



Solved Examples: Percentages

Easy Level

The questions are targeted to improve your knowledge on basic concepts, though easy questions are rare in CAT. These are extremely important for conceptual understanding at the foundation level. Try this question by yourself:

Let's start with the practice questions

Example 1: The price per unit of an article decreases by 4%, and the consumption (in units) decreases by 8%. The expenditure would decrease by

- (a) 12%
- (b) 12.32%
- (c) 11.68%
- (d) 4.32%

Ans: (c)

Let,

Original price per unit- $100x$

Original Consumption- $100y$

New price per unit- $96x$ (decreases by 4%)

New Consumption- $92y$ (decreases by 8%)

Expenditure, in this case, will be 0.96×0.92 times the earlier expenditure.

Using the base of 100, the product will be $(96 - 8) \times 100 + (-4) \times (-8) = 0.8832$

Thus, the expenditure will decrease by $(1 - 0.8832) \times 100 = 11.68\%$.

Example 2: If all the sides of a cuboid are increased by 20%, then by what percentage does its volume increase?

- (a) 20%
- (b) 44%
- (c) 60%
- (d) 72.8%

Ans: (d)

Let initially the sides be x , y and z .

Initial volume = xyz

After the change sides will be $1.2x$, $1.2y$ and $1.2z$.

New volume = $1.728(xyz)$

$\therefore$ Increase in volume is 72.8%.

Example 3: In an election between two candidates, the candidate who gets 30% of the votes polled is defeated by 15,000 votes. The number of votes polled in favour of the winning candidate is

- (a) 11,250
- (b) 15,000
- (c) 26,250
- (d) 37,500

Ans: (c)

The correct option is C. 26250

Percentage of votes obtained by defeated party = 30 %

$\therefore$ Percentage of votes obtained by winning party = $100 \% - 30 \% = 70 \%$

Difference in percentage $70 \% - 30 \% = 40 \%$

Let there be total of x votes.

Therefore, according to the question, $\Rightarrow 40 \% \times x = 15000 \Rightarrow x = 15000 \times 100/40 \Rightarrow x = 37500$

Thus, no. of votes pulled by winning party $70 \% \times 37500 = 26250$

Example 4: In an election between 2 candidates, Chaman gets 80% of the total valid votes. If the total votes were 12000, what is the number of valid votes that the other candidate Dhande gets if 15% of the total votes were declared invalid?

- (a) 1645
- (b) 1545
- (c) 1675
- (d) 2040

Ans: (d)

To find the number of valid votes that the other candidate Dhande gets, we need to first calculate the total valid votes.

Given that the total votes were 12,000 and 15% of the total votes were declared invalid, we can calculate the total valid votes as follows:

Total valid votes = Total votes - Invalid votes

Total valid votes = 12,000 - (15/100) * 12,000

Total valid votes = 12,000 - 1,800

Total valid votes = 10,200

Now, since Chaman gets 80% of the total valid votes, we can calculate the number of valid votes that Dhande gets as follows:

Number of valid votes for Dhande = Total valid votes - Votes for Chaman

Number of valid votes for Dhande = 10,200 - (80/100) * 10,200

Number of valid votes for Dhande = 10,200 - 8,160

Number of valid votes for Dhande = 2,040

Therefore, the number of valid votes that the other candidate Dhande gets is 2,040.

Example 5: In an examination, Madan obtained 20% more than Sahir but 40% less than Ravi. If the marks obtained by Sahir is 80, find the percentage marks obtained by Ravi if the full marks is 200.

- (a) 80%

- (b) 70%
- (c) 78.33%
- (d) 71.11%

Ans: (a)

Sahir obtained 80 marks, hence Madan obtained = $80 \times 1.2 = 96$.

Ravi = $96/0.6 = 160$.

160 out of 200 means a percentage of 80%.

Example 6: A man borrows Rs 6000 at 5% interest, on reducing balance, at the start of the year. If he repays Rs 1200 at the end of each year, find the amount of loan outstanding, in Rs. at the beginning of the third year.

- (a) 3162.75
- (b) 4125.00
- (c) 4155.00
- (d) 5100.00

Ans: (c)

Given Principal amount = Rs. 6000

And

Rate of interest = $r = 5\%$ compounded annually

So,

Interest after 1 year = $6000 \times 5 \times 1/100 = 60 \times 5 = \text{Rs. } 300$

Total money owed after 1 year = $6000 + 300 = 6300$

And

Rs. 1200 paid, So

Total money starting of second year = $6300 - 1200 = \text{Rs. } 5100$

And

Interest after 2 year = $5100 \times 5 \times 1/100 = 51 \times 5 = \text{Rs. } 255$

Money owed after 2 year = $5100 + 255 = 5355$

And

Rs. 1200 paid, So

Total money outstanding starting of Third year = $5355 - 1200 = \text{Rs. } 4155$

Example 7: A man sells an article at a profit of 20%. If he had bought it at 20% less and sold it for Rs. 5 less, he would have gained 25%. Find the cost price (in Rs.) of the article.

Ans: 25

Let the CP be Rs. x

$\therefore \text{SP} = \text{Rs. } 1.2x$ New CP = Rs. $0.8x$ New SP = Rs. $(1.2x - 5)$ $1.25(0.8x)$

$= 1.2x - 5$

$= 1.2x - 5$

$\therefore x = 25$

Example 8: A and B are two friends, each having at least a rupee. If A gives B a sum of Rs. 20, then A has 40% of the amount with B. If B gives A, a sum of Rs. 40, then B will have 40% of the amount with A. What is the amount (in Rs.) with A initially?

Ans: 60

We have $(A - 20) = 0.4(B + 20)$,

i.e. $A - 0.4B = 28$ And $(B - 40) = 0.4(A + 40)$,

i.e. $B - 0.4A = 56$

Solving, we get $A = \text{Rs. } 60$

Medium Level

Almost 70% of questions in CAT are of Medium based questions. Though the conceptually they seem easier, the trick is to solve the calculations faster & we curated problems for you to help you do problems easier.

Example 1: A sum of money compounded annually becomes Rs. 625 in 2 years and Rs. 675 in 3 years. The rate of interest per annum is

- (a) 7%
- (b) 10%
- (c) 5%
- (d) 8%

Ans: (d)

For a difference of 1 year, C.I. can be computed as S.I.

Hence, from the 2nd year to the 3rd year, interest earned = $(675 - 625) = \text{Rs. } 50$ on Rs. 625.

Hence, the rate of interest = $50 / 625 \times 100 = 8\%$ per annum.

Example 2: I bought 5 pens, 7 pencils and 4 erasers. Rajan bought 6 pens, 8 erasers and 14 pencils for an amount which was 50% more than what I had paid. What percentage of the total amount spent by me was spent on pens?

- (a) 37.5%
- (b) 56.5%
- (c) 50%
- (d) 62.5%

Ans: (d)

Let us look at the two equations:

Let (5 pens + 7 pencils + 4 erasers) cost Rs. x , and (6 pens + 14 pencils + 8 erasers) will cost Rs. $1.5x$

In the second case, had Rajan decided to buy 10 pens instead of 6, it would have cost him Rs. $2x$

$\therefore$ (10 pens + 14 pencils + 8 erasers) = Rs. $2x$

Now, subtracting the second equation from the third, we get 4 pens cost Rs. $0.5x$. So, 5 pens will cost Rs. $0.625x$. This is the amount that I have spent on pens.

Hence, fraction of the total amount paid = $0.625 = 62.5\%$

Example 3: Rehman buys a few apples at 15 for a rupee and the same number of apples at 20 for a rupee. He mixes the two lots and sells them at 35 for 2 rupees. What is his gain or loss percentage?

- (a) 3.62% loss
- (b) 2.04% profit
- (c) No profit, no loss
- (d) 2.04% loss

Ans: (d)

Suppose Rehman buys (LCM of 15, 20 and 35) 420 apples.

Total cost of apples bought at 15 for a rupees = $420/15 = \text{Rs. } 28$

Total Cost of apples bought at 20 for a rupees = $420/20 = \text{Rs. } 21$

$\therefore$ Total C.P = Rs. $(28+21) = \text{Rs. } 49$

S.P for $(420+420)$ 840 apples = Rs. $(840 \times 2) / 35 = \text{Rs. } 48$

$\therefore$ Loss % = $(49 - 48)/49 \times 100 = 2.04\%$.

Example 4: After how many years (approximately) would the amount payable on a loan be twice the principal, if principal is lent at 20% CI, compounded half yearly?

- (a) 8 years

- (b) 6 years
(c) 3.6 years
(d) None of these

Ans: (c)

Let the principal be x .

We are supposed to find After how many years would the amount payable on loan be twice the principal is lent at 20% compound interest compounded half yearly.

Amount = $2x$

Rate of interest $r = 20\% = 0.2$

No. of compounds per year = $n = 2$

Amount = $P(1 + r/n)^{nt}$

$$2x = x(1 + 0.2/2)^{2t}$$

$$2 = (1.1)^{2t}$$

$$2 = (1 + 1/10)^{2t}$$

$$t = (\log 2) / (2 \log 1.1)$$

$$t = 3.63$$

So, It will take 3.6 years to double the amount.

Example 5: Sudhir, a very clever businessman, started off a business with very little capital. In the first year, he earned a profit of 50% and donated 50% of the total capital (initial capital + profit) to a charitable organisation. The same course was followed in the 2nd and 3rd years also. If at the end of three years, he is left with ₹ 33,750, then find the amount donated by him at the end of the 2nd year.

- (a) ₹ 90,000
(b) ₹ 25,000
(c) ₹ 45,000
(d) ₹ 40,000

Ans: (c)

You can make the following tables to see the flow of his capital:

Year	Capital at the beginning	Capital after profit	Capital after donation
1	100	150	75
2	75	112.5	56.25
3	56.25	84.375	42.1875

Since, this value is given to us as : 33750, we get $42.1875\% = 33750 \rightarrow 1\% = 800$.

Hence, donation at the end of the 2nd year = $56.25 \times 800 = 45000$.

Example 6: In the university examination last year, Samanyu scored 65% in English and 82% in History. What is the minimum percent he should score in Sociology, which is out of 50 marks (if English and History were for 100 marks each), if he aims at getting 78% overall?

- (a) 94%
- (b) 92%
- (c) 98%
- (d) 96%

Ans: (d)

Samanyu's scores in each area is 65 and 82 respectively out of 100 each.

Since, the exam is of a total of 250 marks (100 + 100 + 50) he needs a total of 195 marks in order to get his target of 78% overall.

Thus, he should score $195 - 65 - 82 = 195 - 147 = 48$ marks in Sociology, which would mean 96%

Example 7: Malti has M with her and her friend Chinki has C with her. Malti spends 12% of her money and Chinki also spends the same amount as Malti did. What percentage of her money did Chinki spend?

- (a) 18M/C
- (b) 18C/M
- (c) 12M/C
- (d) 12C/M

Ans: (c)

Chinki would have spent 12% of Malti.

Thus, her percentage of expenditure would be $0.12 M * 100/C = 12 M/C$

Example 8: Aman's salary is first increased by 25% and then decreased by 20%. The result is the same as Baman's salary increased by 20% and then reduced by 25%. Find the ratio of Baman's initial salary to that of Aman's initial salary.

- (a) 4 : 3
- (b) 11 : 10
- (c) 10 : 9
- (d) 12 : 11

Ans: (c)

Option (c) fits the situation as if the ratio is 10:9, the value of Baman's salary would first go up from 10 to 12 and then come down from 12 to 9 (after a 25% decrease).

On the other hand, the value of Aman's salary would go up from 9 to 11.25 and then come back to 9 (Note that a 25% increase followed by a 20% decrease gets one back to the starting value).

Example 9: Alok and Bimal have, between them, ₹ 12000. Alok spends 12% of his money while Bimal spends 20% of his money. They are then left with a sum that constitutes 85% of the whole sum. Find what amount is left with Alok.

- (a) ₹ 7500
- (b) ₹ 8000
- (c) ₹ 7000
- (d) ₹ 6600

Ans: (d)

Let A has x rupees and B has y rupees

$$\Rightarrow x + y = 12000 \quad \dots(i)$$

Also,

$$\Rightarrow (x - 12\% \text{ of } x) + (y - 20\% \text{ of } y) = 0.85 \times 12000$$

$$\Rightarrow 0.88x + 0.8y = 10200$$

Putting the value of x from eq (i), we get

$$\Rightarrow 0.88(1200 - y) + 0.8y = 10200$$

$$\Rightarrow 1056 - 0.08y = 10200$$

$$\Rightarrow y = 4500$$

$$\Rightarrow x = 7500$$

$$\Rightarrow x - 12\% \text{ of } x = 0.88x = 0.88 \times 7500 = 6600$$

$\therefore$ The amount left with A is Rs. 6600

Example 10: At IIM Bangalore, 60% of the students are boys and the rest are girls. Further 15% of the boys and 7.5% of the girls are getting a fee waiver. If the number of those getting a fee waiver is 90, find the total number of students getting 50% concession if it is given that 50% of those not getting a fee waiver are eligible to get half fee concession?

Ans: 330

The thought process would go like: If we assume 100 students

Total : 60 boys and 40 girls.

Fee waiver : 9 boys and 3 girls. This means that a total of 12 people are getting a fee waiver. (But this figure is given as 90.)

Hence, 1 corresponds to 7.5.

Now, number of students not getting a fee waiver = 51 boys and 37 girls

Students getting a 50% concession = 25.5 boys and 18.5 girls (i.e. a total of 44.) Hence, the required answer = $44 \times 7.5 = 330$.

Hard Level

Around 25% of these type questions come in CAT - If your target is above 95%ile, we recommend you to solve these questions as well.

Example 1: There are three galleries in a coal mine. On the first day, two galleries are operative and after some time, the third gallery is made operative. With this, the output of the mine became half as large again. What is the capacity of the second gallery as a percentage of the first, if it is given that a four-month output of the first and the third galleries were the same as the annual output of the second gallery?

- (a) 70%
- (b) 64%
- (c) 60%
- (d) 65%

Ans: (c)

The third gallery making the capacity 'half as large again' means an increase of 50%.

Further, it is given that: $4(\text{first} + \text{third}) = 12(\text{second})$ In order to get to the correct answer, try to fit in the options into this situation. (Note here that the question is asking you to find the capacity of the second gallery as a percentage of the first.)

If we assume option (a) as correct - 70% the following solution follows: If the second is 70, then first is 100 and first + second is 170. Then third will be 85 (50% of first + second). Then the equation: $4 * (100 + 85)$ should be equal to $12 * 70$ But this is not true.

Through trial and error, you can see that the third option fits correctly. $4 * (100 + 80) = 12 * 60$.

Hence, it is the correct answer.

Example 2: A shopkeeper announces a discount scheme as follows: for every purchase of ₹ 3000 to ₹ 6000, the customer gets a 15% discount or a ticket that entitles him to get a 7% discount on a further purchase of goods costing more than ₹ 6000. The customer, however, would have the option of reselling his right to the shopkeeper at 4% of his initial purchase value (as per the right refers to the 7% discount ticket). In an enthusiastic response to the scheme, 10 people purchase goods worth ₹ 4000 each. Find the maximum. Possible revenue for the shopkeeper.

- (a) ₹ 38,400
- (b) ₹ 38,000
- (c) ₹ 39,400
- (d) ₹ 39,000

Ans: (a)

The shopkeeper would get the maximum revenue when everybody opts for a 4% resale of the right.

In such a case, the shopkeeper's revenue from each customer would be 96% of 4000 = $4000 - 160 = 3840$.

Hence, the total revenue is 38400.

Example 3: The price of raw materials has gone up by 15%, labour cost has also increased from 25% of the cost of raw material to 30% of the cost of raw material. By how much percentage should there be a reduction in the usage of raw materials so as to keep the cost same?

- (a) 17%
- (b) 24%
- (c) 28%
- (d) 25%

Ans: (a)

Let the initial price of raw materials be 100.

The new cost of the same raw material would be 115.

The initial cost of labour would be 25 and the new cost would be 30% of 115 = 34.5

The total cost initially would be ₹ 125.

The total cost for the same usage of raw material would now be: $115 + 34.5 = 149.5$

This cost has to be reduced to 125.

The percentage reduction will be given by $24.5/149.5 = 17\%$ approx.

Example 4: A clock is set right at 12 noon on Monday. It loses $1/2\%$ on the correct time in the first week but gains $1/4\%$ on the true time during the second week. The time shown on Monday after two weeks will be

(a) 11 : 34 : 48

(b) 12 : 25 : 12

(c) 12 : 50 : 24

(d) 12 : 24 : 16

Ans: (a)

Time lost over two weeks = 25% a week time (given that $1/2\%$ clock loses in first week and in the second week it gains $1/4\%$ on true time)

A week = 168 hours

Hence, clock lost = 0.42 hours = 25.2 minutes or 25 minute 12 seconds

Thus, correct time = 11 : 34 : 48