

099  $\int_{2,3}^{\#s} \frac{1-9}{000s}, \frac{11-14}{ALL}, 17-27, 35, 36, 41, 49,$

① Rectangle is twice as long as it is wide

$$L = 2W$$

Perimeter is 60 ft

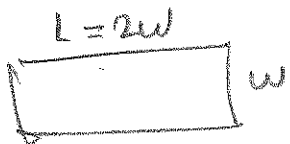
$$2L + 2W = 60$$

Let  $L = \text{length (ft)}$  Find the dimensions

$W = \text{width (ft)}$

$$L = 2W \implies 2L + 2W = 2(2W) + 2W = 60$$

$$4W + 2W = 60$$



$$6W = 60$$



$$\implies L = 2W = 2(10) = 20 = L$$

③ Square has perimeter of 28 ft. Find

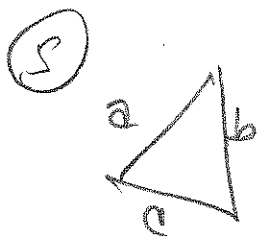
$x = \text{length of its sides (ft)}$



$$4x = 28$$



099  $\hookrightarrow$  2.3 #s 1-9,  $\frac{11-14}{4}$ , 17-27, 35, 36, 41, 49



Triangle has perimeter of 23 inches

Let  $a$  = length of short side (in)

$b$  = " " medium " (in)

$c$  = " " long " (in)

Medium side is 3 inches more than short side

$$b = a + 3$$

Long side is twice the short side

$$c = 2a$$

Perimeter is 23 in

$$a + b + c = 23$$

$$a + (a + 3) + (2a) = 23$$

$$4a + 3 = 23$$

$$4a = 20$$

$$\boxed{a = 5} \Rightarrow \boxed{b = 8 \text{ and } c = 10}$$

⑦ Let  $L$  = length of rectangle (m)

$w$  = width " " (m)

Length is 3m less than twice the width

$$L = -3 + 2w = 2w - 3$$

Perimeter is 18 m

$$2L + 2w = 2(2w - 3) + 2w = 4w - 12 + 2w$$

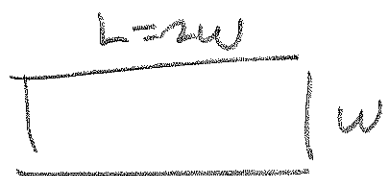
$$= 6w - 12 = 18 \Rightarrow 6w = 30 \Rightarrow \boxed{w = 5}$$

So

$$\boxed{L = 7}$$

099 \$2, 3, 5, 9, 11, 14, 17, 27, 35, 36, 41, 49

(9) Pen is twice as long as it is wide



Perimeter is 48 ft.

Let

$$2L + 2W = 2(2W) + 2W = 48$$

$L =$  length of pen (ft)

$W =$  width of pen (ft)

$$6W = 48$$

$$W = 8 \implies$$

$$L = 16$$

Materials are

\$1.75  $\frac{\$}{ft}$  for long sides

2.25  $\frac{\$}{ft}$  for short sides

Find cost of pen.

$$\text{Cost} = \frac{\text{cost}}{ft} \cdot ft$$

$$= \left(1.75 \frac{\$}{ft}\right) (16 ft) + \left(2.25 \frac{\$}{ft}\right) (8 ft)$$

$$= \left(\frac{7}{4}\right) (16) + \left(\frac{9}{4}\right) (8) = (7)(4) + (9)(2)$$

$$= 28 + 18 = \boxed{\$46 \text{ for the pen}}$$

099 \$2,3 #5  $\frac{11-14}{\text{Ave}}$ , 17-27, 35, 36, 41, 49

(11) \$300.00 is 50% more than he started with

$$300 = x + 0.5x = 1.5x$$

$$1.5x = 300$$

$$x = \frac{300}{1.5} = \frac{300}{\frac{3}{2}} = (300) \left(\frac{2}{3}\right) = 100(2)$$

$$= \$200$$

Let  $x =$  the amt he started with (\$)

(12) Items all \$1 each. Start the day with \$125.50 in the till. End the day with \$1058.60. Tax rate is 8.5%. How many items sold?

Let  $x =$  # of items sold.

$$1058.60 - 125.50 = 933.10 \text{ new money.}$$

Let  $y =$  income before taxes

$$\text{Then } 933.10 = y + 0.085y = 1.085y$$

$$\rightarrow y = \frac{933.10}{1.085} = 860.$$

$$(860 \$) \left(\frac{1 \text{ item}}{1 \$}\right) = 860 \text{ items} = x$$

099 \$ 2, 3 # 5 13, 14, 17-27, 35, 36, 41, 49

(13) Book is marked up 33%  
Student pays \$ 115<sup>00</sup>. How much before markup?

Let  $x$  = price before the markup. (\$)

$$\text{Then } x + .33x = 115$$

$$1.33x = 115$$

$$x = \frac{115}{1.33} \approx$$

$$\boxed{\$86.47 \approx x}$$

$$86.46616541$$

(14) You're paid \$ 26.80 per hour  
 $\downarrow$   
26.80  $\frac{\$}{\text{hr}}$

after a 4.5% raise. What were you making before the raise?

Let  $x$  = amt you made before the raise ( $\frac{\$}{\text{hr}}$ )

$$\text{Then } x + .045x = 26.8$$

$$1.045x = 26.8$$

$$x = \frac{26.8}{1.045} \approx$$

$$\boxed{25.65 \frac{\$}{\text{hr}} \approx x}$$

099 § 2.3 #s 17-27, 35, 36, 41, 49

(17) Two supplementary angles are  $\angle$   
one is 8 times larger than the other.

Let  $x =$  larger angle (in degrees)

$y =$  smaller angle (" " )

Then  $x + y = 180$  and

$$x = 8y$$

$$8y + y = 9y = 180$$

$$\begin{aligned} &\Rightarrow y = 20^\circ \\ &\Rightarrow x = 180 - 20 = 160^\circ = x \end{aligned}$$

(19) Let  $x =$  1<sup>st</sup> angle's measure (degrees)  
 $y =$  " " " " " "

Given 1<sup>st</sup> angle is  $12^\circ$  less than 4 times  
the 2<sup>nd</sup>, find both angles if they're

(a) Complementary:  $\left. \begin{aligned} x + y &= 90 \\ x &= -12 + 4y \end{aligned} \right\} \Rightarrow$

$$-12 + 4y + y = 90$$

$$5y = 102$$

$$y = \frac{102}{5} = 20.4$$

$$y = 20.4^\circ$$

$$\begin{aligned} \Rightarrow x &= 4y - 12 = 4(20.4) - 12 \\ &= 81.6 - 12 \end{aligned}$$

$$= 69.6^\circ = x$$

099 § 2.3 # 19-27, 35, 36, 41, 49

(19) (b)  $x$  &  $y$  are supplementary  $\Rightarrow$

$$x = 4y - 12 \text{ and } x + y = 180 \longrightarrow$$

$$(4y - 12) + y = 180$$

$$5y = 192$$

$$y = \frac{192}{5} = 38.4^\circ \longrightarrow x = 4(38.4) - 12$$

$$\boxed{y = 38.4^\circ}$$

$$\boxed{= 141.6^\circ = x}$$

(21) Let  $x$  = largest angle's measure (degrees)

$y$  = medium " " "

$z$  = smallest " " "

Largest is three times the smallest

$$x = 3z$$

Third angle (medium?) is  $9^\circ$  less than the largest

$$y = x - 9 \longrightarrow$$

$$x + y + z = 180$$

$$(3z) + (x - 9) + z = 180$$

$$3z + (3z - 9) + z = 180$$

$$7z - 9 = 180$$

$$7z = 189$$

$$\boxed{z = 27^\circ}$$

$$x = 3(27) = 81^\circ = x$$

$$y = 81 - 9 = 72^\circ = y$$

099 § 2.3 #s 23-27, 35, 36, 41, 49

(23) The smallest angle is one third the largest

$$x = \frac{1}{3}y$$

The 3<sup>rd</sup> angle is  $10^\circ$  more than the smallest

$$z = x + 10$$

Let  $x$  = the measure of the smallest angle (degrees)

$y$  = " " " " biggest " "

$z$  = " " " " medium " "

We also know  $x + y + z = 180^\circ$

$$\frac{1}{3}y = x \implies y = 3x \text{ is nice}$$

Also,  $z = x + 10$  gives us  $z$  in terms of  $x$ . So,

$x + y + z = 180$  becomes

$$x + (3x) + (x + 10) = 180 \implies$$

$$5x + 10 = 180 \implies$$

$$x = 170 \implies$$

$$x = \frac{170}{5} = 34^\circ$$

$$y = 3x = 102^\circ$$

$$z = x + 10 = 44^\circ$$

Check  $\Sigma$

34

44

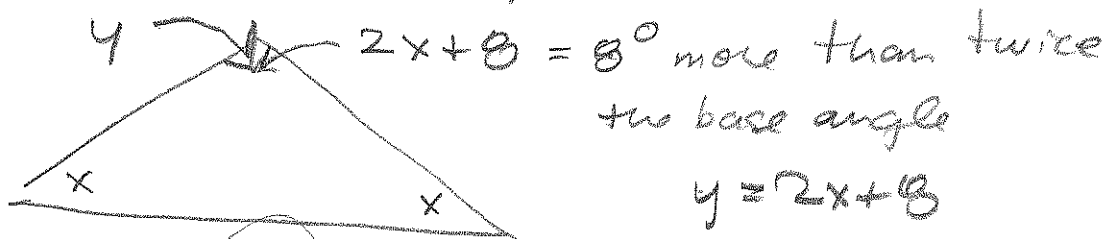
102

180 ✓



099 8' 2, 3#s 25, 27, 35, 36, 41, 49

(35) The 3<sup>rd</sup> angle in an isosceles triangle is  $8^\circ$  more than twice as large as each of the two base angles.



~~$x + x + 2x = 4x = 180$~~

~~$x = \frac{180}{4} = 45^\circ \rightarrow$~~

~~3<sup>rd</sup> angle is  $2(45) + 8 = 98^\circ$~~

$x + x + (2x + 8) = 180$

$4x + 8 = 180$

$4x = 172$

$x = \frac{172}{4} = 43^\circ \rightarrow$

3<sup>rd</sup> angle is  $2(43) + 8 = 86 + 8 = 94^\circ = y$

where  $y =$  measure of 3<sup>rd</sup> angle (in degrees)

Let  $x =$  measure of each base angle (in degrees)

099 S<sup>n</sup> 2, 3 #527, 35, 36, 41, 49

(35) She has \$9,000. She invests part @ 8% and part @ 9% per year. She earns \$750 in interest. How much invested in each account?

Let  $x = \text{amt invested @ 8\% per year (\$)}$   
 $y = \text{" " " 9\% " " "}$

Then  $x + y = 9000$  and

$$.08x + .09y = 750$$

$\Rightarrow y = 9000 - x$ . Subst this to 2<sup>nd</sup> eq'n:

$$.08x + .09(9000 - x) = 750$$

$$.08x + 810 - .09x = 750$$

$$-.01x + 810 = 750$$

$$-.01x = -60$$

$$x = \frac{-60}{-.01} = \$6,000 = x$$

$$\Rightarrow y = 9000 - x = 9000 - 6000 = \$3,000 = y$$

009 S 2.3 #s 36, 41, 49

(36) He invests \$12,000 <sup>split</sup> into 2 accounts.

one pays 10% per year, the other 7%.

How much invested in each if interest was \$960 after one year?

Let  $x = \text{amt invested @ } 10\% \text{ /yr } (\$)$   
 $y = \text{amt " " } 7\% \text{ /yr } (\$)$

$$\text{Then } x + y = 12000 \implies y = 12000 - x$$

$$\text{and } .1x + .07y = 960 \implies$$

$$.1x + .07(12000 - x) = 960$$

$$.1x + 840 - .07x = 960$$

$$.03x + 840 = 960$$

$$.03x = 120$$

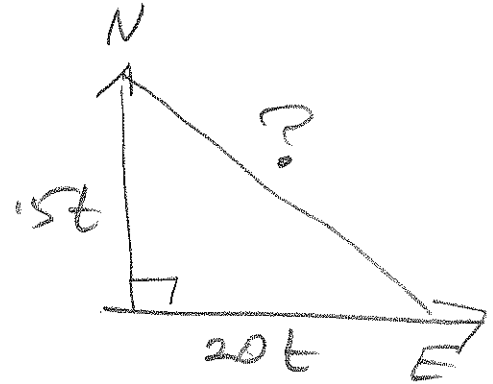
$$x = \frac{120}{.03} = \frac{12000}{3} = \$4000 = x$$

$$\implies y = 12,000 - x = 12000 - 4000 = \$8000 = y$$

099 §2.3 #5 41, 49

(41) One travels due North (a)  $15 \frac{\text{mi}}{\text{hr}}$ . The other travels due East (b)  $20 \frac{\text{mi}}{\text{hr}}$ . How long 'til they're 75 miles apart?

	Distance	rate	time
C1	$15t \text{ mi}$	$15 \frac{\text{mi}}{\text{hr}}$	$t \text{ hrs}$
C2	$20t \text{ mi}$	$20 \frac{\text{mi}}{\text{hr}}$	$t \text{ hr}$



Let  $t =$  time it takes to be 75 miles apart.

$$? = \sqrt{(15t)^2 + (20t)^2} = \sqrt{225t^2 + 400t^2}$$

$$= \sqrt{625t^2} = \sqrt{25^2 t^2} = |25t| = 25t,$$

since only positive answers make sense.

So when is  $25t = 75$ ?

$$t = \frac{75}{25} = \boxed{3 \text{ hrs} = t}$$

Pythagoras!

$$\begin{array}{l} 5 \overline{)625} \\ 5 \overline{)125} \\ 5 \overline{)25} \\ \underline{5} \\ \sqrt{625} \\ = \sqrt{5^4} \\ = \underbrace{5 \cdot 5 \cdot 5 \cdot 5} \\ = 25 \end{array}$$

099 § 2.3 #549

(49) 6% = sales tax rate.

She starts with \$250 and ends with \$1,204. How much should she pay in sales tax?

$$\text{Sales} + \text{tax} = \text{Sales} + \text{tax}$$

$$x + \frac{.06x}{\downarrow} = 1204 - 250 = \text{Revenue on the day}$$

This is the piece we want, but need  $x$ , first.

$$1.06x = 954$$

$$x = \frac{954}{1.06} = \$900, \text{ where}$$

$x = \text{total sales w/o tax } (\$)$

Then tax on sales is  $.06(900) = \$54$