

The lengths of diagonals of a rectangle are represented by $5x$ yards and $7x - 18$ yards. Find the length of each diagonal.

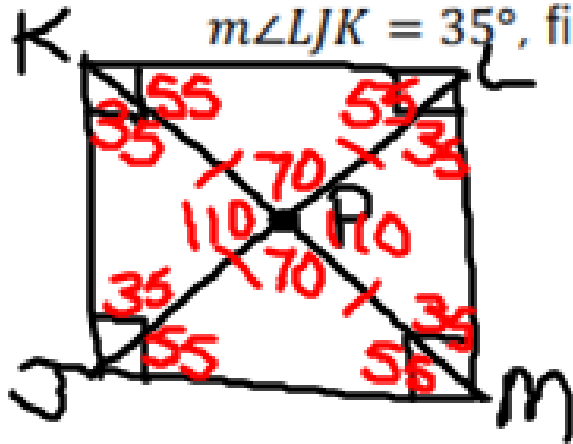
$$\begin{array}{r} 5x = 7x - 18 \\ - 7x \quad - 7x \\ \hline -2x = -18 \\ x = 9 \end{array}$$

$$5(9) = 45$$

$$7(9) - 18 = 45$$

$$\begin{array}{r} 90 \\ - 35 \\ \hline 55 \end{array}$$

Rectangle $JKLM$ has diagonals intersecting at P . If $m\angle LJK = 35^\circ$, find $m\angle LJM$, $m\angle JLK$, $m\angle JPK$, and $m\angle JPM$.



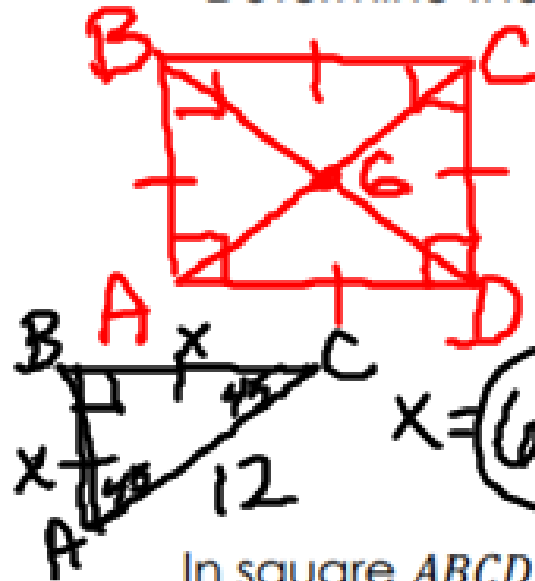
$$\begin{array}{l} m\angle LJM = 55 \\ m\angle JLK = 55 \\ m\angle JPK = 110 \\ m\angle JPM = 70 \end{array}$$

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

Criteria	Trapezoid	Parallelogram	Kite	Rhombus	Rectangle	Square
No parallel sides	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Exactly one pair of parallel sides	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>Exactly one pair of sides are both congruent and parallel</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Two pairs of opposite sides are congruent	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Two pairs of opposite angles are congruent	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Consecutive angles are supplementary	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Diagonals bisect the vertex angles	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

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.



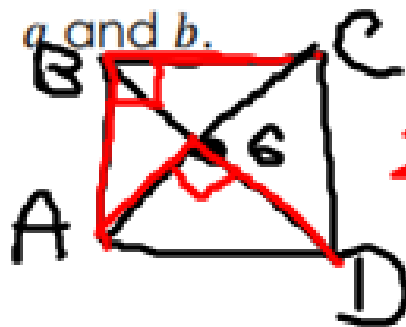
$$\begin{array}{r}
 9x - 6 = 21x - 30 \\
 -9x \quad -9x \\
 \hline
 -6 = 12x - 30 \\
 +30 \quad +30 \\
 \hline
 24 = 12x \\
 2 = x
 \end{array}$$

$x = 6\sqrt{2}$

$$\begin{array}{l}
 x^2 + x^2 = 12^2 \\
 2x^2 = 144 \\
 \frac{2x^2}{2} = \frac{144}{2} \\
 \sqrt{x^2} = \sqrt{72} \\
 \sqrt{x^2} = \sqrt{36 \cdot 2} \\
 x = 6\sqrt{2}
 \end{array}$$

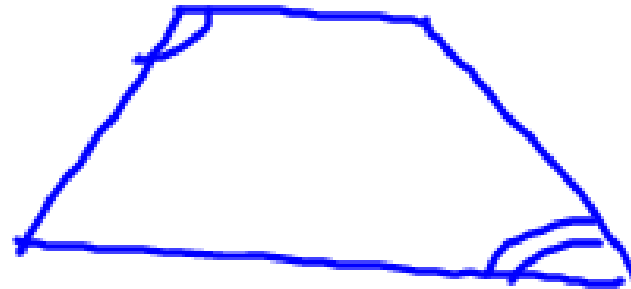
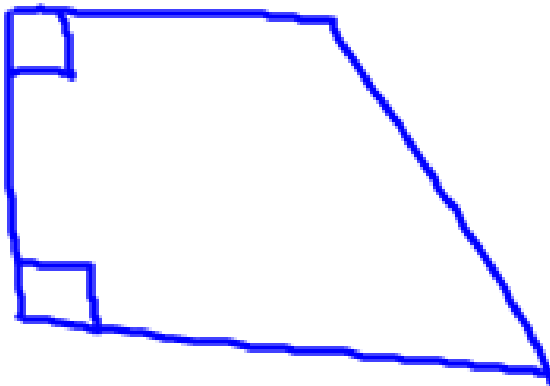
In square $ABCD$, the diagonals intersect at G .

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

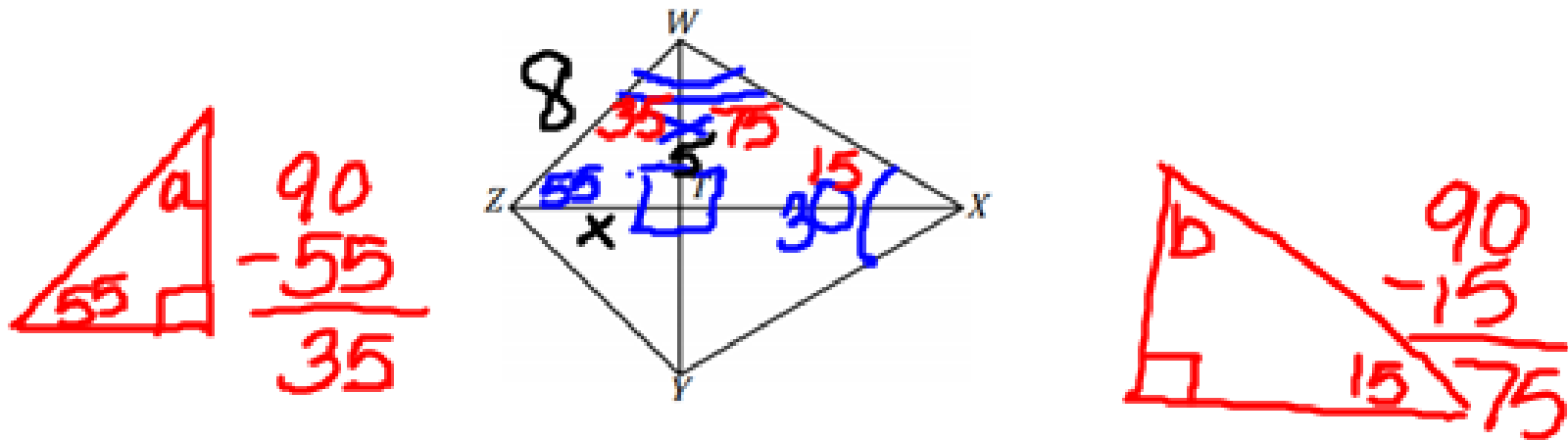


$$\begin{array}{r}
 a + 2b = 90 \rightarrow a + 2b = 90 \\
 2(2a - b = 90) \rightarrow 4a - 2b = 180 \\
 \hline
 5a = 270 \\
 a = 54 \\
 \hline
 54 + 2b = 90 \\
 -54 \quad -54 \\
 \hline
 2b = 36 \\
 b = 18
 \end{array}$$

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.
 - (D) Yes, because only squares have that property, and squares are both parallelograms and quadrilaterals.



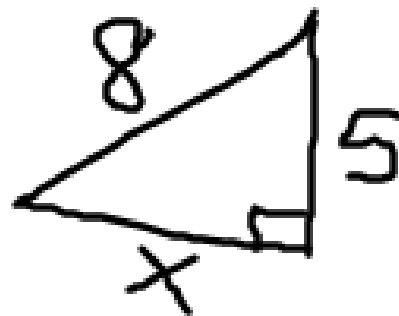
Consider kite $WXYZ$.



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

$$35 + 75 = 110^\circ$$

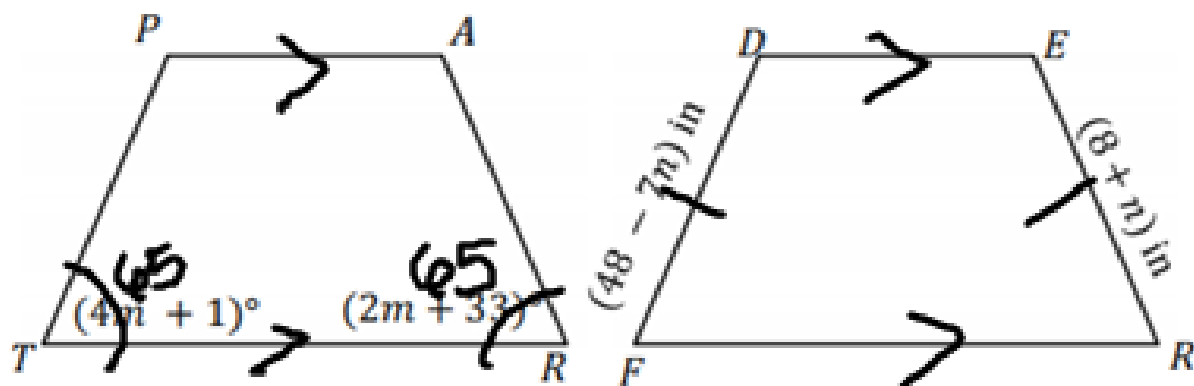
b. If $WZ = 8$ and $WT = 5$, find ZT .



$$\begin{aligned} x^2 + 5^2 &= 8^2 \\ x^2 + 25 &= 64 \\ -25 & \quad -25 \\ \hline \sqrt{x^2} &= \sqrt{39} \end{aligned}$$

$$x = \sqrt{39}$$

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



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

$$\begin{array}{r} 4m + 1 = 2m + 33 \\ -2m \quad -2m \\ \hline 2m + 1 = 33 \\ -1 \quad -1 \\ \hline 2m = 32 \end{array}$$

$$m = 16$$

$$m\angle PTR = 4(16) + 1 = 65^\circ$$

$$m\angle PAR = 180 - 65 = 115^\circ$$

$$\begin{array}{r} 48 - 7n = 8 + n \\ +7n \quad +7n \\ \hline 48 = 8 + 8n \\ -8 \quad -8 \\ \hline 40 = 8n \end{array}$$

$$40 = 8n$$

$$FD = 48 - 7(5) = 13$$

$$5 = n$$