Note Title 9/2/2015

# Prereading Assignment from 2.5

(similar)

Extra example:

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

$2x$ $x$

One number: $2x + 4$

Another number: $x$

One number — compared to → another number $x$

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

Another number: $x = 6$

One numbers: $2x+4$

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

Answer in a complete sentence:

The numbers are 6 and 16.

# Homework Qs from 2.3

**2.3 #21** $-0.7(2x-7) = 0.3(11-4x)$

$-0.7(2x) - 0.7(-7) = 0.3(11) + 0.3(-4x)$

$-1.4x + 4.9 = 3.3 - 1.2x$

$-1.4x + 1.2x = 3.3 - 4.9$

$-0.2x = -1.6$

$\frac{-0.2x}{-0.2} = \frac{-1.6}{-0.2}$

$x = +\frac{1.6}{0.2}\left(\frac{10}{10}\right)$

$x = \frac{16}{2}$

$x = 8$

$\{8\}$

1.4
−1.2
0.2

4.9
−3.3
1.6

OR, switch to fractions:

From here: $-0.2x = -1.6$

$-\frac{2}{10}x = -\frac{16}{10}$

$-\frac{1}{5}x = -\frac{8}{5}$

$\left(-\frac{5}{1}\right)\left(-\frac{1}{5}x\right) = \left(-\frac{8}{5}\right)\left(-\frac{5}{1}\right)$

$x = +8$

$\{8\}$

**2.3 #25** $\frac{3}{4}(8x-4)+3 = \frac{2}{5}(5x+10)-1$

$\frac{3}{4}(8x) + \frac{3}{4}(-4) + 3 = \frac{2}{5}(5x) + \frac{2}{5}(10) - 1$

$6x - 3 + 3 = 2x + 4 - 1$

$6x = 2x + 3$

$6x - 2x = 3$

$4x = 3$

$\frac{4x}{4} = \frac{3}{4} \Rightarrow x = \frac{3}{4}$

$\left\{\frac{3}{4}\right\}$

2.3 #35

$$5(x-2)-(3x+4)=3(6x-8)+10$$

$$5x-10-3x-4=18x-24+10$$

$$2x-14=18x-14$$

$+14$ $+14$

$$2x=18x$$

$-18x$ $-18x$

$$-16x=0$$

$$\frac{-16x}{-16}=\frac{0}{-16}$$

$$x=0$$

Sol'n Set: $\{0\}$

**Note:** Suppose I had $-16x+3=-16x-7$

$+16x$ $+16x$

$$3=-7$$

$+7$ $+7$

$10=0$ False

Solution Set: $\emptyset$ (empty set)

No Solution

**Note:** Suppose I had $-2(8x+1)=-10x-2-6x$

$$-16x-2=-16x-2$$

$+16x$ $+16x$

$-2=-2$

$+2$ $+2$

$0=0$ True for every $x$

Sol'n Set: All real numbers

In xyz homework:

Enter DNE for No Solution

Enter oo for All real numbers

↖ lower-case letter oh's

2.3 #57) $x + (x+3)(-3) = x - 3$

$x - 3x - 9 = x - 3$

$-2x - 9 = x - 3$

$-3x - 9 = -3$

$-3x = 6$

$x = -2$

$\{-2\}$

Could write:

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

$x - 3x - 9 = x - 3$

$-2x - 9 = x - 3$

## 2.5: Applications of Linear equations

2.5 #8) One number is three less than another. Their sum is fifteen. Find the numbers.

another: $x$

one number: $x - 3$

one number $\xrightarrow{\text{compared to}}$ another

one number: $x - 3$

another number: $x$

$x - 3 + x = 15$

$2x - 3 = 15$

$2x = 18$

$x = 9$

another: $x = 9$

one number: $x - 3 = 9 - 3 = 6$

The numbers are 6 and 9.

**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: $x$

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

$$3x - 5 = 22$$
$$+5 \qquad +5$$

$$3x = 27$$

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

$$x = 9$$

another: $x = 9$

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

**The two numbers are 9 and 23.**

Check:

1st sentence { twice another: twice the small one: $2(9)=18$
5 more: $18+5=23$ ✓

2nd sentence: Sum: $23 + 9 = 32$

Decrease by 10: 22 ✓

**Example:** The perimeter of a rectangle is 80 ft. The length is 9 ft more than the width. What are the dimensions?

length: $x+9$

width: $x$

Perimeter = 80

$x + (x+9) + x + (x+9) = 80$

$x + x + 9 + x + x + 9 = 80$

$4x + 18 = 80$

$-18 \quad -18$

$4x = 62$

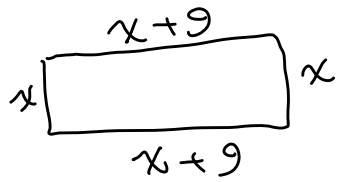
$\frac{4x}{4} = \frac{62}{4}$

$x = \frac{31}{2} = 15\frac{1}{2}$

width: $x = 15\frac{1}{2}$

length: $x + 9 = 15.5 + 9 = 24.5$

length $\xrightarrow{\text{compare to}}$ width $x$




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

$80 = 2(x+9) + 2(x)$

$80 = 2x + 18 + 2x$

$80 = 4x + 18$

Same

$4\overline{)62}$ → 15, 4, 22, 20, 2

The width is 15.5 ft and the length is 24.5 ft.

Check: 1st Sentence: Perimeter = $15.5 + 15.5 + 24.5 + 24.5$

$= 31 + 49 = 80$ ✓

2nd sentence: Length 9' more than width? ✓

2.5 #16) Tim is 5 years older than JoAnn. Six years from now, the sum of their ages will be 79. How old are they now?

| | Now | 6 yrs from now |
|---|---|---|
| Tim | $x+5$ | $x+5+6 = x+11$ |
| JoAnn | $x$ | $x+6$ |

Tim's age now → compare to → JoAnn's Age now: $x$

$$x+11 + x+6 = 79$$

$$2x + 17 = 79$$

$$2x = 62$$

$$\frac{2x}{2} = \frac{62}{2}$$

$$x = 31$$

79 − 17 = 62

JoAnn's age now: $x = 31$

Tim's age now: $x+5 = 31+5 = 36$

JoAnn is 31 now and Tim is 36.

Check: 1st sentence: Tim 5 yrs older than JoAnn? ✓ yes.

2nd sentence: 6 years from now, JoAnn will be $31+6=37$.

and Tim will be $36+6=42$

$37 + 42 = 79$ ✓