Betweenness and Midpoints

1. Point $B$ is between points $A$ and $C$. If $AB = 3x - 1$, $BC = 9x + 8$, and $AC = 139$, find the measure of $BC$.

2. Point $G$ is the midpoint of $RH$. It is known that $RG = 7x - 23$ and $RH = 6x + 90$. Find the value of $GH$.

3. It is known that $XY = 4x - 3$, $ZY = 11x - 60$, and $XZ = 2x + 13$. If point $X$ is between the other two points, find the value of $XY$.

4. Assume that $ST + TU = SU$. The ratio between the lengths of $ST$ and $TU$ is 1:3. If $SU$ has a length of 148, find the value of $TU$.  

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5. Assume that point \( N \) is halfway between points \( L \) and \( M \). If \( \overline{NL} = 16x - 9 \), \( \overline{MN} = 11x + 96 \), and \( \overline{LM} = 20x + 234 \), find the length of \( \overline{LM} \).

6. Assume that \( \overline{FH} = \frac{1}{2}(\overline{FG}) \). If \( \overline{FH} = 9x - 21 \) and \( \overline{HG} = 4x + 14 \), find the length of \( \overline{FG} \).

7. Points \( A, B, C, \) and \( D \) are lined in a straight line, respectively. If \( \overline{AB} = 3(2x - 5) \), \( \overline{BC} = 7x + 13 \), \( \overline{CD} = 2x - 2 \), and \( \overline{AD} = 131 \), find the measure of \( \overline{BD} \).

8. Lower Moreland is running a field trip to the Jersey Shore! The bus driver was told to stop 37 miles into the trip (the half-way marker). If the entire journey can be represented by the expression \( 13x - 30 \), find the value of \( x \).
9. Assume that $M$ is the midpoint of $JB$ and $W$ is the midpoint of $JM$. If $JM = 8x + 10$ and $MB = 11x - 23$, find the measure of $WM$.

10. Assume that $S$ is the midpoint of $RT$ and $U$ is between points $S$ and $T$. It is known that $RS = 12x - 7$, $ST = 5x + 70$, $SU = 8y + 24$, and $UT = 3y + 2$. Find the measure of $SU$.

11. Assume that $F$ is between $DA$ and $A$ is the midpoint of $FR$. If $DF = 9x - 4$, $FA = 3x + 18$, and $DA = 9x + 44$, find the measure of $DR$.

12. Assume that $B$ is located between points $A$ and $C$. Also assume that $AB = 2x + 1$, $BC = 3y + 2$, $AC = 20$, and $AC = 11x - 8y$. Find the values of $x$ and $y$. (Hint: Think systems of equations!)