

Study Notes on Basics of Percentage



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A percentage is a number or ratio expressed as a **fraction of 100**. It is proportion per hundred.

1. When we say 35 percent in mathematical notation, we write 35%.

2. When we want to express this in mathematical form, 35% means 35 per 100 or (35/100).

Important: 50% of 20 can be written 20% of 50 as well.

You can also represent % into decimal, 50% = 0.5

Conversion of fraction into %.

to convert a fraction into %, we multiply it by 100.

$$\frac{1}{4} = (\frac{1}{4}) \times 100 \% = 25 \%$$

$$\frac{1}{3} = (\frac{1}{3}) \times 100 \% = 33(\frac{1}{3}) \%$$

$$\frac{1}{14} = (\frac{1}{14}) \times 100 \% = (\frac{100}{14})\% = (\frac{50}{7})\% = 7 (\frac{1}{7}) \%$$

Note: Never forget to express % notation in the percentage.

We suggest you that you must learn both tables given below.

Fraction	Percentage	Fraction	Percentage	Fraction	Percentage
1	100%	1/7	14(2/7) %	1/13	7 (9/13) %
1/2	50%	1/8	12(1/2) %	1/14	7 (1/7) %
1/3	33(1/3) %	1/9	11(1/9) %	1/15	6 (2/3) %
1/4	25%	1/10	10 %	1/16	6 (1/4) %
1/5	20%	1/11	9 (1/11) %		
1/6	16(2/3) %	1/12	8 (1/3) %		

Conversion of % into a fraction.

To convert % into fraction, we divide it by 100. So, we can express in this way:

$$100\% = (100/100) = 1 \quad 1\% = (1/100) \quad 2\% = (2/100) = (1/50)$$

$$50\% = 50/100 = \frac{1}{2}$$

$$20\% = 20/100 = \frac{1}{5}$$

$$10\% = 10/100 = \frac{1}{10}$$

$$16(\frac{2}{3})\% = (\frac{50}{3})\% = \frac{50}{(3 \times 100)} = \frac{50}{300} = \frac{1}{6}$$



Percentage	Fraction	Percentage	Fraction	Percentage	Fraction
10%	1/10	16 (2/3)%	1/6	15%	3/20
20%	1/5	66 (2/3) %	2/3	7(1/2)%	3/40
40%	2/5	6(1/4)%	1/16	22(1/2)%	9/40
60%	3/5	18(3/4) %	3/16	69(3/13) %	9/13
80%	4/5				

In following examples we will try to avoid calculation using above table.

(i) 99% of 840

we can say 10% = 84, So 1% = 8.4

99% of 840 = 840 - 8.4 = 831.6

(ii) 25% of 320 = $(1/4) \times 320$
= 80

(iii) 76% of 400?

$76\% = 50\% + 25\% + 1\%$
= 200 + 100 + 4
= 304

(iv) 102% of 720?

1% = 7.2 so 2% = 14.4

102% = 100% + 2% = 720 + 14.4 = 734.4

(v) 18% of 300?

$18\% = 20\% - 2\% = (1/5) \times 300 - 6$
= 60 - 6 = 54

or 1% = 3 so 18% = 18 × 3 = 54

(vi) 12% of 540?

1% = 5.4

$12\% = 10\% + 2\%$
= 54 + 10.8
= 64.8



$$(i) 7\frac{1}{7} \% \text{ of } 343 = \frac{1}{14} \times 343 = \frac{49}{2}$$

$$(ii) 12\frac{1}{2} \% \text{ of } 10 \% \text{ of } 400 = \frac{1}{8} \times \frac{1}{10} \times 400 = 5$$

$$(iii) 69\frac{3}{13} \% \text{ of } 7\frac{9}{13} \% \text{ of } 169 = \frac{9}{13} \times \frac{1}{13} \times 169 = 9$$

$$(iv) 9\frac{1}{11} \% \text{ of } 1331 = \frac{1}{11} \times 1331 = 121$$

$$(v) 18\frac{3}{4} \% \text{ of } 11\frac{1}{9} \% \text{ of } 144 = \frac{3}{16} \times \frac{1}{9} \times 144 = 3$$

Example1: Out of his total income, Mr Sharma spends 20% on house rent and 70% of the rest on household expenses. If he saves Rs 1,800 what is his total income (in rupees)?

Solution: Let Income of Mr Sharma is 100

then he spends 20% on the house, so the remaining amount is 80.

now he spends 70% of 80 on household expenses, so the remaining amount left with him is 30% of 80

$$30\% \text{ of } 80 = 1800$$

$$24 = 1800$$

$$1 = 1800/24$$

$$1 = 75$$

$$100 = 7500$$

hence total income is 7500 Rs.

Or, Let total income is P

$$(100\% - 20\%) \times (100\% - 70\%) \times P = 1800$$

$$80\% \times 30\% \times P = 1800$$

$$((80 \times 30) / (100 \times 100)) \times P = 1800$$

$$P = 7500$$

Example2: An army lost 10% its men in war, 10% of the remaining due to diseases died and



10% of the rest were disabled. Thus, the strength was reduced to 729000 active men. Find the original strength.

Solution: Let the army has 100 men.

10% loss in war, so remained are 90 men

then, 10% of 90 died due to diseases, remained $90 - 9 = 81$

then again, 10% of 81 again disabled

So, remained men = 90% of 81

90% of 81 = 729000

$(90 \times 81) / 100 = 729000$

1 = 10000

100 = 1000000

hence total men are 1000000.

Example3: In a village three people contested for the post of village Sarpanch. Due to their own interest, all the voters voted and no one vote was invalid. The losing candidate got 30% votes. What could be the minimum absolute margin of votes by which the winning candidate is led by the nearest rival, if each candidate got an integral percent of votes?

Solution: As given, no vote was invalid i.e. 100% votes were polled and all candidates got votes in an integer value. There were 3 candidates, one losing candidate got 30%, so the remaining two candidates got 70% vote of the total.

Candidate 1 + candidate 2 = 70%

An important point that is given in the question is the minimum absolute margin and integral value.

Case 1: Suppose candidate 1 got 40%, then candidate 2 had got 30%. But this is not the minimum absolute margin.

Case 2: Both got 35% votes, If both got equal votes then there will be no winning candidate.

Case 3: One candidate must have got 34% and another one has got 36%.

Hence the absolute margin is 2%.

Example4: The difference between $4/5$ of a number and 45% of the number is 56. What is 65% of the number?

Solution: Let number is P.

we can say $4/5 = 80\%$

so, $(80\% - 45\%)$ of P = 56

35% of P = 56

$P = (56/35\%)$

65% of P = $56/35 \times 65 = 104$

Example5: Deeksha's science test consists of 85 questions from three sections- i.e. A, B, and C. 10 questions from section A, 30 questions from section B, and 45 questions from section C. Although, she answered 70% of section A, 50% of section B and 60% of section C correctly. She did not pass the test because she got less than 60% of the total marks. How many more



questions she would have to answer correctly to earn 60% of the marks which is the passing grade?

Solution: If she has done 60% of total questions she would have passed,

So, no. of question to be done to pass = 60% of 85 = $(\frac{3}{5}) \times 85 = 51$

But she done 70% of A = 70% of 10 = 7

50% of B = 50% of 30 = 15

60% of C = $(\frac{3}{5})$ of 45 = 27

So, total questions she attempted = $(7+15+27) = 49$

If she has attempted $(51-49) = 2$ more questions she would have passed.

Example6: In an election between 2 candidates, 75% of the voters cast their votes, out of which 2% votes were declared invalid. A candidate got 18522 votes which were 75% of the valid votes. What was the total number of voters enrolled in the election?

Solution: Let the total number of voters enrolled are P.

Number of votes casted = 75% of P = $(\frac{75}{100}) P = 0.75 P$

Important: Those votes which were declared invalid are 2% of cast voted not 2% of total votes.

So, valid votes are = $(100\% - 2\%)$ of $0.75P = 98\%$ of $0.75P$

Given Candidates got 75% of valid votes = 18522

$(75\%) \times 98\% \times 0.75 P = 18522$

$(\frac{3}{4}) * (\frac{98}{10}) * (\frac{3}{4}) P = 18522$

$P = 42 \times 800$

$P = 33600$ votes.

Example7: An ore contains 20% of an alloy that has 85% iron. Other than this, in the remaining 80% of the ore, there is no iron. What is the quantity of ore (in kg) needed to obtain 60 kg of pure iron?

Solution: Let the quantity of ore is P kg

$P \times 20\% \times 85\% = 60\text{kg}$

$P \times (\frac{1}{5}) \times (\frac{17}{20}) = 60$

$P = (60 \times 5 \times 20) / 17$

$P = 6000 / 17$ Kg

Example8: 5% of one number (X) is 25% more than another number (Y). If the difference between the numbers is 96 then find the value of X?

Solution : Given: 5% of X = Y + 25% of Y

$0.05 X = 1.25 Y$

$X = 25 Y$

$X - Y = 96$

$25Y - Y = 96$

$24Y = 96$

$Y = 4$ so, $X = 100$



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