



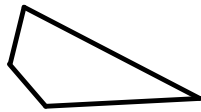
1. Classify the triangle having vertices $D(7, -8)$, $E(10, -4)$, and $F(-2, 5)$. Your solution MUST be algebraic.

Find circumcent
POI \rightarrow PB
 \rightarrow equations of 2 PB

⑤ Show right bisectors
@ point $(-4, 4)$
↑
Circumcenter

perp. bis

2.9 Investigate Properties of Quadrilaterals



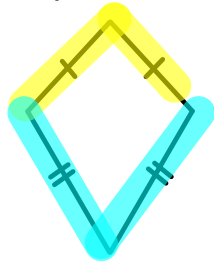
Quadrilaterals

A polygon with 4 sides.



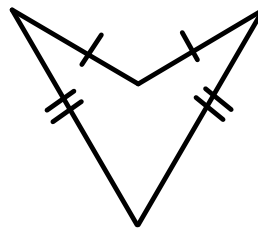
Kite

Pairs of adjacent sides are equal.



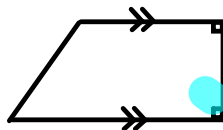
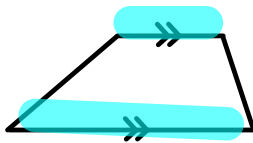
Chevron

Pairs of adjacent sides are equal.
One angle is concave.

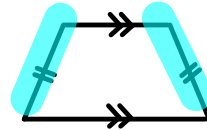


Trapezoid

One pair of parallel sides.



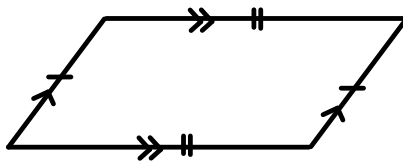
right trapezoid



isosceles trapezoid

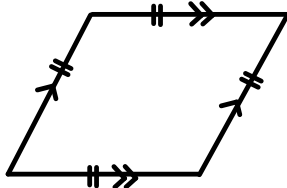
Parallelogram

Both pairs of opposite sides are parallel.
Opposite sides are equal length.



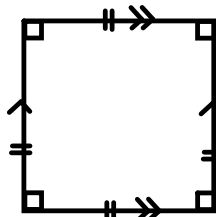
Rhombus

All sides equal length



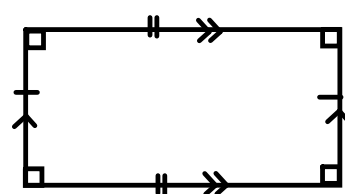
Square

All sides equal.
All angles 90° .



Rectangle

All angles 90° .



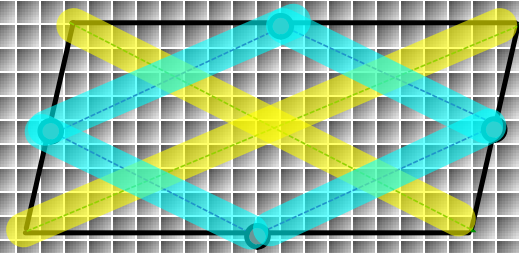
Using your formulas for slope, midpoint, and distance, what would you have to do to prove that a quadrilateral is a.....

kite	lengths of all 4 sides, pairs of adjacent sides are equal
trapezoid	slopes of opposite sides, one pair of opposite sides have equal slopes (isosceles trapezoid: 2 non-parallel sides have equal length) (Right trapezoid: perpendicular sides)
parallelogram	slopes of all sides, opposite sides have equal slopes
rhombus	parallelogram (with no 90°) + 1 pair of adjacent sides are equal length
square	parallelogram (sides meet at 90°) + 1 pair of adjacent sides are equal length
rectangle	parallelogram (sides meet at 90°) + 1 pair of adjacent sides are different lengths

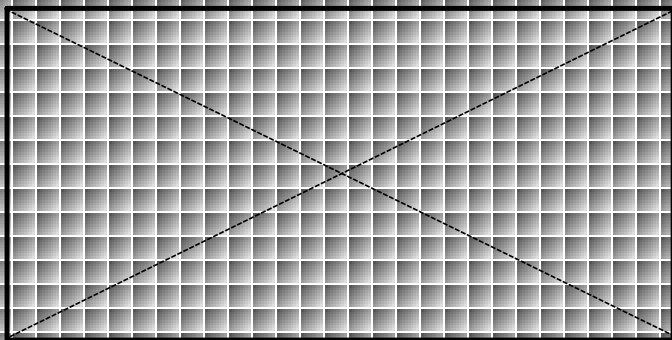
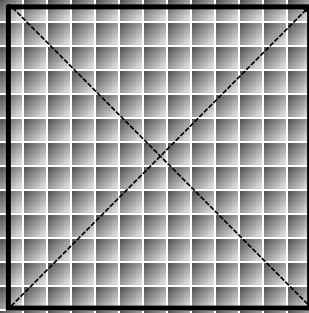


equal
are

Quadrilaterals- Draw all diagonals and midsegments



- Midpoints
- Midsegment
- Diagonal



Investigate!

QUADRILATERALS

Diagonals:

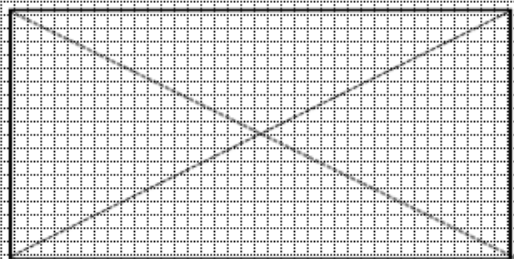
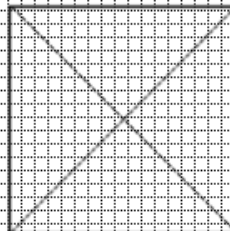
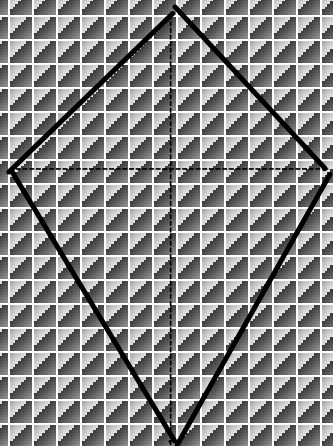
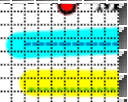
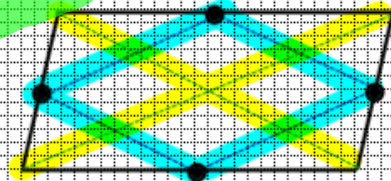
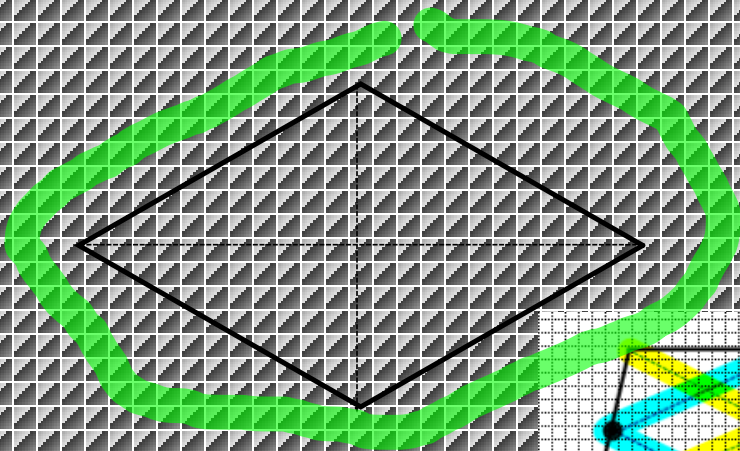
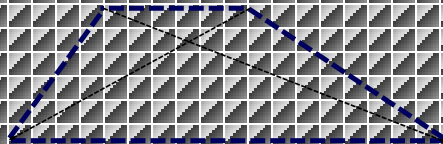
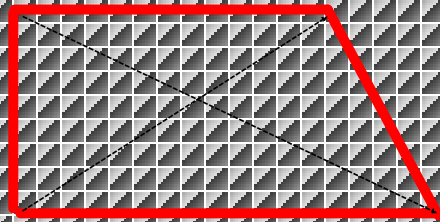
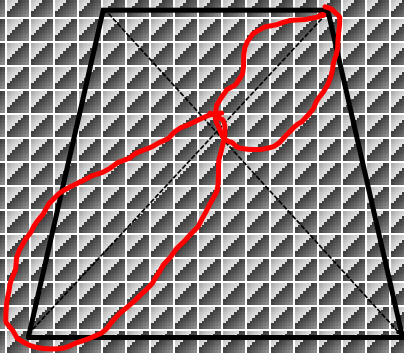
- Determine properties of the **diagonals** of all 6 quadrilaterals:
 - Are the **diagonals** equal in length?
 - Do the **diagonals** bisect each other?
 - Do the **diagonals** intersect at a right angle?

Midsegments (join adjacent midpoints)

- Mark the **midpoint** of each side.
- Draw the **midsegments** of a quadrilateral.
- What shape do the **midsegments** make?

Trapezoid

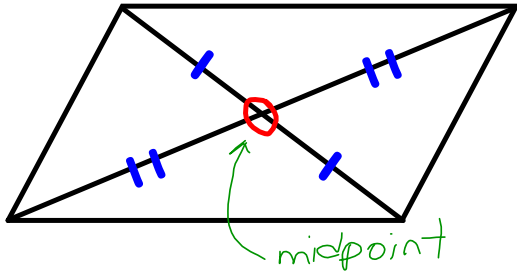
- Fold it in half so that the **parallel sides** line up.
- What do you notice about the **fold line**?
- How does the length of the **fold line** compare to the lengths of the **parallel sides**?
- How could you draw the **fold line** without folding?



Conclusions for Diagonal Properties:

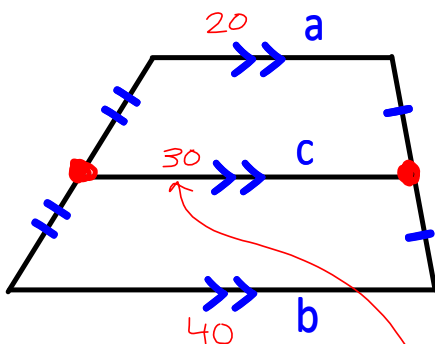
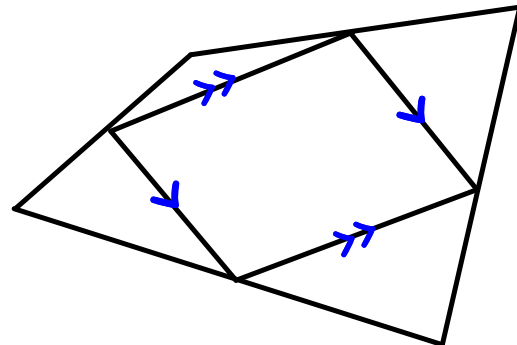
Shape	Equal Lengths?	Perpendicular?	Bisect Each Other?
Square	Yes	Yes	Yes
Rectangle	Yes	No	Yes
Parallelogram	No	No	Yes
Rhombus	No	Yes	Yes
Trapezoid	No	No	No
Kite	No	Yes	One does

Is Isosceles Trapezoid Yes



The diagonals of a parallelogram bisect each other.

The midsegments of any quadrilateral form a parallelogram.



The line joining the midpoints of the non-parallel sides of a trapezoid is parallel to the parallel sides.

Its length is the average of the lengths of the two parallel sides.

$$\frac{20 + 40}{2} = 30$$

Homework:
Page 134 #1,2,3,8,10
Try: Circumcenter and
Orthocenter

(x, why?)

Love Quadrangle

How'd you like to get together sometime?

Don't come any closer to me!

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Attachments

2.9 diagonals of parallelogram.gsp

2.9 Varignon Parallelogram.gsp

2.9 Midsegment of Trapezoid.gsp