MEI Section 9.3: Quadrilaterals and Other Polygons

Vocabulary:

Quadrilateral: a polygon with 4 sides

Example: square, rectangle, 

Parallel: two lines in a plane that never intersect

Example: 

Parallelogram: a quadrilateral with opposite sides that are parallel and congruent

Example: square, rectangle, 

Rectangle: a parallelogram with a right angle

Example:  , square

Square: a rectangle with all 4 sides of equal length

Example: 6in 

Trapezoid: a quadrilateral with exactly one pair of opposite sides parallel

Example: 

Rhombus: a parallelogram with all 4 sides of equal length

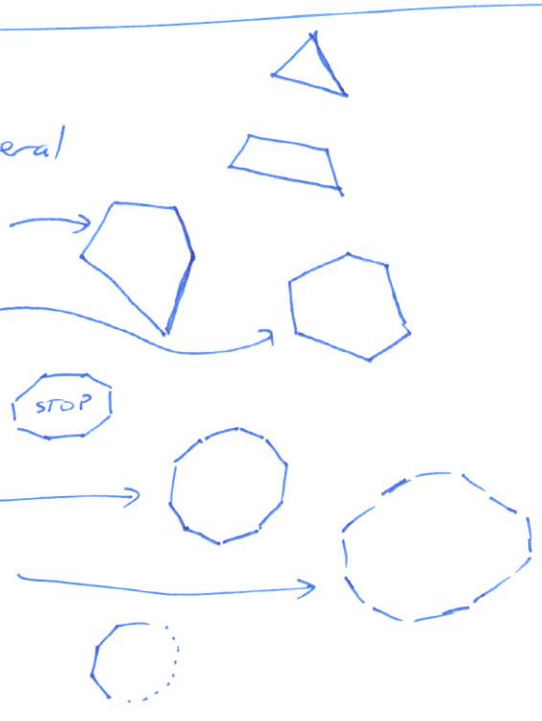
Example: square, 3in 

Opposite Angles: angles "across" from each other, not next to each other or consecutive, opposite angles are congruent to each other in a parallelogram

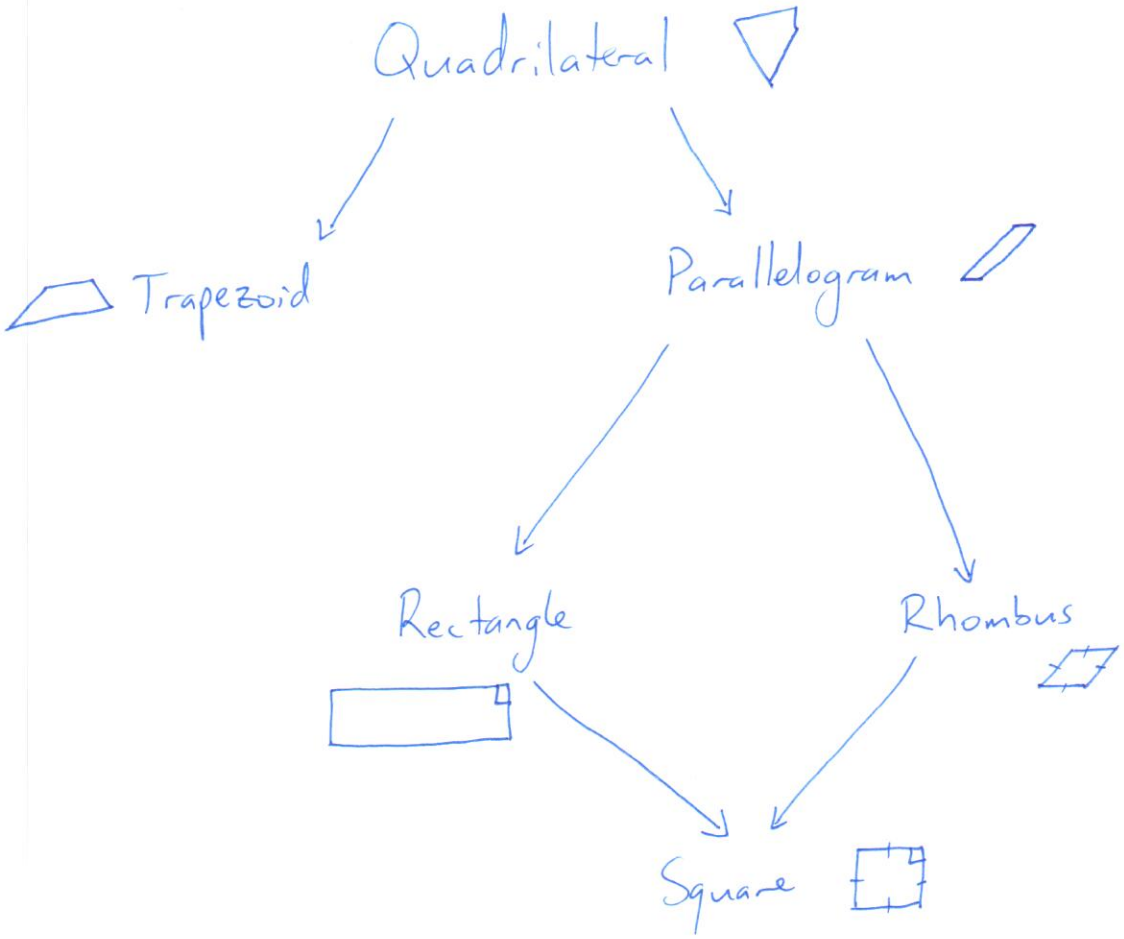
Regular Polygon: a polygon whose sides and angles are all of equal measure

Exploration 1:

Prefix	# sides	Name	Sketch
Tri-	3	triangle	
Quad-	4	quadrilateral	
Penta-	5	pentagon	
Hexa-	6	hexagon	
Octa-	8	octagon	
Deca-	10	decagon	
Dodeca-	12	dodecagon	
	n	n-gon	



Parallel? (answers may vary) lines that never touch but are in the same plane (for example, a paper)



- Trapezoids are not parallelograms.
- Squares are both a rectangle AND a rhombus.
- There are many special kinds of parallelograms.

(student answers will vary)

Exploration 2:

(parallelograms and angles will vary)

(Answers below will vary)

Go back... there are 2 of each mark

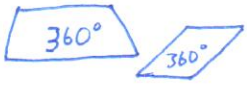
Pay special... the opposite angles are congruent

Now, look... they add to 180°, so they are supplementary

Think... square? 360° ...rectangle 360° = (4×90°)

How do... the same number

What do... both have a total of 360°



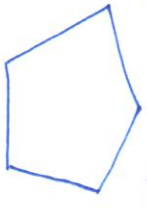
Make a conjecture... the sum of the angles in a quadrilateral is 360°.

Exploration 3: definition of polygon: A simple, closed plane figure formed by 3 or more line segments.

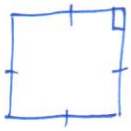
...regular polygon: All sides of the polygon are of equal length and all angles are of equal measure.

...equilateral is regular because: All sides have the same length and all angles are 60°.

...own example:

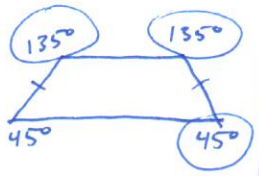


polygon



regular polygon (quadrilateral) (also a square!)

Polygon Practice

1. $180°$	2. $360°$	3. $360 - 90 - 120 - 100 = 50°$
4. each is $80°$ $(180 - 100 = 80°)$	5. $180 - 90 - 40 = 50°$	6. 
7. $25°, 155°, 155°$ $180 - 25 = 155°$	8. $\frac{180}{3} = 60°$	9. $\frac{720}{6} = 120°$
10. $25 + 75 + 50 + 30 = 180°$ NO, they add to $180°$ and not $360°$, which is the sum of angle measures in a quadrilateral.		

Exploration 4:

trapezoid
scalene triangle
parallelogram
right triangle
rhombus (which could be a square)
rectangle (which could be a square)
triangle
infinitely many options, one would be obtuse triangle
pentagon
octagon
isosceles triangle
equilateral triangle
acute triangle
square
rhombus (which could be a square)

No Geo-pices to label.

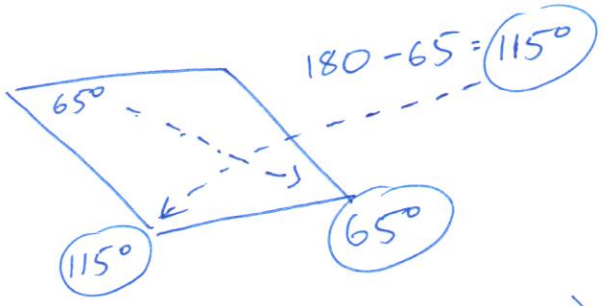
Problems:

1)

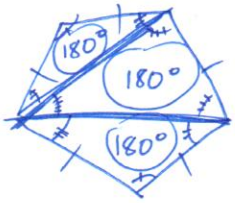
Figure	Classification
A	parallelogram
B	parallelogram, rectangle
C	parallelogram, rhombus, rectangle, square
D	parallelogram, rhombus, rectangle, square
E	trapezoid

2) $360 - 135 - 30 - 40 = 155°$

3)

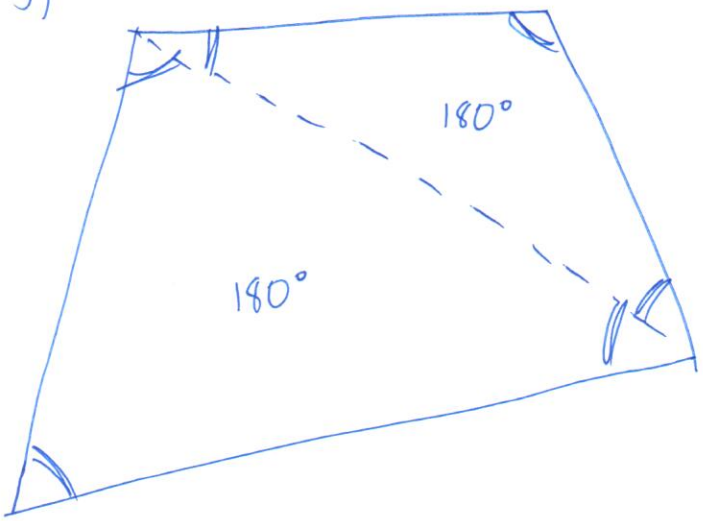


4) (answers to explanation may vary)



$180 + 180 + 180 = \boxed{540°}$ is the sum

5)



(Explanations may vary)

Angles and angle parts sum to $180 + 180$ or $360°$

6)

Quadrilateral	Angle A	Angle B	Angle C	Angle D
M	60°	75°	**145°**	80°
N	68°	118°	80°	**94°**
O	68°	126°	106°	**60°**
P	115°	65°	65°	**115°**
Q	**75°**	110°	65°	110°
R	50°	135°	**135°**	40°
S	**110°**	35°	70°	145°
T	60°	100°	70°	**130°**