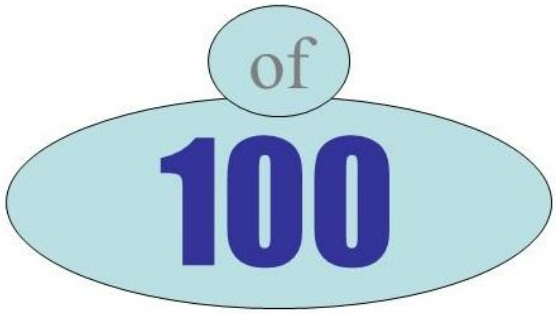
Percentage
Ex 9A

Definition

Percent can be defined as "of one hundred."



PERCENTAGE:

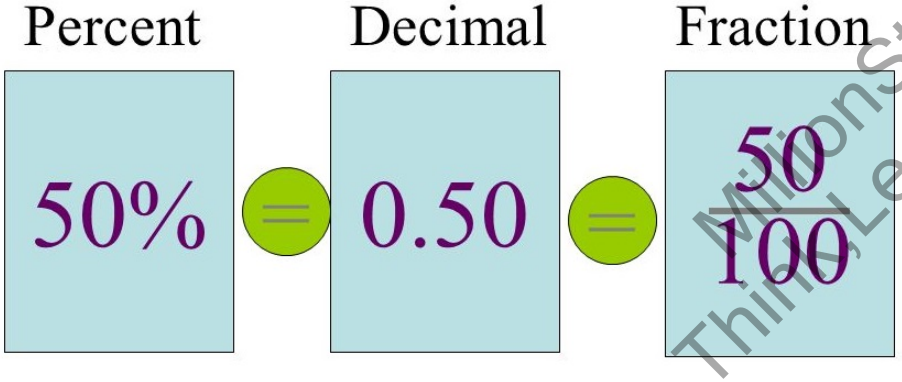
$$\frac{x}{n} \times 100 = p$$

where:

x = *given quantity*
n = *total amount*
p = *percentage of the quantity compared to the total*

$$\text{Percentage increase} = \frac{\text{actual increase}}{\text{original amount}} \times 100\%$$

$$\text{Percentage decrease} = \frac{\text{actual decrease}}{\text{original amount}} \times 100\%$$



$$60\% = \frac{60}{100} = 0.6$$

Percent means "per one hundred", so to convert a percent to a fraction, divide it by 100.

Q1

Answer :

(i) 48%
$= \frac{48}{100}$
$= \frac{12}{25}$

(ii) 220%
$= \frac{220}{100}$
$= \frac{11}{5}$

(iii) 2.5%
$= \frac{2.5}{100}$
$= \frac{25}{1000}$
$= \frac{1}{40}$

Q2

Answer :

(i) $6\% = \frac{6}{100} = 0.06$

(ii) $72\% = \frac{72}{100} = 0.72$

(iii) $125\% = \frac{125}{100} = 1.25$

Q3

Answer :

(i) $\frac{9}{25}$
$= \left(\frac{9}{25} \times 100\right)\%$
$= \left(9 \times 4\right)\%$
$= 36\%$

(ii) $\frac{3}{125}$
$= \left(\frac{3}{125} \times 100\right)\%$
$= 2.4\%$

(iii) $\frac{12}{5}$
$= \left(\frac{12}{5} \times 100\right)\%$
$= 240\%$

Q4

Answer :

$4 : 5 = \frac{4}{5} = \left(\frac{4}{5} \times 100\right)\%$
$= 80\%$

Q5

Answer :

125%
$= \frac{125}{100}$
$= \frac{5}{4} = 5 : 4$

Q6

Answer :

We have :
$6\frac{2}{3}\% = \frac{20}{3}\%$
$= \left(\frac{20}{3} \times \frac{1}{100}\right)$
$= \frac{1}{15}$
$= 0.06$
Also, $\frac{3}{20} = 0.15$
The third number is 0.14.
Clearly, 0.15 is the largest.
Hence, $\frac{3}{20}$ is the largest.

Q7

Answer :

(i) Required percentage $= \left(\frac{96}{150} \times 100\right)\% = 64\%$

(ii) Required percentage $= \left(\frac{200}{5 \times 1000} \times 100\right)\% = 4\%$

(iii) Required percentage $= \left(\frac{250}{2 \times 1000} \times 100\right)\% = 12.5\%$

Q8

Answer :

$4\frac{1}{2}\% = \frac{9}{2 \times 100}$
$\therefore \frac{9}{200}$ of Rs $3600 = \frac{9}{200} \times 3600 =$ Rs 162

Q9

Answer :

Let the number be x.
16% of x is 72.
$\Rightarrow \frac{16}{100} \times x = 72$
$\Rightarrow 16x = 72 \times 100$
$\Rightarrow 16x = 7200$
$\Rightarrow x = \frac{7200}{16} = 450$
$\therefore$ The required number is 450.

Q10

Answer :

Let Rs x be his monthly income.
His savings $= 18\%$ of Rs x

$$= \text{Rs}\left(x \times \frac{18}{100}\right)$$
$$= \text{Rs}\ \frac{9x}{50}$$

Now, $\frac{9x}{50} = 1890$

$\Rightarrow x = \text{Rs}\left(1890 \times \frac{50}{9}\right)$

$\Rightarrow x = \text{Rs}\ 10500$

$\therefore$ His monthly income is Rs. 10500.

Q11

Answer :

Let x be the total number of games played.
Percentage of games won $= 35\%$ of x

$$= \left(x \times \frac{35}{100}\right)$$
$$= \frac{35x}{100}$$

Now, $\frac{35x}{100} = 7$

$\Rightarrow x = \left(7 \times \frac{100}{35}\right)$

$\Rightarrow x = 20$

$\therefore$ The total number games played is 20.

Q12

Answer :

Let *Rs* x be Amit's old salary.

His salary after increment will be Rs $\left(x + \frac{20}{100}\,x\right)$

According to the question, we have :

$\Rightarrow x + \frac{20}{100}\,x = 15300$

$\Rightarrow \frac{100x+20x}{100} = 15300 \quad (\text{LCM} = 100)$

$\Rightarrow \frac{120x}{100} = 15300$

$\Rightarrow 120x = 15300 \times 100$

$\Rightarrow x = \frac{15300\times100}{120}$

$\Rightarrow x = 12750$

$\therefore$ The old salary is Rs 12,750.

Q13

Answer :

Let x be the number of days the school was opened.
Number of days Sonal attended school $= 204$ days
Percentage of her attendance $= 85\%$ of x

$$= \left(\text{x} \times \frac{85}{100}\right)$$
$$= \frac{85\text{x}}{100}$$

Now, $\frac{85x}{100} = 204$

$\Rightarrow x = \left(204 \times \frac{100}{85}\right)$

$\Rightarrow x = 240$

$\therefore$ The school was opened for 240 day.

Q14

Answer :

Let B's income be Rs 100
Then, A's income $=$ Rs 80

Therefore, B's income is more than A's income by $= \frac{(100-80)}{80} \times 100\%$

$= \frac{20}{80} \times 100\% = 25\%$

$$= Rs125$$

$\therefore$ B's income is more than that of A's by $(125 - 100)\%$, i.e., 25%.

Q15

Answer :

Let the consumption of petrol originally be 1 unit and let its cost be Rs 100.
New cost of 1 unit of petrol = Rs 110
Now, Rs 110 will yield 1 unit of petrol.
i.e., Rs 100 will yield $\left(\frac{1}{110} \times 100\right)$, i.e., $\frac{10}{11}$ units of petrol.

Now, reduction in consumption $= \left(1 - \frac{10}{11}\right) = \frac{1}{11}$ unit
Percentage of reduction $= \left(\frac{1}{11} \times \frac{1}{1} \times 100\right)\% = 9\frac{1}{11}\%$
∴ A motorist must reduce the consumption of petrol by $9\frac{1}{11}\%$.

Q16

Answer :

Let x be the population of the town a year ago. Then, present population = 108% of x
$= \left(x \times \frac{108}{100}\right) = \frac{27x}{25}$
Now, $\frac{27x}{25} = 54000 \Rightarrow x = \left(54000 \times \frac{25}{27}\right) \Rightarrow x = 50000$
Hence, the population of the town a year ago was 50000.

Q17

Answer :

Let Rs x be the value of the machine last year.
Then, present value = 80% of Rs x
$= \text{Rs}\left(x \times \frac{80}{100}\right)$
$= \text{Rs}\ \frac{4x}{5}$
Now, $\frac{4x}{5} = 160000$
$\Rightarrow x = \left(160000 \times \frac{5}{4}\right)$
$\Rightarrow x = 40000 \times 5 = 200000$
Hence, the value of the machine last year was Rs 2,00,000.

Q18

Answer :

Mass of the alloy = 1 kg
Percentage of copper = 40%
Percentage of nickel = 32%
Percentage of zinc = {100 − (40 + 32)}%
= 28%
∴ Mass of zinc in 1 kg of alloy $= \left(\frac{28}{100} \times 1\right)$ kg
$= 0.28$ kg $= 0.28 \times 1000$ g $= 280$ g

Q19

Answer :

Amount of protein = 12% of 2600
$= \left(2600 \times \frac{12}{100}\right)$
= 312 cal
Amount of fat = 25% of 2600
$= \left(2600 \times \frac{25}{100}\right)$
= 650 cal
Amount of carbohydrate = 63% of 2600
$= \left(2600 \times \frac{63}{100}\right)$
= 1638 cal

Q20

Answer :

Let x be the amount of gunpowder.
Amount of nitre $= 75\%$
Let x kg be the amount of gunpowder containing 9 kg of nitre.
i.e., $(75\% \text{ of } x) = 9$ kg

$\Rightarrow \left(x \times \frac{75}{100}\right) = 9$

$\Rightarrow \frac{75x}{100} = 9$

$\Rightarrow x = \left(9 \times \frac{100}{75}\right)$

$\Rightarrow x = 12$ kg

Hence, 12 kg of gunpowder contains 9 kg of nitre.
Now, amount of sulphur $= 10\%$
Let x kg be the amount of gunpowder containing 2.5 kg of sulphur.
i.e., $(10\% \text{ of } x) = 2.5$ kg

$\Rightarrow \left(x \times \frac{10}{100}\right) = 2.5$

$\Rightarrow \frac{10x}{100} = 2.5$

$\Rightarrow \frac{x}{10} = 2.5$

$\Rightarrow x = (2.5 \times 10)$

$\Rightarrow x = 25$ kg

Hence, 25 kg of gunpowder contains 2.5 kg of sulphur.

Q21

Let Rs x be the amount of money recieved by C.
Then, amount of money B gets $= (50\% \text{ of Rs } x)$
Amount of money A gets $= (50\% \text{ of B})$
$= (25\% \text{ of Rs } x)$
Now, $x + (50\% \text{ of Rs } x) + (25\% \text{ of Rs } x) = \text{Rs } 7000$

$\Rightarrow x + \left(x \times \frac{50}{100}\right) + \left(x \times \frac{25}{100}\right) = \text{Rs } 7000$

$\Rightarrow x + \frac{50x}{100} + \frac{25x}{100} = \text{Rs } 7000$

$\Rightarrow \left(x + \frac{50x}{100} + \frac{25x}{100}\right) = \text{Rs } 7000$

$\Rightarrow \frac{175x}{100} = \text{Rs } 7000$

$\Rightarrow x = \text{Rs } \left(7000 \times \frac{100}{175}\right)$

$\Rightarrow x = \text{Rs } 4000$

$\therefore$ C gets Rs 4000.
Amount of money B gets $= (50\% \text{ of Rs } x)$
$= (50\% \text{ of Rs } 4000)$
$= \text{Rs } \left(4000 \times \frac{50}{100}\right)$
$= \text{Rs } 2000$

Amount of money A gets $= (25\% \text{ of Rs } x)$
$= (25\% \text{ of Rs } 4000)$
$= \text{Rs } \left(4000 \times \frac{25}{100}\right)$
$= \text{Rs } 1000$

Q22

Answer :

22 carat gold contains 22 parts pure gold out of 24 parts.
Also, 24 carat gold is given to be 100% pure.
$\therefore$ Percentage of pure gold in 22 carat gold $= \left(\frac{22}{24} \times 100\right)\%$
$= 91\frac{2}{3}\%$
Hence, 22 carat gold contains $91\frac{2}{3}\%$ of pure gold.

Q23.

Answer :

Let the original salary be Rs 100

Then, after increment of 25% the salary becomes

$= 100\left(1+\frac{25}{100}\right) = 100\left(\frac{125}{100}\right) = \boldsymbol{Rs}\ 125$

To restore the original salary, let the new salary be decreased by x%.

Thus, we get

$125\left(1-\frac{x}{100}\right) = 100$

$\Rightarrow \left(1-\frac{x}{100}\right) = \frac{100}{125} = \frac{4}{5}$

$\Rightarrow \frac{x}{100} = \frac{1}{5}$

$\Rightarrow x = \frac{100}{5} = 20\ \%$

Therefore, the new salary must be reduced by 20% to restore the original salary.

Percentage
Ex 9B

Q1.

Answer :

(d) 60%

$\frac{3}{5} = \left(\frac{3}{5} \times 100\right)\%$
$= 60\%$

Q2.

Q3.

Answer :

(c) 120%
$6 : 5 = \frac{6}{5}$
$= \left(\frac{6}{5} \times 100\right)\%$
$= 120\%$

Q4.

Answer :

(d) 180

Let x be the required number. Then, we have :
$5\%\ of\ x = 9$
$\Rightarrow \left(x \times \frac{5}{100}\right) = 9$
$\Rightarrow \frac{5x}{100} = 9$
$\Rightarrow x = \left(9 \times \frac{100}{5}\right)$
$\Rightarrow x = 180$

Q5.

Answer :

(c) $133\frac{1}{3}\%$

Required percentage $= \left(\frac{120}{90} \times 100\right)\%$

$= 133\frac{1}{3}\%$

Q6.

Answer :

(d) 2.5%

Required percentage $= \left(\frac{250}{(10\times1000)} \times 100\right)\% = 2.5\%$

Q7

Answer :

(b) 600

Let the required number be x. Then, we have :

$40\%\ of\ x = 240$

$\Rightarrow \left(x \times \frac{40}{100}\right) = 240$

$\Rightarrow \frac{40x}{100} = 240$

$\Rightarrow x = \left(240 \times \frac{100}{40}\right)$

$\Rightarrow x = 600$

Q8

Answer :

(c) 15

Let the required number be x. Then, we have :

$x\%\ of\ 400 = 60$

$\Rightarrow \left(400 \times \frac{x}{100}\right) = 60$

$\Rightarrow \frac{400x}{100} = 60$

$\Rightarrow 4x = 60$

$\Rightarrow x = \frac{60}{4}$

$\Rightarrow x = 15$

Q9

Answer :

(d) 560

Let the required number be x. Then, we have :

$(180\%\ of\ x) \div 2 = 504$

$\Rightarrow \left(x \times \frac{180}{100}\right) \div 2 = 504$

$\Rightarrow \left(\frac{180x}{100}\right) \div 2 = 504$

$\Rightarrow \left(\frac{180x}{100} \times \frac{1}{2}\right) = 504$

$\Rightarrow \frac{9x}{10} = 504$

$\Rightarrow x = \left(504 \times \frac{10}{9}\right)$

$\Rightarrow x = 560$

Q10

Answer :

(a) Rs 160

$20\%\ \ of\ \ Rs\ \ 800 = Rs\ \ \left(800 \times \frac{20}{100}\right)$

$= Rs\ \ 160$

Q11

Answer :

(c) 175

Let the maximum marks be x. Then, we have :

$56\%\ of\ x = \left(x \times \frac{56}{100}\right)$

$= \frac{56x}{100}$

Now, $\frac{56x}{100} = 98$

$\Rightarrow x = \left(98 \times \frac{100}{56}\right)$

$\Rightarrow x = 175$

Q12.

Answer :

(b) decrease by 1 %

Let x be the number.

A 10% increase will give a new number, $\frac{110}{100}x = \frac{11}{10}x$

The number is then reduced by 10%.

The new number will be $\frac{90}{100}\left(\frac{11}{10}x\right) = \frac{990}{1000}x = \frac{99}{100}x$

Difference $= x - \frac{99}{100}x = \frac{1}{100}x$

Percentage of decrease $= \frac{1}{100}x \times \frac{1}{x} \times 100 = 1\%$

Q13.

Answer :

(a) $18\frac{3}{4}\%$

$4\ h\ 30\ min = (4 \times 60 \times 60) + (30 \times 60)$

$= 16200\ sec$

$24\ h = (24 \times 60 \times 60)$

$= 86400\ sec$

Now, $\left(\frac{16200}{86400} \times 100\right)\% = 18\frac{3}{4}\%$

Q14.

Answer :

(c) 1200

Let x be the total number of examinees.

Percentage of the examinees passed = 65%

Percentage of the examinees failed = 35%

Number of the examinees failed = (35% of x)

$= \left(x \times \frac{35}{100}\right)$

$= \frac{35x}{100}$

Now, $\frac{35x}{100} = 420$

$\Rightarrow x = \left(420 \times \frac{100}{35}\right)$

$\Rightarrow x = 1200$

Q15.

Answer :

(a) 50

Let x be the required number. Then, we have :

$20\%\ of\ x + 40 = x$

$\Rightarrow \left(x \times \frac{20}{100}\right) + 40 = x$

$\Rightarrow \frac{20x}{100} + 40 = x$

$\Rightarrow \left(\frac{20x}{100} - x\right) = -40$

$\Rightarrow \frac{-80x}{100} = -40$

$\Rightarrow x = \left(40 \times \frac{100}{80}\right)$

$\Rightarrow x = 50$

Q16.

Answer :

(c) 120

Let the required number be x. Then, we have :

$$x - \left(27\frac{1}{2}\% \text{ of } x\right) = 87$$
$$\Rightarrow x - \left(\frac{55}{2}\% \text{ of } x\right) = 87$$
$$\Rightarrow x - \left(x \times \frac{55}{2} \times \frac{1}{100}\right) = 87$$
$$\Rightarrow x - \frac{11x}{40} = 87$$
$$\Rightarrow \frac{29x}{40} = 87$$
$$\Rightarrow x = \left(87 \times \frac{40}{29}\right)$$
$$\Rightarrow x = 120$$

Q17.

Answer :

(c) 0.25%

Required percentage $= \left(\frac{0.05}{20} \times 100\right)\% = 0.25\%$

Q18.

Answer :

(d) 300%

Required percentage $= \left(\frac{1206}{3} \times \frac{1}{134} \times 100\right)\% = 300\%$

Q19.

Answer :

(a) x

Let the required number be z. Then, we have :

$$x\% \text{ of } y = y\% \text{ of } z$$
$$\Rightarrow \left(y \times \frac{x}{100}\right) = \left(z \times \frac{y}{100}\right)$$
$$\Rightarrow \frac{yx}{100} = \frac{zy}{100}$$
$$\Rightarrow z = \left(\frac{yx}{100} \times \frac{100}{y}\right)$$
$$\Rightarrow z = x$$

Q20.

Answer :

(a) x

Required percentage $= \left(\frac{1}{35} \times \frac{7}{2} \times 100\right)\% = 10\%$

Percentage
Ex 9C

Q1.

Answer :

(i) $24\% = \frac{24}{100}$
$= \frac{6}{25}$

(ii) $105\% = \frac{105}{100}$
$= 1.05$

(iii) $4 : 5 = \frac{4}{5}$
$= \left(\frac{4}{5} \times 100\right)\%$
$= 80\%$

(iv) $56\% = \frac{56}{100}$
$= \frac{14}{25}$
$= 14 : 25$

Q2.

Answer :

Let the required number be x. Then, we have :
$(34\% \text{ of } x) = 85$
$\Rightarrow \left(x \times \frac{34}{100}\right) = 85$
$\Rightarrow \frac{34x}{100} = 85$
$\Rightarrow x = \left(85 \times \frac{100}{34}\right)$
$\Rightarrow x = 250$ Hence, the required number is 250.

Q3.

Answer :

Let the value of the machine last year be Rs x.
Then, its present value = 90% of Rs x
$= Rs\ \left(x \times \frac{90}{100}\right)$
$= Rs\ \frac{90x}{100}$

Now, $\frac{90x}{100} = 54000$
$\Rightarrow x = \left(54000 \times \frac{100}{90}\right)$
$\Rightarrow x = \text{Rs } 60000$
Hence, the value of the machine last year was Rs 60,000.

Q4.

Answer :

Percentage of copper = 30%
Percentage of nickel = 42%
Percentage of zinc = $\{100 - (30 + 42)\}\%$
$= 28\%$

$\therefore$ Mass of zinc in 1 kg of the alloy $= \left(\frac{28}{100} \times 1\right) \text{kg} = 0.28 \text{ kg} = 280 \text{ g}$

Q5.

Answer :

Let the total number of students be x. Then, we have :
Percentage of boys = 60%
Percentage of girls = 40%
$\therefore$ Number of girls = 40% of x
$= \left(x \times \frac{40}{100}\right)$
$= \frac{40x}{100}$

Now, $\frac{40x}{100} = 14$
$\Rightarrow x = \left(14 \times \frac{100}{40}\right)$
$\Rightarrow x = 35$

$\therefore$ Total number of students = 35

Q6.

Answer:

We have :

$8\frac{1}{3}\% = \frac{25}{3}\%$

$= \left(\frac{25}{3} \times \frac{1}{100}\right)$

$= \frac{1}{12}$

$= 0.083$

Also, $\frac{4}{25} = 0.16$

The third number is 0.15.

Q7. Clearly, 0.16 is the largest.

Answer : i.e., $\frac{4}{25}$ is the largest.

(d) 10%

Required percentage $= \left(\frac{1}{45} \times \frac{9}{2} \times 100\right)\% = 10\%$

Q8.

Answer :

(c) 120

Let the required number be x

$x - (30\% \text{ of } x) = 84$

$\Rightarrow \left\{x - \left(x \times \frac{30}{100}\right)\right\} = 84$

$\Rightarrow \left(x - \frac{30x}{100}\right) = 84$

$\Rightarrow \frac{70x}{100} = 84$

$\Rightarrow x = \left(84 \times \frac{100}{70}\right)$

$\Rightarrow x = 120$

Q9.

Answer :

(b) 15%

Let the required number be x. Then, we have :

$(x\% \text{ of } 320) = 48$

$\Rightarrow \left(320 \times \frac{x}{100}\right) = 48$

$\Rightarrow \frac{320x}{100} = 48$

$\Rightarrow x = \left(48 \times \frac{100}{320}\right)$

$\Rightarrow x = 15\%$

Q10.

Answer :

(d) 120%

Required percentage $= \left(\frac{54}{45} \times 100\right)\% = 120\%$

Q11.

Answer :

(c) 80

Let the required number be x. Then, we have :

$(25\% \text{ of } x) + 60 = x$

$\Rightarrow \left(x \times \frac{25}{100}\right) + 60 = x$

$\Rightarrow \frac{25x}{100} + 60 = x$

$\Rightarrow \left(\frac{25x}{100} - x\right) = -60$

$\Rightarrow \frac{-75x}{100} = -60$

$\Rightarrow x = \left(60 \times \frac{100}{75}\right)$

$\Rightarrow x = 80$

Q12.

Answer :

(c) 240

Let the required number be x. Then, we have :

$(5\% \text{ of } x) = 12$

$\Rightarrow \left(x \times \frac{5}{100}\right) = 12$

$\Rightarrow \frac{5x}{100} = 12$

$\Rightarrow x = \left(12 \times \frac{100}{5}\right)$

$\Rightarrow x = 240$

Q13.

Answer :

(i) $7\frac{1}{2}\%$ of Rs $1200 = \left(\frac{15}{2}\% \text{ of Rs } 1200\right)$

$= \text{Rs } \left(\frac{15}{2} \times \frac{1}{100} \times 1200\right)$

$= \text{Rs } 90$

Hence, $7\frac{1}{2}\%$ of Rs $1200 = \text{Rs } 90$

(ii) Required percentage $= \left(\frac{240}{3 \times 1000} \times 100\right)\% = 8\%$

Hence, 240 ml is 8% of 3 L.

(iii) (x% of 35) $= 42$

$\Rightarrow \left(35 \times \frac{x}{100}\right) = 42$

$\Rightarrow \frac{35x}{100} = 42$

$\Rightarrow x = \left(42 \times \frac{100}{35}\right)$

$\Rightarrow x = 120\%$

$\therefore$ If x% of 35 is 42, then $x = 120\%$.

(iv) $\left(\frac{12}{5} \times 100\right)\% = 240\%$

Hence, $\frac{12}{5} = 240\%$

(v) Let the required number be x. Then, we have :

$120 = x\% \text{ of } 80$

$\Rightarrow \left(80 \times \frac{x}{100}\right) = 120$

$\Rightarrow \frac{80x}{100} = 120$

$\Rightarrow x = \left(120 \times \frac{100}{80}\right)$

$\Rightarrow x = 150\%$

$\therefore 120 = 150\% \text{ of } 80$

Q14.

Answer :

(i) $6\% \text{ of } 8 = \left(8 \times \frac{6}{100}\right)$

$= 0.48$

Hence, it is false.

(ii) $6 : 5 = \frac{6}{5}$

$= \left(\frac{6}{5} \times 100\right)\%$

$= 120\%$

Hence, it is false.

(iii) $\frac{3}{5} = \left(\frac{3}{5} \times 100\right)\%$

$= 60\%$

Hence, it is true.

(iv) 6 hours $= \left(\frac{6}{24} \times 100\right)\% = 25\%$

Hence, it is true.