Percentage- Key Notes

Percentage= (Sum of quantities)/(Number of quantities)

Percentage increase by x%= ((x+100)/100)*Initial

Percentage decrease by x%= ((100-x)/100)*Initial

Some common percentage conversions

1/2=50%	2/6=33.33%	2/8=25%	6/9=66.66%	9/10=90%	1/12=8.33%
1/3=33.33%	3/6=50%	3/8=37.5%	7/9=77.77%	1/11=9.09%	2/12=16.67%
2/3=66.67%	4/6=66.67%	4/8=50%	8/9=88.88%	2/11=18.18%	3/12=25%
1/4=25%	5/6=83.33%	5/8=62.5%	1/10=10%	3/11=27.27%	4/12=33.33%
2/4=50%	1/7=14.28%	6/8=75%	2/10=20%	4/11=36.36%	5/12=41.67%
3/4=75%	2/7=28.57%	7/8=87.5%	3/10=30%	5/11=45.45%	6/12=50%
1/5=20%	3/7=42.85%	1/9=11.11%	4/10=40%	6/11=54.54%	7/12=58.33%
2/5=40%	4/7=57.14%	2/9=22.22%	5/10=50%	7/11=63.63%	8/12=66.67%
3/5=60%	5/7=71.72%	3/9=33.33%	6/10=60%	8/11=72.72%	9/12=75%
4/5=80%	6/7=85.71%	4/9=44.44%	7/10=70%	9/11=81.81%	10/12=83.33%
1/6=16.67%	1/8=12.5%	5/9=55.55%	8/10=80%	10/11=90.9%	11/12=91.67%

Exercise questions

1. A trader makes a profit equal to the selling price of 75 articles when he sold 100 of the articles. What % profit did he make in the transaction?
A) 33.33%
B) 75%
C) 300%
D) 150%

2. A merchant buys two articles for Rs.600. He sells one of them at a profit of 22% and the other at a loss of 8% and makes no profit or loss in the end. What is the selling price of the article that he sold at a loss?
A) Rs. 404.80
B) Rs. 440
C) Rs. 536.80
D) Rs. 160

3.A trader professes to sell his goods at a loss of 8% but weights 900 grams in place of a kg weight. Find his real loss or gain percent.
A) 2% loss
B) 2.22% gain
C) 2% gain
D) None of these

4. Rajiv sold an article for Rs.56 which cost him Rs.x. If he had gained x% on his outlay, what was his cost?
A) Rs. 40
B) Rs. 45
C) Rs. 36
D)Rs. 28

5. A trader buys goods at a 19% Amount on the label price. If he wants to make a profit of 20% after allowing a Amount of 10%, by what % should his marked price be greater than the original label price?
A) +8%
B) -3.8%
C) +33.33%
D) None of these

6. If apples are bought at the rate of 30 for a rupee. How many apples must be sold for a rupee so as to gain 20%?
A) 28
B) 25
C) 20
D) 22

7. Two merchants sell, each an article for Rs.1000. If Merchant A computes his profit on cost price, while Merchant B computes his profit on selling price, they end up making profits of 25% respectively. By how much is the profit made by Merchant B greater than that of Merchant A?
A) Rs.66.67
B) Rs. 50
C) Rs.125
D) Rs.200

8. A merchant marks his goods in such a way that the profit on sale of 50 articles is equal to the selling price of 25 articles. What is his profit margin?
A) 25%
B) 50%
C) 100%
D) 66.67%

9. A merchant marks his goods up by 75% above his cost price. What is the maximum % Amount that he can offer so that he ends up selling at no profit or loss?
A) 75%
B) 46.67%

C) 300%
D) 42.85%

10. The price of a T.V. is increased 30% before budget and in budget 20% is also increased. Then total increase in price will be
A) 50%
B) 56%
C) 55%
D) 59%

Answer Key

1.C; 2.A; 3.B; 4.A; 5.A; 6.B; 7.B; 7.B; 8.C; 9.D; 10.B

Concepts and Theory

Percentages

By a certain percent, we mean that many hundredths. Thus, x percent means x hundredths, written as x%.

To express x% as a fraction, we have x%=x/100.
Thus, 20%= 20/100= 1/5
To express a/b as a percent, we have, a/b= (a/b)*100%.
Thus, 1/4= (1/4)*100%= 25%.

1. If A is R% more than B, then B is less than A by R/ (100+R)*100
2. If A is R% less than B, then B is more than A by R/(100-R)*100
3. If the price of a commodity increases by R%, then reduction in consumption, not to increase the expenditure is: R/(100+R)*100
4. If the price of a commodity decreases by R%, then the increase in consumption, not to decrease the expenditure is: R/(100-R)*100

Results on population:

Let the population of a town be P now and suppose it increases at the rate of R% per annum, then;

1. Population after n years= $p\ (1+(R/100))^n$
2. Population n years ago= $P/(1+(R/100))^n$

3. If a number is increased by x% and thereafter reduced by x%, then the number will be reduced by $x^2/100$ percent

4. If a number is reduced by x% and there after increased by x% then the number will be reduced by $x^2/100$ percent

5. If in an examination, in which the minimum pass percentage is x%, a candidate secures y marks and falls by z marks, then the total number of marks in this examination will be 100*(y+z)/x

6. If in an examination x% and y% candidates respectively fail in two different subjects while z% candidates fail in both the subjects, then the percentage of candidates who pass in both the subjects will be [100-(x+y+z)]%

Tips:

1. If an object's price is increased or decreased by x% and the other factor is decreased by y% then the net effect is given by:
Net Effect= [x+y+xy/100]%

2. If the net effect is nil, ie, there is no loss or no gain, then the above formula becomes: y=100x/100+x

3. If the price of an article is successively increased by x%,y% and z% then single equivalent increase in the price will be $[x+y+z+\{xy+yz+zx\}/(100)+xyz/100^2]$%

4. If after spending p1% first, then p2% from the remaining and so on, B is the balance amount, then the total (original) amount is given by:
Total amount= B*100*100...../ (100-p2).....

Population formula: 1)If the population increases by x% during the first year, by y% during the second year, by z% during the third year, the population after three years will be:
P(1+x/100)(1+y/100)(1+z/100)

Exercise Questions

1. What percent is 2 minutes 24 seconds of an hour?

a. 6%

b. 2%

c. 4%

d. 8%

2 . Adding 20% of x to x is equivalent to multiplying x by which of the following?

a. 12.5

b. 1.05

c. 1.15

d. 1.20

3 . What is the value of $8^{1}/_{3}\%$ of 600+ $37^{1/2}$ of 400

a. 100

b. 300

c. 150

d. 200

4. Two third of three fifth of five sixth of a number is what percentage of that number?

a. $66^{2}/_{3}\%$

b. $33^{1}/_{3}\%$

c. 60%

d. 40%

5. Due to fall in manpower , the production in a factory decreases by 40%, By what percentage should the working hours be increased to restore the original level of production?

a. $66^{2}/_{3}\%$

b. $46^{1}/_{3}\%$

c. 25%

d. 40%

6. The salary of all officers is increased twice successively by 20%. What is the net percentage increase in their salaries?

a. 20%

b. 40%

c. 21%

d. 44%

7. In an examination it is necessary for a candidate to get 45 % of the maximum marks to pass. A candidate who gets 180 marks, fails by 45 marks. Find the maximum marks.

a. 450

b. 600

c. 500

d. 550

8. 10 litres of water is added to 50 litres of a solution containing 20% of alcohol in water . What is the strength of alcohol in the solution now ?

a. 20%

b. $16\ ^{2}/_{3}$ %

c. $12\ ^{1}/_{2}$ %

d. $33\ 1/_{3}$ %

9. The population of a town increase annually by 20% . If the present population is 2,00,000, then what is the difference in population after two years and three years

a. 63,250

b. 48,800

c. 60,800

d. 57,600

10. Population of a city decreases by 10% at the end of first year and increases by 10% at the end of second year and again decreases by 10% at the end of third year. If the population of the city at the end of third year is 4455, then what was the population of the city at the beginning of the first year?

a. 5,000

b. 4,500

c. 4,950

d. 1,000

11. If the price of an article decreases by $11^{1}/_{9}$ % and the sale of the article increases by $12^{1/2}$ %, what is the net effect on revenue?

a. 1% loss

b. 1% gain

c. No loss or no gain

d. Cannot be determined

12. In an exam 80% of the boys and 40% of the girls passed. The number of girls who passed is 120, which is $2/3^{rd}$ of the number of boys who failed. What is the total number of students who appeared for the exam?

a. 1200

b. 380

c. 3800

d. 2180

13. The population of cities A and B is equal. The population of city A increases in two successive years by 20% and 15% respectively and that of city B increases successively by 20% and 10% respectively. If the difference in the population of two cities after 2 years is 768, then what was the total population of the two cities initially?

a. 12,800

b. 26,500

c. 24,600

d. 25,600

14. What quantity of water should be added to reduce 5 litres of 45% acidic liquid to 25% acidic liquid?

a. 3litres

b. 2litres

c. 4litres

d. 4.5litres

15. A, B, and C contest an election from a particular constituency. A and B together got 50% more votes than C. The vote share of A and C together is 30 percentage points more than the vote share of B. Who won the election?

a. A

b. B

c. C

d. Cannot be determined

16. In an examination amar got 8% less than the pass mark and mohan got 20% more than the pass mark. If the difference between the percentage of their mark is 14, then what is the pass percentage

a. 40%

b. 50%

c. 60%

d. cannot be determined.

17. The salaries of A and B together is Rs. 14,000. A spend 80% of his salary and B spends 85% of his salary. What is the salary of B if their savings are equal?

a. Rs. 6,000

b. Rs. 8,000

c. Rs. 7,500

d. Rs. 6,500

18. A sum of Rs. 395 was divided among A, B, and C in such a way that B gets 25% more than A and 20% more than C. What is the share of A?

a. Rs.195

b. Rs.180

c. Rs. 98

d. Rs. 120

19. There are three positive intigers such that 70% of the first number , $58\,^{1}/_{3}\%$ of second number and $38\,^{8}/_{9}\%$ of the third number are all equal. Which of the following can those three numbers be?

a. 5,6,9

b.10,12,18

c.15,18,27

d. All the three

20. Three times a number is 20% more than twice another number when increased by 105. If twice the first number increased by 36 is 20% less than three times of the second number, then what is the first number?

a. 150

b.162

c. 180

d.None of these

Answer & Explanations

1. 2mt 24s =144s

144*100/60*60=4%

2. 120x/100= 1.2*x

3. 25*600/300 + 75*400/200 =50+150= 200

4. 2/3*3/5*5/6 =1/3

1/3 x/ x*100 = 100/3 = $33\ ^{1}/_{3}$ %

5. Increase in working hours 40*100/100-40 =4000/60 =$66\ ^{2}/_{3}$ %

6. M . F = 120/100*120/100 = 36/25

Net % increase = (M . F -1) *100 =(36/25-1) * 100

11/25 *100 = 44 %

7. Let max . mark = x

pass mark =45x/100

180 = 45x/100-45

x = 180*100-4500/45 =500

8. Quantity of alcohol in 50 litres = 50*20/100 =10

strength in 60 litre solution = 10/60*100 = 100/6 = $16\,^{2}/_{3}$

9. M .F for 2Yrs = 120/100*120/100 =36/25

M .F for 3Yrs =120/100*120/100*120/100 =6/5*6/5*6/5 =216/125

Population after 2Yrs = 2,00,000*36/25 = 2,88,000

Population after 3 Yrs = 2,00,000*216/125 = 3,45,600

Difference = 3,45,600 – 2,88,000 =57,600

10. M. F = 90/100*110*100*90/100 = 81*11/1000

Population before 3Yrs = I.Q /M. F = 4455*1000/81*11 = 5000

11. M. F 1 = 100-100/9/100 =800/900 = 8/9

M. F 2 = 100+25/2/100 =225/200 =9/8

Total M. F =8/9*9/8 = 1

Overall % change = (M. F – 1) * 100 = (1 – 1) * 100 = 0

12. Let the Number of boys = x , Number of girls =y

40y/100 =120

y = 300

120= 2/3* 20x/100 = 2x/15

x = 900

Total = x+y = 300+900 =1200

13. Population of city A = Population of city B = A

M . F of A = 120/100*115/100 = 138/100

M . F of B = 120/100*110/100 =132/100

Population of A after 2 years = A*138/100

Population of B after 2 years = A*132/100

Difference = A/100(138 –132) = 768

A = 768*100/6 = 12800

Total initial population = 12800+12800 = 25,600

14. Quantity of acid in 5litres =45*5/100 = 2.25litres

Let X litres of water is added to the solution, then there is 2.25litres of acid in (5+ X) Litres of liquid.

25% of (5 + X) = 2.25, 25/100* (5 + X) = 2.25

X = 225-125/25 = 4

15. Let a,b,c be the vote share of A, B, C respectively

a + b = 1.5 c

a + c = b + 30

a + b + c = 100, 2b + 30 = 100,

b = 35

a = 25, c = 40, So, C won the election.

16. Let P be the pass percentage, then

Amar got 0.92 P% and mohan got 1.2 p%

Given that, 1.2 P – 0.92 p = 14

P =14/0.28 = 50%

17. Let the salaries of A and B are X and Y respectively

X + Y = 14,000

Savings of A = 20X/100 = Savings of B = 15Y/100

X = ¾ Y

3/4Y + Y = 14,000, 7Y/4 =14,000, Y =8,000

18. Let each one's share is A,B and C respectively, then

B =125A/100 = 120C/100

A =100B/125 =4/5B, C = 100B/120 = 5/6B

4/5B +B +5/6B =395, 79B/30 =395, B =395*30/79 =150

A = 4*150/5 = 120

19. All the three are in the same ratio

20. Let the two numbers be x and y.

3x = 1.2(2y +105)

3x = 2.4y +126 ……..(1)

2x +36 = 0.8(3y)

2x +36 =2.4y ……..(2)

x = 162