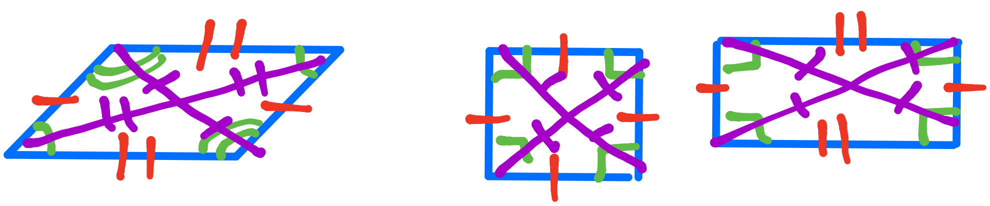
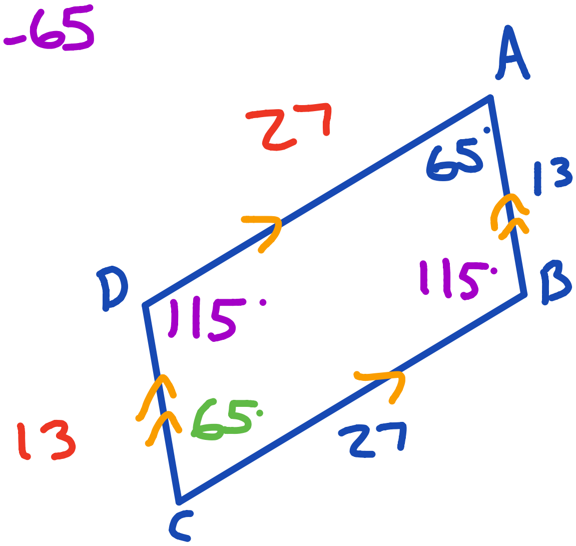
Properties of parallelograms

- Quadrilateral- is a polygon with four sides. The sum of all the angles is 360 degrees.
- Parallelogram- is a special type of quadrilateral with two pairs of opposite sides that are parallel.
- Opposite angles and sides are congruent.
- Consecutive angles are supplementary.
- Diagonals bisect each other

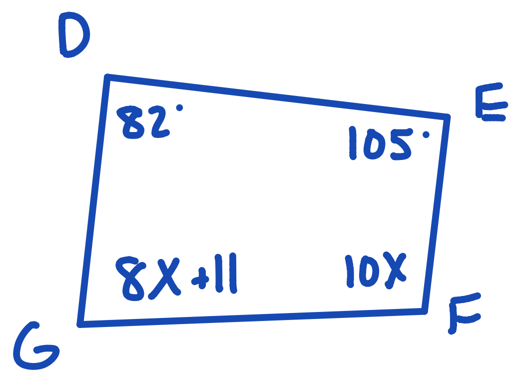


Ex.1 Find the missing angles of parallelogram ABCD if angle A is 65 degrees.

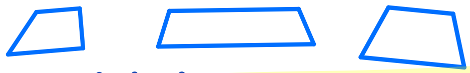
180-65

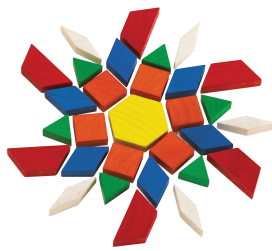


Ex.2 Find angle G



Trapezoids

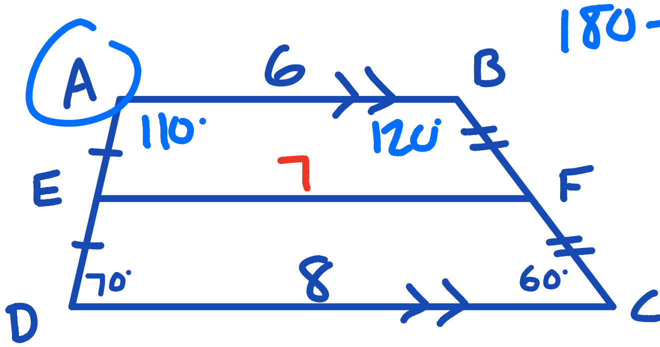
- Trapezoid has exactly one pair of opposite parallel sides. 
- Isosceles trapezoid- has one pair of opposite parallel sides and congruent legs.
- The median is one half the sum of the bases
- Consecutive angles are supplementary



Ex.1 Find $\overline{EF}$ and angle A.

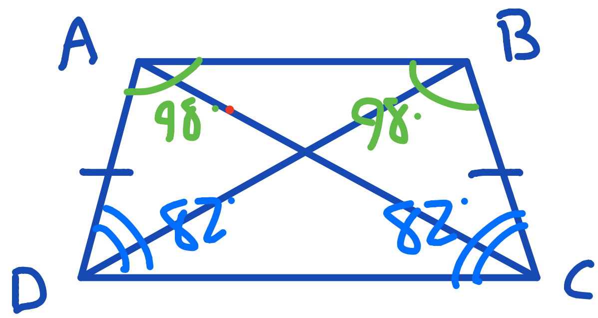
180-70

180-60



$$\frac{6+8}{2} = \frac{14}{2} = 7$$

Ex.2 Find $\overline{BD}$, angle B, and angle D.



$180-98=82$

$\overline{AC}=10$

$\overline{BD}=10$

$m\angle A=98°$

$m\angle D=82$

$m\angle B=98°$

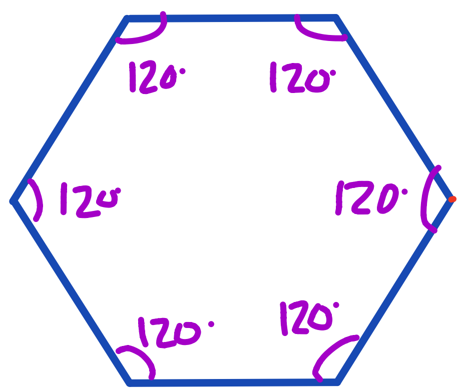
$m\angle C=82$

Polygons

- A polygon is a closed figure with three or more sides.
- A regular polygon is a polygon with all equal sides.
- Convex polygon- is a polygon with no interior angles greater than 180 degrees and where all diagonals lie inside the polygon.
- Concave polygon- is a polygon with at least one interior angle greater than 180 and are at least one diagonal that does not lie entirely inside the polygon.
- The sum of interior angles of a regular polygon can be found by multiplying the number of triangles by 180.
- n = number of sides $S = (n-2)(180^\circ)$
- Exterior angle can be found by extending only one of its sides, exterior angles have a sum of 360.

Ex.1 Find the sum of the interior angles and one interior angle.

$\frac{720}{6}$

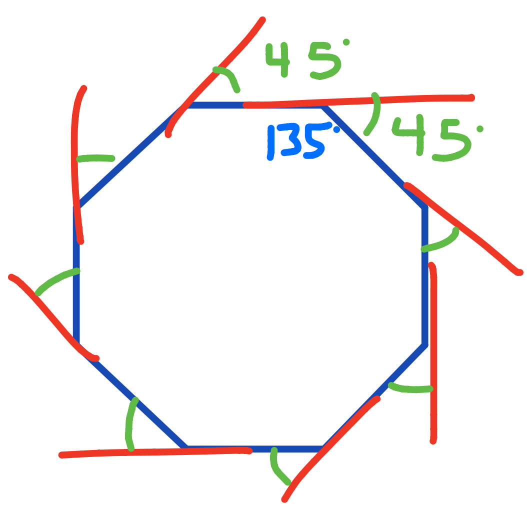


720°

$(n-2)(180)$
$(6-2)(180)$
720°

Ex.2 Find one exterior angle of the polygon.

180−45

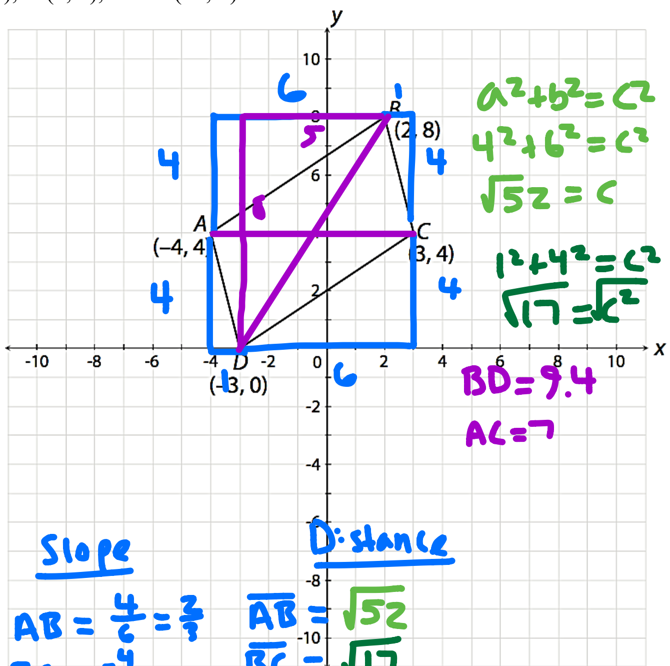


$\frac{360°}{8} = 45$

Properties of Quadrilaterals [A] Name: Key Block: ___

Justify whether the statement applies to the shape using slope, midpoint, and the distance formula.

Parallelogram *ABCD* has the following vertices: *A* (–4, 4), *B* (2, 8), *C* (3, 4), and *D* (–3, 0).



$a^2+b^2=c^2$

$4^2+6^2=c^2$

$\sqrt{52}=c$

$1^2+4^2=c^2$

$\sqrt{17}=\sqrt{c^2}$

BD = 9.4

AC = 7

Slope

AB = $\frac{4}{6}=\frac{2}{3}$

BC = $\frac{-4}{1}$

CD = $\frac{2}{3}$

DA = -4

Distance

$\overline{AB}=\sqrt{52}$

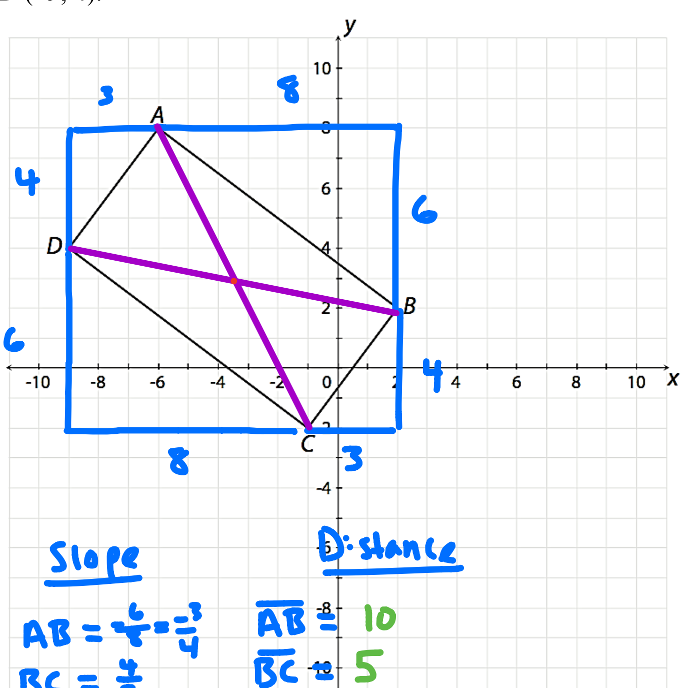
$\overline{BC}=\sqrt{17}$

$\overline{CD}=\sqrt{52}$

$\overline{DA}=\sqrt{17}$

Opposite Sides Parallel Prove by showing the opposite sides have the same slopes.	Opposite sides have the same slope
Opposite sides congrunet Prove by find the length of the opposite sides using $a^2+b^2=c^2$	Opposite sides are congruent
Daigonals bisect each other Prove by finding the midpoint of each diagonal. $midpoint=\left(\frac{x_2+x_1}{2},\frac{y_2+y_1}{2}\right)$	yes
Four right angles Prove by finding the slopes of adjacent sides are opposite reciprocals.	No
Congruent diagonals Prove by find the length of the diagonals using $a^2+b^2=c^2$	No
Four congruent sides Prove by find the length of each side using $a^2+b^2=c^2$	No
Diagonals are perpedicular Prove by finding the slopes of the diagonals and showing they are opposite reciprocals.	No

Rectangle *ABCD* has vertices *A* (–6, 8), *B* (2, 2), *C* (–1, –2), and *D* (–9, 4).



Slope

AB = $\frac{-6}{8}=\frac{-3}{4}$

BC = $\frac{4}{3}$

CD = $-\frac{3}{4}$

DA = $\frac{4}{3}$

Distance

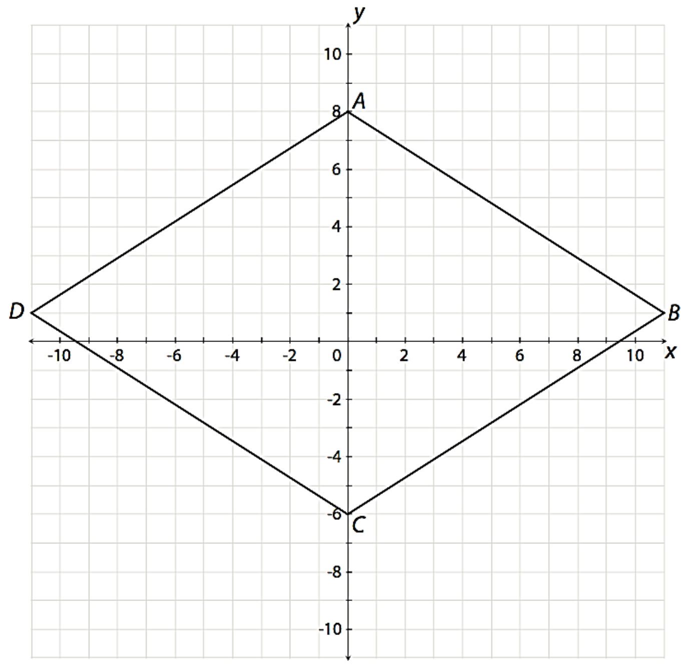
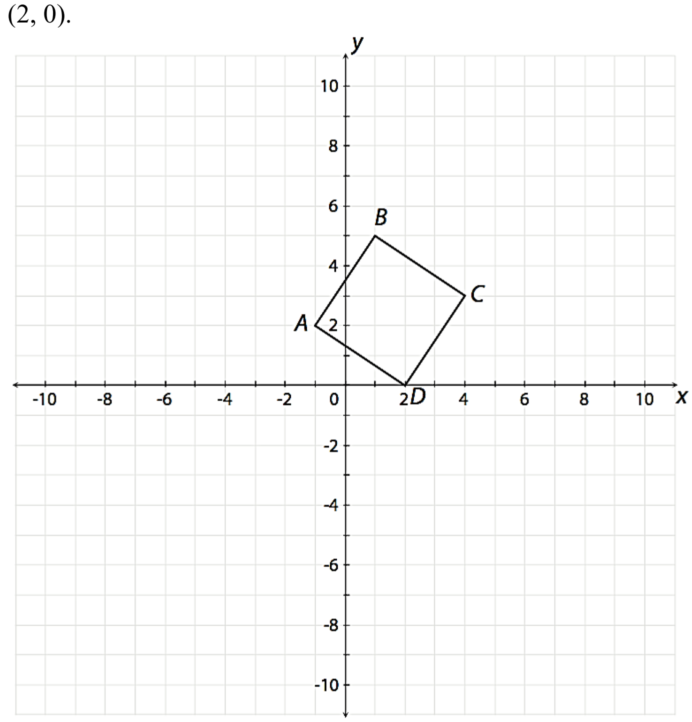
$\overline{AB}$ = 10

$\overline{BC}$ = 5

$\overline{CD}$ = 10

$\overline{DA}$ = 5

Opposite Sides Parallel Prove by showing the opposite sides have the same slopes.	yes
Opposite sides congrunet Prove by find the length of the opposite sides using $a^2+b^2=c^2$	yes
Daigonals bisect each other Prove by finding the midpoint of each diagonal. $midpoint=\left(\frac{x_2+x_1}{2},\frac{y_2+y_1}{2}\right)$	yes
Four right angles Prove by finding the slopes of adjacent sides are opposite reciprocals.	yes
Congruent diagonals Prove by find the length of the diagonals using $a^2+b^2=c^2$	yes
Four congruent sides Prove by find the length of each side using $a^2+b^2=c^2$	No
Diagonals are perpedicular Prove by finding the slopes of the diagonals and showing they are opposite reciprocals.	N

Rhombus *ABCD* has vertices *A* (0, 8), *B* (11, 1), *C* (0, –6), and *D* (–11, 1). 	**Opposite Sides Parallel** Prove by showing the opposite sides have the same slopes.	
	Opposite sides congrunet Prove by find the length of the opposite sides using $a^2 + b^2 = c^2$	
	Daigonals bisect each other Prove by finding the midpoint of each diagonal. $midpoint = \left(\frac{x_2 + x_1}{2}, \frac{y_2 + y_1}{2}\right)$	
	Four right angles Prove by finding the slopes of adjacent sides are opposite reciprocals.	
	Congruent diagonals Prove by find the length of the diagonals using $a^2 + b^2 = c^2$	
	Four congruent sides Prove by find the length of each side using $a^2 + b^2 = c^2$	
	Diagonals are perpedicular Prove by finding the slopes of the diagonals and showing they are opposite reciprocals.	
Square *ABCD* has vertices *A* (–1, 2), *B* (1, 5), *C* (4, 3), and *D* (2, 0). 	**Opposite Sides Parallel** Prove by showing the opposite sides have the same slopes.	
	Opposite sides congrunet Prove by find the length of the opposite sides using $a^2 + b^2 = c^2$	
	Daigonals bisect each other Prove by finding the midpoint of each diagonal. $midpoint = \left(\frac{x_2 + x_1}{2}, \frac{y_2 + y_1}{2}\right)$	
	Four right angles Prove by finding the slopes of adjacent sides are opposite reciprocals.	
	Congruent diagonals Prove by find the length of the diagonals using $a^2 + b^2 = c^2$	
	Four congruent sides Prove by find the length of each side using $a^2 + b^2 = c^2$	
	Diagonals are perpedicular Prove by finding the slopes of the diagonals and showing they are opposite reciprocals.	