Answer Key

1. TU = 2x, UB = 3x + 1, TB = 21

$TU + UB = TB$
$2x + 3x + 1 = 21$
$5x + 1 = 21$
$5x = 20$
$x = 4$

$TU = 2x$
$= 2(4)$
$= 8$
$UB = 3x + 1$
$= 3(4) + 1$
$= 12 + 1$
$= 13$

x = 4
TU = 8
UB = 13

2. TU = 4x-1, UB = 2x -1, TB = 5x

$TU + UB = TB$
$4x - 1 + 2x - 1 = 5x$
$6x - 2 = 5x$
$+2 \quad +2$
$6x = 5x + 2$
$-5x \quad -5x$
$x = 2$

$TU = 4x - 1$
$= 4(2) - 1$
$= 8 - 1$
$= 7$
$UB = 2x - 1$
$= 2(2) - 1$
$= 4 - 1$
$= 3$

x = 2
TU = 7
UB = 3
TB = 10

$TB = TU + UB$
$TB = 3 + 7$
$TB = 10$

Write an equation **for the each:** $\overline{AB} \cong \overline{BC}$

3. Segment AB is congruent to segment BC $AB = BC$
4. $\overline{XY} \cong \overline{AB}$ $XY = AB$
5. Point B bisects segment AC $AB = BC$
6. 2x+5 is equal to 4x-8 $2x + 5 = 4x - 8$
7. Point A is the midpoint of segment PT $PA = AT$

$\overline{AB} \cong \overline{BC}$

$\overline{PA} \cong \overline{AT}$

For 8 and 9 **suppose** $\overline{RS}$ **is congruent to** $\overline{MN}$**. For each set of lengths, solve for x, and find the length of each segment.** **For** 10-12, $\overline{AB} \cong \overline{BC}$.

8. RS = 3x + 17, MN = 7x - 15

$\overline{RS} \cong \overline{MN}$
$RS = MN$
$3x + 17 = 7x - 15$
$-3x \quad -3x$
$17 = 4x - 15$
$+15 \quad +15$
$32 = 4x$
$x = 8$

$RS = 3x + 17$
$= 3(8) + 17$
$= 24 + 17$
$= 41$

x = 8
RS = 41
MN = 41

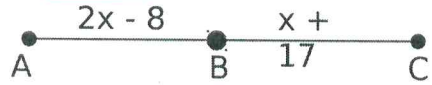
9. RS = x + 10, MN = 2x + 4

$\overline{RS} \cong \overline{MN}$
$RS = MN$
$x + 10 = 2x + 4$
$-x \quad \rightarrow$
$10 = x + 4$
$-4 \quad -4$
$6 = x$

$RS = x + 10$
$= 6 + 10$

x = 6
RS = 16
MN = 16

10.



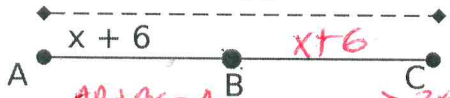
$\overline{AB} \cong \overline{BC}$
$2x - 8 = x + 17$
$+8 \quad +8$
$2x = x + 25$
$-x \quad \rightarrow$
$x = 25$

$AB = 2x - 8$
$= 2(25) - 8$
$= 42$

$AB + BC = AC$
$42 + 42 = AC$
$84 = AC$

x = 25
AB = 42
BC = 42
AC = 84

11.



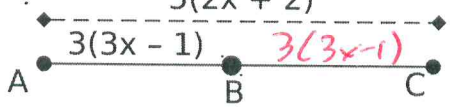
$AB + BC = AC$
$x + 6 + x + 6 = 3x - 31$
$2x + 12 = 3x - 31$
$-2x \quad -2x$
$12 = x - 31$
$+31 \quad +31$
$43 = x$

$AB = x + 6$
$= 43 + 6$
$= 49$

$49 + 49 = 98$

x = 43
AB = 49
BC = 49
AC = 98

12.



$AB + BC = AC$
$3(3x-1) + 3(3x-1) = 5(2x+2)$
$9x - 3 + 9x - 3 = 10x + 10$
$18x - 6 = 10x + 10$
$-10x \quad -10x$
$8x - 6 = 10$
$+6 \quad +6$
$8x = 16$
$x = 2$

$AB = 3(3x-1)$
$= 3(3(2)-1)$
$= 3(6-1)$
$= 3(5)$
$= 15$

x = 2
AB = 15
BC = 15
AC = 30

or

$AB + BC = AC$
$BC = AC - AB$
$BC = 5(2x+2) - 3(3x-1)$
$BC = 10x + 10 - 9x + 3$
$BC = x + 13$
$AB = BC$
$3(3x-1) = x + 13$
$9x - 3 = x + 13$
$-x \quad -x \quad -3 \quad -3$
$8x = 16$
$x = 2$