Percentage - 2 QA - 02

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Number of Questions : 30

Percentage calculations

1. If all the sides of a cuboid are increased by 20%, then by what percentage does its volume increase?
(1) 20% (2) 44%
(3) 60% (4) 72.8%

2. Gun powder contains 75% nitre, 10% of sulphur and the rest is charcoal by weight. If quantity of gunpowder is 24 kg, then what is the weight of charcoal?
(1) 3.6 kg (2) 4.5 kg
(3) 5 kg (4) 5.5 kg

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
(1) 11,250 (2) 15,000
(3) 26,250 (4) 37,500

4. If sides of a square is increased by 30%, then what is the percentage increase in its area?
(1) 9% (2) 30%
(3) 60% (4) 69%

5. A vendor sells 30% of his fruits and throws away 40% of the rest of the fruits. Next day he sells 50% of the remainder fruits and throws away the rest. What percent of the fruits does the vendor throw?
(1) 51% (2) 49%
(3) 63% (4) 72%

6. If the price of a bicycle is increased by 9.09%, then by 8.33% and then by 7.7%, the price becomes Rs. 1,274. What is the original price of the bicycle?
(1) Rs. 999 (2) Rs. 1,001
(3) Rs. 1,100 (4) Rs. 1,150

7. Vaibhav was writing the CAT exam. There were four passages of equal length (in words) and they had 5, 8, 8 and 6 questions respectively. Vaibhav can answer exactly 12 questions in the time he takes to read any one of the four passages. Assume that his rate of reading and answering question remains the same across all four passages. By what rate should Vaibhav increase his reading speed in order to cutdown his total time spent by 10%?
(1) 20% (2) 18.5%
(3) 25% (4) 9.8%

8. The price per unit of an article decreases by 4%, and the consumption (in units) decreases by 8%. The expenditure would decrease by
(1) 12% (2) 12.32%
(3) 11.68% (4) 4.32%

9. In a class, 70% of the students are boys and 14% of the students play cricket. If 10% of boys play cricket, then what percentage of the cricket players are boys?
(1) 80% (2) 70%
(3) 60% (4) 50%

10. In a stockpile of products produced by three machines M1, M2 and M3, 40% and 30% were manufactured by M1 and M2 and the rest by M3. 3% of the products manufactured by M1 are defective, 1% of the products by M2 are defective, while 95% of the products of M3 are not defective. What is the percentage of defective products in the stockpile?
(1) 3% (2) 5%
(3) 30% (4) 32.7%

11. ABC & Company produces nuts for FGH Ltd. The rejection rate for the nuts produced was 4% for the first quarter of the month and 8% for the next quarter of the month. The monthly rejection rate was maintained at 7%. Thus, ratio of first quarter to second quarter production was:
(1) 1 : 3 (2) 2 : 1
(3) 1 : 1 (4) 1 : 2

12. Ratio of prices of two houses A and B was 4 : 5 last year. This year price of A increased by 25% and that of B by Rs 50,000. If prices are now in the ratio of 9 : 10, then price of A last year was
(1) Rs. 3,60,000 (2) Rs. 4,50,000
(3) Rs. 4,80,000 (4) Rs. 5,00,000

13. A candidate scores 39% of the maximum marks and fails by 58 marks, while another candidate who scores 55% of the maximum marks, gets 22 marks more than minimum required marks to pass the examination. Find maximum marks of examination.
(1) 450 (2) 650
(3) 500 (4) 550

14. Two lumps having mixture of gold and silver together weighs 20 kg. One lump contains 75% gold and 31.25 gm silver per kg. Another lump contains 85% gold and 30 gm silver per kg. Total quantity of silver in two lumps is 617.5 gm. If two lumps are melted to form one, then percentage of gold in it will be
(1) 75% (2) 87%
(3) 15.6% (4) 78%

15. 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?

16. A college has raised 75% of the amount it needs for a new building by receiving an average donation of Rs. 600 from people already solicited. People already solicited represents 60% of people, the college will ask for donations. If college is to raise exactly the amount needed for the new building, what should be the average donation (in Rs.) from remaining people to be solicited?

17. In a certain town, people are either married or unmarried. Similarly, either they work or they don't work. 37% of the total population was married and 76% of the married people were working. Similarly, 54% of the unmarried people were working. If the total number of people who work was 1,24,280, then the total population of the town was:
(1) 90,000 (2) 2,00,000
(3) 1,80,000 (4) 2,16,000

18. There is an alloy (A) of silver and copper. A certain weight of this alloy is mixed with 15 kg of pure silver and is melted. The new alloy (B) contains 90% of silver. If alloy (A) is mixed with 10kg of a 90% silver alloy, and is melted to form new alloy (C), then (C) is found to contain 84% silver. Find the percentage of silver in (A).
(1) 80% (2) 90%
(3) 75% (4) 85%

SI / CI

19. 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
(1) 7% (2) 10%
(3) 5% (4) 8%

20. Difference between compound interest and simple interest for 2 years on a sum of money is Rs. 160. If total simple interest is Rs. 2,880, then find rate of interest.
(1) $5\frac{5}{9}\%$ (2) $12\frac{1}{2}\%$
(3) $11\frac{1}{9}\%$ (4) 9%

21. 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?
(1) 8 years (2) 6 years
(3) 4 years (4) None of these

22. If the difference between the CI and the SI at the end of 2 years is Rs. 100, what is the principal? Rate is 5% per annum in both the cases. (Assume same principal for both the cases.)
(1) Rs. 50,000 (2) Rs. 40,000
(3) Rs. 10,000 (4) None of these

23. The compound interest on a certain sum of money for 2 years at 10% per annum is Rs. 420. The simple interest on the same sum at the same rate and for the same tiwe will be
(1) Rs. 350 (2) Rs. 375
(3) Rs. 400 (4) None of these

24. Bhawna lent part of Rs.10,000 to Myra, one of her friends at 8% SI for 4 years. She invested the remaining amount at 12% SI. Total income from interest after 4 years was Rs. 3,800. What was sum (in Rs.) lent to Myra?

25. Narayan and Murthy invested some money at 6% and 7% per annum respectively of SI. At the end of 2 years they found that together they received Rs. 354 as interest. One-fourth of Narayan's initial investment is equal to one-fifth of the money invested by Murthy. Find the total money invested.
(1) Rs. 2,746.5 (2) Rs. 2,600
(3) Rs. 2,700 (4) Rs. 2,880

26. A certain amount of money compounded annually at r% becomes Rs. 1,440 and Rs. 1,728 after 2 and 3 years respectively. Find the value of r.
(1) 5% (2) 10%
(3) 15% (4) 20%

27. Rs. 2,189 is divided into three parts such that their amounts after 1, 2 and 3 years respectively may be equal. If the rate of simple interest being 4% p.a. in all cases, the smallest part is
(1) Rs. 389 (2) Rs. 756
(3) Rs. 703 (4) Rs. 352

28. Rohit decides to invest a certain amount of money in savings account of a bank that pays 20% compound interest per annum for a period of two years. What is the sum of money that Rohit should invest so that he receives Rs. 200 at the end of first year, and Rs. 400 at the end of second year?

(1) Rs. 500 (2) Rs. $\frac{1400}{3}$

(3) Rs. $\frac{4000}{9}$ (4) None of these

29. An amount of Rs. 7,000 was divided into two equal parts. The first part was deposited in a bank at simple interest rate of 8% per annum for three years. The second part was deposited in another bank at the rate of 10% per annum, compounded annualy, for 2 years. What is the difference in the interests earned from the two amounts?

30. Equal sums of money are invested for 2 years at 10% compound interest - one gets compounded annualy and the other half-yearly. Find the difference (in Rs.) between the amounts at the end of 2 years if the sum invested was Rs. 5,000.

(1) Rs. 26.50 (2) Rs. 27.50

(3) Rs. 25.50 (4) Rs. 24.50

QA - 02 : Percentage - 2
Answers and Explanations

1	4	**2**	1	**3**	3	**4**	4	**5**	2	**6**	2	**7**	2	**8**	3	**9**	4	**10**	1
11	1	**12**	1	**13**	3	**14**	4	**15**	–	**16**	–	**17**	2	**18**	1	**19**	4	**20**	3
21	3	**22**	2	**23**	3	**24**	–	**25**	3	**26**	4	**27**	3	**28**	3	**29**	–	**30**	3

1. 4 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)
∴ Increase in volume is 72.8%.

2. 1 The percentage of charcoal
= [100 – (75 + 10)] % = 15 %
Quantity of charcoal = 15 % of 24 kg

$= \frac{15}{100} \times 24 = 3.6$ kg.

3. 3 Let total number of votes be x.
Then, 30% of x + 15000 = 70% of x
⇒ 15000 = 0.4x
⇒ x = 37500
The required number = 70% of 37500

$= \frac{70}{100} \times 37500 = 26250$

4. 4 Net percentage change

$= a + b + \frac{ab}{100} = 30 + 30 + \frac{30 \times 30}{100} = 69\%$

5. 2 Suppose, he has 100 fruits. He sells 30 fruits and throws away 40% of 70 i.e. 28 fruits. Now he was left with 42 fruits. Next day, he sells 50% of 42 = 21 fruits. So, he throws 21 + 28 = 49 fruits.
Hence, the required percentage = 49.

6. 2 Let the original price of the bicycle be Rs. x. Then,

$$x \times \left(1 + \frac{9.09}{100}\right) \times \left(1 + \frac{8.33}{100}\right) \times \left(1 + \frac{7.7}{100}\right) = 1274$$

$$\Rightarrow x \times \left(1 + \frac{1}{11}\right) \times \left(1 + \frac{1}{12}\right) \times \left(1 + \frac{1}{13}\right) = 1274$$

$$\Rightarrow x \times \frac{12}{11} \times \frac{13}{12} \times \frac{14}{13} = 1274$$

⇒ x = 91 × 11 = Rs. 1,001.

7. 2 Let time taken to answer a question = t

	Ist	IInd	IIIrd	IVth		
Read	12t	12t	12t	12t	→	48t
Q's	5t	8t	8t	6t	→	27t
Total	17t	20t	20t	18t	→	75t

Total time = 75t
10% less = 67.5t
⇒ Time spent on only reading all 4 passages
= 67.5t – 27t = 40.5t

∴ Each passage requires = $\frac{40.5}{4}$ = 10.125t

He has to increase his speed by $\frac{12t}{10.125t}$ = 1.185

Increase in speed = 1.185 – 1 = 0.185 i.e. 18.5%

8. 3 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) × 100 + (–4) × (–8) = 0.8832
Thus, the expenditure will decrease by
(1 – 0.8832) × 100 = 11.68%.

9. 4 Percentage of boys who play cricket in the class

$= \frac{70}{100} \times \frac{10}{100} \times 100 = 7\%$

∵ 14% of students are cricket players. (Given)
∴ Percentage of cricket players who are boys

$= \frac{\frac{7}{100}}{\frac{14}{100}} \times 100 = 50\%.$

10. 1 Let there be 100 products in the stockpile.
Hence, products from M1 = 40, from M2 = 30 and from M3 = 30. Number of defective products from M1 = 0.03 × 40 = 1.2, from M2 = 0.01 × 30 = 0.3 and from M3 = 0.05 × 30 = 1.5
Therefore, total number of defective products = 3, and percentage of defective products = 3%.

Alternative method:
Total percentage defectives = 3% of 40% + 1% of 30% + 5% of 30% = 3% of total.

11. 1 We have $7(x + y) = 4x + 8y$ where x and y are the production for first and second quarter. The equation gives x : y = 1 : 3

12. 1 Given that, initially A : B = 4 : 5
After one year, we have A = 5x, B = 5x + 50,000
As per the question, we have

$$\frac{5x}{5x+50,000} = \frac{9}{10}$$

$\Rightarrow$ x = 90,000
which gives A = Rs. 3,60,000

13. 3 Let total score = x
Passing marks = 0.39x + 58 = 0.55x – 22
$\Rightarrow$ 80 = 0.16x

$$\Rightarrow x = \frac{80}{16}\times 100$$

Hence, maximum marks = 500

14. 4 Weight of first lump = x kg
Weight of second lump = (20 – x) kg
31.25x + 30(20 – x) = 617.5 $\Rightarrow$ x = 14 kg
Total gold = 75% of 14 + 85% of 6 kg = 15.6 kg

$$\text{Now percentage of gold} = \frac{15.6}{20}\times 100 = 78\%$$

15. 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 = Rs. 60

16. Let x be the total number of people, college will ask for donations.
$\therefore$ People already solicited = 0.6x
Amount raised from the people solicited
= 600 × 0.6x = 360x
Now 360x constitutes 75% of the amount.
Hence, remaining 25% constitutes 120x
$\therefore$ Average donation from remaining people

$$= \frac{120x}{0.4x} = 300$$

17. 2 Assume x be population of the town.
Number of people who work
= 0.37x × 0.76 + 0.63x × 0.54 = 0.6214x
$\Rightarrow$ 0.6214x = 124280
$\Rightarrow$ x = 2,00,000

18. 1 Let weight of silver and copper be x and y respectively, in alloy A

	Alloy B	Alloy C
Silver :	x + 15	x + 9
Copper :	y	y

$$\text{From B :} \quad \frac{x+15}{x+y+15} = \frac{90}{100} \Rightarrow x - 9y = -15$$

$$\text{From C :} \quad \frac{x+9}{x+y+10} = \frac{84}{100} \Rightarrow 4x - 21y = -15$$

$\therefore$ x = 12, y = 3

$\therefore$ Percentage of silver in A = $\frac{12}{15}\times 100 = 80\%$

19. 4 For a difference of 1 year, CI can be computed as SI. Hence, from the 2nd year to the 3rd year, interest earned = (675 – 625) = Rs. 50 on Rs. 625.
Hence, the rate of interst

$$= \frac{50}{625} \times 100 = 8\% \text{ per annum}$$

Alternative method :
Since the values are for consecutive years,

$$\therefore \frac{\text{3rd year value}}{\text{2nd year value}} = \frac{675}{625} = 1\frac{2}{25},$$

which is the interst component.

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

$$\therefore \frac{2}{25} = 8\%$$

20. 3 Let p be the principal value, r% be the rate of interest and n = 2 = duration.
Thus, according to the question

$$P\left\{\left[\left(1+\frac{r}{100}\right)^2 - 1\right] - \frac{2r}{100}\right\} = 160$$

$$\Rightarrow \quad P\left\{\frac{r^2}{(100)^2}\right\} = 160 \qquad \text{...(i)}$$

$$\text{Also } 2880 = \frac{P\times r\times 2}{100}$$

$$\Rightarrow Pr = \frac{2880\times 100}{2} \qquad \text{...(ii)}$$

$\therefore$ Using (ii) in (i), we get

$$r\frac{2880\times 100}{2} = 160\times 100\times 100$$

$$r = \frac{16\times 100\times 2}{288} = \frac{100}{9} = 11\frac{1}{9}\%$$

Alternative method :
Let r be the rate of interest.
Simple Interest and Compound Interest for first year will be same = $\frac{2880}{2} = \text{Rs.}1440$

Difference between CI and SI = SI on SI of first year,

$160 = \frac{1440 \times 1 \times r}{100}$

$\therefore r = \frac{160 \times 100}{144} = \frac{100}{9}\% = 11\frac{1}{9}\%$

21. 3 Suppose principal is Rs. x and it doubles in time t.
We have

$2x = x\left(1+\frac{20/2}{100}\right)^{2t}$

or $2 = (1.1)2t$
$\Rightarrow$ $2t = 8$
or $t = 4$ years. (approximately)

22. 2 Suppose the principal is P, r = 5% (given)

CI – SI (for 2 years) = $P\left(\frac{r}{100}\right)^2$

or $100 = P\left(\frac{5}{100}\right)^2$

or P = Rs. 40,000

23. 3 Compound interest (CI) = Amount – Principle (P)

$= P\left(1+\frac{r}{100}\right)^n - P$

$= P\left[\left(1+\frac{r}{100}\right)^n - 1\right]$, where

r is the rate of interest, n is the duration

Now, CI = $P\left[\left(1+\frac{10}{100}\right)^2 - 1\right]$

$420 = P\left[\left(\frac{11}{10}\right)^2 - 1\right] = P\left[\frac{121-100}{100}\right] = \frac{21P}{100}$

$\Rightarrow$ P = Rs. 2,000

$\therefore$ SI = $\frac{P \times r \times t}{100} = \frac{P \times 10 \times 2}{100}$

$= \frac{2000 \times 10 \times 2}{100}$ = Rs. 400

24. Let x be the sum that he lent to his friend.

$\therefore \frac{x \times 8 \times 4}{100} + \frac{(10000-x) \times 12 \times 4}{100} = 3800$

x = Rs. 6250.

25. 3 SI for 2 years = 354.

Hence, for one year = $\frac{254}{2}$ = 177.

(Let's assume the sums of Narayan and Murthy are x and y respectively.)

$\therefore 177 = \frac{6x}{100} + \frac{7y}{100} \Rightarrow 6x + 7y = 17700$ ...(i)

$\therefore \frac{x}{4} = \frac{y}{5} \Rightarrow x = \frac{4}{5}y$

Putting the value of x in (i), we get

$6 \times \frac{4}{5}y + 7y = 17700$

$\frac{24y}{5} + 7y = 17700$

$\therefore$ y = 1500 and x = 1200
Hence, total sum (x + y) = 1500 + 1200 = Rs. 2,700.

Alternative method:

Narayan's investment × $\frac{1}{4}$ = Murthy's investment × $\frac{1}{5}$

$\therefore$ Narayan : Murthy = 4 : 5
Let Narayan be 4x $\Rightarrow$ murthy = 5x.
Now Narayan + Murthy = 9x has to be divisible by 9.
$\therefore$ (a), (b) and (e) are eliminated.
Try (c) and (d) and find the interest earned in each case.

26. 4 Difference of sum after 2 and 3 years = 1,728 – 1,440 = Rs. 288
Rs. 288 is the simple interest on Rs. 1,440 for one year.

$288 = \frac{1440 \times r \times 1}{100} \Rightarrow r = 20\%$.

27. 3 Let three parts be a, b and c where a > b > c
Therefore, by the simple interest formula
1.04a = 1.08b = 1.12c and a + b + c = 2189
Solving above equations, we get c = 703

28. 3 Let, the amount that was invested by Rohit in bank be 'C'.
1.2(1.2C – 200) = 400
$\Rightarrow$ 1.44C = 240 + 400

$\therefore C = \frac{640}{1.44} = \text{Rs.}\frac{4000}{9}$

29. Interest earned on first part = $3500 \times 3 \times \frac{8}{100}$ = Rs. 840.00

Interest earned on second part

$= 3500\left(1+\frac{10}{100}\right)^2 - 3500$

$= 3500 \times \frac{11}{10} \times \frac{11}{10} - 3500$

= 4235 – 3500 = Rs. 735

Difference = Rs. (840 – 735) = Rs. 105

30. 3 Difference = $5000\left(1+\frac{5}{100}\right)^4 - 5000\left(1+\frac{10}{100}\right)^2$

= 5000(1.2155 – 1.21) = Rs. 27.50.