Chapter 13. Direct and Inverse Proportion

Question 1

Suppose 6*kg* of salt contains 6×10^7 crystals. How many crystals are there is (i) 7*kg* of salt (ii) 3.5 kg of salt?

Solution:

Weight of salt	6	7	3.5
Crystals	$6x10^7$	x	y

(i) $\frac{6}{6\times10^7}=\frac{7}{x}$ or $6x=42\times10^7$ or $x=\frac{42\times10^7}{6}=7\times10^7$ crystals

(ii) $\frac{6}{6\times10^7}=\frac{3.5}{y}$ or $6y=3.5\times6\times10^7 or\ y=3.5\times10^7$.

Question 2

A machine in a pepsi factory fills 680 bottles in 5hrs. How many bottles will it fill in 3 hrs?

Solution:

Time	5	3
Number of bottles	680	x

$$\frac{5}{680}=\frac{3}{x}$$
$$x=\frac{3\times680}{5}=408 \text{ bottles}$$

Number of bottles = 408 bottles.

Question 3

Bacteria enlarged 60000 times attains a length of 3*cm*. What is the length of bacteria if it is enlarged 10000 times only.

Solution:

Length of bacteria	3	x
Enlargement of bacteria	60000	10000

$$\frac{3}{60000}=\frac{x}{10000} \text{ or } \frac{3\times10000}{60000}=x$$
$$\frac{1}{2}\text{cm}=x$$

Length of bacteria = 0.5 *cm*.

Question 4

A bus travels 40*kms* in 30minutes. If the speed of the bus remains same, how far can it travel in 3 *hrs*?

Solution:

Distance (*km*)	40	x
Time (*min*)	30	180

$\frac{40}{30} = \frac{x}{180}$ or $x = \frac{40 \times 180}{30} = 240\text{km}$.

Question 5

A contractor estimates that 5 persons could plumb Ravi's house in 8 days. If he uses 6 persons instead of 5, how long should they take to complete the job.

Solution:

Number of days	8	x
Number of persons	5	6

$5 \times 8 = 6x$

$40 = 6x$

$\Rightarrow \frac{40}{6} = x$

$x = 6\frac{2}{3}\text{days}$

Number of days required = $6\frac{2}{3}$.

Question 6

If a box of pens is given to 25 children, they will get 2 pens each. How many would each get, if the number of children is reduced by 10?

Solution:

$25 \times 2 = 10 \times x$

$\frac{25 \times 2}{10} = 5 = x$

Each will get 5 pens.

Question 7

A batch of tablets were packed in 10 boxes with 6 tablets in each box. If the same batch is packed using 12 tablets in each box. How many boxes would be needed?

Solution:

Number of boxes	10	x
Number of tablets in each box	6	12

$10\times 6=12\times x$ or $\frac{60}{12}=x$

5 boxes are needed.

Question 8

In a toy company, it requires 36 machines to produce a car toys in 54 days. How many machines would be required to produce the same number of car toys in 81 days?

Solution:

Number of machines	36	*x*
Number of cars produced (days)	54	81

$36\times 54 = x\times 81$

$\frac{36\times 54}{81} = x$

$\frac{4\times 54}{9} = x$

$x = \frac{216}{9} = 24$

24 machines are required.

Question 9

Two persons could fit the AC unit in a house in 2 days one person fell ill before the work started, how long would the job take now?

Solution:

Number of persons	2	1
Number of days	2	x

$2\times 2 = x\times 1$ or $x = 4$ days .

Question 10

In a college 7 period a day each of 45 minutes duration. How long each period be, if the school has 9 periods a day assuming the number of hours to be the same?

Solution:

Number of periods	7	9
Duration (min)	45	x

$7 \times 45 = 9 \times x$ or $\frac{7 \times 45}{9} = x$ or 35 minutes.

Each period will have 35 minutes.

Question 11

There are 200 students in a primary school. They need 50 litres of drinking eater/day. If 50 of them are reduced how many litres of water needed per day?

Solution:

Number of students	200	150
Water consumption (*l*)	50	?

$200 \times 50 = 150 \times x$ or $x = \frac{200 \times 5}{15} = 66.6l$

66.6liters of water is required per day.

Question 12

If the weight of 25 precious stones is 50 grams. How many precious stones of the same type would weigh 4500 kilograms.

Solution:

Number of stones	25	x
Weight of stones (in grams)	50	4500

The number of stones and their weigh are directly proportion.

$\frac{25}{50} = \frac{x}{4500}$

$\frac{25 \times 4500}{50} = x$

x = 2250 stones

2250 stones will weigh 4500 kilograms.

Question 13

A mixture of paint is prepared by mixing 1 part of Blue pigments with 5 parts of base. In the following table, find the parts of base that need to be added.

Solution:

Parts of blue pigment	1	4	9	12
Parts of base	5	-	-	-

More parts of blue pigment the more would be the parts of base. This is a direct proportion $\frac{x_1}{y_1} = \frac{x_2}{y_2}$

i. $\frac{1}{5} = \frac{4}{y_2}$ or $y_2 = 20$

ii. $\frac{1}{5} = \frac{9}{y_3}$ or $y_3 = 45$

iii. $\frac{1}{5} = \frac{12}{y_4}$ or $y_4 = 60$.

Question 14

In the above question (13) if 1 part of a blue pigment requires 45ml of base, how much blue pigment should we mix with 900ml of base.

Solution:

Part of blue pigment	1	x
Part of base	45	900

$$\frac{1}{45} = \frac{x}{900}$$

$$\frac{900}{45} = x \text{ or } 20 = x$$

20 parts of blue pigment is required to mix with the base.

Question 15

Nandika has a road map with a scale 1*cm* representing 25*km*. She drivers on a road for 100*km*. What would be her distance covered in the map?

Solution:

$$1cm : 25km$$
$$?: 100km$$
$$\frac{1}{x} = \frac{25}{100}$$
$$x = 4cm$$

Nandika covered 4*cm* distance in the map.

Question 16

In a school, the prize money of Rs2,00,000 is to be divided equally amongst the top scorers. Complete the following table and find whether the prize money given to an individual scorers is directly or inversely proportional to the number of scorers?

Solution:

number of top scorers	1	2	4	6	8	10
Prize for each scorers	2,00,000	1,00,000	y_1	y_2	y_3	y_4

Since the number of scorers increases, the prize of the amount decreases, it is inverse proportion

$2 \times 1,00,000 = 4y_1$ or $y_1 = 50,000$

$2 \times 1,00,000 = 6y_2$ or $y_2 = 33333$

$2 \times 1,00,000 = 8y_3$ or $y_3 = 25000$

$2 \times 1,00,000 = 10y_4$ or $y_4 = 20000$

Question 17

Mr X is making a wheel using spokes. He wants to fix equal spokes in such a way that the angles between any pair of convective spokes are equal. Help him by completing the following table.

Solution:

Number of spokes	3	6	9	12	15
Angle between a pair of consecutive spokes	90	60	x_1	x_2	x_3

$6\times 60 = 9x_1$ or $x_1 = \frac{6\times 60}{9} = 40°$

$6\times 60 = 12x_2$ or $x_2 = \frac{6\times 60}{12} = 30°$

$6\times 60 = 15x_3$ or $x_3 = \frac{6\times 60}{15} = 24°$

Question 18

The cost of 5 litres of a milk is Rs55. Tabulate the cost of 2, 4, 10 and litres of milk

Solution:

Number of litres	2	4	5	10
Cost (in Rs)	y_1	y_2	55	y_3

$\frac{5}{55} = \frac{2}{y_1}$ or $y_1 = \frac{2\times 55}{5} = Rs\,22$

$\frac{5}{55} = \frac{4}{y_2}$ or $y_2 = \frac{4\times 55}{5} = Rs44$

$\frac{5}{55} = \frac{10}{y_3}$ or $y_3 = \frac{10\times 55}{5} = Rs110$

Question 19

Arrangement of tables & chairs in an exam hall done by 10 workers in 6 hours? How many workers will be required to do the same work in 4hrs?

Solution:

Number of hours	6	4
Number of workers	10	x

$6 \times 10 = 4 \times x$ or $\frac{6 \times 10}{4} = 15 \text{ workers}$.

Question 20

5 pipes are required to fill a petrol tank in 2 hour 20 minutes. How long will it take if only 4 pipes of the same type are used?

Solution:

Number of pies	5	4
Time (in min)	140	x

$140 \times 5 = x \times 4$

$\frac{140 \times 5}{4} = x$

175 minutes= x

2 hrs 91 min = x

Number of hours required = 2 hrs 91 min.