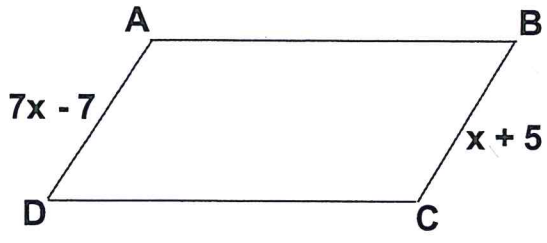


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Geometry

## Quadrilateral Properties with Algebra Segments

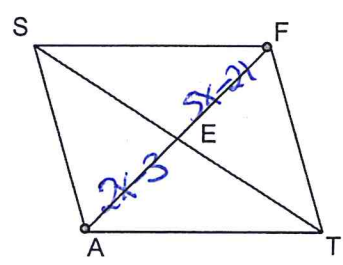
1. ABCD is a parallelogram. Find the measure of  $\overline{AD}$  and  $\overline{BC}$  and explain your answer.



A parallelogram has opposite sides congruent.  
 $7x-7 = x+5$   
 $-x \quad -x$   
 $6x-7 = 5$   
 $+7 \quad +7$   
 $6x = 12$   
 $\frac{6x}{6} = \frac{12}{6}$   
 $x = 2$

$7(2)-7 = 7$   
 $2+5 = 7$

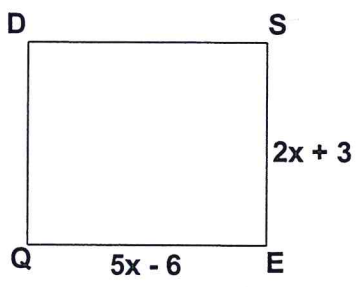
2. SFAT is a rhombus with  $\overline{AE} = 2x-3$  and  $\overline{EF} = 5x-21$ . Find  $\overline{EF}$  and explain your answer.



A rhombus has diagonals that bisect each other.  
 $2x-3 = 5x-21$   
 $-2x \quad -2x$   
 $-3 = 3x-21$   
 $+21 \quad +21$   
 $18 = 3x$   
 $\frac{18}{3} = \frac{3x}{3}$   
 $6 = x$

$5(6)-21 = 9$

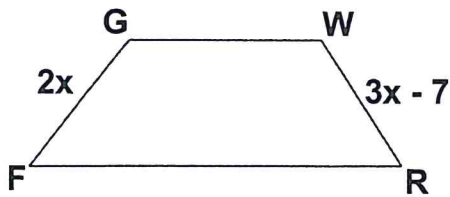
3. DSEQ is a square.  $m\overline{QE} = 5x-6$  and  $m\overline{SE} = 2x+3$ . Find all sides of the square and explain your answer.



Consecutive sides of a square are congruent.  
 $5x-6 = 2x+3$   
 $-2x \quad -2x$   
 $3x-6 = 3$   
 $+6 \quad +6$   
 $3x = 9$   
 $\frac{3x}{3} = \frac{9}{3}$   
 $x = 3$

$2(3)+3 = 9$   
 All sides are 9 because a square has all sides congruent.

4. Quad FGWR is an isosceles trapezoid. Find  $\overline{WR}$  and explain your answer.



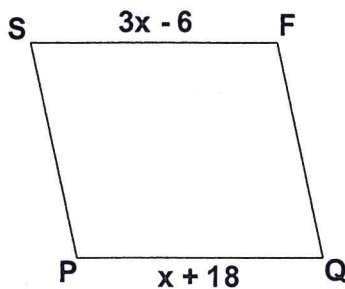
An isosceles trapezoid has congruent legs.

$$2x = 3x - 7$$

$$\begin{array}{r} -3x \\ \hline -x = -7 \\ \frac{-x}{-1} = \frac{-7}{-1} \\ x = 7 \end{array}$$

$3(7) - 7 = 14$

5. SFQP is a rhombus. Find  $\overline{FQ}$  and explain your answer.



A rhombus has opposite sides congruent.

$$3x - 6 = x + 18$$

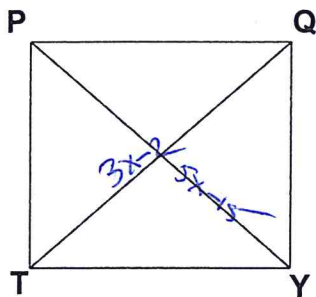
$$\begin{array}{r} -x \\ \hline 2x - 6 = 18 \\ +6 \quad +6 \\ \hline 2x = 24 \\ \frac{2x}{2} = \frac{24}{2} \\ x = 12 \end{array}$$

$3(12) - 6 = 30$

$FQ = 30$

A rhombus has all sides congruent.

6. PQYT is a square.  $\overline{QT} = 3x - 2$  and  $\overline{PY} = 5x - 15$ . Find  $\overline{QT}$  and  $\overline{PY}$  and explain your answer.



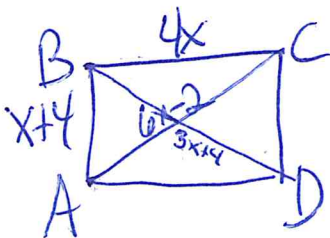
A square has congruent diagonals.

$$3x - 2 = 5x - 15$$

$$\begin{array}{r} -3x \\ \hline -2 = 2x - 15 \\ +15 \quad +15 \\ \hline 13 = 2x \\ \frac{13}{2} = \frac{2x}{2} \\ x = 6.5 \end{array}$$

$5(6.5) - 15 = 17.5$

7. In rectangle ABCD,  $\overline{AB} = x + 4$ ,  $\overline{BC} = 4x$ ,  $\overline{AC} = 6x - 2$ , and  $\overline{BD} = 3x + 4$ . Find  $\overline{AD}$ .



A rectangle has congruent diagonals.

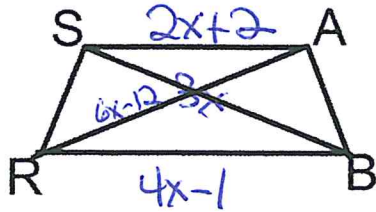
$$6x - 2 = 3x + 4$$

$$\begin{array}{r} -3x \\ \hline 3x - 2 = 4 \\ +2 \quad +2 \\ \hline 3x = 6 \\ \frac{3x}{3} = \frac{6}{3} \\ x = 2 \end{array}$$

$AD \cong BC$  because a rectangle has opposite sides congruent.

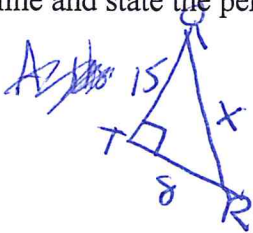
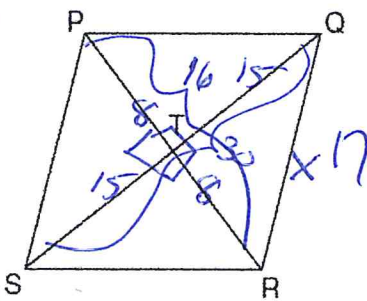
$4(2) = 8$

8. In trapezoid SABR,  $\overline{SA} = 2x+2$ ,  $\overline{SB} = 3x$ ,  $\overline{RB} = 4x-1$ , and  $\overline{AR} = 6x-12$ .  
What value of  $x$  would make SABR an isosceles trapezoid?



An isosceles trapezoid has congruent diagonals.  
 $6x-12 = 3x$   
 $-6x \quad -6x$   
 $-12 = -3x$   
 $\frac{-12}{-3} = \frac{-3x}{-3}$   
 $4 = x$

9. In the diagram of rhombus PQRS below, the diagonals  $\overline{PR}$  and  $\overline{QS}$  intersect at point T,  $PR = 16$ , and  $QS = 30$ . Determine and state the perimeter of PQRS.

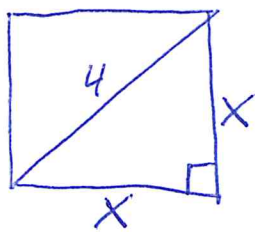


$(17)(4) = 68$   
 A rhombus has 4 equal sides.

$a^2 + b^2 = c^2$   
 $8^2 + 15^2 = x^2$   
 $64 + 225 = x^2$   
 $\sqrt{289} = \sqrt{x^2}$   
 $x = 17$

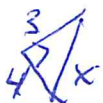
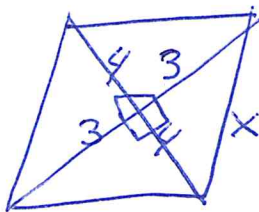
A rhombus/square has diagonals that bisect each other and are perpendicular forming right triangles. Use  $a^2 + b^2 = c^2$ .

10. A square has a diagonal that measures 4 inches. What is the length of one of its sides in simplest radical form?



$a^2 + b^2 = c^2$   
 $x^2 + x^2 = 4^2$   
 $2x^2 = 16$   
 $\frac{2x^2}{2} = \frac{16}{2}$   
 $\sqrt{x^2} = \sqrt{8}$   
 $\sqrt{4} \sqrt{2}$   
 $2\sqrt{2}$

11. A rhombus has diagonals that measure 6 and 8. Find the perimeter of the rhombus.



$a^2 + b^2 = c^2$   
 $3^2 + 4^2 = x^2$   
 $9 + 16 = x^2$   
 $25 = x^2$   
 $5 = x$

$4(5) = 20$

