Prereading from 2.5

Note Title 9/2/2015

Similar / 2nd example

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

"one number": $2x+4$

"another" number: x

$(2x+4) + x = 22$ one number compare to another

$2x+4+x=22$

$3x+4=22$

$3x=18$

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

$x = 6$

"another" number: $x=6$

"one number": $2x+4$

Plug in $x=6$: $2(6)+4 = 12+4 = 16$

Answer in a complete sentence:

The numbers 6 and 16.

Check: 1st sentence: Twice the small #: $2(6)=12$; 4 more: 16 ✓

2nd sentence: Sum is 22? $16+6=22$ ✓

Homework Qs

2.3 #13

$$1 = \frac{1}{2}(4x+2)$$

$$1 = \frac{1}{2}(4x) + \frac{1}{2}(2)$$

$$1 = \frac{4}{2}x + \frac{2}{2}$$

$$1 = 2x + 1$$

$$0 = 2x$$

$$\frac{0}{2} = \frac{2x}{2}$$

$$0 = x$$

$\{0\}$

2.3 #25

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

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

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

$$6x = 2x + 3$$

$$-2x \quad -2x$$

$$4x = 3$$

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

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

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

2.3 #71

$$0.10x + 0.12(x+500) = 214$$

$$0.10x + 0.12x + 0.12(500) = 214$$

$$0.10x + 0.12x + 60 = 214$$

$$0.22x = 154$$

$$\frac{0.22x}{0.22} = \frac{154}{0.22}$$

$$x = \frac{154}{0.22}\left(\frac{100}{100}\right) = \frac{15400}{22}$$

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$214 - 60 = 154$

0.12×500

$12 \times 50 = 600$

$12 \times 5 = 60$

$0.12 \times 5 = .60$

$12 \times 500 = 6000$

$.12 \times 500 = 60$

$x = \frac{15400}{22} = 700$

OR switch to fractions before dividing

$$0.22x = 154$$

$$\frac{22}{100}x = 154$$

$$\frac{100}{22}\left(\frac{22}{100}x\right) = 154\left(\frac{100}{22}\right)$$

$$x = \frac{15400}{22}$$ then proceed as before.

$$22\overline{)154}\ \ 7$$

$$22\overline{)15400}\ \ 700$$

22×3: 6, 132; 22×7: 154

Yet another option:

$$0.10x + 0.12(x+500) = 214$$

multiply both sides by 100:

$$100\left(0.10x + 0.12(x+500)\right) = (214)(100)$$

$$100(0.10x) + 100(0.12)(x+500) = 214(100)$$

$$10x + 12(x+500) = 21400$$

$$10x + 12x + 6000 = 21400$$

$$22x + 6000 = 21400$$

$$22x = 15400$$

$$x = \frac{15400}{22} = 700$$

$21400 - 6000 = 15400$

$\{700\}$

2.5: Applications of Linear Equations

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

"one number": $2x+5$

"another" number: x

one number → compared to → another: x

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

($x + (2x+5)$: sum)

$3x+5-10 = 22$

$3x - 5 = 22$

$+5 \quad +5$

$3x = 27$

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

$x = 9$

"another" number: $x=9$

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

The numbers are 9 and 23.

Check:

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

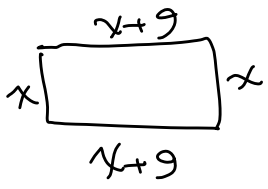
2nd sentence: sum: $23 + 9 = 32$

Decrease by 10: 22 ✓

Ex: The perimeter of a rectangle is 80 ft. The length is 9 ft more than the width. What are the length and width?

length: $x+9$
width: x

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



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

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

$4x + 18 = 80$

$-18 \quad -18$

$4x = 62$

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

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

Same!

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

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

$80 = 2x + 18 + 2x$

$80 = 4x + 18$

$2\overline{)31}$ 15, 2, 11, 10, 1

width: $x = 15\frac{1}{2} = 15.5$

length: $x+9 = 15\frac{1}{2} + 9 = 24\frac{1}{2} = 24.5$

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

2.5 #14) Justin is 2 years older than Ethan. In 9 years, the sum of their ages will be 30. Find their ages now.

	Now	In 9 years
Justin	$x+2$	$(x+2)+9 = x+11$
Ethan	x	$x+9$

Justin's age now $\xrightarrow{\text{compared to}}$ Ethan's age now x

see next page

Previous ex. cont'd

$$(x+11)+(x+9)=30$$

$$x+11+x+9=30$$

$$2x+20=30$$

$$2x=10$$

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

$$x=5$$

Ethan's age now: $x=5$ ← looked up x in table

Justin's age now: $x+2$

$x=5 \Rightarrow 5+2=7$

Ethan is 5 now, and Justin is 7.

1st sentence: J 2 yrs older than E? Yes ✓

2nd sentence: In 9 years, Ethan will be $5+9=14$

Justin will be $7+9=16$

Sum 30 ✓