Problem Solving Using Equations

Set up and solve each equation.

The sum of twice a number and 21 is 83.
Find the number.

\[ 2n + 21 = 83 \]
\[ 2n + 21 - 21 = 83 - 21 \]
\[ 2n = 62 \]
\[ n = 31 \]
The number is 31.

1. Twice a number, diminished by 17 is 3. Find the number.
   \[ 2x - 17 = -3 \]
   \[ x = 7 \]

2. Six times a number, increased by 3 is 27. Find the number.
   \[ 6x + 3 = 27 \]
   \[ x = 4 \]

3. Three times the difference of 5 minus a number is 27. Find the number.
   \[ 3(5 - x) = 27 \]
   \[ x = -4 \]

4. Karl's team score is 39 points. This was one point less than twice Todd's team score. Find Todd's team score.
   \[ 2x - 1 = 39 \]
   \[ x = 19 \]

5. The length of a rectangle is 6 feet more than twice the width. If the length is 24 feet, what is the width?
   \[ 2x + 6 = 24 \]
   \[ x = 9 \]

6. Four fifths of the third grade went on a trip to the zoo. If 64 children made the trip, how many children are in the third grade?
   \[ \frac{4}{5} x = 64 \]
   \[ x = 80 \]

7. The price of a pack of gum today was 63¢. This is 3¢ more than three times the price ten years ago. What was the price ten years ago?
   \[ 3x + 0.03 = 0.63 \]
   \[ x = 0.20 \]

8. The sum of three consecutive integers is 279. Find the integers.
   \[ x + x+1 + x+2 = 279 \]
   \[ x = 92, 93, 94 \]

9. The sum of two consecutive odd integers is 112. Find the integers.
   \[ x + x+2 = 112 \]
   \[ x = 55, 57 \]

10. Find four consecutive integers such that the sum of the second and fourth is 132.
    \[ x + 1 + x + 3 = 132 \]
    \[ x = 64 \]
    \[ 64, 65, 66, 67 \]

11. Find three consecutive odd integers such that their sum decreased by the second equals 50.
    \[ x + x+2 + x+4 - (x+2) = 50 \]
    \[ x + x + 2 + x + 4 - x - 2 = 50 \]
    \[ 2x + 4 = 50 \]
    \[ x = 23, 25, 27 \]
More Problem Solving Using Equations

Set up and solve each equation.

The sum of two numbers is 52. The difference of the same two numbers is 20. Find the numbers.

\[
\begin{align*}
x &= \text{one number} \\
x - (52 - x) &= 20 \\
x - 52 + x &= 20 \\
2x - 52 &= 20 \\
2x - 52 + 52 &= 20 + 52 \\
2x &= 72 \\
\frac{2x}{2} &= \frac{72}{2} \\
x &= 36
\end{align*}
\]

52 - x = second number

\[
52 - x = 52 - 36 = 16
\]

The numbers are 36 and 16.

1. One number is four times another. Their sum is 35. Find the numbers.

\[
x + 4x = 35 \quad \quad \quad x = \frac{35}{5} = 7 \quad \quad \quad 7, 28
\]

2. The sum of two numbers is 21. One number is three less than the other. Find the numbers.

\[
x - 3 + x = 21 \quad \quad \quad x = 12
\]

3. The greater of two numbers is one less than 8 times the smaller. Their sum is 98. Find the numbers.

\[
8x - 1 + x = 98 \quad \quad \quad x = 11 \quad \quad \quad 11, 87
\]

4. In a triangle, the second angle measures twice the first, and the third angle measures 5 more than the second. If the sum of the angles measures is 180°, find the measure of each angle.

\[
x + 2x + 2x + 5 = 180 \quad \quad \quad x = 35
\]

\[
35, 70, 75
\]

5. The length of a rectangle is 4 centimeters (cm) less than three times the width. The perimeter is 64 cm. Find the width and length.

(Hint: Perimeter = 2l + 2w)

\[
2(x) + 2(3x - 4) = 64 \quad \quad \quad x = 9
\]

\[
6 = 9 \\
l = 23
\]

6. The sum of three numbers is 64. The second number is 3 more than the first. The third number is 11 less than twice the first. Find the numbers.

\[
x + x + 3 + 2x - 11 = 64 \quad \quad \quad x = 18 \quad \quad \quad 18, 21, 25
\]

7. Bill can type 19 words per minute faster than Bob. Their combined typing speed is 97 words per minute. Find Bob’s typing speed.

\[
x + 19x = 97 \quad \quad \quad x = \frac{97}{20}
\]

\[
x + (x + 19) = 97 \\
2x + 19 = 97 \\
2x = 78 \\
x = \frac{78}{2} = 39 \text{ wpm}
\]

\[
x + 19 = 57 \text{ wpm}
\]