ME1 Section 9.2: Triangles

Vocabulary: **Polygon**: closed plane figure formed by 3 or more line segments that join with exactly two other line segments.

Example: triangle △ or square □

Vertex: the point where two line segments meet (plural is ver-tices)

Example: 

Equilateral Triangle: a triangle with all three sides having the same length (all angles also have the same measure)

Example:  or 6m  6m, 6m

Isosceles Triangle: a triangle with two sides of equal length

Example:  or 2in  2in, 1in

Scalene Triangle: a triangle with all 3 sides of different lengths

Example: 4in  2in, 5 in

Conjecture: a statement we think might be true based on observations that has not yet been proved to always be true.

Example: Our conjecture is that "the sum of the measures of the angles of a triangle is 180°"

Tessellation: a way of covering a plane with a shape, leaving no gaps (also called a tiling)

Example:  etc.

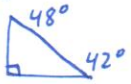
Congruent: two lengths or angles with equal measure are congruent

Example: A 36° B 36° $\angle A \cong \angle B$ because $m\angle A = m\angle B$

Triangle Sum Theorem: The sum of the measures of the angles in any triangle equals 180°.

Example:  45°, 50°, 85° $45° + 50° + 85° = 180°$

Right Triangle: a triangle with one right angle (90°)

Example: 

Hypotenuse: the longest side of a right triangle, opposite the right angle

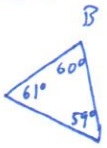
Example:  ← hypotenuse

Legs of a Right Triangle: the two shorter sides of a right triangle

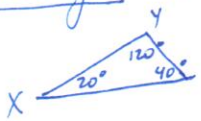
Example: 

Pythagorean Theorem: relates the lengths of the legs of a right triangle to the length of the hypotenuse, allows you to find the third side if you know two sides

Acute Triangle: a triangle with all 3 angles less than 90°

Example:  $\triangle ABC$ is acute

Obtuse Triangle: a triangle with one angle greater than 90°

Example:  $\triangle XYZ$ is obtuse

Exploration 1: Polygons: (answers may vary)

Figure	Characteristics	Polygon / Not, # sides
A	4 ≅ sides	P, 4
B	circle	NP
C	squiggle: not a line segment	NP
D	not closed, line segments	NP
E	line segment	NP
F	segments overlap	NP
G	closed figure, line segments	P, 5
H	overlapping polygons	NP
I	all sides ≅	P, 6

A triangle is one type of a polygon.

Exploration 2: 1) (drawings will vary)
sum of other two sides is > 5 units

2) 2 angles always have equal measure (the angles across from the sides of equal length)

3) all 3 angles are equal, & their measures are 60°

Classify: equilateral, isosceles

Conversely... Do you see why they might be true?
(answers may vary – same on both sides, etc.)

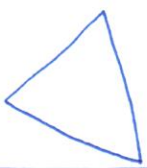
It is also possible... called a scalene triangle

Exploration 3:

Sum appears to be 180°

This is a conjecture

... convincing argument ...? yes (student answers may vary)

Type of Triangles	Characteristics	Sketch:
Acute Triangle	all 3 ∠s are less than 90°	
Obtuse Triangle	one ∠ is greater than 90° (other two are less than 90°)	
Right Triangle	one angle is 90°, (the other two are less than 90°)	

Exploration 4: Tessellations:

...adds up to 180°

...is congruent to your original triangle ABC,

which means the angles are also congruent

(student answers may vary slightly)

Problems:

1) Two angles in each triangle are congruent, angles may or may not be congruent between the two triangles

2) duplicate

3) no angles the same (but add to 180° in each triangle)

4) 3 different angle measures, add to 180°

5) $m\angle a = 180 - 90 - 30 = 60°$

$m\angle b = 180 - 40 - 65 = 75°$

$m\angle C = 180 - 20 - 20 = 140°$

6) isosceles
equilateral
scalene
equilateral
isosceles
scalene
equilateral
isosceles
scalene

7)

A	B	C	classification
		45°	right
30°			obtuse
	40°		acute
		25°	obtuse
55°			right
		65°	obtuse
50°			acute
		60°	acute
45°			acute

Exploration 5: Pythagorean Theorem

one 90° (right) angle

longest side: hypotenuse

right angle is opposite the hypotenuse

shorter sides: legs