Lecture-1 : Percentage & Fraction(MCQ)

Teacher's Work	Percentage (MCQ)

Topic-1: Conversion of Percentage

❖ Any fractions, if multiplied by 100, converts to %. Thus, any % value, if divided by 100, converts to fraction.

01. What percent of 700 is 2.1? [Combined 7 Bank Officer (Cash): 2023]
a) 3 b) 0.3 c) 0.03 d) 30

02. What would be the value of 20% of m as a percentage of p, if 8% of m = 4% of p? [21 Based Combined SO: 10-11-23]
a) 80% b) 16% c) 10% d) None

03. Which of the following fractions is equivalent of 0.5%?
a) 1/20 b) 1/200 c) 1/500 d) 1/2000

04. If 65% of x = 13% of y, then find the value of x if y = 2,000. [BD Gas Fields - AM Exam - 2021]
a) 200 b) 300 c) 400 d) 500

Topic-2: Expressing percentage respect to other

❖ X% of any number Y means $\frac{X}{100} \times Y = \frac{XY}{100}$

❖ X is what % of Y means $\frac{X}{Y} \times 100\%$. Similarly, Y is what % of X means $\frac{Y}{X} \times 100\%$.

❖ Percentage = $\frac{\text{target}}{\text{base}} \times 100$

05. 10% of 4800 is how much more than 8% of 4800?
a) 84 b) 80 c) 96 d) 98

06. If b equals 10% of a and c equals 20% of b. then which one of the following equals 30% of c?
a) 0.0006% of a b) 0.006% of a
c) 0.06% of a d) 0.6% of a

07. A reduction in 25% of the price of an article enables a buyer to buy 50 kilograms more for Tk. 500. What is the reduced price per kilogram in Taka? [বাখারবাদ গ্যাস এ.এম (জেনারেল) পরীক্ষা - ২০১৭]
a) 2 b) 2.50 c) 3 d) 3.50

08. Of the 3600 employees of a company x, 1/3 are clerical. If the clerical staff were to be reduced by 1/3, what percents of the total number of remaining employees would be clerical? [বাখারবাদ গ্যাস এ.এম (জেনারেল) পরীক্ষা - ২০১৭]
a) 25% b) 22.2% c) 20% d) 12.5%

Topic-3: Percentage involving Unitary Method

09. A school has raised 75% of the amount it needs for a new building by receiving an average donation of Tk. 60 from the people already solicited. The people already solicited represent 60% of the people the college will ask for donations. If the college is to raise exactly the amount needed for the new building, how much must the remaining people donate per person?
a) Tk 25 b) Tk 30 c) Tk 40 d) Tk 50

10. At an election involving two candidates, 68 votes were declared invalid. The wining candidate secures 52% and wins by 98 votes. The total number of votes polled is:
a) 2382 b) 2450 c) 2518 d) 2323

11. Mr. Ahsan is insured completely for Tk 50,000 of damages to his car. For any damage above Tk 50,000, the insurance company will pay Tk 50,000 plus 20% of the rest of the damage amount. For a recent accident, Mr. Ahsan was paid Tk 56,000 by the insurance company. What was the total amount of the damage estimated?
a) Tk 30,000 b) Tk 70,000
c) Tk 80,000 d) Tk 86,000

Topic-4: Budget & Consumption

❖ If thef price of a commodity increases by R%, then the reduction in consumption so as not to increase the expenditure is $\left[\frac{R}{(100+R)} \times 100\right]\%$

❖ If the price of a commodity decrease by R%, then the increase in consumption so as not to decrease the expenditure is $\left[\frac{R}{(100-R)} \times 100\right]\%$

12. If the price of sugar is increased by 25%, how much percent must a person reduce his consumption so that expenditure on sugar remains same?
a) 18% b) 20% c) 23% d) 25%

13. If the price of petrol increases by 25% and Raju intends to spend only an additional 15% on petrol, by how much% will he reduce the quantity of petrol purchased?
a) 10% b) 12% c) 8% d) 6.67%

14. The price of a loaf of bread was increased by 20%. How many loaves can be purchased now by the amount of money used to buy 300 loaves at the earlier price?
a) 240 b) 250 c) 280 d) 320

Topic-5: More-less & smaller-bigger % Calculation

❖ If A is R% more than B, then B is less than A by $\left[\frac{R}{(100+R)} \times 100\right]\%$

❖ If A is R% less than B, then B is more than A by $\left[\frac{R}{(100-R)} \times 100\right]\%$.

15. If income of Ravi is 20% more than that of Ram, then income of Ram is how much per cent less than that of Ravi?
a) 16% b) $16\frac{2}{3}\%$ c) 20% d) 25%

16. **Fresh grapes contain 80 percent water while dry grapes contain 10 percent water. If the weight of the dry grapes is 250 kg what is total weight when it was fresh?** [BB-AD: 20-10-23]
a) 1000kg b) 1100kg c) 1125kg d) 1225gk

Topic-6: Equation Related

17. **In a club 50% of the male votes and 80% of the female voters voted for candidate A. if candidate A received 70% of the total votes, what is the ratio of male to female voters?**
a) $\frac{1}{3}$ b) $\frac{1}{2}$ c) $\frac{1}{8}$ d) $\frac{1}{4}$

18. **Karim has 40% more stamps than Rahim. If he gives 45 of his stamps to Rahim, then Rahim will have 10% more stamps than Karim. How many stamps did karim begin with?**
a) 175 b) 200 c) 220 d) 245

Topic-7: Successive Rules

❖ When the value of an object is first changed (increased or decreased) by a% and then change (increased or decreased) by b%, then

Net effect $= \left[\pm a \pm b + \frac{(\pm a)(\pm b)}{100}\right]\%$

Net effect is an increase or a decrease according to the +ve or −ve sign, respectively of the final result.

19. **The tax on a commodity is diminished by 10% and its consumption increases by 10%. Find the effects on revenue.** [Janata Officer (RC) – 28-06-2024]
a) Increases by 2% b) Decreases by 1%
c) Increases by 1% d) Decreases by 2%

20. **Per day wage rate of workers is reduced by 50% due to economic slowdown. After one year, the wage rate is increased by 60%. If the per day wage rate before the decrease was Tk. 100, then what is the per day wage rate now?**
a) 90 b) 100 c) 60 d) 80

Teacher's Work | Decimal (MCQ)

01. **Which of the following is the largest?**
a. $\sqrt{0.3}$ b. $\frac{1}{3}$ c. $\frac{2}{5}$
d. $\frac{3}{7}$ e. $\frac{4}{11}$

02. **How many times is 0.1 greater than 0.01?**
a) 1 time b) 10 times
c) 100 time d) 1000 times

03. **Riyad owned $\frac{5}{8}$ of an interest in a house. He sold $\frac{1}{5}$ of his interest for Tk. 1,000. What was the total value of the house?**
a) Tk. 3,000 b) Tk. 4,000
c) Tk. 6,000 d) Tk. 8,000

04. **A man spent $\frac{1}{2}$ of his money and then lost $\frac{1}{4}$ of the remainder. He was left with Tk. 3600. How much did he start with?** [IBA, MBA- 54 inte; Shylet Gas-2021]
a) 8000 b) 8600
c) 9600 d) None of the avobe

05. **If the numerator of a fraction is increased by 2 and the denominator by 1 it becomes 1. Again if the numerator decreased by 4 and the denominator by 2 it becomes ½ . Find the fraction.** [BB-AD: 28-10-22]
a) 4/5 b) 5/6 c) 6/7 d) 7/8

06. **Bowl S contains only marbles. If $\frac{1}{4}$ of the marbles were removed, the bowl would be filled to $\frac{1}{2}$ of its capacity. If 100 marbles were added the bowl would be full. How many marbles are in bowl S?** [21 Based Combined SO: 10-11-23]
a) 100 b) 200 c) 250 d) 300

Teacher's Work | Fraction (MCQ)

07. **A cake divided into 18 pices. If Rehana takes 1/3rd of the cake and Rashed takes 1/3rd of the cake left how many pices are left?** [Combined 7 Bank Office (Cash): 2023]
a) 8 b) 6 c) 4 d) 10

08. **A tree increases annually by $\frac{1}{8}$ of its height. B how much will it increase after 2 years, if it stand today 64 cm high?** [Pubali Bank (SO)-2013]
a) 72 cm b) 74 cm c) 75 cm d) 81 cm

09. **$\frac{1}{4}$ of Ahsan's money is equal to $\frac{1}{6}$ of Babu's money If both together have Tk. 600, what is th difference between their amounts?** [Agrani Bank Off 2013]
a) 50 b) 120 c) 240 d) 360

10. **In a certain English class, $\frac{1}{4}$ of the number of girl is equal to $\frac{1}{6}$ of the total number of students. Wha is the ratio of the number of boys to the numbe of girls in the class?** [BD Tourism Board-(AC)-2017]
a) 1 : 4 b) 2 : 3 c) 1 : 2 d) None

11. **At a college football game $\frac{4}{5}$ of the seats in th lower deck of the stadium were sold. If one-fourt of all the seating in the stadium is located in lowe deck, and if $\frac{2}{3}$ of all the seats in the stadium were sold, what fraction of the unsold seats in the stadium were in the lower deck?** [IFIC Bank (MTO) 2013]
a) $\frac{3}{20}$ b) $\frac{1}{6}$ c) $\frac{1}{3}$ d) $\frac{7}{15}$

01. Express each of the following as a fraction:
i) 45% ii) 135% iii) 0.4%

Sol. We have:

(i) $45\% = \frac{45}{100} = \frac{9}{20}$

ii) $135\% = \frac{135}{100} = \frac{27}{20} = 1\frac{7}{20}$

(iii) $0.4\% = \frac{0.4}{100} = \frac{4}{1000} = \frac{1}{250}$.

02. Express each of the following as a decimal:
a) 12% b) 2% c) 264% d) 0.08%

Sol. We have:

(i) $12\% = \frac{12}{100} = 0.12$. ii) $2\% = \frac{2}{100} = 0.02$.

(iii) $264\% = \frac{264}{100} = 2.64$

(iv) $0.08\% = \frac{0.08}{100} = 0.0008$.

03. Express $\frac{3}{5}$ as rate per cent.

Sol. $\frac{3}{5} = \left(\frac{3}{5}\times 100\right)\% = 60\%$.

04. Which is largest in 18%, $\frac{4}{15}$ and 0.27?

Sol. $18\% = \frac{18}{100} = 0.18$, $\frac{4}{15} = 0.265$ and 0.27

Clearly, 0.27 is the largest.

05. (i) What per cent of 80 is 64? (ii) What per cent of 1 kg is 50 gms? (iii) What per cent of 3.5 litres is 300 ml?

Sol. We have:

(i) Required$\% = \left(\frac{64}{80}\times 100\right)\% = 80\%$.

(ii) Required $\% = \left(\frac{50}{1000}\times 100\right) = 5\%$.

(iii) Required $\% = \left(\frac{300}{3500}\times 100\right)\% = \frac{60}{7}\% = 8\frac{4}{7}\%$.

06. 60% of a number is 24 less than $\frac{3}{4}$ th of that number. Find the number.

Sol. Let the required number be x. Then,

60% of $x = \frac{3}{4}x - 24$

$\Rightarrow \frac{60}{100}\times x = \frac{3}{4}x - 24$

$\Rightarrow \left(\frac{3x}{4} - \frac{3x}{5}\right) = 24$

$\Rightarrow (15x - 12x) = 480 \Rightarrow 3x = 480 \Rightarrow x = 160$.

Hence, the required number is 160.

07. If A carns 15% more than B, then how many percent less does B earn than A?

Sol. (Short cut Method):

$\text{Required}\% = \left\{\frac{R}{100+R}\times 100\right\}\% = \left(\frac{15}{115}\times 100\right)\% = \frac{300}{23} = 13.04\%$.

08. If A earns 10% less than B, then how many percent more does B earn than A?

Sol. (Short Cut Method)

$\text{Required }\% = \left\{\frac{R}{100-R}\right\}\% = \left(\frac{10}{90}\times 100\right)\% = \frac{100}{9} = 11.11\%$.

09. If the price of tea is increased by 8%, by how much percent must the consumption of tea be diminsished by a family so as not to increase the expenditure on it?

Sol. (Short Cut Method)

$\text{Reduction \& in consumption} = \left\{\frac{R}{(100+R)}\times 100\right\}\%$

$= \left(\frac{8}{108}\times 100\right)\% = \frac{200}{27}\% = 7.4\%$.

10. The price of sugar falls by 12%. By how much per cent must a family increase its consumption so as not to decrease the expenditure on it?

Sol. (Short Cut Method)

$\text{Increase \& in consumption} = \left\{\frac{R}{(100-R)}\times 100\right\}\%$

$\left(\frac{12}{88}\times 100\right)\% = \frac{150}{11}\% = 13.64\%$.

11. The tax on a commodity is diminished by 15% and its consumption increases by 20%. Find the effect on revenue.

Sol. Originally, let the revenue obtained be Tk.. x.

New revenue = (Consumption × tax)

$= (120\% \text{ of } 85\% \text{ of Tk. } x) = \text{Tk.}\left(\frac{120}{100}\times\frac{85}{100}\times x\right)$

$= \text{Tk.}\frac{102x}{100} = 102\%$ of the original.

Hence, the revenue is increased by 2%.

12. (i) ? % of 36 = 6 (ii) ?% of 25 = 0.5

Sol. (i) Let x% of 36 = 6. Then, $\left(\frac{x}{100}\times 36\right) = 6$.

$\therefore x = \left(\frac{6\times 100}{36}\right) = \frac{50}{3} = 16\frac{2}{3}$

$\therefore 16\frac{2}{3}\%$ of 36 = 6.

(ii) Let x% of 25 = 0.5. Then, $\left(\frac{x}{100}\times 25\right) = 0.5$.

$\therefore x = (0.5\times 4) = 2$.

Hence, 2% of 25 is 0.5.

13. The population of a town is 176400. It increases at 5% per annum.
(i) What will be its population after 2 years?
(ii) What was its population 2 years ago?

Sol. (i) Population after 2 years $= \left\{P\times\left(P+\frac{R}{100}\right)^n\right\}$

$= \left\{176400\times\left(P+\frac{5}{100}\right)^2\right\} = \left(176400\times\frac{21}{20}-\frac{21}{20}\right) = 194481.$

(ii) Population 2 years ago $= \frac{P}{\left(1+\frac{R}{100}\right)^n}$

$= \frac{176400}{\left(1+\frac{5}{100}\right)^2} = \left(176400\times\frac{21}{20}-\frac{21}{20}\right) = 160000.$

14. The value of a machine depreciates at the rate of 10% per annum and its present value is Tk. 1000000. What will be its value after 3 years?

Sol. Formula: Depreciated value = Tk. $\left\{P\times\left(1-\frac{R}{100}\right)^n\right\}$

$\therefore$ Value after 3 years = Tk. $\left\{1000000\times\left(1-\frac{10}{100}\right)^3\right\}$

$= \text{Tk.}\left(1000000\times\frac{9}{10}\times\frac{9}{10}\times\frac{9}{10}\right) = \text{Rs } 729000.$

15. The value of a machine depreciates at the rate of 20% per annum and its present value is Tk. 64000. What was its value 2 years ago?

Sol. Formula: Value n years ago $= R\left\{\frac{R}{100-R}\right\}$

Value 2 years ago + Tk. $\frac{P}{\left(\frac{20}{100}\right)^2} = \text{Tk.}\frac{64000}{(4/5)^2}$

$= \text{Tk.}\left(64000\times\frac{5}{4}\times\frac{5}{4}\right) = \text{Tk. } 100000.$

Students' work	Percentage

01. A school has only three classes having 20, 30 and 40 students respectively. The percentages of students passed are 30%, 50% and 60% respectively. The percentage of passed students in the entire school is – [21 Based Combined Officer (Cash) 2024]

a) 30 b) 40 c) 45 <u>d) 50</u>

02. The value of a machine is Tk. 6250. Its value decreases by 10% during the first year, 20% during the second year and 30% during the third year. What will be the value of the machine after 3 years? [21 Based Combined Officer (Cash) 2024]

a) 2650 b) 3050 <u>c) 3150</u> d) 3750

03. What percentage of numbers from 1 to 70 have squares that end in the digit 1? [21 Based Combined Officer General: 2024]

a) 14 b) 12 <u>c) 20</u> d) 21

04. In a class of 65 students and 4 teachers, each student got sweets that are 20% of the total number of students and each teacher got sweets that are 40% of the total number of students. How many sweets are there? [BB-AD: 20-10-23]

a) 104 b) 845 <u>c) 949</u> d) 897

05. In a class, 120 students are male and 100 students are female. 25% of male students and 20% of female students are engineering students. 20% of the male engineering students and 25% of the female engineering students passed the final exam. What percentage of engineering students passed the exam? [20 Based Combined SO: 20-01-2023]

a) 10% b) 16% <u>c) 22%</u> d) 25%

06. In a factory, there are workers, executives and clerks. 58% of the employees are workers, 660 are executives and the remaining 264 employees are clerks. How many employees are there in the factory? [20 Based Combined SO: 20-01-2023]

a) 1500 b) 2000 <u>c) 2200</u> d) 2500

07. $\frac{1}{3}+\frac{1}{3}$ equals how many twelfths? [Janata Officer (RC – 28-06-2024]

a) 2 <u>b) 8</u> c) 4 d) 6

08. Which of the following is greater than 1? [Janata Officer (RC) – 28-06-2024]

a) $\frac{0.00004}{0.005}$ <u>b) $\frac{0.01}{0.003}$</u> c) $\frac{0.003}{0.006}$ d) $\frac{0.001}{0.01}$

09. Three boys agree to divide a bag of marbles in the following manner. The first boy takes one more than half the marbles. The second takes a third of the number remaining. The third boy finds that he is left with twice as many marbles as the second boy. The original number of marbles is – [BB-AD: 20-10-23]

a) 38 b) 36
c) 32 <u>d) Can't be Determined</u>

10. After the increase of price of oil by 40%, a family decided to reduce its oil consumption so that the expenditure for oil goes up by 26% only. If the total consumption of oil before the price rise was 10 kg per month, then what is the current consumption of oil per month (in kg)? [বাখারবাদ গ্যাস এ.এম (জেনারেল) পরীক্ষা - ২০১৭]

a) 8 b) 8.50
<u>c) 9</u> d) None of these

11. A box contains 200 marbles, 25% of which are of black colour. Babu took some marbles from the box and found that 30% of them are black. Of the remaining marbles, 10% were black marbles. How many marbles did Babu take? [বাখারবাদ গ্যাস এ.এম (জেনারেল) পরীক্ষা - ২০১৭]

a) 120 b) 125
<u>c) 150</u> d) None of these

12. **Due to reduction in books' price by 10%, the number of books sold increased by 35%. What ws the percentage increase in revenue?** [BD Gas Fields - AM Exam - 2021]
a) 17 b) 18
c) 19 d) None of these

13. **An employer pay 3 workers X, Y and Z a total of Tk. 36,600 a week. X is paid 125% of the amount Y is paid and 80% of the amount Z is paid. How much does X make a week?** [কর্ণফুলী গ্যাস এ.ম (সাধারণ) পরীক্ষা - ২০২১]
a) 9,000 b) 10,800
c) 11,700 d) 12,000

14. **The ratio of the cost of two articles is 7 : 3. The first one was sold at a loss of 20% and the second one was sold at a gain of 40%. What is the overall percentage of gain/loss?** [Titas Gas AM (General) Exam - 2021]
a) 2% loss b) 2% gain
c) 4% loss d) 4% gain

15. **75% of 0.08=?** (BB AD 2010)
a) 0.04 b) 0.50 c) 0.06 d) 0.60

16. **What is 1% of 0.025?** (BB AD 2001, 2008)
a) 0.25 b) 0.025
c) 0.0025 d) 0.00025

17. **If 35% of a number is 12 less than 50% of that number, then the number is:** (Rupali Off 2013)
a) 40 b) 50 c) 60 d) 80

18. **If 18 is 15% of 30% of a certain number, what is the number?** (BSC SO 18, BB AD 2006, 2009)
a) 300 b) 400 c) 500 d) 600

19. **Alam spent 20% of his income on taxes and 20% of the remainder on rent. What percent of his income he has spent on rent?** (Agrani SO 2010)
a) 12% b) 14% c) 16% d) 18%

20. **In a factory, there are workers, executives and clerks. 58% of the employees are workers, 660 are executives and the remaining 264 employees are clerks. How many employees are there in the factory?** [Combined Senior Officer: 2022]
a) 1500 b) 2000 c) 2200 d) 2500

21. **There are 900 students in a school. 4% of them left the school and 50% of the remaining are girls. How many girls remained in the school?** (Agrani Off 2010)
a) 432 b) 450 c) 464 d) 448

22. **68% of the candidates in a recruitment test have passed the written part of it. The number is 14 less than what would have been in case 75% would have passed. What was the number of candidates appeared?** (Agrani Off 2010)
a) 150 b) 170 c) 190 d) 200

23. **In a class, 34% of the students are female. Given that there are 16 more male than female. How many female students are there in the class?**
a) 17 b) 32 c) 36 d) 45

24. **The number of marbles in Amin's collection is 80% of the number in Rahim's collection. If Rahim has 80 more marbles than Amin, how many marbles do they have altogether?** (Agrani SO 2013)
a) 720 b) 120 c) 135 d) 400

25. **A student first reduced a number by 20% and then increased it again by 20%. If the difference between the last number and the original number is 8, the original number is:** ***(BB AD 2013)***
a) 200 b) 250 c) 300 d) 400

26. **If the price of sugar is increased by 25%, how much percent must a person reduce his consumption so that expenditure on sugar remains same?**
a) 18% b) 20% c) 23% d) 25%

27. **A reduction of 25% in the price of sugar enables a person to get 10 kg more on purchase of Tk. 600. Find the reduced rate of per kg sugar.**
a) 60 b) 15 c) 25 d) 30

28. **During a sale, a furniture shop gives 50% off on the retail price of a desk. On Friday, it gives an additional 20% off on all furniture. The desk's retail price was Tk. 320. How much will the desk cost on Friday?**
a) Tk. 118 b) Tk. 128 c) Tk. 96 d) Tk. 115

29. **The maid works for 20 hours in a week. She proposed to raise her wage rate 25% and reduce the weekly working hours such that her take home wage will remain unchanged. If the proposal is accepted, how many hours the maid will work a week?**
a) 18 b) 17 c) 19 d) 16

30. **The total income of Mr. Sakib in the years 2003, 2004 and 2005 was Tk. 36,400. His income increased by 20% each year. What was his income in 2005?** (BB AD 2012)
a) 15,000 b) 14,400
c) 16,450 d) 12,350

31. **The population of a colony of bacteria increases by 20 percent every 3 minutes. If at 9:00am the colony had a population of 144,000, what was the population of the colony at 8:54am?**
a) 100,000 b) 112,000
c) 120,000 d) 121,000

32. **A tank that was 40% full of oil is emptied into a 20-gallon bucket. If the oil fills 35% of the bucket's volume, then what is the total capacity of the tank, in gallons?**
a) 8.75 b) 15 c) 16 d) 17.5

33. **In an examination, there were 2000 candidates, out of which 900 candidates were boys and the rest were girls. If 32% of the boys and 38% of the girls passed, then the total percentage of failed candidates is:**
a) 55 % b) 45 % c) 64.75 % d) 65 %

34. In a country, 60% of the male citizen and 70% of the female citizen are eligible to vote. 70% of male citizens eligible to vote voted, and 60% of female citizens eligible to vote voted. What fraction of the citizens voted during the election?

a) 0.42 b) 0.48 c) 0.49 d) 0.54

35. If a number is increased by 20%, decreased by 15%, and increased by 7%, the overall percent change is closest to a:

a) 2% decrease b) 2% increase
c) 9% increase d) 12% increase

36. If 15% of A is equal to 20% of B, then 25% of A is equal to what per cent of B?

a) 30% b) $33\frac{1}{3}$ % c) 35% d) 25%

37. If A's salary is 25% higher than B's salary, then how much per cent is B's salary lower than A's salary?

a) 15% b) 20% c) 25% d) $33\frac{1}{3}$

38. A's salary is 20% less than B's salary. Then, B's salary is more than A's salary by

a) $33\frac{2}{1}$ % b) $16\frac{2}{3}$ % c) 20% d) 25%

39. In an examination, the marks obtained by Shantanu is 40% less than the marks obtained by Kamal, then marks obtained by Kamal is how much per cent more than the marks obtained by Shantanu?

a) $55\frac{2}{3}$ % b) $44\frac{3}{5}$ % c) $33\frac{1}{3}$ % d) $66\frac{2}{3}$ %

40. The price of sugar is increased by 25%. If a family wants to keep its expenses on sugar unaltered, then the family will have to reduce the consumption of sugar by

a) 20% b) 21% c) 22% d) 25%

Illustrative	Fraction (MCQ)

01. If $\frac{1}{3.718} = .2689$, then find the value of $\frac{1}{.0003718}$

Sol. $\frac{1}{.0003718} = \frac{10000}{3.718} = \left(10000 \times \frac{1}{3.718}\right) = 10000 \times 2689$
$= 2689$ **(Ans)**

02. Express as vulgar fractions:

(i) $0.\overline{37}$ **(ii) $0.0\overline{53}$**
(iii) $0.\overline{001}$ **(iv) $3.\overline{142857}$**

Sol. (i) $0.\overline{37} = \frac{37}{99}$. (ii) $0.\overline{053} = \frac{53}{999}$. (iii) $0.\overline{001} = \frac{1}{999}$.

(iv) $3.\overline{142857} = 3 + 0.\overline{142857}$
$= 3 + \frac{142857}{999999} = 3\frac{142857}{999999}$ **(Ans).**

03. The numerator of a fraction is decreased by 25% and the denominator is increased by 250%. If the resultant fraction is $\frac{6}{5}$, what is the original fraction?

Sol. Let original fraction be $\frac{a}{b}$.

Now, according to the question

$$\frac{a - a \times \frac{25}{100}}{b + b \times \frac{250}{100}} = \frac{6}{5}$$

$$\frac{0.75a}{3.50b} = \frac{6}{5} \Rightarrow \frac{a}{b} = \frac{6}{5} \times \frac{3.50}{0.75} = \frac{6 \times 350 \times 100}{5 \times 75 \times 100} = \frac{28}{5}$$ **(Ans)**

04. $\frac{5}{9}$ of a number is equal to twenty five percent of second number. Second number is equal to $\frac{1}{4}$ of third number. The value of third number is 2960. What is 30% of first number?

Sol. Let the third number be 2960

$\therefore$ Second number $= \frac{1}{4}$ of third number $= \frac{1}{4} \times 2960 =$ 740

$\frac{5}{9}$ of first number = 25% of second number

$\frac{5}{9}$ first number $= \frac{25 \times 740}{100} = 185$

$\Rightarrow$ First number $= \frac{185 \times 9}{5} = 333$

$\therefore 30\%$ of $333 = \frac{30}{100} \times 333 = 999$ **Ans:**

05. A number, when 35 is subtracted from it, reduces to its 80 percent. What is four-fifth of that number?

Sol. Let, the number is x

ATQ, $x - 35 = \frac{x \times 80}{100} \Rightarrow x - 35 = \frac{4x}{5} \Rightarrow x - \frac{4x}{5} = 35 \Rightarrow \frac{x}{5} =$

$35 \Rightarrow x = 175$

So, four-fifth of the number is $= 175 \times \frac{4}{5} = 14$

(Ans.)

06. Mr. X lost a wallet containing Tk. 120. Incidentally, he had only notes of Tk. 2 and Tk. 5 denominations in the wallet. If the total number of notes was 30, how many Tk. 5 denomination notes did he has? [Janata Bank ltd, Officer (Cash)-2020]

Sol. Let, no. of Tk. 2 notes x and no. of Tk. 5 notes y

$x + y = 30$.....(i)

So, $x = 30 - y$

$2x + 5y = 120$.....(ii)

Now, $2(30 - y) + 5y = 120$

$\Rightarrow 60 - 2y + 5y = 120$

$\Rightarrow 3y = 60$ so, $y = 20$ **Ans:**

07. A man spent $\frac{1}{2}$ of his money and then lost $\frac{1}{4}$ of the remainder. He was left with Tk. 3,600. How much did he start with? [Sonali Bank Ltd, Officer-2018 + Uttara Bank Ltd, PO-2021]

Sol. Let, he has Tk. x

After spending he has $= \frac{x}{2}$

After lossing he has $= \frac{x}{2} - \left(\frac{x}{2} \times \frac{1}{4}\right)$

$= \frac{x}{2} - \frac{x}{8} = \frac{4x-x}{8} = \frac{3x}{8}$

Here, $\frac{3x}{8} = 3600 \Rightarrow x = 3600 \times \frac{8}{3} = 9600$ **(Ans)**

08. Equal amounts of water were poured into two empty jars of different capacities, which made one jar $\frac{1}{4}$ full and the other jar $\frac{1}{3}$ full. If the water in the jar with the lesser capacity is then poured into the jar with the greater capacity, what fraction of the larger jar will be filled with water? [Probashi Kallyan Bank, SO-2021]

Sol. Let, x liters of water was poured in each jar

Jar I is $\frac{1}{4}$ full, so its capacity = 4x liters

Jar II is $\frac{1}{3}$ full, so its capacity = 3x liters

As jar II is with lesser capacity, So now the x liter from Jar II is poured to Jar I

Total water in jar I = 2x litres

The faction of Jar I $= \frac{2x}{4x} = \frac{1}{2}$

Hence Jar I is filled with $\frac{1}{2}$ fraction **Ans:**

09. After being dropped a certain ball always bounces back to $\frac{2}{5}$ of the height of its previous bounce. After the first bounce it reaches a height of 125 inches. How high (In inches) will it reach after its fourth bounce? [Sonali Bank, (SO)-2018 + NRB Commercial Bank, TAO-2021]

Sol. As per question, 1st bounce = 125 inches

2nd bounce $= \frac{2}{5} \times 125 = 50$,

3rd Bounce $= \frac{2}{5} \times 50 = 20$

4th bounce $= \frac{2}{5} \times 20 = 8$ inches **Ans:**

10. A collection of books went on sale and $\frac{2}{3}$ of them was sold for Tk 2.30 each. If none of the 36 remaining books were sold, what was the total amount received for the books that were sold? [Uttarba Bank Ltd. (PO)-2021]

Sol. Unsold Book $= 1 - \frac{2}{3} = \frac{1}{3}$ Part

Now value of $\frac{1}{3}$ part = 36

1 value of 1 part = 36 × 3

$\therefore$ value of $\frac{2}{3}$ part $= \frac{36 \times 3 \times 2}{3} = 72$

$\therefore$ Selling price of book = 72 × 2.30

= Tk. 165.6 **(Ans)**

Lecture-2 : Percentage (Written)

Teacher's Work

01. Every year Mr. Kalam saves Tk. 5400 wich is 15 percent of his annual income. Mr. Rahim spends Tk. 2800 a month which is 87.5 percent of his monthly income. Who is earning more? [BB AD Written Exam 2022]

02. In an election, 30% of the voters voted for candidate A; whereas 60% of the remaining voted for candidate B. The remaining voters did not vote. If the difference between those who voted for candidate A and those who did not vote was 1200, how many individuals were eligible for casting vote in the election? [Janata Bank (EO)-2017]

03. In a country, 60% of the male citizen and 70% of the female citizen are eligible to vote. 70% of male citizens eligible to vote voted, and 60% of the female citizens eligible to vote voted. What fraction of the citizens voted during the election?

04. Mr. Akbar is a potato seller in a local bazaar, when he brings potatoes from the village market to his shop in the town; he has to pay a minimum of Tk. 100 toll up to total sale of Tk. 1,000. For any amount of sale above Tk. 1,000, he has to pay an additional toll of 7.5% on the incremental amount. If the total amount of toll paid was Tk. 257.50 then what was his total sales proceeds from the potatoes? [Basic Bank (AM)-2013]

05. Kabir spends 80% of his income. His income is increased by 50% and he increases his expenditure by 25%. Calculate the percentage of his increased amount of savings. [Bangladesh Shipping Corporation (AO)-2018]

06. Mr. Karim gave 40% of the money he had, to his wife. He also gave 20% of the remaining amount to each of his three sons. Half of the amount now left was spent on miscellaneous items and the remaining amount of Tk. 12,000 was deposited in the bank. How much did Mr. Karim have initially? *[Somobai Bank (Off)-2015, Meghna Bank-(MTO) – 2017 & Janata Bank-(EO)-2018]*

07. The price of a shirt and a pant together is Tk. 1,300. If the price of the shirt increases by 5% and that of the pant by 10%, it costs Tk. 1,405 to buy those two things. Find the respective price of a shirt and a pant. *[BHBFC (SO)-2017]*

08. If sugar price reduced $6\frac{1}{4}\%$ then one can buy 1 kg more sugar at Tk. 120. Find the rate of original and reduced price. *[Janata Bank (Cash)-2015]*

09. A man works for certain hours. If his hourly payment increases by 20%, what percent of working hours he may reduce so that total income remains unchanged? *[Basic Bank- (AM)- 2018]*

10. Recently Kamal's hourly wage has been increased by 10%. Before this increase, Kamal's total weekly wage was Tk. 137. If his weekly working hours were to decrease by 10% from last week's total working hours, what would be the change, if any, in Kamal's total weekly wage? *[BB (AD)-2009]*

11. In an organization 30% of all employees live over 10 miles away from the place of work & 60% of worker who live over 10 miles use company transport. If 40% of employees of the company use company transport, what percent of the employees live 10 miles or less from work and use company transport? *[BB (Off)-2001, Eastern Bank (NITO)- 2007]*

12. In a tournament, a player has a record of 40% wins, out of the number of games he has played so far which in turn is $\frac{2}{5}$ of the total number of games he plays. What is the maximum percentage of the remaining games that the palyer can lose and still win 50% of all the games played?

Illustrative Questions

01. The monthly income of a person was Tk. 13500 and his monthly expenditure was Tk. 9000. Next year, his income increased by 14% and his expenditure by 7%. Find the percentage increase in his savings.

Sol. Increased income = 114% of Tk 13500

$= \text{Tk.}\left(\frac{114}{100}\times 13500\right) = \text{Tk } 15390.$

Increased expenditure = 107% of Tk 9000

$= \text{Tk}\left(\frac{107}{100}\times 9000\right) = 9630.$

Increased savings = Tk (15390–9630) = Tk. 5760.

Original savings = Tk (13500–9000) = Tk. 4500.

$\therefore$ Savings increase = Tk (5760–4500) = Tk 1260.

$\therefore$ Increase % in savings $= \left(\frac{1260}{4500}\times 100\right)\% = 28\%.$

Ans: 28%

02. Salesperson A's compensation for any week is Tk. 360 plus 6 percent of the portion of A's total sales above Tk 1000 for that week. Salesperson B's compensation for any week is 8 percent of B's total sales for that week. For what amount of total weekly sales would both salespersons earn the same compensation?

Sol. Let the required weekly sales be Tk x.

Then, A's compensation = Tk [360 + 6% of (x–1000) $= \frac{8}{100}x$

B's compensation = 8%. Of Tk. x

So, 360 + 6% of (x–1000) = 8% of x

$\Rightarrow 360 + \frac{6}{100}(x-1000) = \frac{8}{100}x$

$\Rightarrow 360 + \frac{3}{50}x - 60 = \frac{2}{25}x$

$\Rightarrow \frac{x}{50} = 300 \quad \therefore x = 15000.$

Hence, required weekly sales = Tk 15000. **(Ans)**

03. A man buys a house for Tk. 5 lakh and rents it. He puts $12\frac{1}{2}\%$ of each month's rent aside for repairs, pays Tk. 1660 as annual taxes and realizes 10% on his investment thereafter. Find the monthly rent of the house.

Sol. Let the annual rent of the house be Tk. x. Then,

$X - \left(12\frac{1}{2}\% \text{ of } x + 1660\right) = 10\% \text{ of } 5{,}00{,}000$

$\Rightarrow x - \left(\frac{25}{2}\times\frac{1}{100}\times x + 1660\right) = 50{,}000$

$\Rightarrow \frac{7x}{8} - 1660 = 50{,}000$

$\Rightarrow \frac{7x}{8} = 51{,}660$

$\Rightarrow x = = 59{,}040.$

Hence, monthly rent = Tk. $\left(\frac{59040}{12}\right)$ = Tk 4,290.

04. In an election between two candidates, 75% of the voters cast their votes, out of which 2% of the votes were declared invalid. A candidate got 9261 votes which were 75% of the total valid votes. Find the total number of votes enrolled in that election.

Sol. Let the total number of votes enrolled by x. Then,

Number of votes cast = 75% of x. Valid votes = 98% of (75% of x).

$\therefore 75\%$ of [98% of (75% of x)] = 9261

$\Leftrightarrow \left(\frac{75}{100}\times\frac{98}{100}\times\frac{75}{100}\times x\right) = 9261$

$\Leftrightarrow x = \frac{9261\times100\times100\times100}{75\times98\times75}$

$\therefore x = 16800.$ **(Ans)**

05. Shobha's Mathematic Test had 75 problems i.e. 10 arithmetic, 30 algebra and 35 geometry problems. Although she answered 70% of the arithmetic, 40% of the algebra and 60% of the geometry problems correctly, she did not pass the test because she got less than 60% of the problems right. How many more questions she would have needed to answer correctly to earn a 60% passing grade?

Sol. Number of questions attempted correctly = (70% of 10 + 40% of 30 + 60% of 35)
= (7 + 12 + 21) = 40.
Questions to be answered correctly for 60% grade = 60% of 75 = 45.
∴ Required number of questions = (45–40) = 5. **(Ans)**

06. If 50% of (x–y) = 30% of (x + y), then what percent of x is y?

Sol. 50% of (x–y) = 30% of (x+y)

$\Leftrightarrow \frac{50}{100}(x-y) = \frac{30}{100}(x+y) \quad \Leftrightarrow 5(x-y) = 3(x+y)$

$\Leftrightarrow 2x = 8y \qquad \Leftrightarrow x = 4y.$

$\therefore$ Required percentage $= \left(\frac{y}{x}\times 100\right)\%$

$= \left(\frac{y}{4y}\times 100\right)\% = 25\%$ **Ans: 25%**

07. Mr. Jones gave 40% of the money he had, to his wife. He also gave 20% of the remaining amount to each of his three sons. Half of the amount now left was spent on miscellanceous items and the remaining amount of tk 12,000 was deposited in the bank. How much money did Mr. Jones havce initially?

Sol. Let, Mr. Jones initially had Tk 1,00,000 with him.

Money given to wife = Tk $\frac{40}{100}x$ = Tk. $\frac{2x}{5}$.

$\therefore$ Remainign balance = Tk $\left(x-\frac{2x}{5}\right)$ = Tk $\frac{3x}{5}$.

Money given to 3 sons = Tk $\left(3\times\frac{20}{100}\times\frac{3x}{5}\right)$ = Tk $\frac{9x}{25}$.

$\therefore$ Remainign balance = Tk $\left(\frac{3x}{5}-\frac{9x}{25}\right)$ = Tk. $\frac{6x}{25}$.

Amount deposited in bank = Tk $\left(\frac{1}{2}\times\frac{6x}{25}\right)$ = Tk. $\frac{3x}{25}$.

$\therefore \frac{3x}{25} = 12000$

$\Leftrightarrow x = \left(\frac{12000\times 25}{3}\right) = 1{,}00{,}000.$

So, Mr. Jones initially had Tk 1,00,000 with him.
Ans: Tk 1,00,000

08. Peter got 30% of the maximum marks in an examination and failed by 10 marks. However, Paul who took the same examination got 40% of the total marks and got 15 marks more than the passing marks. What were the passing marks in the examination?

Sol. Let the maximum marks be x. Then,
(30% of x) + 10 = (40% of x) –15

$\Rightarrow \frac{30}{100}x + 10 = \frac{40}{100}x - 15$

$\Rightarrow \frac{10x}{100} = 25 \Rightarrow x = 250.$

$\therefore$ Passing marks = (30% of 250) + 10 = $\left(\frac{30}{100}\times 250\right)$ + 10 = 85. **(Ans)**

09. If $z = \frac{x^2}{y}$ and x, y are both increased in value by 10%, find the percentage change in the value of z.

Sol. Let X, Y and Z represent the changed values of x, y and z respectively.

Then, X = 110% of x = $\frac{11x}{10}$; Y = 110% of y = $\frac{11y}{10}$

$\therefore Z = \frac{X^2}{Y} = \frac{\left(\frac{11x}{10}\right)^2}{\frac{11y}{10}} = \frac{121x^2}{100}\times\frac{10}{11y} = \frac{11x^2}{10y} = \frac{11}{10}\times\frac{x^2}{y} = \frac{11}{10}Z.$

Increase in the value of z = $\left(\frac{11z}{10}-z\right) = \frac{z}{10}$.

$\therefore$ Increase% = $\left(\frac{z}{10}\times\frac{1}{z}\times 100\right)\% = 10\%$. **Ans: 10%**

10. In a tournament, a player has a record of 40% wins, out of the number of games he has played so far which in turn is $\frac{2}{5}$ of the total number of games he plays. What is the maximum percentage of the remaining games that the palyer can lose and still win 50% of all the games played?

Sol. Let the total number of games played be x.

Number of games already played = 40% of x = $\frac{2x}{5}$.

Games already lost = 60% of $\frac{2x}{5} = \frac{6x}{25}$.

Number of games that the player can lose = 50% of x = $\frac{x}{2}$.

$\therefore$ Number of games that the player can still lose = $\left(\frac{x}{2}-\frac{6x}{25}\right) = \frac{13x}{50}$.

Remaining games to be played = $\left(x-\frac{2x}{5}\right) = \frac{3x}{5}$.

$\therefore$ Required percentage = $\left(\frac{13x}{50}\times\frac{5}{3x}\times 100\right)\% = 43.3\%$.

Ans: 43.3%

11. A man's working hours a day were increased by 20% and his wages per hour were increased by 15%. By how much percent was his dayly earning increased?

Sol. Let the original number of working hours a day be x and original wages per hour be Tk y.
Then, original daily earning = Tk (xy).

Increased working hours = 120% of x = $\frac{6x}{5}$.

Increased wages per hour = 115% of Tk y = Tk $\frac{23y}{20}$.

New daily earning = Tk $\left(\frac{6x}{5}\times\frac{23y}{20}\right)$ = Tk $\left(\frac{69xy}{50}\right)$.

Increase in daily earning = Tk $\left(\frac{69xy}{50}-xy\right)$
= Tk $\left(\frac{19xy}{50}\right)$

$\therefore$ Increase % = $\left(\frac{19\,xy}{50}\times\frac{1}{xy}\times 100\right)\% = 38\%$.

Ans: 38%

12. Due to a reduction of $6\frac{1}{4}$ % in the price of sugar, a man is able to buy 1 kg more for Tk 120. Find the original and reduced rate of sugar.

Sol. Let original rate be Tk. x per kg.

Reduced rate = Tk $\left(100-\frac{25}{4}\right)$ % of x = $\frac{375}{4} \times \frac{1}{100} \times x$

= Tk $\frac{15x}{16}$ per kg

ATQ, $\frac{120}{\frac{15x}{16}} - \frac{120}{x} = 1 \Leftrightarrow \frac{128}{x} - \frac{120}{x} = 1 \quad \therefore x = 8.$

So, original rate = Tk 8 per kg.

Reduced rate = Tk $\left(\frac{15}{16} \times 8\right)$ per kg = Tk 7.50 per kg.

Ans: Tk 8 & Tk 7.50 per kg.

Students' work

01. A part time employee whose hourly wage was increased by 25% decided to reduce the number of hours worked per week so that the employees' total weekly income would remain unchanged. By what percent should the number of hours worked be reduced? [ICB-2011] **20%**

02. When price of sugar was raised by 25%, a person cut off his sugar consumption in such a way that his expenditure on sugar was unchanged. By what percentage the person reduced sugar consumption? [AB Bank (PO)-1993 (Written) + [IFIC Bank (PO)-2008-(Written)] **20%**

03. The sum of the pay of two officers is Tk. 24,000 per month. If the pay of one officer is decreased by 9% and the pay of the second is increased by 17%, their pays become equal. Find the pay of each officer. [BB (AD)-2006] **Tk.13,500 & Tk. 10,500**

04. When the price of TV set was increased by 30%, the number of TV sets sold decreased by 20%. What is the effect on sales in percentage? (BHBFC (SO)-2007] **4% Increase**

05. In a group of people solicited by a charity, 30% contributed Tk. 400 each, 45% contributed Tk. 200 each and the rest contributed Tk. 20 each. If the charity received a total of Tk. 3000 from the people who contributed Tk. 20 then how much was contributed by the entire group? [ICB (Officer)-2011] [Dhaka Bank (MTO)-2011] **Tk. 1,29,000**

06. A man wages and interest from his investment Tk. 5,000. If he invests double and the wages increased 50% then total amount is Tk. 8000. What is his actual income in terms of wages and interest? [SEBL (PO) & BKB-(SO)-2017] **Tk. 4,000 & Tk 1,000**

07. A businessman before closing his shop, counted the money kept in the cash box and found there were X number 50 paisa coin, X number of Tk. 1 notes, X number of Tk. 2 notes and X number of Tk. 5 notes. Apart from this there is nothing in the box. The next day when he opened the shop he founds that the cash box had been stolen. As he was insured, he got Tk. 1,615 which is 95% of the stolen money from the insurance company. How many Tk. 2 notes were in the box? (BASIC Bank (AM)- 2012] **200**

08. Malek spends 75% of his income. His income is increased by 20% and he increases his expenditure by 10%. Calculate the percentage of his increased amount of saving. [Basic Bank (AO) – 2009] **50%**

09. In a company there are 75% skilled workers and remaining are unskilled. 80% of skilled workers and 20% of unskilled workers are permanent. If number of temporary workers is 126, then what is the number of total workers? [examveda.com] **360**

10. You can now buy 4 meters of more cloth with the Tk. 800 become of a reduction in price by 20%. Calculate the original price and current price of per meter of cloth. [RBL (SO)-2000] **Tk. 50 and Tk 40**

11. Due to an increase of 30% in the price of eggs, 3 eggs less are available for Tk. 7.80. The present rate of eggs per dozen is? **Tk. 9.36**

12. A scored 30% marks and failed by 15 marks. B scored 40% marks and obtained 35 marks more than those required to pass. The pass percentage is? **33%**

13. When the price of TV set was increased by 30%, the number of TV sets sold decreased by 20%. What is the effect on sales in percentage? **4%**

14. The population of a city is 35000. On an increase of 6% in the numbegr of men and an increase of 4% in the number of women, the population would become 36760. What was the number of women initially? **1700**

15. 10% of the votes did not cast their vote in election between two candidates. 10% of the votes polled were found invalid. The successful candidates got 54% of the valid votes and won by a majority of 1,620 votes. Find the number of voters enrolled on the voter's list? **25000**

16. Abir's monthly salary is equal to 30% of zahir's monthly salary or 20% of sohel's monthly salary. If the sum of sohels and zahirs income is tk 50000, what is the monthly salary of abir? **Tk 6000**

17. A owns 40% of tee stock in ABC Company. B owns 15,000 shares. C owns all the shares not owned by A or B. How many shares of stock does A own if C has 25% more shares than A? **Tk. 60,000**

18. A school has raised 75% of the amount it needs for a new building by receiving an average donation of Tk. 60 from the people already solicited. The people already solicited represent 60% of the people the college will ask for donations. If the college is to raise exactly the amount needed for the new building, how much must the remaining people donate per person? **Tk. 30**

19. The sum of the pay of two officers is Taka 24,000 per month. If the pay of one officer is decrease by 9% and the pay of the second is increased by 17%, there pays become equal. Find the pay of each officer. **Tk. 10,500**