Ex. Find the measure of \( TU \).

\[ 32 - 20 = 12 \]
\[ TU = 12 \]

Segment Addition Postulate

- If \( B \) is between \( A \) and \( C \), then \( AB + BC = AC \).
- If \( AB + BC = AC \), then \( B \) is \text{ in between } \( A \) and \( C \).

Ex 1. \( S \) is between \( T \) and \( V \). \( R \) is between \( S \) and \( T \). \( T \) is between \( R \) and \( Q \). \( QV = 18, QT = 6 \), and \( TR = RS = SV \). Make a \textit{sketch} and answer the following.

\[ 6 + x + x + x = 18 \]
\[ 6 + 3x = 18 \]
\[ 3x = 12 \]
\[ x = 4 \]

a. \( RS = \frac{4}{x} \) 

b. \( QS = \frac{14}{6 + x + x} \)

\[ 2 \cdot x \]
\[ 6 + 8 \]

c. \( TS = \frac{8}{3x} \)

d. \( TV = \frac{12}{3x} \)
Ex 2. If $RS = 8y + 4$, $ST = 4y + 8$, and $RT = 15y - 9$,

Find the value of $y$ and the lengths of $RS$, $ST$, and $RT$.

Is $RS \cong ST$? **No**

\[
\begin{align*}
RS + ST &= RT \\
(8y + 4) + (4y + 8) &= 15y - 9 \\
12y + 12 &= 15y - 9 \\
12y - 12y &= 15y - 12y - 9 \\
0 &= 3y - 9 \\
\frac{3y - 9}{3} &= y \\
7 &= y
\end{align*}
\]

**Segment Addition Post.**

\[
\begin{align*}
RS &= 8y + 4 = 8 \cdot 7 + 4 = 60 \\
ST &= 4y + 8 = 4 \cdot 7 + 8 = 36 \\
RT &= 15y - 9 = 15 \cdot 7 - 9 = 96 \checkmark
\end{align*}
\]

Ex 3. Suppose $J$ is between $H$ and $K$. Use the Segment Addition Postulate to solve for $x$.

Then find the length of each segment.

\[
\begin{align*}
HJ &= 2x + \frac{1}{3} \\
JK &= 5x + \frac{2}{3} \\
KH &= 12x - 4
\end{align*}
\]

\[
\begin{align*}
HJ + JK &= HK \\
2x + \frac{1}{3} + 5x + \frac{2}{3} &= 12x - 4 \\
7x + 1 &= 12x - 4 \\
-7x &= 5x - 4 \\
1 &= 5x - 4 \\
\frac{1}{5} &= x
\end{align*}
\]

**HJ**: $2(\frac{1}{3}) = \frac{2}{3}$

**JK**: $5(\frac{2}{3}) = \frac{10}{3}$

**HK**: $12(\frac{1}{3}) - 4 = 8 \checkmark$

**You Try! 1.** Find the value of $x$ and all of the missing segment lengths.

\[
\begin{align*}
13 + 6 + 2x - 18 &= 4x - 29 \\
2x + 1 &= 4x - 29 \\
\frac{1}{2} &= 2x - 29 \\
36 &= 2x \\
15 &= x
\end{align*}
\]

\[
\begin{align*}
UV &= 2(15) - 18 = 30 - 18 = 12 \\
SV &= 4(15) - 29 = 31
\end{align*}
\]
You Try! 2. Find value of \( y \) and \( QP \) given the information in the figure.

\[
\begin{align*}
2y + 21 &= 3y + 1 \\
-2y & \quad -2y \\
21 &= y + 1 \\
-1 & \quad -1 \\
20 &= y \\
\end{align*}
\]

\[
\begin{align*}
Q &= 2y \\
&= 20 \\
QP &= 40
\end{align*}
\]

You Try! 3. Find \( x \) and \( BC \) if \( B \) is between \( A \) and \( C \), \( AC = 4x - 12 \), \( AB = x \), \( BC = 2x + 3 \).

Draw and label a picture!

\[
\begin{align*}
2x + 3 &= 4x - 12 \\
-2x & \quad -2x \\
3 &= x - 12 \\
+12 & \quad +12 \\
15 &= x
\end{align*}
\]

\[
BC = 2x + 3 \\
= 2 \cdot 15 + 3 \\
= 30 + 3 \\
= 33
\]

You Try! 4. Find the value of \( x \) and each segment length if \( L \) is between \( N \) and \( M \), \( NL = 6x - 5 \), \( LM = 2x + 3 \), \( NM = 30 \). Draw and label a picture!

\[
\begin{align*}
6x - 5 & \quad 2x + 3 \\
N & \quad L \\
\end{align*}
\]

\[
\begin{align*}
6x - 5 + 2x + 3 &= 30 \\
8x - 2 &= 30 \\
+2 & \quad +2 \\
8x &= 32 \\
\frac{8x}{8} &= \frac{32}{8} \\
x &= 4 \\
NL &= 19 \\
LM &= 11
\end{align*}
\]
Ex 4. Given the information in the figure, find $WX$.

$WX + XY = 6$
$WX = XY$
$WX + WX = 6$

$2WX = 6$
$\frac{2WX}{2} = \frac{6}{2}$
$WX = XY = 3$

Ex 5. Given $S$ is between $R$ and $T$ and $RS = 4x, RS \cong ST$ and $RT = 24$, solve for $x$ and find all the segment lengths.

$4x + 4x = 24$
$8x = 24$
$x = 3$

$RS = ST = 4 \cdot 3 = 12$

Ex 5. Find the perimeter of the shape shown in the figure.

Add up all the sides!!

$3x + 5 = 5x - 1$
$-3x
$5 = 2x - 1$
$+1
$\frac{5}{2} = 2x
$\frac{1}{2}$
$3 = x$

Need $XY, XZ + YZ$

Sides are congruent

$XY = 3 \cdot 3 + 5 = 9 + 5 = 14$
$XZ = 5 \cdot 3 - 1 = 15 - 1 = 14$
$YZ = 9 \cdot (3) = \frac{27}{2} = 13 \frac{1}{2}$

$P = XY + XZ + YZ$
$= 14 + 14 + 13 \frac{1}{2}$
$P = 41 \frac{1}{2}$

GE Segment addition postulate KFC 2019

4