SOLUTIONS Assignment #3
Section 1.12 WORD Problems

#4

NAME OF VARIABLE	UNIT	original BLEND	Added Mix	FINAL Mix
AMOUNT OF BLEND	L	7600	x	$7600+x$
% METHANOL IN BLEND	L/L	5% = 0.05	50% = 0.5	10% = 0.1
AMOUNT OF METHANOL IN BLEND	L	$0.05(7600)$	$(0.5)x$	$0.1(7600+x)$

AMOUNT OF METHANOL IN ORIGINAL BLEND + AMOUNT OF METHANOL IN Added blend = AMOUNT OF METHANOL IN FINAL BLEND

$$0.05(7600) + 0.5x = 0.1(7600+x)$$

$$380 + 0.5x = 760 + 0.1x$$

$$0.4x = 380$$

$$x = 950$$

950 L must be added.

#16 * Assume each truck is used once only

NAME OF VARIABLE	UNIT	Fleet A	Fleet B	TOTAL
NUMBER OF TRUCKS	truck	x	$x+5$	
HOURS PER TRIP	hr/truck	8	6	
TOTAL hrs ON delivery	hr	$8x$	$6(x+5)$	198

Hours by Fleet A + Hours by Fleet B = TOTAL hours

$$8x + 6(x+5) = 198$$

$$14x + 30 = 198$$

$$x = 12$$

12 TRUCKS IN Fleet A
17 trucks IN Fleet B

#17

Length of main pipeline = x

Length of smaller pipelines (3 of them) = $x + 2.6$

Total length of 4 pipes = 35.4

$$x + 3(x+2.6) = 35.4$$

$$x + 3x + 7.8 = 35.4$$

$$4x = 27.6$$

$$x = 6.9$$

So the main pipeline is **6.9 km** & the smaller ones are **9.5 km** each.

#22

Let x = speed of sound

NAME OF VARIABLE	UNIT	1 hour TRIP	3 hour TRIP	TOTAL TRIP
Average speed	km/h	$x-100$	$x+400$	
Time spent at that speed	h	1	3	
distance TRAVELLED	km	$1(x-100)$	$3(x+400)$	5740

TOTAL distance TRAVELLED = distance ON 1hr Flight + distance on 3hr Flight

$$5740 = x-100+3(x+400)$$
$$5740 = x-100+3x+1200$$
$$4640 = 4x$$
$$\boxed{x = 1160 \text{ km/hr}}$$

#24

Let x = time until Appointment (hr) (5)

NAME OF VARIABLE	UNIT	FASTER TRAVELLING	SLOWER TRAVELLING
Speed	Km/h	60	45
time travelling	h	$x - \frac{1}{6}$ *	$x - \frac{1}{12}$ *
distance travelled	Km	$60(x-\frac{1}{6})$	$45(x-\frac{1}{12})$

* Note $10 \text{ minutes} = \frac{10}{60} \text{ hrs} = \frac{1}{6}$

$5 \text{ minutes} = \frac{5}{60} \text{ hrs} = \frac{1}{12}$

distance travelling (FAST) = distance travelling (SLOW)

$$60\left(x-\tfrac{1}{6}\right) = 45\left(x-\tfrac{1}{12}\right)$$

$$60x - 10 = 45x - 3.75$$

$$15x = 6.25$$

$$x = \frac{6.25}{15} \text{ hrs}$$

To convert Answer to minutes

Time until Appointment $= \frac{6.25}{15} \cdot 60$

$= \boxed{25 \text{ minutes}}$

#28

NAME OF VARIABLE	UNIT	ORIGINAL MIX	Added MIX	FINAL MIX
AMOUNT OF MIX	L	x	$8-x$	8
% GAS IN MIX	L/L	75% = 0.75	100% = 1	93.75% = 0.9375 *
AMOUNT OF GAS IN MIX	L	$0.75x$	$1(8-x)$	$8(0.9375) = 7.5$

* $\frac{15}{1}$ $\frac{\text{GAS}}{\text{OIL}}$ MEANS $\frac{15\ (\text{GAS})}{16\ (\text{TOTAL})} = 0.9375$ or 93.75%

GAS IN ORIGINAL MIX + GAS IN Added MIX = GAS IN FINAL MIX

$$0.75x + 8 - x = 7.5$$
$$-0.25x = -0.5$$
$$x = 2$$

2 L OF pure gasoline must be added

#30

NAME OF VARIABLE	UNIT	ROADBED MATERIAL 1	ROADBED MATERIAL 2	FINAL MIX
AMOUNT OF MATERIAL	TONNES (T)	x	$250-x$	250
% CRUSHED ROCK	T/T	0.75	0.3	0.5
AMOUNT OF CRUSHED ROCK	T	$0.75x$	$0.3(250-x)$	$0.5(250) = 125$

AMOUNT OF ROCK IN 1 + AMOUNT OF ROCK IN 2 = AMOUNT OF ROCK IN FINAL

$$0.75x + 0.3(250-x) = 125$$
$$0.\ x + 75 = 125$$