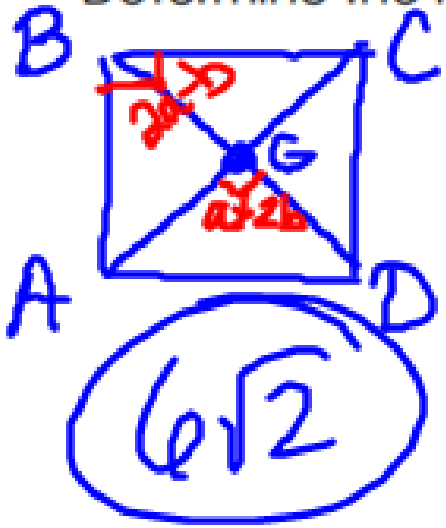
In square $ABCD$, the diagonals intersect at G. If $AC = 9x - 6$ and $BD = 21x - 30$.

Determine the length of the side of the square.



$9x - 6 = 21x - 30$

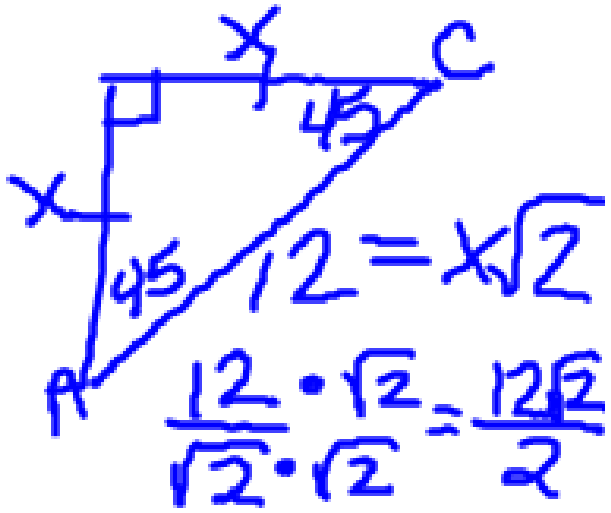
$-9x \quad -9x$

$-6 = 12x - 30$

$+30 \quad +30$

$24 = 12x$

$2 = x$



In square $ABCD$, the diagonals intersect at G.

If $m\angle AGD = a + 2b$ and $m\angle ABC = 2a - b$, find the values of a and b.

$a + 2b = 90$

$-2b \quad -2b$

$a = 90 - 2b$

$a + 2(18) = 90$

$a + 36 = 90$

$a = 54$

$a + 2b + 2a - b = 180$

$90 - 2b + 2(90 - 2b) - b = 180$

$90 + 180 - 4b - b = 180$

$270 - 5b = 180$

$-270 \quad -270$

$-5b = -90$

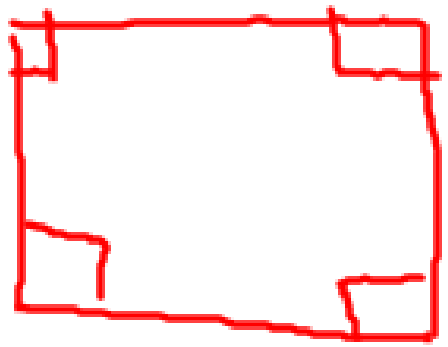
$b = 18$

1. Identify which quadrilateral(s) meet the following criteria.

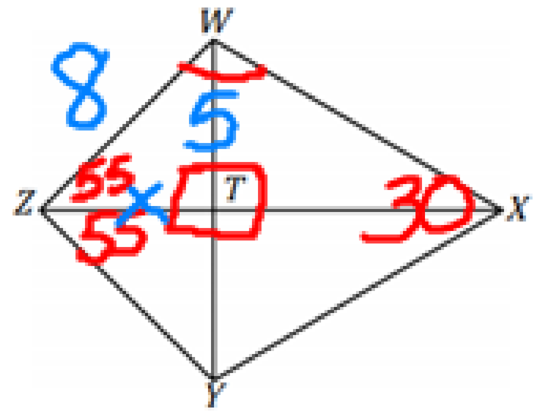
Criteria	Trapezoid	Parallelogram	Kite	Rhombus	Rectangle	Square
No parallel sides	☐	☐	☐	☐	☐	☐
Exactly one pair of parallel sides	☐	☐	☐	☐	☐	☐
Exactly one pair of sides are both congruent and parallel	☐	☐	☐	☐	☐	☐
Two pairs of opposite sides are congruent	☐	☐	☐	☐	☐	☐
Two pairs of opposite angles are congruent	☐	☐	☐	☐	☐	☐
Consecutive angles are supplementary	☐	☐	☐	☐	☐	☐
Diagonals bisect the vertex angles	☐	☐	☐	☐	☐	☐

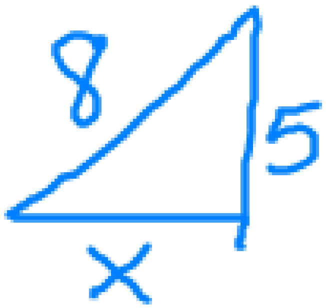
1. If two opposite angles of a quadrilateral are supplementary, is the quadrilateral a parallelogram?

   (A) No, because in parallelograms, angles are supplementary if and only if they are consecutive.
   (B) No, because opposite angles in a parallelogram are never congruent.
   (C) Yes, but only when the angles of the quadrilateral are right angles. Otherwise, it will be a trapezoid rather than a parallelogram.
   ● Yes, because only squares have that property, and squares are both parallelograms and quadrilaterals.



Consider kite $WXYZ$.





a. If $m\angle WZT = 55°$ and $m\angle WXY = 30°$, find $m\angle ZWX$.

$110 + 30 + 2x = 360$

$140 + 2x = 360$ $\quad 2x = 220$

$x = 110$

b. If $WZ = 8$ and $WT = 5$, find ZT.

$x^2 + 5^2 = 8^2$

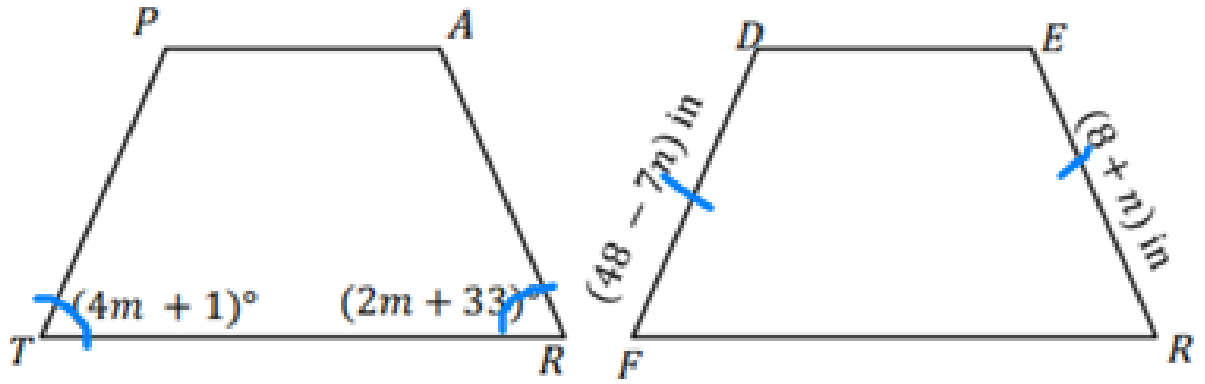
$x^2 + 25 = 64$

$-25 \quad -25$

$\sqrt{x^2} = \sqrt{39}$

$\sqrt{39}$

4. Consider isosceles trapezoids $TRAP$ and $FRED$.



Find m, n, $m\angle PTR$, $m\angle PAR$, and FD.

$4m+1 = 2m+33$

$-2m \quad -2m$

$2m+1 = 33$

$-1 \quad -1$

$2m = 32$

$m = 16$

$m\angle PTR = 4(16)+1$

$= 65°$

$m\angle PAR = 115°$

$48 - 7n = 8 + n$

$+7n \quad +7n$

$48 = 8 + 8n$

$-8 \quad -8$

$40 = 8n$

$5 = n$

$FD = 48 - 7(5)$

$= 13$

1. A diagonal of a rhombus that is on the coordinate plane can be modeled by the equation $6x + y = 13$. What is the slope of the other diagonal?

$y = mx + b$

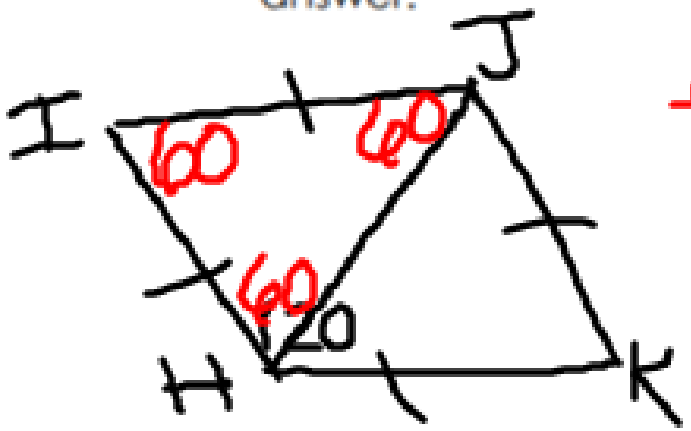
$6x + y = 13$

$-6x \quad -6x$

$y = -6x + 13 \quad m = -6$

$\frac{1}{6}$

2. In rhombus $HIJK$, $m\angle H$ is 120°. Does the diagonal $\overline{HJ}$ divide the rhombus into two equilateral triangles? Justify your answer.



$\frac{120}{2} = 60$ opp $\angle$'s $\cong$

$\triangle$'s sum = 180

yes