

Chapter 3 Word Problems

#1) $x + y = 20$

$$1.10x + 0.80y = 0.89(20)$$

$$x + y = 20$$

$$y = 14$$

6 pounds @ \$1.10

14 pounds @ \$0.80

$$\rightarrow x + y = 20$$

$$\rightarrow 1.10x + 0.80y = 17.8$$

$$-0.80x - 0.80y = -16$$

$$0.30x = 1.8$$

$$x = 6$$

#2) $x + y = 60$

$$1.16x + 0.92y = 1.02(60)$$

$$x + y = 60$$

$$x = 25$$

25 pounds @ \$1.16

35 pounds @ \$0.92

$$\rightarrow x + y = 60$$

$$\rightarrow 1.16x + 0.92y = 61.20$$

$$-1.16x - 1.16y = -69.60$$

$$-0.24y = -8.4$$

$$y = 35$$

#3) $x + y = 30$

$$0.70x + 0.90y = 0.82(30)$$

$$x + y = 30$$

$$x = 12$$

12 pounds @ \$0.70

18 pounds @ \$0.90

$$\rightarrow x + y = 30$$

$$\rightarrow 0.70x + 0.90y = 24.6$$

$$-0.70x - 0.70y = -21$$

$$0.20y = 3.6$$

$$y = 18$$

$$\begin{aligned} \#4) \quad X + Y &= 17 & \longrightarrow & -0.01X - 0.01Y = -0.17 \\ .05X + .01Y &= 0.61 & \longrightarrow & 0.05X + 0.01Y = 0.61 \\ & & & 0.04X = 0.44 \end{aligned}$$

$$\begin{aligned} 11 + Y &= 17 \\ Y &= 6 \end{aligned}$$

$$X = 11$$

11 nickels
6 pennies

$$\begin{aligned} \#5) \quad 0.25X + 0.10Y &= 3.25 & 0.25(Y + 6) + 0.10Y &= 3.25 \\ X &= Y + 6 & 0.25Y + 1.50 + 0.10Y &= 3.25 \\ & & 0.35Y + 1.50 &= 3.25 \\ X &= 5 + 6 & 0.35Y &= 1.75 \\ X &= 11 & Y &= 5 \end{aligned}$$

11 quarters
5 dimes

$$\begin{aligned} \#6) \quad 0.10X + 0.05Y &= 1.75 & 0.10(2Y) + 0.05Y &= 1.75 \\ X &= 2Y & 0.20Y + 0.05Y &= 1.75 \\ & & 0.25Y &= 1.75 \\ X &= 2(7) & Y &= 7 \\ X &= 14 & & \end{aligned}$$

14 dimes
7 nickels

$$\#7) \quad X + y = 11$$

$$X - y = 25$$

$$2X = 36$$

$$X = 18$$

$$18 + y = 11$$

$$y = -7$$

$$X = 18$$

$$y = -7$$

$$\#8) \quad X + y = 36$$

$$X = 3y$$

$$3y + y = 36$$

$$4y = 36$$

$$y = 9$$

$$X = 3(9)$$

$$X = 27$$

$$X = 27$$

$$y = 9$$

$$\#9) \quad X + y = 19$$

$$X - y = 5$$

$$2X = 24$$

$$X = 12$$

$$12 + y = 19$$

$$y = 7$$

12 years old

7 years old

$$\#10) \quad X = \text{smaller \#}$$

$$y = \text{larger \#}$$

$$y - X = 18 \rightarrow y = X + 18$$

$$2X = y + 20$$

$$2X = X + 18 + 20$$

$$2X = X + 38$$

$$X = 38$$

$$y - 38 = 18$$

$$y = 56$$

$$\#11) \quad X + y = 6400$$

$$.02X + .04y = 224$$

$$\rightarrow -0.02X - 0.02y = -128$$

$$0.02X + 0.04y = 224$$

$$0.02y = 96$$

$$y = 4800$$

$$X + 4800 = 6400$$

$$X = 1600$$

\$1600 @ 2%

\$4800 @ 4%

$$\#12) 0.03X + 0.05Y = 350$$

$$Y = X + 600$$

$$Y = 4000 + 600$$

$$Y = 4600$$

$$\#4000 @ 3\%$$

$$\#4600 @ 5\%$$

$$0.03X + 0.05(X + 600) = 350$$

$$0.03X + 0.05X + 30 = 350$$

$$0.08X + 30 = 350$$

$$0.08X = 320$$

$$X = 4000$$

$$\#13) 0.05X + 0.045Y = 229$$

$$X = 3Y - 100$$

$$X = 3(1200) - 100$$

$$X = 3600 - 100$$

$$X = 3500$$

$$\#3500 @ 5\%$$

$$\#1200 @ 4.5\%$$

$$0.05(3Y - 100) + 0.045Y = 229$$

$$0.15Y - 5 + 0.045Y = 229$$

$$0.195Y - 5 = 229$$

$$0.195Y = 234$$

$$Y = 1200$$

$$\#14) l = 2w$$

$$2l + 2w = 90$$

$$2(2w) + 2w = 90$$

$$4w + 2w = 90$$

$$6w = 90$$

$$w = 15$$

$$l = 2(15)$$

$$l = 30$$

length 30 in
width 15 in

$$\#15) X + Y = 90$$

$$X = Y + 20$$

$$Y + 20 + Y = 90$$

$$2Y + 20 = 90$$

$$2Y = 70$$

$$Y = 35$$

$$X = 35 + 20$$

$$X = 55$$

$$X = 55^\circ$$

$$Y = 35^\circ$$

$$\#16) \begin{aligned} X + y &= 180 \\ X &= 2y \end{aligned}$$

$$\begin{aligned} 2y + y &= 180 \\ 3y &= 180 \\ y &= 60 \end{aligned}$$

$$\begin{aligned} X &= 2(60) \\ X &= 120 \end{aligned}$$

$$\begin{aligned} X &= 120^\circ \\ y &= 60^\circ \end{aligned}$$

$$\#17) \begin{aligned} X &= \text{first } \# \\ y &= \text{second } \# \end{aligned}$$

$$X + y = 2X - 18 \rightarrow y = X - 18$$

$$X - y = 2y - 32$$

$$X - (X - 18) = 2y - 32$$

$$25 = X - 18$$

$$X - X + 18 = 2y - 32$$

$$43 = X$$

$$18 = 2y - 32$$

$$50 = 2y$$

$$25 = y$$

$$\#18) \begin{aligned} 2l + 2w &= 42 \\ l &= 2w + 3 \end{aligned}$$

$$2(2w + 3) + 2w = 42$$

$$l = 2(6) + 3$$

$$4w + 6 + 2w = 42$$

$$l = 12 + 3$$

$$6w + 6 = 42$$

$$l = 15$$

$$6w = 36$$

$$w = 6$$

length 15m, width 6m

$$\#19) \begin{aligned} X &= 3y \\ X - 10 &= 5(y - 10) \end{aligned}$$

$$3y - 10 = 5(y - 10)$$

$$X = 3(20)$$

$$3y - 10 = 5y - 50$$

$$X = 60$$

$$-2y - 10 = -50$$

$$-2y = -40$$

$$y = 20$$

Mrs Johnson 60 yo
son 20 yo

#20) $X = \text{Don}$ $3X + 5Y = 150$ $3X + 5(2X - 9) = 150$ $Y = 2(15) - 9$
 $Y = \text{Scan}$ $Y = 2X - 9$ $3X + 10X - 45 = 150$ $Y = 20 - 9$
 $13X - 45 = 150$ $Y = 21$
Don is 15yo
Scan is 21yo
 $13X = 195$
 $X = 15$

#21) $12X + 7Y = 5.36$ $\xrightarrow{-2}$ $-24X - 14Y = -10.72$
 $8X + 5Y = 3.68$ $\xrightarrow{\cdot 2}$ $24X + 15Y = 11.04$
 $Y = 0.32$
 $8X + 5(0.32) = 3.68$
 $8X + 1.60 = 3.68$ $\$0.26 \text{ for orange}$
 $8X = 2.08$ $\$0.32 \text{ for apple}$
 $X = 0.26$

#22) $2X + 3Y = 133$ $\xrightarrow{-2}$ $-4X - 6Y = -266$
 $3X + 6Y = 231$ $\xrightarrow{-}$ $3X + 6Y = 231$
 $-X = -35$
 $X = 35$
 $2(35) + 3Y = 133$
 $70 + 3Y = 133$
 $3Y = 63$ $\$35 \text{ for jeans}$
 $Y = 21$ $\$21 \text{ for shirt}$

$$\begin{array}{lcl}
 \#23) & X + y = 25 & \longrightarrow X + y = 25 \\
 & 3.25X + 4.79y = 3.9(25) & \longrightarrow 3.25X + 4.79y = 97.50 \\
 & & -3.25X - 3.25y = -81.25 \\
 & & \hline
 & & 1.54y = 16.25 \\
 & & y = 10.55 \\
 & X + 10.55 = 25 & \\
 & X = 14.45 & 14.45 \text{ pounds apricots} \\
 & & 10.55 \text{ pounds prunes}
 \end{array}$$

$$\begin{array}{lcl}
 \#24) & X + y = 10 & \longrightarrow X + y = 10 \\
 & .02X + .12y = .08(10) & \longrightarrow .02X + .12y = .80 \\
 & & -0.02X - 0.02y = -0.20 \\
 & & \hline
 & & 0.10y = 0.60 \\
 & & y = 6 \\
 & X + 6 = 10 & \\
 & X = 4 & \\
 & & 4L @ 2\% \\
 & & 6L @ 12\%
 \end{array}$$

$$\begin{array}{lcl}
 \#25) & 3X + 20y = 11.40 & \longrightarrow 3X + 20y = 11.40 \\
 & 2X + 10y = 7.20 & \xrightarrow{-2} -4X - 20y = -14.40 \\
 & & \hline
 & & -X = -3 \\
 & & X = 3 \\
 & 3(3) + 20y = 11.40 & \\
 & 9 + 20y = 11.40 & \\
 & 20y = 2.40 & \\
 & y = 0.12 & \\
 & & \$3 \text{ for newspaper} \\
 & & \$0.12 \text{ for balloon}
 \end{array}$$