CHAPTER – 3

PERCENTAGE CALCULATIONS, FRACTIONS

ADDITION / SUBTRACTION OF FRACTIONS:

Eg 1. $\frac{4}{9}+\frac{13}{18}+\frac{7}{54}$ =?

Sol. The LCM of the denominators 9, 18 and 54 is 54. [The students should calculate LCM mentally. As 54 is divisible by 9, 18 and 54 the LCM is 54]. After finding the LCM, the students should concentrate on calculating the numerators.
As 9 has to be multiplied by 6 to get 54, the numerator 4 is multiplied by 6 i.e., 4 x 6 = 24.
Similarly 13 x 3 = 39 and 7 x 1 = 7.

$$\therefore \frac{4}{9}+\frac{13}{18}+\frac{7}{54} = \frac{24}{54}+\frac{39}{54}+\frac{7}{54}$$
$$= \frac{24+39+7}{54} = \frac{70}{54} = \frac{35}{27}$$

Eg 2. $\frac{7}{18}-\frac{11}{24}+\frac{13}{36}$ =?

Sol. The LCM of the denominators 18, 24 and 36 is 72. 36 is divisible by 18, so the LCM of 18 and 36 is 36. To find the LCM of 24 and 36, take the larger number i.e. 36 and its multiples 72, 108, etc. 36 is not divisible by 24. So, LCM is not 36. 72 is divisible by 24. So the LCM is 72. The denominator of the resultant fraction is 72.

$$\frac{7}{18}-\frac{11}{24}+\frac{13}{36} = \frac{28}{72}-\frac{33}{72}+\frac{26}{72} = \frac{21}{72} = \frac{7}{24}$$

PERCENTAGE CALCULATIONS:

Conversion of fractions to percentage

1/2 = 50%,	1/3 = 33.33%, 2/3 = 66.66%,	1/4 = 25%, 3/4 = 75%,
1/5 = 20%, 2/5 = 40%, 3/5 = 60%, 4/5 = 80%,	1/6 = 16.66%, 5/6 = 83.33%,	1/7 = 14.28% 2/7 = 28.57%, 3/7 = 42.85%, 4/7 = 57.13%, 5/7 = 71.42%, 6/7 = 85.72%,
1/8 = 12.5%, 3/8 = 37.5%, 5/8 = 62.5%, 7/8 = 87.5%,	1/9 = 11.11%, 2/9 = 22.22%, 4/9 = 44.44%, 5/9 = 55.55%, 7/9 = 77.77%, 8/9 = 88.88%,	1/11 = 9.09%, 2/11 = 18.18%, 3/11 = 27.27%, 4/11 = 36.36%, 5/11 = 45.45%, 6/11 = 54.54%, 7/11 = 63.63%, 8/11 = 72.72%, 9/11 = 81.81%, 10/11 = 90.9%,

1/12 = 8.33%,
5/12 = 41.66%,
7/12 = 58.33%,
10/12 = 83.33%,
11/12 = 91.66%

It will be very useful to memorize all the above values as it will help us to do the calculations very fast.

Eg.1 37.5 % of 1248

Sol: 37.5% = 3/8
$\therefore$ 37.5% of 1248 = $3/8 \times 1248$
$= 3 \times 156 = 468$

Eg.2 42.85% of 2114

Sol: 42.85% = 3/7
$\therefore$ 42.85% of 2114 = $3/7 \times 2114 = 3 \times 302 = 906$

Eg.3 63.33% of 2233

Sol: 63.63% = 7/11
$\therefore$ 63.63% of 2233 = $7/11 \times 2233 = 7 \times 203 = 1421$

Eg.4 58.33% of 2184

Sol: 58.33% = 7/12
$\therefore$ 58.33% of 2184 = $7/12 \times 2184 = 7 \times 182 = 1274$

Eg.5 44.44% of 8127

Sol: 44.44% = 4/9
$\therefore$ 44.44% of 8127 = $4/9 \times 8127 = 4 \times 903 = 3612$

Eg.6 39 is what percent of 186?

Sol. The number that follows 'of' should always come in the denominator.
So, $\frac{39}{186}$ x 100 is to be calculated.
10% of the denominator is 18.6
20% of the denominator is 18.6 x 2 = 37.2
1% of the denominator is 1.86
21% of the denominator is 37.2+ 1.86 ~ 39
$\therefore \frac{39}{186}$ = 21%

Eg.7 457 is what percent of 1382?

Sol. 1/3 x 1382 $\cong$ 461 = 33.33%
461 – 457 = 4 $\cong$ 3 x 1.38 = 0.3%
$\therefore \frac{457}{1382}$ = 33.33% – 0.3% = 33.03%

Eg.8 What is 20% of 1205

Method 1

20% = 1/5
20% of 1205 = 1/5 of 1205 = 241

Method 2

10% = $\frac{10}{100}$ = 0.1
10% of 1205 = 1205
$\therefore$ 20% of 1205 = 1205 x 2 = 241

Eg.9 Find 22% of 4568

20% (10% x 2) = 456.8 x 2 = 913.6
+ 2% = 1/10 x 20% = 91.36

22% = 1004.96

Eg.10 Find 36% of 1835

Method 1

30% (10% x 3) = 1835 x 3 = 550.5
+ 6% = 1/5 x 30% = 110.1

36% = 1004.96

Method 2

40% (10% x 4) = 183.5 x 4 = 734
– 4% = 1/10 of 40% = – 73.4

36% = 660.6

Eg.11 Find the value of 26% of 496.

Sol. 26% = 25% + 1%
25% of 496 = 1/4 of 496 = 124
1% of 496 = 4.96

26% of 496 = 128.96

Eg.12 Find the value of 35.6% of 928.

Sol. 10% of 928 = 92.8
30% of 928 = 92.8 x 3 = 278.4
5% of 928 = 46.4
0.1% of 928 = 0.928
35.6% = 30% = 278.4
+5% = 46.4
+0.5% = 4.6
+0.1% = 0.9

330.3

0% + 5% + 0.5% + 0.1%
278.8 + 46.4 + 4.6 + 0.9 = 330.3

Percentage calculations

How to calculate the value of 36% of 1325?
Here, explain the concept of 10% and 1%. i.e, for any value, say 1264, 10% of the value is obtained by simply shifting the decimal point by one place (or digit) to the left. Note that 1264 = 1264.0
$\therefore$ 10% of 1264.0 = 126.40 (i.e. the decimal point moves to the left by one place (or digit)). Similarly, 1% of 1264.0 will be obtained by shifting the decimal point by two places to the left. Hence, 1% of 1264.0 = 12.640.
Hence 36% of 1325 = (40% – 4%) of 1325 = ($4 \times 10\% - 4 \times 1\%$) of 1325 = ($4 \times 132.5 - 4 \times 13.25$) = 530 – 53 = 477.
Similarly consider another example, say, 18% of 3250 = (20% – 2%) of 3250
= ($2 \times 10\% - 2 \times 1\%$) of 3250 = ($2 \times 325 - 2 \times 32.5$) = 585.

If there is a 10% increase then the new value will become 1.1 times the old value and in general if there is an increase of p%, the new value will become 1.p times the old value. Here, emphasize, when to use this concept and when not to use i.e. if there is an increase of 33.33% then the new value will become 4/3 times the old value. Calculating in this way i.e. converting $33^1/_3$ into a fraction and simplifying is faster.
Whenever percentage increase cannot easily be converted into a convenient fraction, then the approximate percentage increase p, in integer form, must be found and then 1.p has to be used. Similarly, explain for percentage decrease.

Exercise – 3(a) **Time: 45 min.**

Questions 1 to 29: Percentages

1. 13% of 29 =?

2. 18% of 91 =?

3. What percentage of 161 is 89?

4. What percentage of 2079 is 256?

5. Find 23.75% of 160.

6. 54% of 1111 =?

7. 81% of 909 =?

8. 72% of 541 =?

9. 33% of 649 =?

10. 25% of $\frac{8}{90}$ =?

11. What percentage of 933 is 588?

12. By what percentage is 412 more than 322?

13. What percentage of 1457 is 754?

14. 35% of 4712 =?

15. 23.83% of 272 =?

16. 18 is what percentage of 472?

17. 23 is what percentage of 67?

18. 88.88% of 0.99 =?

19. What percentage of 1498 is 1372?

20. What is the result when 330 becomes 277.7% of itself?

21. By what percentage should 412 be decreased to get 161?

22. 17.42% of 264 =?

23. 28.75% of 480 =?

24. 34% of 4500 =?

25. What percentage of 890 is 1186?

26. By what percentage is 445 more than 160?

27. 34.09% of 792 =?

28. What is the result when 3289 is increased by 81.81%?

29. 36.66% of 1566 = ?

Questions 30 to 34: Fractions

30. $\frac{13}{27}+\frac{197}{216}+\frac{19}{24}+\frac{47}{54}=$?

31. $\frac{4}{9}+\frac{5}{6}+\frac{9}{11}+\frac{3}{5}=?$

32. $\frac{2}{11}+\frac{13}{16}+\frac{15}{44}+\frac{7}{8}+\frac{3}{4}=?$

33. $\frac{47}{77}+\frac{2}{11}+\frac{23}{154}+\frac{7}{22}=$?

34. Find the H.C.F. of $\frac{2}{3}$, $\frac{4}{13}$, $\frac{6}{11}$.

Questions 35 to 45: Percentages

35. 21.66 % of 240 is

36. What percentage of 434 is 985?

37. By what percentage is 525 more than 186?

38. 91.66% of 228 =?

39. 4932 is what percentage of 5480?

40. 520 is what percentage of 650?

41. 69.57% of 546 =?

42. 83.33% of 833 =?

43. 9.39% of 120 =?

44. 136 is what percentage of 980?

45. 683 is what percentage of 495?

Exercise – 3(b) **Time: 45 min.**

Questions 1 to 12: Percentages

1. 86.88% of 465 =?

2. 58.3% of 1440 =?

3. 86.3% of 546 =?

4. 152 is what percentage of 555?

5. 1296 is what percentage of 4624?

6. 18% of 419 =?

7. 27% of 743 =?

8. 147 is what percentage of 274?

9. 84% of 947 =?

10. 83 is what percentage of 516?

11. 88% of 738 =?

12. 281 is what percentage of 1384?

Directions for questions 13 to 39: From the choices, select the one which gives an accurate/approximate value to replace the question mark (?)

13. 6 of $\frac{5}{8}\div\frac{5}{8}-\frac{1}{8}=?$

(A) $6^1/_8$ (B) $5^3/_4$
(C) $6^3/_4$ (D) $5^7/_8$

14. $25\frac{2}{5}+8\frac{4}{5}+\frac{4}{5}=?$

(A) 34 (B) 35 (C) 36 (D) 37

15. $\frac{\frac{180}{37}\text{ of }14\cdot 8}{\frac{17}{60.1}\text{ of }180\cdot 30}=?$

(A) 1.4 (B) 1.6
(C) 1.5 (D) 1.2

16. $\frac{1}{3}$ of $\frac{2}{6}$ of $\frac{1}{7}$ of $\frac{2}{18}$ of 2140 =?

(A) 4.92 (B) 3.77
(C) 3.01 (D) 4.14

17. $12\frac{13}{18}+16\frac{11}{27}-10\frac{5}{9}=?$

(A) $18^2/_3$ (B) $18^{31}/_{54}$
(C) 18 (D) $20^1/_2$

18. $\frac{5/8\times 2\frac{2}{5}-\frac{5}{4}}{1\frac{1}{4}}=?$

(A) 1/5 (B) 4/5
(C) 6/5 (D) 8/5

19. $\frac{3}{7}$of$\frac{4}{9}$of$\frac{2}{5}$ of 7560 = $(?)^2$

(A) 18 (B) 22 (C) 24 (D) 26

20. $\frac{9\times 15-25}{(24\times 80)\div 320}=?$

(A) $16\frac{1}{3}$ (B) $17\frac{1}{3}$ (C) $18\frac{1}{3}$ (D) $19\frac{1}{3}$

21. $2\frac{3}{5}\times 3\frac{2}{5}\div 8\frac{21}{25}$ = ?

(A) $\frac{1}{2}$ (B) $\frac{1}{4}$

(C) $\frac{1}{5}$ (D) None of these

22. $\frac{48\times 4+38}{12\times 7.5+2.5\times 0.8}$ = ?

(A) 25 (B) 2.5

(C) 0.25 (D) 250

23. $\frac{264}{144}\times\frac{336}{231}\times\frac{42}{272}$ =?

(A) 1 (B) $\frac{7}{17}$ (C) $\frac{27}{17}$ (D) $\frac{17}{27}$

24. $4\frac{1}{7}\div 8\frac{2}{3}\times 3\frac{1}{4}\times\frac{31}{12}$ =?

(A) 3.24 (B) 4.43

(C) 4.01 (D) 5.1

25. $\frac{5}{2}\times\frac{3}{4}\div\frac{9}{4}\times\frac{5}{4}$ =?

(A) $\frac{4}{3}$ (B) 2

(C) $\frac{2}{3}$ (D) None of these

26. $9\frac{7}{8}-3\frac{1}{4}-2\frac{1}{6}=?^2+\frac{11}{24}$

(A) $\frac{1}{4}$ (B) 4 (C) -4 (D) 2

27. $\frac{3}{2}+\frac{5}{3}\div\left(\frac{6}{7}-\frac{5}{6}\right)$ =?

(A) 66.5 (B) 68.5

(C) 71.5 (D) $\frac{17}{42}$

28. $\frac{1444}{222}\times\frac{74}{1764}\times\frac{441}{361}$ =?

(A) $\frac{1}{3}$ (B) $\frac{2}{3}$ (C) $\frac{4}{3}$ (D) $\frac{8}{3}$

29. $5\frac{1}{3}\times 2\frac{1}{7}\times 9\frac{2}{5}\times 4\frac{3}{8}\times 2\frac{6}{47}$ =?

(A) 10 (B) 100

(C) 1000 (D) 1

30. $\frac{2}{5}$ of $\frac{3}{4}$ of $\frac{1}{7}$ of 10800 = $\frac{3}{7}$ of $\frac{9}{5}$ of ? of 840

(A) $\frac{3}{5}$ (B) $\frac{1}{3}$ (C) $\frac{5}{7}$ (D) $\frac{6}{7}$

31. $\frac{176}{43}\times\frac{215}{27}\times\frac{110}{22}$ = ?

(A) 160 (B) 150 (C) 140 (D) 320

32. $11\frac{3}{5}\times 1\frac{1}{2}\times 7\frac{7}{9}\times\frac{1}{203}$ = ?

(A) $\frac{2}{5}$ (B) $\frac{4}{9}$ (C) $\frac{2}{3}$ (D) $\frac{5}{8}$

33. $\frac{3}{17}$ of 204 + $\frac{3}{7}$ of 301 = ?

(A) 145 (B) 155

(C) 167 (D) None of these

34. $3\frac{1}{8}\times 3\frac{1}{5}\times 2\frac{1}{2}\div 5$ =?

(A) 25 (B) 5 (C) 16 (D) 8

35. $\frac{3.98\times 5.01}{0.915\times 0.487}$ =?

(A) 5 (B) 10 (C) 45 (D) 20

36. $5\frac{1}{6}+2\frac{5}{6}-5\frac{?}{3}=2\frac{1}{3}$

(A) 1 (B) 2 (C) 3 (D) $\frac{1}{2}$

37. $\frac{\frac{1}{8}\text{ of }1608}{\frac{1}{13}\text{ of }39}$ =?

(A) 67 (B) 7 (C) 46 (D) 17

38. $\frac{9.93\times 19.8}{35.03+2.9+1.96}$ =?

(A) 2 (B) 8 (C) 5 (D) 6

39. ?= $\frac{897}{64}\times\frac{782}{17}\times\frac{220}{74}$

(A) 1920 (B) 1870

(C) 1970 (D) 2010

Questions 40 to 45: Fractions

40. $\frac{17}{41}-\frac{34}{82}+\frac{171}{41}+\frac{37}{123}$ =?

41. $\frac{77}{11}+\frac{14}{22}+\frac{21}{33}$ =?

42. $\frac{21}{48}-\frac{82}{41}+\frac{119}{170}+\frac{156}{78}$ = ?

43. $\frac{18}{66}+\frac{33}{132}+\frac{42}{924}$ = ?

44. $\frac{2}{39}-\frac{1}{52}+\frac{3}{91}$ =?

45. $\frac{2}{85}-\frac{1}{34}+\frac{1}{51}$ = ?

Key

Exercise – 3(a)

1. 3.77	3. 55.28%	5. 38	7. 736.29
2. 16.38	4. 12.3%	6. 599.94	8. 389.52

9. 214.17
10. $\frac{1}{45}$
11. 63%
12. 27.95%
13. 51.75%
14. 1649.2
15. 64.817
16. 3.8%
17. 34.33%
18. 0.88
19. 91.58%
20. 916.6
21. 60.92%
22. 45.9888
23. 138
24. 1530
25. 133.4%
26. 178.12%
27. 270
28. 5980
29. 574.2
30. $\frac{55}{18}$
31. $\frac{2669}{990}$
32. $\frac{521}{176}$
33. $\frac{97}{77}$
34. $\frac{2}{429}$
35. 52
36. 227%
37. 182.25%
38. 209
39. 90%
40. 80%
41. 379.85
42. 694.16
43. 11.268
44. 13.88%
45. 138%

Exercise – 3(b)

1. 403.99
2. 839.52
3. 471.19
4. 27.38%
5. 28.02%
6. 75.42
7. 200.61
8. 53.65%
9. 795.43
10. 16.06%
11. 649.44
12. 20.3%
13. D
14. B
15. A
16. B
17. B
18. A
19. C
20. C
21. D
22. B
23. B
24. C
25. D
26. D
27. C
28. A
29. C
30. C
31. A
32. C
33. D
34. B
35. C
36 B
37. A
38. C
39. A
40. $\frac{550}{123}$
41. $\frac{91}{11}$
42. $\frac{91}{80}$
43. $\frac{25}{44}$
44. $\frac{71}{1092}$
45. $\frac{7}{510}$