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I. Introduction

the word 'percent' is abbreviated form of the latin word **per centum** which means 'per hundred' or 'hundredths'. Thus, the term percent means per hundred or for every hundred. The symbol '%' is used for the term percent. Thus '48 percent' is written as '48%' and it means that '48 out of 100'.

To convert any fraction to percent, multiply it by 100 and put the percent sign (%)

$$\frac{a}{b} = \left(\frac{a}{b} \times 100\right) \%$$

(Fraction) (Percent)

$$\text{e.g., } \frac{9}{10} = \left(\frac{9}{10} \times 100\right) \% = 90\%$$

$$1\frac{3}{20} = \left(\frac{23}{20} \times 100\right) \% = 115\%$$

II. Conversion of percent

$$0.01 = 1/100 = 1\%$$

$$0.1 = 1/10 = 10\%$$

$$0.2 = 1/5 = 20\%$$

$$0.25 = \frac{1}{4} = 25\%$$

$$0.5 = \frac{1}{2} = 50\%$$

$$0.75 = \frac{3}{4} = 75\%$$

1) Conversion of Percent into fraction

To convert a percent into fraction, divide it by 100 and remove the '%' sign.

$$a\% = \frac{a}{100}$$

$$\text{e.g., } 57\% = \frac{57}{100}$$

$$2\% = \frac{2}{100}$$

Note : percent is a fraction with denominator 100 and the numerator of this fraction is called the **RATE PERCENT**.

2) Conversion of Fraction into Percent

3) Conversion of percent into Ratio

To convert the percent into ratio, first change it to fraction by dividing it by 100 and remove the '%' percent sign. Finally reduce the obtained fraction in the simplest form.

$$\text{e.g., } 25\% = \frac{25}{100} = \frac{1}{4} = 1 : 4$$

$$0.4\% = \frac{0.4}{100} = \frac{4}{1000} = \frac{1}{250} = 1 : 250$$

4) Conversion of Ration into Percent

$$a : b = \frac{a}{b} = \left(\frac{a}{b} \times 100\right) \%$$

$$\text{e.g., } 3 : 8 = \frac{3}{8} = \left(\frac{3}{8} \times 100\right) \% = 37\frac{1}{2} \%$$

5) Conversion of Percent into Decimal

To convert the percent to decimal, first change it to fraction by dividing it by 100 and remove the % sign. Then put the decimal point accordingly.

$$a \% = \frac{a}{100} = 0.0a$$



e.g, $12\% = \frac{12}{100} = 0.12$
 $354\% = \frac{354}{100} = 3.54$
 $\frac{2}{5}\% = \frac{2}{5 \times 100} = 0.004$

6) Conversion of Decimal into Percent

To convert decimal into percent, first change it to fraction for the removal of decimal and then multiply it by 100 and put the % sign.

e.g, $2.3 = \frac{23}{10} = \left(\frac{23}{10} \times 100\right)\% = 230\%$

$0.045 = \frac{45}{1000} = \left(\frac{45}{1000} \times 100\right)\% = 4.5\%$

$23.57 = \frac{2357}{100} = \left(\frac{2357}{100} \times 100\right)\% = 2357\%$

III. Finding a Percentage of a Given Number

To find the percentage of a given number, multiply the number n=by the required percent.

Let the number = x

Required percent = p%

Percentage of given number = p% of x
 $= \frac{p}{100} \times x$

IV. Finding the original number from its percent

Let original number = x

Required percent = p%

Obtained percentage = y

Now p% of x = y

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

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

$$\text{Number} = \frac{\text{obtained percentage}}{\text{percent}} \times 100$$

V. Two different percentages of a number

Let $P_1\%$ of x = Y_1

(Where x is given number)

And $P_2\%$ of x = Y_2 (i)

$$\frac{P_1}{100} \times x = Y_1 \text{ (ii)}$$

$$\frac{P_2}{100} \times x = Y_2$$

Adding (i) and (ii)

$$\frac{P_1 + P_2}{100} \times x = Y_1 + Y_2$$

$$x = \frac{Y_1 + Y_2}{P_1 + P_2} \times 100$$

Similarly subtracting (i) and (ii)

$$\frac{P_2 - P_1}{100} \times x = Y_2 - Y_1$$

$$x = \frac{Y_2 - Y_1}{P_2 - P_1} \times 100$$

VI. Finding how much percent one quantity is of another quantity

To find what percent of one quantity is of the other quantity if two quantities are given, we proceed as :

Let a and b are two quantities and we want to know 'what percent of a is b?'

Let x% of a is equal to b



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$$\frac{x}{100} \times a = b$$

$$X = \frac{b}{a} \times 100$$

Some important points:

- 1) To convert a fraction into a percent we multiply the fraction by 100.
- 2) To convert a ratio into a percent, we write it as a fraction and multiply it by 100
- 3) To convert a decimal into a percent, we shift the decimal point two places to the right
- 4) To convert a percent into a fraction, we remove the percent sign (%) and divide it by 100
- 5) To convert a percent into a ratio, we remove the percent sign (%) and form shift a ratio with the remaining number as the first term and 100 as the second term.
- 6) To convert a percent into a decimal, we remove the percent sign (%) and shift the decimal points two places to the left.
- 7) To express x as a percentage of y
Percentage = $\frac{x}{y} \times 100\%$
- 8) If x% of a quantity is y, then
Whole quantity = $\frac{y}{x} \times 100$
- 9) Percentage increase

$$= \left(\frac{\text{increase in quantity}}{\text{original quantity}} \times 100 \right) \%$$

10) Percentage Decrease

$$= \left(\frac{\text{decrease in quantity}}{\text{original quantity}} \times 100 \right) \%$$

11) If a quantity increases by r%, then

New quantity = original quantity + increase in quantity

= original quantity + r% of original quantity

= original quantity + $\frac{r}{100}$ of original quantity

= $1 + \frac{r}{100}$ of original quantity

New quantity = $\left(\frac{100+r}{100} \right) \times$ original quantity

12) If a quantity decreases by r%, then

New quantity = original quantity + increase in quantity

= original quantity - r% of original quantity

= original quantity - $\frac{r}{100}$ of original quantity

= $1 - \frac{r}{100}$ of original quantity

New quantity = $\left(\frac{100-r}{100} \right) \times$ original quantity

13) If a population of a city increases by r% per annum, then the population after 'n' years

= $\left(1 + \frac{r}{100} \right)^n$ of the original population population after 'n' years





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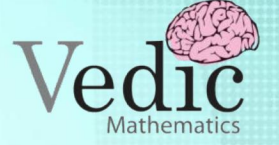
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$$= \left(1 + \frac{r}{100}\right)^n \times \text{original population}$$

$$\frac{\text{Population 'n' years ago}}{\text{original population}} = \frac{1}{\left(1 + \frac{r}{100}\right)^n}$$

Simplification Based on Percentage

1) What is 25% of 840

- a) 160 b) 170
c) 180 d) 210

14) If a number x is r% more than y, then

Y is less than x by $\left(\frac{r}{100+r} \times 100\right) \%$

15) If a number x is r% less than y, then

Y is more than x by $\left(\frac{r}{100-r} \times 100\right) \%$

16) If the price of commodity increases by r%, then

Reduction in consumption, not to increase the expenditure

$$= \left(\frac{r}{100+r} \times 100\right) \%$$

2) What number is 36% of 120

- a) 43.7 b) 43.2
c) 43.8 d) 43.9

17) If the price of a commodity decreases by r%, then

Increase in consumption, not to increase the expenditure

$$= \left(\frac{r}{100-r} \times 100\right) \%$$

3) What number is $8\frac{1}{3} \%$ of 120

- a) 30 b) 20
c) 40 d) 10

18) If a quantity is increased or decreased by x% and another quantity is increased or decreases by y%, the percent % change on the product of both the quantity is given by

$$\text{Required \% change} = \left(x + y + \frac{xy}{100} \%\right)$$

Note : for increasing use (+) we sign and for decreasing use (-) we sign

4) What Number is $4\frac{1}{6} \%$ of 1200

- a) 90 b) 60





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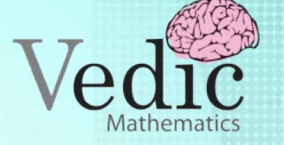
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c) 50

d) 55

c) 12.6%

d) 12.8%

8) 10 is what % of 200

a) 5.3%

b) 5.8%

c) 5.1%

d) 5%

5) 15 is what percentage of 50

a) 39%

b) 30%

c) 32%

d) 33%

9) 20% Of what is 45

a) 223

b) 228

c) 225

d) 222

6) 14 is what % of 25

a) 56%

b) 54%

c) 59%

d) 55%

10) $11\frac{1}{9}$ % of what number is 20

a) 170

b) 180

c) 130

d) 190

7) 10 is what % of 80

a) 12.5%

b) 12.7%





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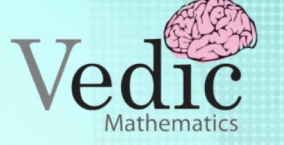
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11) $12\frac{2}{3}\%$ of what number is 760

- a) 6000 b) 5000
c) 4000 d) 6600

14) 40% of 1640 + x = 35% of 980 + 150% of 850

- a) 961 b) 967
c) 965 d) 962

12) 55% of 160 + 24% of 50 – 36% of 150

- a) 47 b) 48
c) 49 d) 46

13) 9.3% of 500 – 4.8% of 250 – 2.5% of 240

- a) 28.4 b) 28.5
c) 28.3 d) 28.6

15) $16\frac{2}{3}\%$ of 600 - $33\frac{1}{3}\%$ of 180

- a) 50 b) 30
c) 40 d) 20

16) 7.5% of 140 + 2.5% of 80

- a) 12.5 b) 12.78
c) 12.8 d) 12.65





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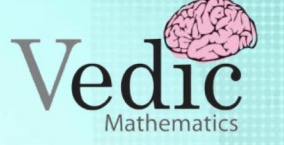
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19) $37\% \text{ of } 150 - 0.05\% \text{ of } 1000 = ?$

a) 56

b) 59

c) 55

d) 54

17) $145\% \text{ of } 700.05 + 22.99 \times 15.05 (\approx)$

a) 1370

b) 1344

c) 1360

d) 1356

20) $(16\% \text{ of } 480) + (x\% \text{ of } 978) = 653.82$

a) 59

b) 58

c) 64

d) 69

18) $14\% \text{ of } 80 + x\% \text{ of } 90 = 31.9$

a) 24

b) 23

c) 26

d) 22

Practice Problems

1) 5% of a number is 15. The number is

a) 150

b) 200

c) 250

d) **300**

2) 63% of 347 is

a) **2.25**

b) 2.40

c) 2.50

d) 12.75





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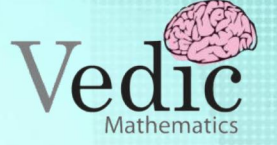
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3) $\frac{6}{5} = ?\%$

- a) 20
- b) 40
- c) 100
- d) **120**

4) 37.5% of 680 is

- a) 300
- b) **255**
- c) 245
- d) 235

5) 75% of what area is 15 squares meter?

- a) $10m^2$
- b) $15m^2$
- c) **$20m^2$**
- d) $25m^2$

6) The number 0.05 is what percent of 20%?

- a) **0.25%**
- b) 0.30%
- c) 30%
- d) 40%

7) What percent of 3 meters is 75cm?

- a) 10%
- b) 15%
- c) 20%
- d) **25%**

8) If 65% of $x - 37\frac{1}{2}\%$ of $x = 44.55$. the value of x is

- a) 160
- b) **162**
- c) 164
- d) 158

9) 45% of ? + 30% of 90 = 30% of 210

- a) 120
- b) **80**
- c) 60
- d) 90

10) 45% of $\frac{5}{6} + ? = 20\%$ of 4.375

- a) 4.55
- b) 3.735
- c) 0.25
- d) **0.5**

11) $\frac{5}{7}$ of 49 + 20% of 130 = ? + 49

- a) 18
- b) 15
- c) **12**
- d) 121

12) 35% of ? = $\frac{3}{4}$ of 48 + 62

- a) **280**
- b) 245
- c) 265
- d) 230





Statement Based Problems

13) ?% of 6144 = $2\frac{1}{2} \times 245.76$

- a) 16 b) 20
c) 5 d) **10**

14) One - fifth percent of 520 is:

- a) 0.104 b) **1.04**
c) 10.4 d) 104

15) 5% of (25% of Rs. 1600) is :

- a) Rs. 5 b) Rs. 17.50
a) **Rs. 20** d) Rs. 25

16) $13937.869 \div 199.54 + 15\% \text{ of } 201 = ?$

- a) 150 b) 90
c) 80 d) **100**

1) If A's salary is 20% less than B's salary, by how much percent is B's salary more than A's?

- a) 24% b) 25%
c) 23% d) 27%

2) The price of sugar was increased by 20% and then reduced by 10%. If the reduced price is Rs. 10.80 per Kg, find the original price of 8Kg of sugar?

- a) Rs. 10 per Kg
b) Rs. 20 per Kg
c) Rs. 30 per Kg
d) Rs. 50 per Kg

3) If the length of a rectangle is decreased by 50% and the breadth is increased by 80%. Then find the % change in the area of rectangle.

- a) Decreases by – 10%
b) Decreases by 10%
c) Increases by 10%
d) Increases by – 10%





4) The population of Mumbai has been increasing at the rate of 10% every year. If the percent population is 4840000. What was it 2 years ago?

- a) 40,00,000
- b) 45,00,000
- c) 44,00,000
- d) 42,00,000

7) A student has to obtain 40% marks to pass. He obtains 210 and fails by 40. Find the maximum number of marks.

- a) 625
- b) 635
- c) 645
- d) 615

5) The population of a town increased from 50,000 to 52,000. Find the increased percentage of population of town.

- a) 5%
- b) 3%
- c) 4%
- d) 8%

8) From a man's salary 25% is deducted on house rent, 20% of the rest is deducted on education of children and 40% of the rest is deducted on food, still is left with Rs. 9,000. Find the salary.

- a) 26,000
- b) 25,000
- c) 24,000
- d) 23,000

6) A towel was 50cm broad and 100cm long. When bleached, it was found to have lost 20% of its length and 10% of its breadth. Find the percentage of decreases in area?

- a) Decreases by 28%
- b) Increases by 28%
- c) Decreases by 29%
- d) Increases by 29%

9) In a fruit basket, apples and oranges are in the ratio 2 : 3. What is the percentage of apples in the basket?

- a) 43%
- b) 45%
- c) 44%
- d) 40%





10) A mixture of alcohol and water contains 35% alcohol by weight. 40gm of water is added to such 100gm of mixture. What percent of alcohol is present by weight in new mixture?

- a) 26% b) 25%
c) 23% d) 27%

11) If 15% of 40 is greater than 25% of a number by 2, the number is

- a) **16**
b) 20
c) 24
d) 32

12) 5 out of 2,250 parts of the earth is sulphur. The percentage of sulphur in the earth is

- a) $\frac{4}{9}\%$ **b) $\frac{2}{9}\%$**
c) $\frac{5}{7}\%$ d) $\frac{7}{6}\%$

13) What rate percent is one minute 12 seconds to an hour?

- a) **2%**
b) 3%
c) 4%
d) 5%

14) Rupa spends 75% of her salary and saves Rs. 150 per month. Her monthly salary is

- a) Rs. 300
b) Rs. 350
c) **Rs. 600**
d) Rs. 700

15) The number of students in a class increases from 900 to 936 due to mixing of sections. Determine the percent increases in number

- a) **4%**
b) 6%
c) 8%
d) 12%





16) A's income is 150% more than B's. by how much percent is B's income less than A's?

- a) 45%
- b) 50%
- c) **60%**
- d) 70%

17) A candidate who gets 20% marks in the examination fails by 30 marks but another candidate who get 32% marks get 42 marks more than the minimum pass marks. The pass percentage is

- a) **25%**
- b) 33%
- c) 36%
- d) 40%

18) What will be 160% of a number whose 200% is 140?

- a) 200
- b) 160
- c) 140
- d) **112**

19) $(x\% \text{ of } y + y\% \text{ of } x) = ?$, if $xy = 30,000$

- a) 900
- b) 800
- c) **600**
- d) 300





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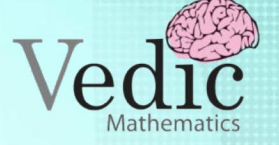
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- a) 4800, 4000
- b) **8000, 800**
- c) 7000, 1800
- d) 7200, 1600

20) Standard gold contains 22 parts of pure gold to 2 parts alloy. The percentage of alloy in a sovereign which is made of standard gold is

- a) 11%
- b) 12%
- c) **$8\frac{1}{3}\%$**
- d) $11\frac{1}{3}\%$

23) A reduction of 12.5% in the price of a dining table brought down its price to Rs. 4375. The original price (in Rs) of the table was

- a) 6000
- b) 5400
- c) 5200
- d) **5000**

21) If the price of kerosine be raised by 10%, find by how much percent a house holder must reduce his consumption of kerosine so that not to increase his expenditure?

- a) 10%
- b) **0.09%**
- c) 9.0%
- d) 8.25%

22) Divide Rs. 8800 into two parts such that one part is 10% of the other

24) If three – fifth of a number is 40 more than 40% of the same number. The number is





- a) 100
- b) 150
- c) **200**
- d) 400

- b) 40gm
- c) **60gm**
- d) 80gm

25) 5% of income of A is equal to 15% of income of B and 10% of income of B is equal to 20% of income of C. if income of C is Rs. 2000, then total income of A, B and C is

- a) Rs. 20,000
- b) **Rs. 18,000**
- c) Rs. 14,000
- d) Rs. 6,000

26) 300gms of sugar solution has 40% sugar in it. How much sugar should be added to make it 50% in the solution?

- a) 10gm

