01 **An aeroplane flies along the four sides of a square field at the speeds of 200, 400, 600 and 800 km/hr. Find the average speed of the plane around the field.**

Let each side of the square field be x km

$\therefore$ Average speed of the plane

$$= \frac{4x}{\frac{x}{800} + \frac{x}{600} + \frac{x}{400} + \frac{x}{200}}$$

$$= \frac{4 \times 2400}{3 + 4 + 6 + 12} = \frac{9600}{25} = 384 \text{ km/hr}$$

02 **A piece of string is 40 centimeters long. It is cut into three pieces. The longest piece is 3 times as long as the middle-sized and the shortest piece is 23 centimeters shorter than the longest piece. Find the length of the shortest piece (in cm).**

Let the largest piece = $3x$

Middle = x

Shortest = $3x - 23$

Given, $3x + x + (3x - 23) = 40$

$\Rightarrow 7x = 40 + 23 \Rightarrow 7x = 63$

$\therefore x = 9$

Hence, the shortest piece = $3x - 23$

$= 3(9) - 23 = 4$

03 **From a number of mangoes, a man sells half the number of existing mangoes plus 1 to the first customer, then sells 1 / 3rd of the remaining number of mangoes plus 1 to the second customer, then sells 1 /4rd of the remaining number of mangoes plus 1 to the third customer and 1 / 5th of the remaining number of mangoes plus 1 to the fourth customer. He then finds that he does not have any mango left. How many mangoes did he have originally ?**

Let the number of mangoes that the man had originally $= x$

No. of mangoes sold to

1^{st} customer $= \frac{x}{2}+1$

Remaining mangoes $= x-\left(\frac{x}{2}+1\right)=\frac{x-2}{2}$

2^{nd} customer $= \frac{x-2}{6}+1=\frac{x+4}{6}$

Remaining mangoes $= \frac{x-2}{2}-\left(\frac{x+4}{6}\right)=\frac{x-5}{3}$

3^{rd} customer $= \frac{x-5}{12}+1=\frac{x+7}{12}$

Remaining mangoes $= \frac{x-5}{3}-\left(\frac{x+7}{12}\right)=\frac{x-9}{4}$

4^{th} customer $= \frac{x-9}{20}+1=\frac{x+11}{20}$

Remaining mangoes = $\frac{x-14}{4}-\left(\frac{x+11}{20}\right)=\frac{x-14}{20}$

Given, number of mangoes left at last = 0

$\Rightarrow \frac{x-14}{20}=0$

$\therefore x = 14$

04 **When 'a' is added to each numerator of $\frac{2}{3}, \frac{x}{3}$ and $\frac{a}{6}$, the sum of the new fractions is 6. Find the value of a × x.** Note : a & x are integers.

$$\frac{2+a}{3}+\frac{x+a}{4}+\frac{2a}{6}=6$$

$$\frac{4(2+a)+3(x+a)+2(2a)}{12}=6$$

$\Rightarrow 8 + 4a + 3x + 3a + 4a = 72$

$11a + 3x = 64$

for $x = 3$ and $a = 5$,

we get $11(5) + 3(3) = 64$

Hence $a \times x = 5 \times 3 = 15$

05 **Mr. Arun, a salesman, was paid a basic salary of Rs. 800 every month. The company also provided an incentive scheme which was tied to the sales achieved.**

Number of books sold in a month	Incentive paid for a book sold
1–10	Rs. 20 each
Thereafter	Rs. 30 each

(a) **Mr. Arun earned Rs. 1150 in January. How many books did he sell in January ?**

(b) **The company increased the incentive for the sales of more than 10 books. Under the new scheme. Mr. Arun would have got $2\frac{4}{23}$ % more. What was the increase in incentive paid for sales of more than 10 books ?**

(a) Let x be the number of books sold

$800 + 20(10) + 30(x - 10) = 1150$

$800 + 200 + 30x - 300 = 1150$

$700 + 30x = 1150$

$700 - 700 + 30x = 1150 - 700$

$30x = 450$

$$\frac{30x}{30} = \frac{450}{30}$$

$x = 15$

(b) New salary = $\frac{100 + 2\frac{4}{23}}{100} \times 1150$

Let the new incentive paid (for more than 10 books sold) be Rs. y each

$800 + 20(10) + y(15 - 10) = 1175$

$800 + 200 + 5y = 1175$

$1000 + 5y = 1175$

$1000 - 1000 + 5y = 1175 - 1000$

$5y = 175$

$\frac{5y}{5} = \frac{175}{5}$

$y = \$35$

$\therefore$ there was an increase of Rs. (35 – 30) = Rs. 5 per book for selling more than 10 books