

NUMBER PROBLEMS

1) One number is four times a second number. If the sum of the two numbers is thirty, find the numbers.

let "n" be the first number.

1st	2nd
n	4n

$$n + 4n = 30$$

$$\frac{5n}{5} = \frac{30}{5}$$

$$\boxed{n = 6}$$

∴ Numbers are 6 and 24.

2) The difference between two numbers is 16. Five times the smaller is the same as 8 less than twice the larger. Find the numbers.

let "s" be the smaller number

$$\begin{aligned} \text{larger} - \text{smaller} &= 16 \\ \text{larger} - s &= 16 \\ \text{larger} &= 16 + s \end{aligned}$$

①

larger	smaller
16 + s	s

②

$$\begin{aligned} 5s &= 2(16 + s) - 8 \\ 5s &= 32 + 2s - 8 \end{aligned}$$

$$\frac{3s}{3} = \frac{24}{3}$$

$$\boxed{s = 8}$$

∴ Numbers are 8 and 24

3) The sum of two numbers is the same as four times the smaller number. If twice the larger is decreased by the smaller, the result is 30. Find the numbers.

let "s" be the smaller

larger	smaller
3s	s

$$\begin{aligned} \text{larger} + \text{smaller} &= 4 \text{smaller} \\ \text{larger} + s &= 4s \\ \text{larger} &= 3s \end{aligned}$$

$$2(3s) - s = 30$$

$$\frac{5s}{5} = \frac{30}{5}$$

$$\boxed{s = 6}$$

∴ Numbers are 6 and 18.

4) Determine three consecutive even integers whose sum is 456.

let "n" represent the first number

1st	2nd	3rd
n	n+2	n+4

$$n + n + 2 + n + 4 = 456$$

$$\begin{aligned} 3n + 6 &= 456 \\ -6 &\quad -6 \end{aligned}$$

$$\frac{3n}{3} = \frac{450}{3}$$

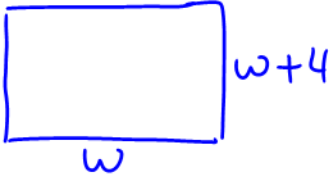
$$n = 150$$

∴ The numbers are 150, 152 and 154.

DIMENSION PROBLEMS

4) The length of a rectangle is 4 meters longer than the width. If the perimeter of the rectangle is 128 meters, what are the dimensions of the rectangle?

let "w" be the width



$$2(w) + 2(w+4) = 128$$

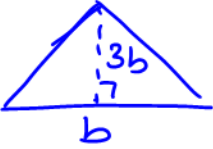
$$2w + 2w + 8 = 128$$

$$\begin{array}{r} 2w + 2w + 8 = 128 \\ -8 \qquad -8 \\ \hline 4w = 120 \\ \frac{4w}{4} = \frac{120}{4} \\ \boxed{w = 30} \end{array}$$

\therefore Dimensions are 30 by 34.

5) The height of a triangle is thrice its base. If the area is ~~24~~ 48 m^2 , calculate the height. AREA = Base x Height / 2

let "b" be the base



base	height
b	3b

$$2 \cdot \frac{b \cdot 3b}{2} = 48 \cdot 2$$

$$\frac{3b^2}{3} = \frac{48}{3}$$


$$\sqrt{b^2} = \sqrt{16}$$

$$b = 4$$

\therefore Height is 12 m.

6) The length of a rectangle is four times bigger than its width. If the area is 100 m^2 . Calculate the perimeter.

let "w" represent the width



$$w \cdot 4w = 100$$

$$\frac{4w^2}{4} = \frac{100}{4}$$

$$\sqrt{w^2} = \sqrt{25}$$

$$w = 5$$

$$\text{Perimeter} = 2(5) + 2(20)$$

$$= 10 + 40$$

$$= 50$$

\therefore Perimeter is 50m.

AGE PROBLEMS

7) Justin is six years older than his sister, and the sum of their ages is 32. Determine Justin's age algebraically.

let "s" rep sister's age

Justin	Sister
s+6	s

\therefore Justin is 19 years old.

$$s + 6 + s = 32$$

$$2s + 6 = 32$$

$$\frac{2s}{2} = \frac{26}{2}$$

$$\boxed{s = 13}$$

8) Cameo is 5 years older than Isabella. In 6 years, the sum of their ages will be 35 years. How old is each person now?

let "a" be Isabella's age now

	Cameo	Isabella
now	a+5	a
in 6 years	a+5+6	a+6

$a+11 + a+6 = 35$
 $2a + 17 = 35$
 $2a = 18$
 $\frac{2a}{2} = \frac{18}{2}$
 $a = 9$

∴ Cameo is 14 and Isa. is 9 years old.

9) In 5 years I would be three times as old as I was 25 years ago. How old am I?

let "n" be my age.

	me
now	n
in 5 years	n+5
25 years ago	n-25

$n+5 = 3(n-25)$
 $n+5 = 3n-75$
 $-n \quad -n$
 $5 = 2n-75$
 $+75 \quad +75$
 $80 = 2n$
 $\frac{80}{2} = \frac{2n}{2}$
 $n = 40$

∴ I'm 40 years old.

MONEY PROBLEMS

10) There are 15 fewer quarters than dimes in a parking meter. The value of the coins is \$15.50. How many dimes are there?

let "d" be number of dimes

	dimes	quarters
#	d	d-15
\$ (in cents)	10d	25(d-15)

$10d + 25(d-15) = 1550$
 $10d + 25d - 375 = 1550$
 $35d = 1925$
 $\frac{35d}{35} = \frac{1925}{35}$
 $d = 55$

∴ There are 55 dimes and 40 quarters.

11) A coin-sorting machine contains nickels, dimes and quarters worth \$5.50. There are 3 times as many nickels as dimes and 2 more quarters than dimes. How many of each type of coin are there?

let "d" rep # of dimes

	nickels	dimes	quarters
#	3d	d	d+2
\$ (in cents)	5(3d)	10(d)	25(d+2)

$15d + 10d + 25d + 50 = 550$
 $50d = 500$
 $\frac{50d}{50} = \frac{500}{50}$
 $d = 10$

∴ There are 30 nickels, 10 dimes and 12 quarters.

12) A sporting goods store ordered 65 hats at a cost of \$900. Some hats cost \$15 and others cost \$12. How many of each type of hat was ordered?

	A	B
price	\$15	\$12
quantity	n	$65-n$
value	$15n$	$12(65-n)$

Let "n" be the number of hat A

$$15n + 12(65-n) = 900$$

$$15n + 780 - 12n = 900$$

$$-780 \quad -780$$

$$\frac{3n}{3} = \frac{120}{3}$$

$$n = 40$$

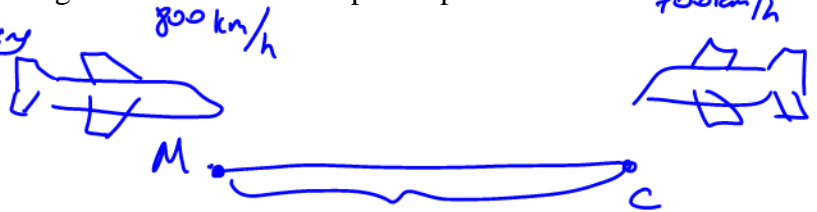
∴ 40 of hat A
25 of hat B

TIME-DISTANCE PROBLEMS

13) A plane left Montreal for Calgary, a distance of 3000km, travelling at 800km/h. At the same time, a plane left Calgary for Montreal travelling at 700km/h. How long after take-off did the planes pass each other?

let "t" rep time travelled before meeting

	M	C
time	t	t
speed	800	700
distance	$800t$	$700t$



$$800t + 700t = 3000 \quad 3000 \text{ km}$$

$$\frac{1500t}{1500} = \frac{3000}{1500}$$

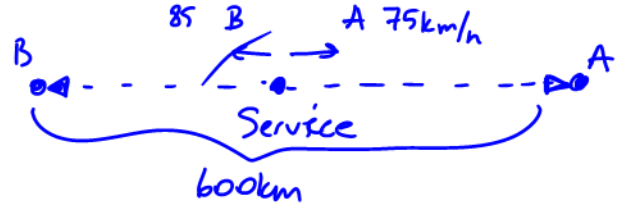
$$t = 2$$

∴ 2 hours after take off, they met.

14) Two cars left a service centre at the same time. One car travelled in one direction at 75km/h. The other car travelled in the opposite direction at 85km/h. After how long were they 600km apart?

let "t" rep time travelled

	A	B
time	t	t
speed	75	85
distance	$75t$	$85t$



$$75t + 85t = 600$$

$$160t = 600$$

$$t = 3.75$$

∴ It took them 3 hours and 45 min.

MIXTURE PROBLEMS

15) Walnuts sell for \$6.75/kg and Cashews sell for \$10.20/kg. How much of each would there be in 120kg mixture that sells for \$8.75/kg?

let "c" rep weight of cashews

	walnuts	cashews	mixture
weight	$120-c$	c	120
price	$\$6.75/\text{kg}$	$\$10.20/\text{kg}$	$\$8.75/\text{kg}$

$$6.75(120-c) + 10.20c = 8.75(120) \quad \leftarrow \text{total cost}$$

$$810 - 6.75c + 10.20c = 1050$$

$$810 + 3.45c = 1050 - 810$$

$$\frac{3.45c}{3.45} = \frac{240}{3.45}$$

∴ There'll be approximately 70kg of cashews and 50kg of walnuts.