between the number of toothpicks on one side with the number of toothpicks in the perimeter.**
5. **Write an expression to represent the number of toothpicks on any one side in terms of the number of toothpicks making up the perimeter of the triangle.**
6. **Repeat 1 to 5 constructing squares.**
7.
  - a) **Write an expression to represent the number of toothpicks on any one side in terms of the number of toothpicks making up the perimeter of the square.**
  - b) **How does this compare to your answer in #5?**
8. **Repeat 1 to 5 constructing hexagons.**
9.
  - a) **Write an expression to represent the number of toothpicks on any one side in terms of the number of toothpicks making up the perimeter of the hexagon.**
  - b) **How does this compare to your answer in #5 and 7b?**

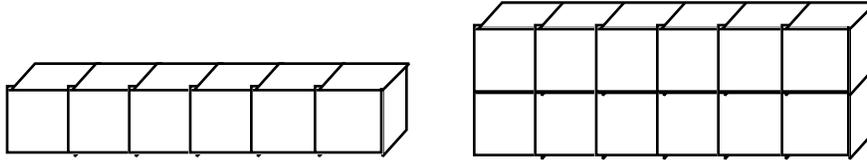
When you have completed this station,  
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## 5. Algebra

Grade 8  
A-4

**Materials:** centimetre cubes or  
linking cubes

**Construct the following with the cubes:**



Suppose you have been hired to paint only the sides that show because the bottom of each structure is nailed to the floor.

1. How many sides of the cubes would you need to paint on the smaller structure?
2. How many sides of the cubes would you need to paint on the larger structure?
3. Build the next structure that follows this pattern. How many sides of the cube would you need to paint on this structure?
4. Write an expression to represent the number of sides of the cubes that need to be painted in each structure.
5. Can you predict how many sides of the cubes would need to be painted if you had six rows of blocks?
6. Using the blocks, create a pattern and develop questions similar to those above. Provide the answers to your questions.

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## 6. Algebra

Grade 8

A-4

**Materials:** flyers

1.
  - a) Find the current price of gas in your community.
  - b) Make a chart to show the cost of one litre, two litres, three litres and four litres.
  - c) Look for the pattern and write an expression to represent the cost of gas in relation to the amount purchased.
  
2.
  - a) What is the speed limit in front of your school yard? At this rate, how far would you travel in one hour? ... in two hours? ... in three hours?
  - b) Look for the pattern and write an expression to represent the the distance travelled in relation to time.
  
3.
  - a) Find a reasonable amount of money that people in your community pay for babysitting. If you don't babysit yourself, find someone in your school who does in order to get this information.
  - b) Make a chart to show how much you would make if you babysat 1 hour, 2 hours, 3 hours, ... up to eight hours.
  - c) Look for the pattern and write an expression to represent money earned in relation to time.
  
4. Look at the flyers. Cut out two ads and develop questions as above for each one. Glue the ad to your answer sheet.

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place your answer sheet in your portfolio.

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## 7. Algebra

Grade 8  
A-5

**Materials:** lego or rectangular blocks

Ms Fix would like a brick border for one side of her garden. She does not know yet which of the two basic patterns to choose: Classic or Modern.



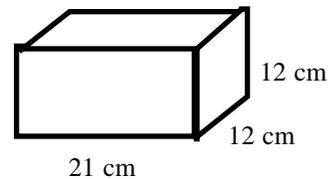
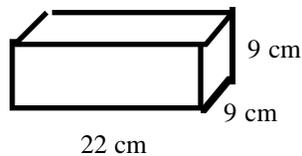
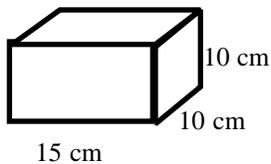
In order to make the brick border long enough, she has to repeat the basic pattern a number of times. The length of the side of the garden is 14.20 metres.

At the brickyard, Ms Fix can choose from three different kinds of bricks.

yellow

red

green



Write a letter to Ms Fix in which you explain to her what to do. Include in your letter what bricks she can buy, how many, and justify your solution to her design problem. Assume that the bricks fit tight against each other and that there is no space left between them.

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## 8. Algebra

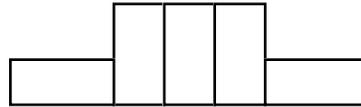
Grade 8  
A-7

**Materials:** lego or rectangular blocks

Ms Fix would like a brick border for one side of her garden. She does not know yet which of the two basic patterns to choose: Classic or Modern.



Classic

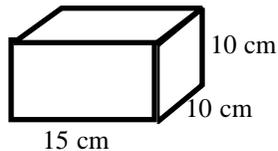


Modern

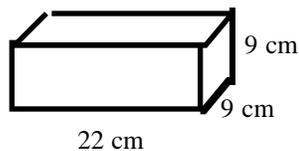
In order to make the brick border long enough, she has to repeat the basic pattern a number of times. The length of the side of the garden is 14.20 metres.

At the brickyard, Ms Fix can choose from three different kinds of bricks.

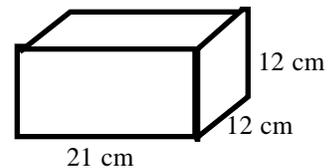
yellow



red



green



Ms Fix wants to have the Modern pattern, 25 times repeated along the side of her garden. She cannot find bricks that she can use.

1. What would be the dimensions of the bricks she is looking for? Explain how you got your answer.
2. Write a rule, or a formula, that Ms Fix can use to find out how many bricks she needs for any length of a border, and for any kind of brick. Explain how your rule or formula works.

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## 9. Algebra

Grade 8  
A-2, A-4,  
A-10, A-12

Materials: grid paper

Brock started making a chart to show the value of  $y$  when  $x$  changes in the expression  $y = x + 2$ .

x	0	1	2			
y	2	3	4			

1. Continue Brock's chart and make a graph to show the relationship.
2. In which quadrant have you drawn the graph?
3. What needs to be included in order to extend the graph into the second and third quadrant.
4. What real-life situation could be represented by this graph?

Troy claims that it is easy to draw a graph to help calculate the total price of gasoline his mom purchases for her car. He states that since gas is 56¢ a litre, he can use the expression  $y = 56x$ .

5. What does each variable represent in this case?
6. Make a chart to show the relationship between the amount of gasoline purchased and the price per litre.
7. Write three questions that can be answered by using your chart or graph and write the solutions to your questions.

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## 10. Algebra

**Grade 8**  
**A-10, A-11, A-14**

**Materials:** grid paper

**Susan says that she can draw a square on the Cartesian Plane such that each corner is in a different quadrant. Some students say that this is impossible.**

- 1. Draw a graph to help Susan show that it is indeed possible.**
- 2. List the coordinates of the corners of the square.**
- 3. If you were to slide your square 6 units to the right and 3 units up would the corners still each be in a different quadrant?**
- 4. Draw the image of the square and list the coordinates of the corners on the square after the translation.**

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place your answer sheet in your portfolio.

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# 11. Algebra

Grade 8  
A-11, A-12, A-14

**Materials:** grid paper

**Susan says that she can draw a square on Cartesian Plane such that each corner is in a different quadrant. Some students say that this is impossible.**

- 1. Draw a graph to help Susan show that it is indeed possible.**
- 2. List the coordinates of the corners of the square.**
- 3. What if you were to slide your square 6 units to the right and 3 units up. Would the corners still each be in a different quadrant?**
- 4. Draw the image of the square and list the coordinates of the corners on the square after the translation.**

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## 12. Algebra

**Grade 8**  
**A-20**

**Materials:** poster board  
markers  
computer (optional)

**Make a poster to**

- 1. define and give examples of variables**
- 2. show the difference between an expression and an equation**

When you have completed this station,  
place your answer sheet in your portfolio.  
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# 13. Algebra

Grade 8  
A-11, A-12, A-14

Materials: pattern blocks

1. Draw to show how you can use the pattern blocks to show

a)  $2$    $+$   $4$    $+$   $5$  

b)  $3x + 3y + 4z$

c)  $5p + 2q + 7r$

2. Simplify each of the following by combining like terms:

a)          

b)  $3$    $4$    $8$    $4$    $1$    $10$  

c)  $a + 3a + 3a + 7a$

d)  $9y + 3x + 8y + 7x$

3. a) Use the pattern blocks to explain what is meant by combining like terms.

b) Use real-life examples to show the connection between adding and combining like terms.

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place your answer sheet in your portfolio.

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