Concept: Angles and Polygons

Name:

COMPUTER COMPONENT

Instructions: In UMATH X follow the **Content Menu** path:

Measurement and Geometry > Angles and Polygons

Work through all Sub Lessons of the following Lessons **in order**:

- *In This Topic*
- *Parallel Lines*
- *Examples with Parallel Lines*
- *Angles in Triangles*
- *Angles in a Polygon*

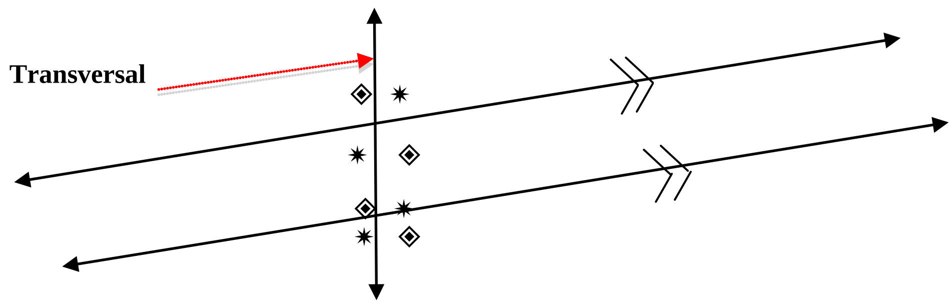
As you work through the computer exercises, you will be prompted to make notes in your notebook/math journal.

SUMMARY

1. You're standing in front of an apartment building looking up and to your complete amazement, you notice that parallel lines abound. Being so impressed with the sight, you sketch the shape of the building, making special note of many pairs of parallel lines. Here is your artistic rendering, with one color being used for horizontal lines and a second color being used for vertical lines.

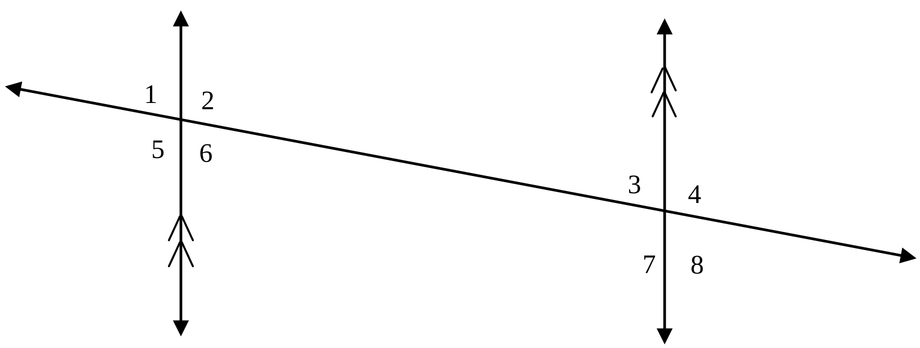
(Answers will vary)

2. In this model, a pair of parallel lines intersects with a third line. Name this third line and then use two colors to show which angles are the same measure / rotation.



Name of line that intersects a pair of parallel lines: **Transversal**

3.



Put the whole picture together … see if you can fill in the following chart. Be careful, as you'll find more than one answer.

Angle Pairing	Pair #1	Pair #2	Pair #3	Pair #4	Pair #5
Alternate Angles –"Z" shape	**6 & 3**	**2 &7**			
Corresponding Angles – "F" shape	**5 &7**	**6 & 8**	**1 & 3**	**2 & 4**	
Opposite Angles – "X" shape	**1 &6**	**2 & 5**	**3 & 8**	**4 & 7**	
Supplementary Angles	**1 & 5**	**1 & 6**	**6 & 2**	**2 & 1**	**3 & 7**

To confirm your knowledge of the Interior Angles of a Triangle, use a model, cut off the angles, and see if the fit along a straight line = 180°

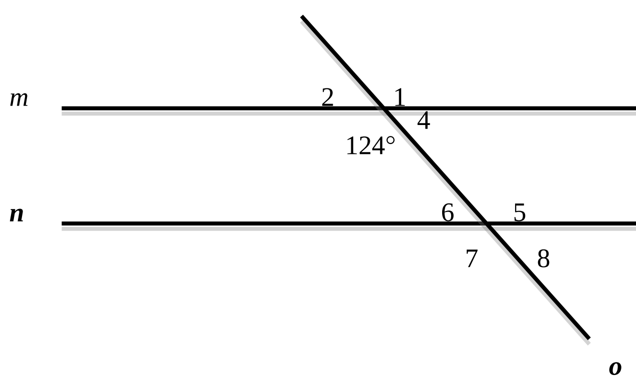
OFF COMPUTER EXERCISES

1. Draw a pair of parallel lines cut by a transversal and label the angles formed.

Answers will vary based on the angle of the transversal.

- Name two pairs of alternate interior angles-
  ____
- Name four pairs of corresponding angles-
  ____
- Name two pairs of alternate exterior angles-
  ____
- Name two pairs of interior angles on the same side of the transversal-
  ____
- Name three pairs of angles that are congruent-
  ____
- Name two pairs of different types of angles that are supplementary-
  ____

2. Complete the following statements about the measures of angles in the figure below, where $m || n$.



(a) ∠1= ***124 °*** (b,) ∠ 2= ***56 °*** (c) ∠ 4= ***56°***

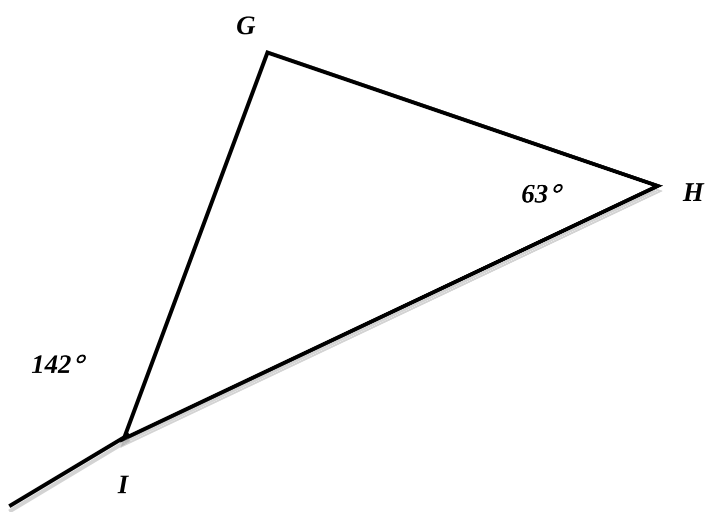
(d) ∠ 5= ***124 °*** (e) ∠ 6= ***56 °*** (f)∠ 7= ***124°***

3. Explain why a triangle cannot have:

- Two obtuse angles- ***The sum of the interior angles of any triangle is 180°. Since an obtuse angle is greater than 90° and less than 180°; two obtuse angles would exceed the sum of the interior angles of a triangle.***

- An obtuse angle and a right angle- ***Again, the sum of the interior angles of any triangle is 180°. An obtuse angle and a right angle (90°) would exceed the sum of the interior angles of a triangle. <u>Don't forget-</u> We still require a value for the third angle!***

4. Describe a way to find the measure of ∠ G in the following triangle.



Finding the measure of ∠ G

- ***We know that 143° is one value in a supplementary angle.***

- ***To find the other value, 'I', we simply subtract 180°- 143°= 37° ∴ 'I' = 37°***

- ***We also know that the sum of the interior angle of a triangle is 180°***

- ***To find the value of 'G', we simply add the values of the angles we know and then subtract from 180°***
  37°+ 63°= 100° and then 180°- 100°= 80°

- ***∴ G = 80°***

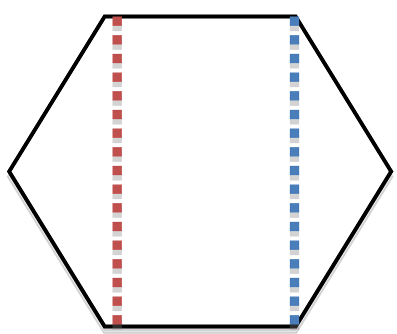
What we know about calculating the Interior Angles of polygons:

- We can implement the formula: (n-2)180° with n= number of sides.
- Working with the knowledge that the Interior Angles of a triangle is 180°, we can divide our polygon in to triangles and multiply the number of triangles by 180°

5. Use your superior knowledge of how to calculate the sum of the Interior Angles of *any* polygon to complete the table.

Number of Sides	*Sum of Interior Angles*
3 *Name:* ***Triangle***	***(n-2)180°*** ***= (3-2)180°*** ***= 180°***
4 *Name:* ***Quadrilateral***	***(n-2)180°*** ***= (4-2)180°*** ***= 360°***
5 *Name:* ***Pentagon***	***(n-2)180°*** ***= (5-2)180°*** ***= 540°***
6 *Name:* ***Hexagon***	***(n-2)180°*** ***= (6-2)180°*** ***= 720°***
7 *Name:* ***Heptagon***	***(n-2)180°*** ***= (7-2)180°*** ***= 900°***
8 *Name:* ***Octagon***	***(n-2)180°*** ***= (8-2)180°*** ***= 1080°***

6. ***Challenge:*** By using the diagram below, convince us as to why the sum of the interior angles of a hexagon is 720°



- ***This diagram has been divided in to 2 triangles and a rectangle.***

- ***We know that the sum of the interior angles of any triangle is 180° and 360° for any quadrilateral.***

- ***∴ 180° + 180° + 360° = 720°***

7. A manufacturer of stop signs is in the process of setting up his new metal cutting machine. He wants to calibrate the machine so it will automatically cut out a metal sheet the correct size and shape for a stop sign. How should the angles on the new metal cutter be set?

Explain your thinking here.

- ***First, I need to identify the shape- Octagon.***

- ***Second, I need to find the sum of the interior angles of this Octagon.***
  Rule: (n-2)180° (8-2)180° = 1080°

- ***Next, I have identified this polygon as a regular Octagon. This means that all of its angles and sides are of equal measurement.***

- ***Lastly, as this polygon is a regular Octagon, I simply divide the sum of the interior angles by the number of angles in this shape. This will give me the setting required for the new metal cutter.***

- ***∴ 1080° ÷ 8 = 135 °***