Section 2.5: Applications of Linear Eqns

Note Title 1/22/2015

Problem from prereading Assignment (Similar to Ex 2, p. 185)

One number is 4 more than twice another. Their sum is 22. Find the numbers.

another: x; twice another: $2x$; 4 more than twice another: $2x+4$

One number: $2x+4$

Another number: x

one number —compared to→ another number x

$$x + 2x + 4 = 22$$
$$3x + 4 = 22$$
$$3x = 18$$
$$\frac{3x}{3} = \frac{18}{3}$$
$$x = 6$$

Another number: $x = 6$

One number: $2x+4$

$x = 6 \Rightarrow 2(6)+4 = 12+4 = 16$

The numbers are 6 and 16.

2.5 #10 One number is five more than twice another. If their sum is decreased by ten, the result is 22. Find the numbers.

One number: $2x+5$

Another number: x

One number —compared to→ another # x

$$\underbrace{2x+5+x}_{\text{sum}} - 10 = 22$$
$$3x - 5 = 22$$
$$+5 \quad +5$$
$$3x = 27$$
$$x = 9$$

another number: $x = 9$

one number: $2x+5 = 2(9)+5 = 18+5 = 23$

The numbers are 9 and 23.

Check answer on next page.

Check of previous answer:

Twice 9: 18
5 more: $18+5=23$ } 1st sentence checks ✓

Sum: $23+9=32$
Decrease it by 10: 22 ✓ 2nd sentence checks.

$$\begin{array}{r} {\scriptstyle 1} \\ 23 \\ +\ 9 \\ \hline 32 \end{array}$$

Ex: The perimeter of a rectangle is 100 ft. The length is 6 ft less than three times the width. What are the length and width?

three times the width: $3x$ (width = x)

length: $3x-6$
width: x

length —compare to→ width x

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

$8x - 12 = 100$

$8x = 112$

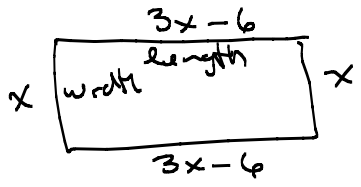
$\frac{8x}{8} = \frac{112}{8}$

$x = 14$

$$8\overline{)112}\quad 14$$
$$\begin{array}{r} 8 \\ \hline 32 \\ 32 \\ \hline 0 \end{array}$$

width: $x=14$

length: $3x-6$
$= 3(14)-6$
$= 42-6 = 36$



Could also write:
Perimeter = 2(length) + 2(width)
$2x + 2(3x-6) = 100$
$2x + 6x - 12 = 100$
$8x - 12 = 100$

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

Check: Is perimeter 100 ft? $2(14) + 2(36)$
$= 28 + 72 = 100$ ✓

3 times width: $3(14) = 42$
6 ft less: 36 ✓

2.5 #28 One side of a triangle is 6 meters more than twice the shortest side. The third side is 9m more than the shortest side. The perimeter is 75 meters. Find all the sides.

One side: $2x+6$
shortest side: x
third side: $x+9$

one side —compare to→ shortest side (x)
third side —compare to→ shortest side (x)

$$2x+6+x+x+9=75$$
$$4x+15=75$$
$$4x=60$$
$$\frac{4x}{4}=\frac{60}{4}$$
$$x=15$$

shortest side: $x=15$
one side: $2x+6=2(15)+6=36$
third side: $x+9=15+9=24$

The sides are 15m, 36m, and 24m long.

2.5 #12 Cary is 9 years older than Dan. In 7 years, the sum of their ages will be 93. Find the age of each man now.

	Age now	Age in 7 years
Dan	x	$x+7$
Cary	$x+9$	$x+9+7=x+16$

Cary's age now —compare to→ Dan's age now (x)

$$x+7+x+16=93$$
$$2x+23=93$$
$$2x=70$$
$$x=35$$

Dan's age now: 35
Cary's age now: $x+9=35+9=44$.

Dan is 35 now and Cary is 44.

We'll do the money problems in 2.5 Tuesday.

For now, let's do consecutive integer problem from 2.6.

Ex:
Find four consecutive integers whose sum is 74.

1st integer: x

2nd integer: $x+1$

3rd integer: $x+2$

4th integer: $x+3$

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

$$4x + 6 = 74$$

$$4x = 68$$

$$\begin{array}{r} 17 \\ 4\overline{)68} \\ 4 \\ \hline 28 \\ 28 \\ \hline 0 \end{array}$$

$x = 17$ ← 1st integer:

2nd integer: $x+1 = 17+1 = 18$

3rd: $x+2 = 17+2 = 19$

4th: $x+3 = 17+3 = 20$

The integers are 17, 18, 19, 20.

Note: consecutive even integers: x
$x+2$
$x+4$
$x+6$ ...

consecutive odd integers: x
$x+2$
$x+4$ ...

Pre reading Assignment: Read Section 2.7. (p206 – 211) stop at D. (compound inequalities)
Rework Example 7
Similar Example: matched Problem #7