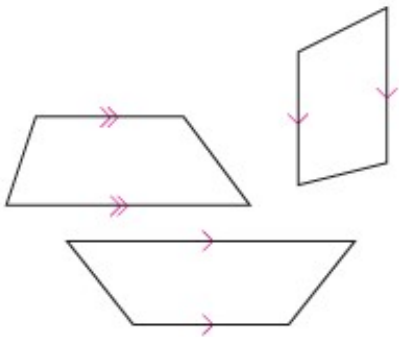


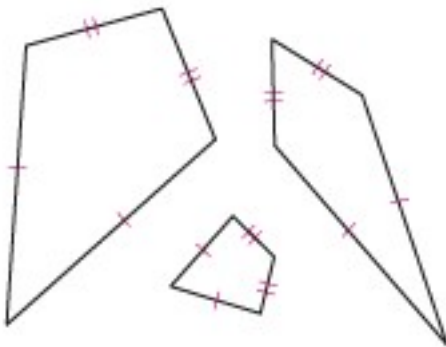
## Lesson 1.6 – Special Quadrilaterals

\*\*Reminder: A quadrilateral is a polygon with four sides.

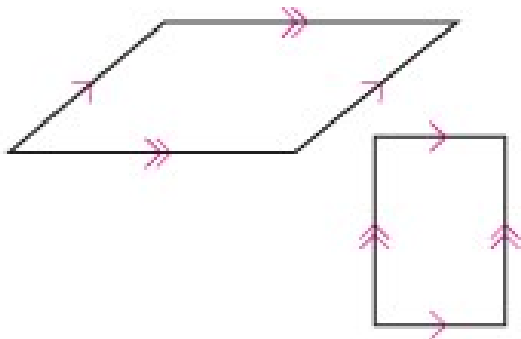
Trapezoid - A trapezoid is a quadrilateral with exactly one pair of parallel sides.



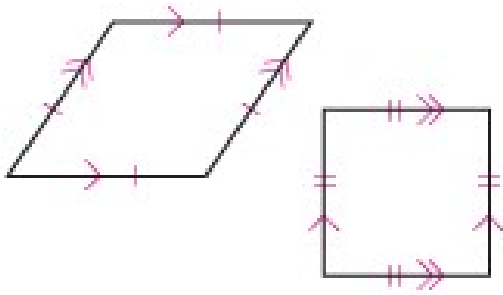
Kite - A kite is a quadrilateral with two distinct pairs of consecutive congruent sides.



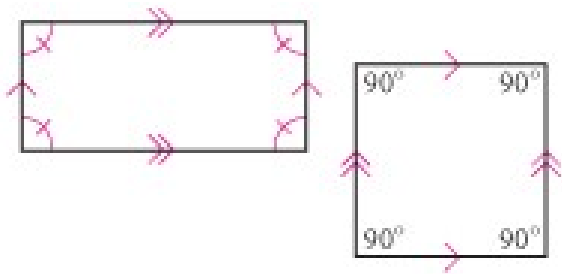
Parallelogram - A parallelogram is a quadrilateral with two pairs of parallel sides.



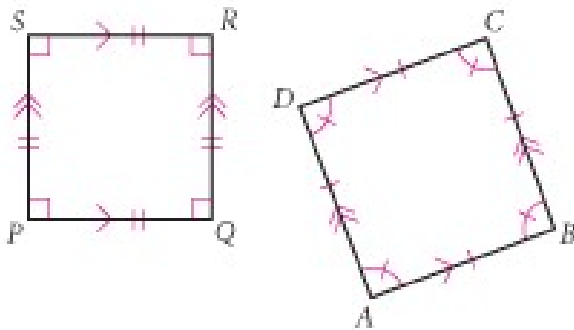
Rhombus - A rhombus is an equilateral parallelogram.



Rectangle - A rectangle is an equiangular parallelogram.



Square - A square is an equilateral rectangle, an equiangular rhombus, and a regular quadrilateral.

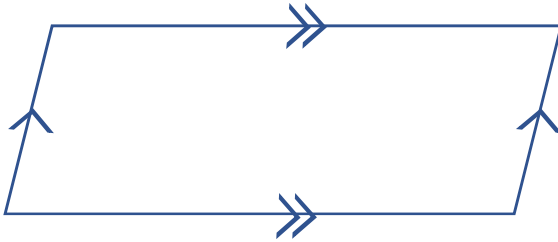


\*\*A square is a type of rhombus and a type of rectangle.

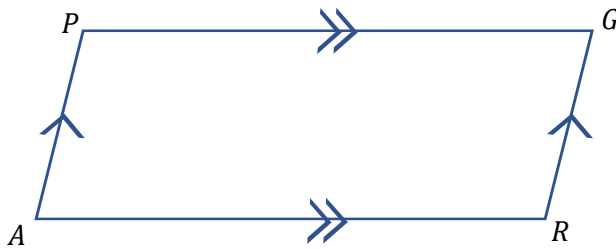
Example 1: Sketch, label, and mark the figure

Parallelogram  $PGRA$

A parallelogram should have two pairs of parallel sides. Remember to mark parallel sides with matching number of arrows.



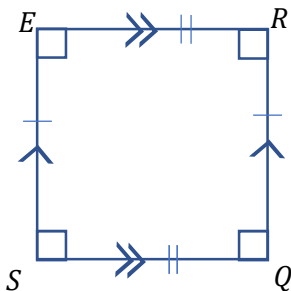
Finally, name the parallelogram starting at one vertex and moving counterclockwise and clockwise around the parallelogram.



Example 2: Sketch, label, and mark the figure

Square  $SQRE$

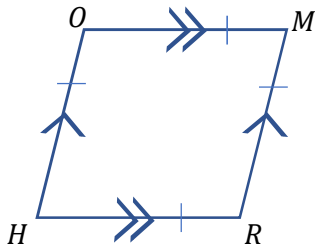
A square should have two sets of parallel sides, four 90-degree angles, four congruent sides, and be named SQRE.



Example 3: Sketch, label, and mark the figure

Rhombus  $RHOM$  with acute  $\angle H$

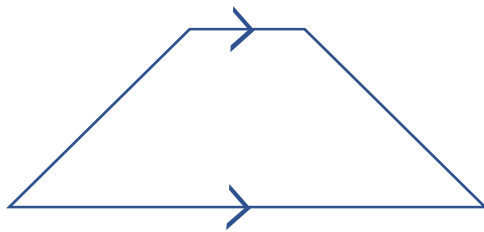
A parallelogram should have two pairs of parallel sides and four congruent sides. By telling us that we need to have an acute angle, the problem is telling us that we cannot draw a square. As we name the rhombus, we need to make sure that H will land on one of the acute angles.



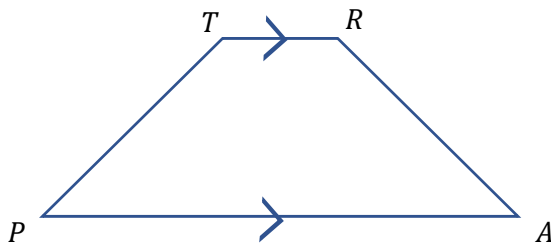
Example 4: Sketch, label, and mark the figure

Trapezoid  $TRAP$  with acute  $\overline{TR} \parallel \overline{AP}$ ,  $\overline{RE} \perp \overline{PA}$  and  $P, E$ , and  $A$  collinear

A trapezoid has one pair of parallel sides.

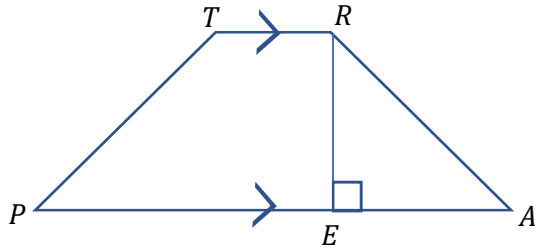


As we name the trapezoid, make sure that one of the bases is named  $\overline{TR}$  and the other  $\overline{AP}$ .



\*\*Remember to name the trapezoid in either a clockwise or counterclockwise pattern.

To make  $\overline{RE} \perp \overline{PA}$ , we need to work with point R that is already in our figure as well as side  $\overline{PA}$  that is already in our figure. So, we should draw a perpendicular line from point R to meet side  $\overline{PA}$ .

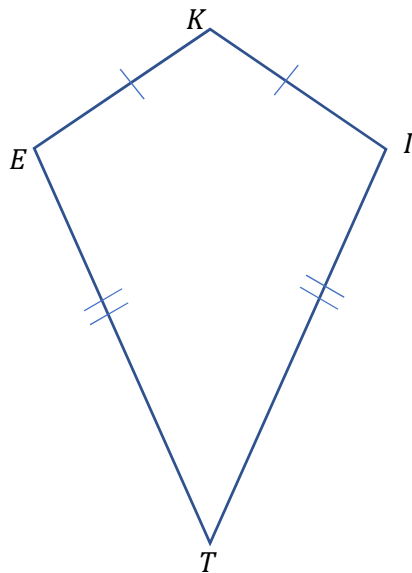


Saying that we need to make  $P, E,$  and  $A$  be collinear, just means that point E should be on the side  $\overline{PA}$ .

Example 5: Sketch, label, and mark the figure

Kite  $KITE$  with  $EK = KI$  and obtuse  $\angle K$

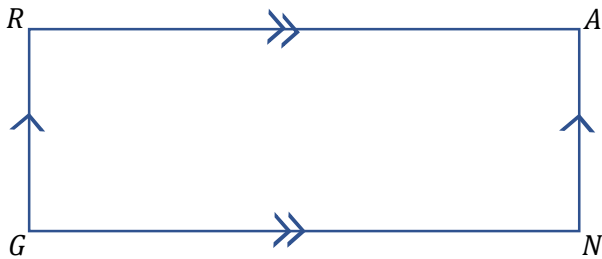
A kite should have two sets of consecutive congruent sides. We need to make sure that point K falls between two of the congruent sides and ensure that angle obtuse.



Example 6: Sketch, label, and mark the figure

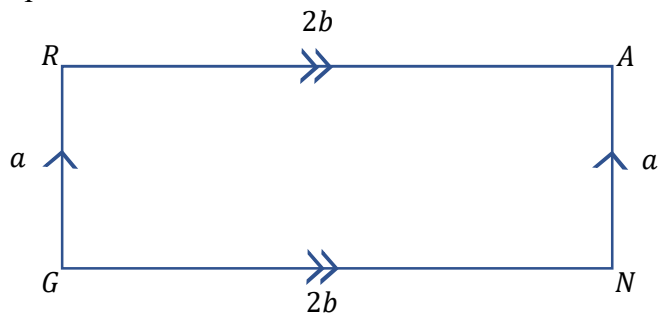
Rectangle  $RANG$  with perimeter  $2a + 4b$

A rectangle needs to have two pairs of parallel sides and four 90-degree angles.

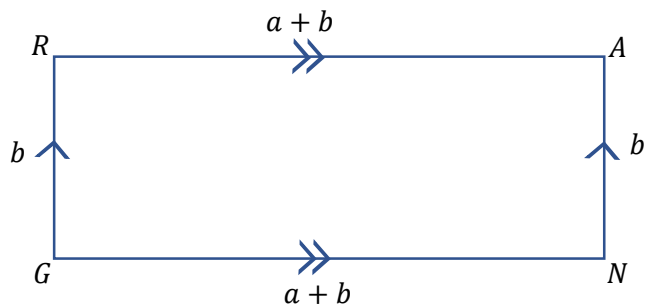


To get a perimeter of  $2a + 4b$ , we need to split the terms evenly between opposite sides.

Option 1:



Option 2:



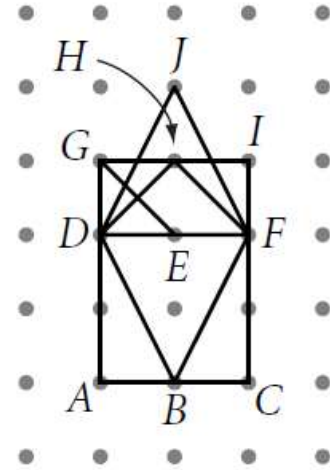
There are more possibilities.

Example 7: Name the polygon in the figure. Assume that the grid is square

Square

A square needs to have all sides the same measure and four 90-degree angles.

The square is  $ACDF$



Example 8: Name the polygon in the figure. Assume that the grid is square

Parallelogram

A parallelogram needs to have two pairs of parallel sides.

There are several options of a parallelogram:

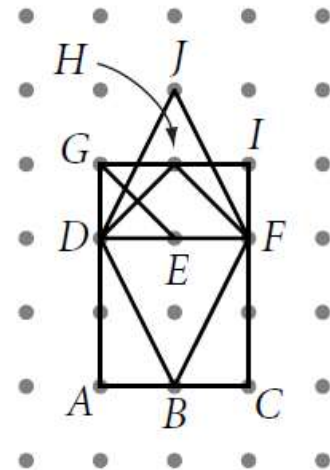
$ACDF$

$GICA$

$JFBD$

$GDFI$

$GEFH$



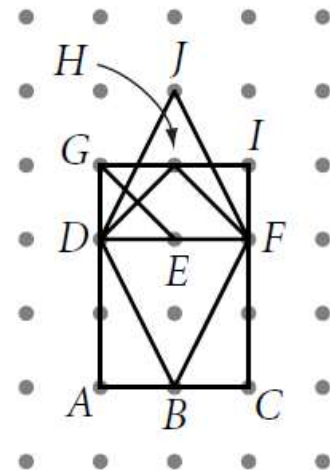
Example 9: Name the polygon in the figure. Assume that the grid is square

Rhombus

A rhombus needs to have two pairs of parallel sides and be equilateral.

There are a couple of options:

$ACDF$  or  $JFBD$



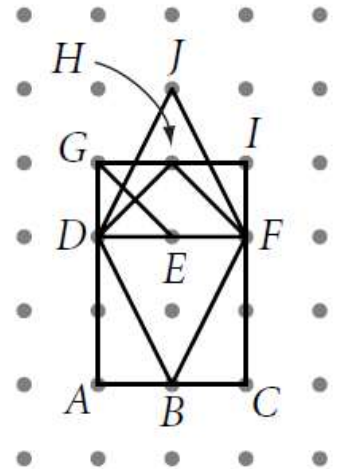
Example 10: Name the polygon in the figure. Assume that the grid is square

Kite

A kite needs to have two sets of consecutive congruent sides.

Those sides need to be distinct.

The kite is  $DHFB$

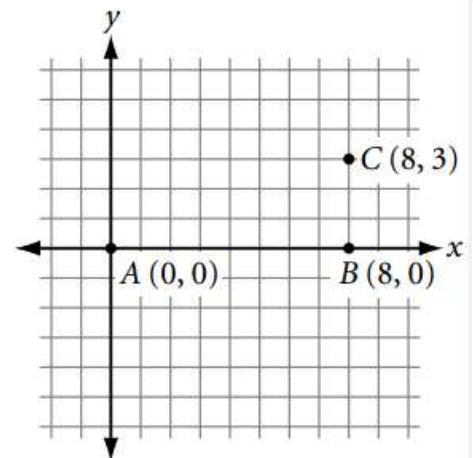


Example 11: Use the graph

Locate  $D$  so that  $ABCD$  is a rectangle

Point  $D$  needs to be above point  $A$  and to the left of point  $C$ .

$D(0, 3)$

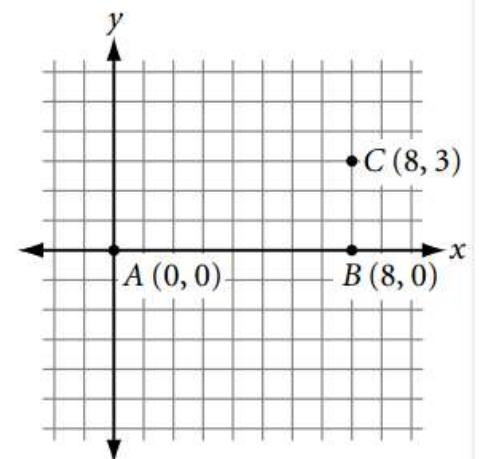


Example 12: Use the graph

Locate  $E$  so that  $ABCE$  is a trapezoid

We can line point  $E$  up to the left of point  $C$  as long as it isn't directly above point  $A$ .

Example:  $E(5, 3)$



Example 13: Use the graph

Locate  $G$  so that  $A, B, C,$  and  $F$  determine a parallelogram that is not a rectangle

We have to shift our perspective on this one and place point  $G$  below point  $A$ .

$G(0, -3)$

