Math Links

GRADE 7 TASKS
Algebra and Geometry
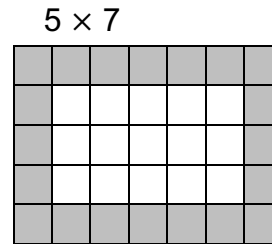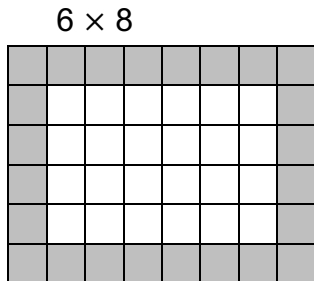
BORDER TILE EXTENSION
Algebra – writing expressions

Part 1:

1. Two different grids are pictured below. Write several numerical expressions for the number of shaded border squares for each grid.

6×8

5×7

2. Write several numerical expressions for the number of shaded border squares for a 4×6 grid.

3. Consider the established pattern of grids above. If the length of the shorter side has a length of n, what is the length of the longer side? Write several variable expressions for the number of shaded border squares, and simplify them all. Circle the simplified expressions to show that they are all equivalent.
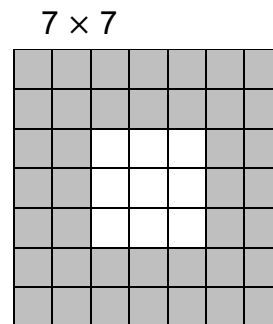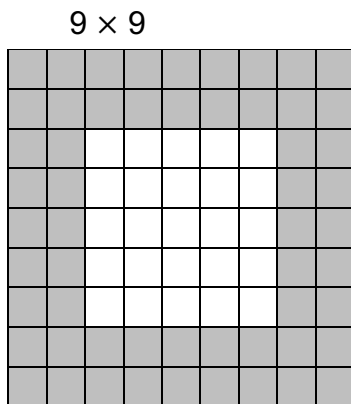
Part 2:

4. Two different grids are pictured below. Write several numerical expressions for the number of shaded border squares for each grid.

9×9

7×7

5. Write several numerical expressions for the number of shaded border squares for a 5×5 grid.

6. Consider the established pattern of grids above. If the length each side is n, write several variable expressions for the number of shaded border squares, and simplify them all. Circle the simplified expressions to show that they are all equivalent.

EXPLORING EQUATIONS*
Algebra – solving equations

Part A

For each problem below, use any three or four of the whole numbers 1 through 9 no more than one time each to find the greatest value for x.

1.

$$\boxed{}\, x \;+\; \boxed{} \;=\; \boxed{}$$

2.

$$\boxed{}\, x \;-\; \boxed{} \;=\; \boxed{}$$

3.

$$\frac{\boxed{}}{\boxed{}}\, x \;+\; \boxed{} \;=\; \boxed{}$$

4.

$$\frac{\boxed{}}{\boxed{}}\, x \;-\; \boxed{} \;=\; \boxed{}$$

Part B

Describe your approaches to these problems.

1. How did you start?

2. Did you start each problem differently or the same?

3. How confident are you that your solution provides the largest value of x for each problem?

4. How do the differences in the operations (addition and subtraction) affect the differences in your answers?

Part C

Repeat the problems on this page using the same directions but this time find the least value of x.

ALGEBRA NUMBER LINES
Algebra – writing and graphing inequalities

Find the range of values for the expressions.

	Expression	Range	Graph of Range
1	A	0 < A < 2	
2	B	-1 < B < 1	
3	C	-2 < C < 0	
4	A + B		
5	B + A		
6	A + C		
7	B + C		
8	B – A		
9	A – B		
10	B – C		

11. Explain how you determined the range for problem 6 above.

12. Explain how you determined the range for problem 10 above.

SHOPPING FOR A PARTY

Algebra – tables, graphs, equations, proportional relationships

This problem gives you an opportunity to work with volume discount offers to see how the best buy changes as the quantity you buy changes.

The following party supply stores sell cowboy party hats.

Party Supply House **Western hats $3/each** **Get 3 for the price of 2.**	**Economy Party Place** **Western Hats $4/each** **Buy one and get one free.**	**Party Town** **Cowboy hats** **$2.25/each**

1. Which of these deals (if any) represents a proportional relationship between the number of hats and total cost? Support your answer with multiple representations (i.e. graphs, tables, equations, verbal description).

2. Which party store would you choose? Explain your reasoning clearly. Include both mathematical and real-life non-mathematical considerations.

INTERIOR ANGLES OF POLYGONS
Geometry – polygons and angles

1. Fill in each column of this chart.
   - For column I, look up the names of the various polygons.
   - For columns III and IV, sketch the polygons and explore how drawing triangles in the polygon interiors can lead to conclusions about the sum of the interior angles for each polygon. Attach drawings.

I	II	III	IV	V
Name of Polygon	Number Of Sides	Number of Diagonals From Any Given Vertex	Number Of "Triangles" Formed	Sum Of Interior Angles
	3	0	1	_____$^{\circ}$
	4			
	5			
	6			
	7			
	8			
	9			
	10			
"n-gon"	n			

2. Explain patterns you see in the table in words.

3. Explain your rule for any n-sided figure.

DRAWING GEOMETRIC FIGURES USING TECHNOLOGY
geometric figures

This task requires the use of technology to review common geometric figures.

Using a program of your choice (Microsoft Word, GeoGebra, etc.), draw the following geometric figures found in these lessons. Name them using words and symbols.

- line segment
- ray
- line
- right angle
- obtuse angle
- acute angle
- straight angle
- right triangle
- obtuse triangle
- acute triangle

- equilateral triangle
- isosceles triangle
- scalene triangle
- square
- rectangle (non-square)
- parallelogram
- rhombus
- trapezoid
- isosceles trapezoid

SCALE DRAWING OR SCALE MODELS
Geometry and proportional relationships - scale

Choose an object of your choice. Select an appropriate scale factor and make an enlargement or reduction of the object. This can be as a drawing, or for an extra challenge, this can be as a model. Include an explanation and calculations to show how you determined your scale and measurements.

THE GRADUATION CELEBRATION
Geometry and proportional relationships - scale

You are planning a graduation celebration for 75 students in your class. The room for the party has dimensions of 60 feet by 90 feet. You will construct a stage in the shape of a trapezoid with parallel edges that are 10 feet and 20 feet. The depth of the stage will be 15 feet. You want to put circular tables with diameters of 10 feet around the room, and you need to leave space for chairs and for people to walk around. Each table can seat up to 9 people. You also want to have a big square dance floor.

1. Make a scale drawing of the room, and lay out where you will put the stage, dance floor, and tables. Label everything, and indicate how many people will sit at each table.

2. What is the area of the stage?

3. How many tables do you need? What is the area of the space taken up by the tables?

4. What are the dimensions of your dance floor?