

2.4: Applications of Linear Equations

2.4.1

Note Title

9/26/2018

Example: One number is four more than twice ^{2x} another number. Their sum is 22. Find the numbers.

"one number": $2x + 4$

"another number": x

one number $\xrightarrow[\text{to}]{\text{compared to}}$ another number ~~x~~

$$\underbrace{(2x+4) + (x)}_{\text{sum}} = 22$$

$$2x + 4 + x = 22$$

$$3x + 4 = 22$$

$$3x = 18$$

$$\frac{3x}{3} = \frac{18}{3}$$

$$x = 6$$

Still need to answer the original question:

another number: $x = 6$

one number: $2x + 4$

$$\begin{aligned} \text{substitute } x=6 &\Rightarrow 2(6) + 4 \\ &= 12 + 4 \\ &= 16 \end{aligned}$$

The numbers are 6 and 16.

Example: One number is five more than twice another. If their sum is decreased by ^{2x}10, the result is 22. Find the numbers.

one number: $2x + 5$

another number: x

$$\underbrace{(2x+5) + (x)}_{\text{sum}} - 10 = 22$$

$$2x + 5 + x - 10 = 22$$

$$3x - 5 = 22$$

$$3x = 27$$

$$\frac{3x}{3} = \frac{27}{3}$$

$$x = 9$$

another number: $x = 9$

one number: $2x + 5$

$$x = 9 \Rightarrow 2(9) + 5 = 18 + 5 = 23$$

The numbers are 9 and 23.

Ex. Five times the sum of a
number and seven is thirty.
_x ₇
Find the number.

2.1.3

The unknown number: x

$$5(\text{sum})$$

$$= 30$$

$$5(x+7)$$

$$= 30$$

$$5x + 35$$

$$= 30$$

$$- 35$$

$$- 35$$

$$5x = -5$$

$$\frac{5x}{5} = \frac{-5}{5}$$

$$x = -1$$

The number is -1 .

Ex.: Find four consecutive integers whose sum is 74.

1st integer: x

2nd integer: $x+1$

3rd integer: $x+2$

4th integer: $x+3$

$$\text{Sum} = 74$$

$$(x) + (x+1) + (x+2) + (x+3) = 74$$

$$x + x+1 + x+2 + x+3 = 74$$

$$4x + 6 = 74$$

$$\begin{array}{r} -6 \\ 4x = 68 \end{array}$$

$$\frac{4x}{4} = \frac{68}{4}$$

$$x = 17$$

1st integer: $x = 17$

2nd integer: $x+1$

$$x=17 \Rightarrow 17+1=18$$

3rd integer: $x+2$

$$x=17 \Rightarrow 17+2=19$$

4th integer: $x+3$

$$17+3=20$$

The four integers
are 17, 18, 19, 20,

Ex: Find three consecutive even integers whose sum is 120.

2.4.5

1st integer: x

2nd integer: $x+2$

3rd integer: $x+4$

$$(x) + (x+2) + (x+4) = 120$$

$$x + x+2 + x+4 = 120$$

$$3x + 6 = 120$$

$$3x = 114$$

$$\frac{3x}{3} = \frac{114}{3}$$

$$x = 38$$

1st integer: $x = 38$

2nd integer: $x+2$

$$x=38 \Rightarrow 38+2=40$$

3rd: $x+4$

$$x=38 \Rightarrow 38+4=42$$

The integers are 38, 40, and 42.

Note:

Consecutive integers

x

$x+1$

$x+2$

$x+3$

$x+4$

Consecutive even integers

x

$x+2$

$x+4$

$x+6$

$x+8$

Consecutive odd integers

x

$x+2$

$x+4$

$x+6$

$x+8$

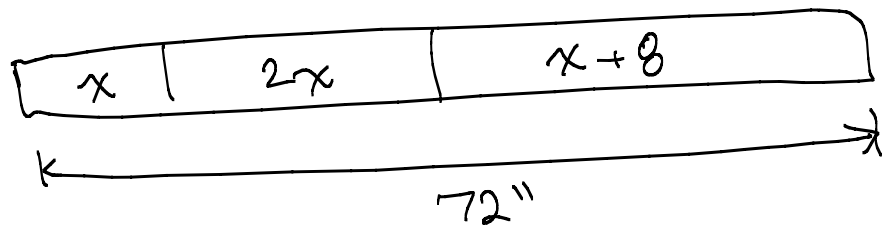
Example: A 72-inch board is cut into

three pieces. The second piece is $2x$ as long as the first piece. The third piece is $x + 8$ inches longer than the first piece.
How long are the pieces?

1st piece: x

2nd piece: $2x$

3rd piece: $x + 8$



$$(x) + (2x) + (x + 8) = 72$$

$$x + 2x + x + 8 = 72$$

$$4x + 8 = 72$$

$$4x = 64$$

$$x = 16$$

1st piece: 16

2nd: $2x = 2(16) = 32$

3rd: $x + 8 = 16 + 8 = 24$

The pieces are 16", 32", and 24" long.

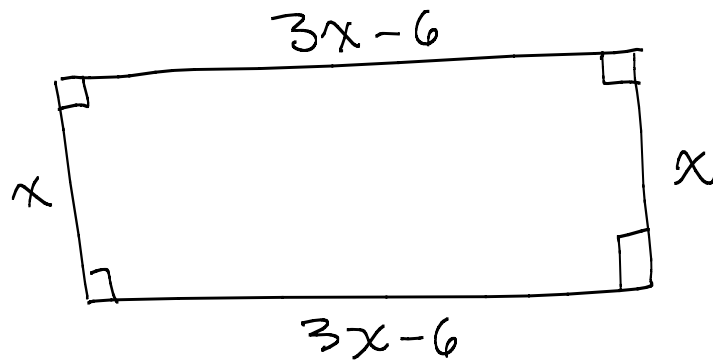
2.6: Geometry Applications

2.6.1

Ex. The perimeter of a rectangular garden is 100 feet. The length is 6 feet less than three times the width. Find the dimensions of the garden.

$$\begin{aligned}\text{length: } & 3x - 6 \\ \text{width: } & x\end{aligned}$$

length $\xrightarrow[\text{to}]{\text{compared to}}$ width



$$\text{Perimeter} = 100 \text{ ft or}$$

$$(x) + (3x - 6) + (x) + (3x - 6) = 100$$

$$x + 3x - 6 + x + 3x - 6 = 100$$

$$8x - 12 = 100$$

$$8x = 112$$

$$\frac{8x}{8} = \frac{112}{8}$$

$$x = 14$$

$$\text{width: } x = 14$$

$$\text{length: } 3x - 6 = 3(14) - 6 = 42 - 6 = 36$$

$$2(\text{length}) + 2(\text{width}) = \text{Perimeter}$$

$$2(3x - 6) + 2x = 100$$

$$6x - 12 + 2x = 100$$

$$8x - 12 = 100$$

$$8x = 112$$

$$x = 14$$

The width is 14 ft
and the length is 36 ft.