CHAPTER 3

Fractions and Decimals

3.1 FRACTION

A fraction is a part of a whole. If a whole thing is divided into equal parts, their each part is a fraction.

$$\text{Fraction} = \frac{\text{Number of equal parts that have been taken}}{\text{Total number of equal parts}}$$

3.2 TYPES OF FRACTIONS

Proper Fraction

Fractions having numerator less than the denominator.

For example : $\frac{3}{7}, \frac{5}{7}$

Improper Fraction

Fractions having denominator less than the numerator.

For example : $\frac{7}{5}, \frac{8}{3}$

Like Fraction

Fractions having same denominator. For example : $\frac{5}{7}, \frac{4}{7}$

Unlike Fraction

Fractions having different denominator. For example : $\frac{4}{7}, \frac{8}{11}$

Unit Fraction

Fractions having 1 as numerator. For example : $\frac{1}{4}, \frac{1}{5}$

Equivalent Fraction

Two fractions are said to be equivalent fractions, when they have the same value. For example : $\frac{5}{7}$ and $\frac{15}{21}$ are equivalent fractions.

Mixed Fraction

The combination of whole number and proper fraction are called mixed fraction. For example : $4\frac{3}{4}, 6\frac{1}{9}$

3.3 COMPARISON OF FRACTIONS

Like fractions or fractions with same denominator

Fractions with smaller numerator is smaller.

For example : $\frac{5}{7} < \frac{6}{7}$

Fractions with same numerator

Fractions with smaller denominator is greater.

For example : $\frac{4}{9} < \frac{4}{7}$

Fractions with different numerator and denominator

Consider : 4/5 and 5/7

(a) Cross Multiplication

Step-1 : Cross multiply the fractions

$$\frac{4}{5} \diagdown\diagup \frac{5}{7}$$

i.e., 4 × 7 = 28 and 5 × 5 = 25

Step–2 : Since 28 > 25 $\Rightarrow \frac{4}{5} > \frac{5}{7}$

(b) By converting into like fractions

Step–1: L.C.M. of denominators (7 and 5) = 35

Step–2: Convert the given fractions into like fractions.

i.e., $\frac{4}{5} \times \frac{7}{7} = \frac{28}{35}$ and $\frac{5}{7} \times \frac{5}{5} = \frac{25}{35}$

Step–3 : Now compare numerators

As $25 < 28 \Rightarrow \dfrac{25}{35} < \dfrac{28}{35} \Rightarrow \dfrac{5}{7} < \dfrac{4}{5}$

3.4 OPERATIONS ON FRACTIONS

Addition and Subtraction

➤ **Like fractions :** Add $\dfrac{7}{15}$ and $\dfrac{4}{15}$.

$\dfrac{7}{15} + \dfrac{4}{15} = \dfrac{7+4}{15} = \dfrac{11}{15}$

➤ Subtract $\dfrac{9}{17}$ from $\dfrac{12}{17}$.

$\dfrac{12}{17} - \dfrac{9}{17} = \dfrac{3}{17}$

➤ **Unlike Fractions :** First convert the given fractions into like fractions and then proceed as discussed above.

Subtract $\dfrac{5}{7}$ from $\dfrac{4}{5}$.

$\dfrac{4}{5} - \dfrac{5}{7} = \dfrac{4\times 7 - 5\times 5}{35} = \dfrac{28-25}{35} = \dfrac{3}{35}$

➤ **Mixed Fractions**

Method 1 : Add/subtract the wholes and fractional parts separately.

Add : $3\dfrac{1}{5}$ and $4\dfrac{1}{6}$.

$3 + 4 = 7$ and $\dfrac{1}{5} + \dfrac{1}{6} = \dfrac{6}{30} + \dfrac{5}{30} = \dfrac{11}{30}$

$\therefore \quad 3\dfrac{1}{5} + 4\dfrac{1}{6} = 7\dfrac{11}{30}$

Method 2 : First convert mixed fractions into improper fractions and then proceed as above.

$\therefore \quad 3\dfrac{1}{5} = \dfrac{16}{5}$ and $4\dfrac{1}{6} = \dfrac{25}{6}$

L.C.M. of 5 and 6 = 30

$\Rightarrow \quad \dfrac{16\times 6}{5\times 6} = \dfrac{96}{30}$ and $\dfrac{25\times 5}{6\times 5} = \dfrac{125}{30}$

$\therefore \quad 3\dfrac{1}{5} + 4\dfrac{1}{6} = \dfrac{96}{30} + \dfrac{125}{30} = \dfrac{221}{30} = 7\dfrac{11}{30}$

Multiplication

➤ **Fraction by a fraction :**

Product of fractions = $\dfrac{\text{Product of numerators}}{\text{Product of denominators}}$

For example : $\dfrac{2}{5} \times \dfrac{4}{7} = \dfrac{2\times 4}{5\times 7} = \dfrac{8}{35}$

➤ **Fraction by a whole number :** Multiply a fraction by whole number is obtained by multiplying the numerator by that whole number and denominator by 1.

For example : $15 \times \dfrac{3}{17} = \dfrac{15\times 3}{17} = \dfrac{45}{17}$

Division

➤ **Division of a whole number by a fraction :** Divide 18 by $\dfrac{2}{9}$.

$18 \div \dfrac{2}{9} = 18 \times \dfrac{9}{2} = 81$

➤ **Division of a fraction by a whole number :** Divide $\dfrac{3}{14}$ by 6.

$\dfrac{3}{14} \div 6 = \dfrac{3}{14} \times \dfrac{1}{6} = \dfrac{1}{28}$

➤ **Division of a fraction by another fraction :** Divide $\dfrac{5}{36}$ by $\dfrac{7}{18}$.

$\dfrac{5}{36} \div \dfrac{7}{18} = \dfrac{5}{36} \times \dfrac{18}{7} = \dfrac{5}{14}$
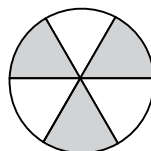
💡 *Olympiad Bite*

• Reciprocal of a fraction means interchanging the numerator and denominator of the given fraction.
• In division of fractions, change the divisor to its reciprocal and multiply it with the given dividend.

SELF TEST - 1

1. Find the shaded fraction of the given figure.

(A) $\dfrac{1}{2}$

(B) $\dfrac{1}{3}$

(C) $\dfrac{3}{5}$

(D) $\dfrac{2}{5}$

2. Find the missing number in the box.

$7\dfrac{2}{5} = \dfrac{\boxed{?}}{5}$

(A) 37

(B) 42

(C) 40

(D) 38

3. Compare and fill the box.

$$7\frac{1}{5}+3\frac{1}{4} \;\boxed{}\; 2\frac{1}{4}+3\frac{1}{5}$$

(A) >   (B) <
(C) =   (D) Can't be determined

4. Find the value of $4\frac{1}{4}-1\frac{3}{8}+6\frac{1}{4}$.

(A) $7\frac{1}{8}$ (B) $9\frac{1}{8}$

(C) $4\frac{1}{5}$ (D) $3\frac{1}{4}$
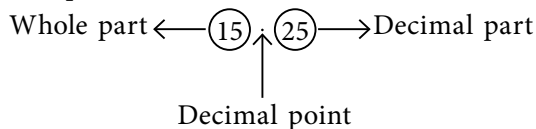
5. Kirti bought 80 apples and distribute $\frac{4}{5}$ of them to poor children. How many apples will be left with her?

(A) 64   (B) 20
(C) 16   (D) 24

3.5 DECIMALS

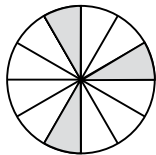Decimal form is an another way to represent a number. In decimal form, there are two parts : whole and fractional.

For example :

Whole part $\longleftarrow$ (15) $\uparrow$ (25) $\longrightarrow$ Decimal part

Decimal point

Here, 15.25 is read as fifteen point two five.

Tenths

$\frac{1}{10}$ is represented as 0.1 in the decimal form.

Shaded fraction = $\frac{3}{10}$
Decimal form = 0.3

Hundredths

$\frac{1}{100}$ is represented as 0.01 in the decimal form.

Thousandths

$\frac{13}{1000}$ in decimal is represented as 0.013.

3.6 CONVERSION OF DECIMALS

Whole Numbers into Decimals

The number 18 can be written in decimal form as 18.0

Decimals into Fractions

Step 1 : Write the decimal number divided by 1.

Step 2 : Multiply both numerator and denominator by 10, 100 or 1000 depending upon the number of digits after the decimal point.

For example : Reduce it to lowest form.

$$25.013 = \frac{25.013}{1} = \frac{25.013 \times 1000}{1000} = \frac{25013}{1000}$$

(As there are 3 digits after decimal point)

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There is no fractional (decimal) part in whole numbers.

While converting a fraction with denominator as 10, 100, 1000 into decimals, shift the decimal point by 1, 2, 3 places to the left respectively.

3.7 TYPES OF DECIMALS

Equivalent Decimals

Two decimals may be look different but represent the same value.

For example : 0.8 and 0.80 are equivalent decimals.

Like Decimals

Decimal numbers having same number of decimal places.
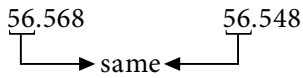
For example : 0.714 and 0.568

Unlike Decimals

Decimal numbers having different number of decimal places.
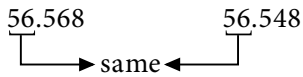
For example : 0.8 and 0.24

3.8 COMPARING DECIMALS

Compare 56.568 and 56.548.

Step–1 : Compare the whole parts.

56.568   56.548

↳ → same ← ↲

Step–2 : Compare the tenth digits.

56.568   56.548

↳ → same ← ↲

Step–3 : Compare the hundredth digits.

56.568   56.548

↳ → 6 > 4 ← ↲

Hence, 56.568 > 56.548

3.9 ADDITION AND SUBTRACTION OF DECIMALS

Step 1 : Change the given decimals to like decimals.

Step 2 : Line up the decimal points, *i.e.*, the addends are placed one below the other such that the tens digit is below tens, ones is below ones, decimal points below the decimal point, tenths below the tenths and so on.

Step 3 : Add as in case of whole numbers. (Carry wherever necessary)

Step 4 : Place the decimal point in the sum directly below the decimal points in the addends.
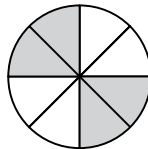
SELF TEST - 2

1. Find the place value of digits 7 in 4105.378.

(A) 7

(B) $\dfrac{7}{10}$

(C) $\dfrac{7}{100}$

(D) 70

2. Find the shaded decimal part of given figure.

(A) 0.5
(B) 0.2
(C) 0.1
(D) 0.4

3. Arrange the given decimal numbers in ascending order.

5.2, 5.02, 5.002

(A) 5.002, 5.02, 5.2   (B) 5.02, 5.002, 5.2
(C) 5.2, 5.002, 5.02   (D) 5.2, 5.02, 5.002

4. Subtract 42.35 from 814.49

(A) 768.28   (B) 772.14
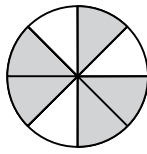(C) 786.82   (D) 751.12

5. Compare and fill the box.

7 tens 45 hundredths ☐ 8 tens 24 hundredths

(A) >   (B) <
(C) =   (D) Can't be determined

EXERCISE

1. Find the shaded fraction of the given figure.

(A) $\dfrac{3}{7}$ (B) $\dfrac{4}{7}$

(C) $\dfrac{3}{8}$ (D) $\dfrac{5}{8}$

2. Which of the following fractions are in order from the greatest to the least?

(A) $\dfrac{2}{6}, \dfrac{1}{2}, \dfrac{2}{3}$ (B) $\dfrac{2}{3}, \dfrac{1}{2}, \dfrac{2}{6}$

(C) $\dfrac{1}{2}, \dfrac{2}{6}, \dfrac{2}{3}$ (D) $\dfrac{2}{3}, \dfrac{2}{6}, \dfrac{1}{2}$

3. Which of the following decimals is smallest?

(A) 0.305 (B) 0.035
(C) 0.350 (D) 0.053

4. A vessel had $3\dfrac{2}{3}$ L of milk. A dog drank $\dfrac{1}{3}$ L from vessel. How much milk was left in the vessel?

(A) $1\dfrac{1}{3}$ L (B) $3\dfrac{1}{3}$ L

(C) $1\dfrac{2}{3}$ L (D) $3\dfrac{1}{4}$ L

5. A bag contains 18 red balls and 12 white balls. What fraction of the balls is white?

(A) $\dfrac{1}{5}$ (B) $\dfrac{2}{5}$

(C) $\dfrac{3}{5}$ (D) $\dfrac{4}{5}$

6. Priya had 4500 mL of juice. She used $\dfrac{2}{5}$ of it on the first day and $\dfrac{1}{4}$ of it on the second day. How much juice was left ?
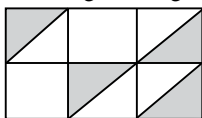
(A) 1280 mL (B) 1920 mL
(C) 1575 mL (D) 1680 mL

7. 80 ones 2 tenths and 4 hundredths is same as _____.

(A) 80.24 (B) 802.4
(C) 80.06 (D) 8.24

8. What fraction of the given figure is unshaded?

(A) 2/5 (B) 3/4
(C) 1/3 (D) 2/3

9. What must be subtracted from the sum of $3\dfrac{4}{5}$ and 8 to get $4\dfrac{3}{5}$?

(A) $7\dfrac{3}{5}$ (B) $4\dfrac{1}{5}$

(C) $7\dfrac{1}{5}$ (D) $5\dfrac{1}{5}$

10. Vinita uses $\dfrac{1}{4}$ cup of apple sauce in place of every $\dfrac{1}{3}$ cup of butter in her cookie recipe. What is the quantity of apple sauce will Vinita use in place of 1 cup of butter?

(A) $\dfrac{1}{12}$ cup (B) $\dfrac{1}{7}$ cup

(C) $\dfrac{2}{4}$ cup (D) $\dfrac{3}{4}$ cup

11. There are _____ eighths in $4\dfrac{3}{4}$.

(A) 38 (B) 19
(C) 18 (D) 20

12. In 18.495, the place value of the digit 9 is _____.

(A) 9 (B) 90
(C) 0.9 (D) 0.09

13. The shaded decimal part of the given figure is _____.

(A) 0.48

(B) 0.25

(C) 5.20

(D) 2.50
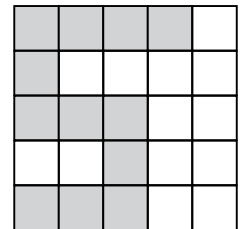
14. What fraction of the given figure is shaded?

(A) $\dfrac{1}{4}$ (B) $\dfrac{3}{8}$

(C) $\dfrac{3}{14}$ (D) $\dfrac{1}{3}$

15. 11 thousands +14 hundreds +15 hundredths + 8 thousandths = _____.

(A) 12380.158 (B) 11400.158
(C) 12400.058 (D) 12400.158

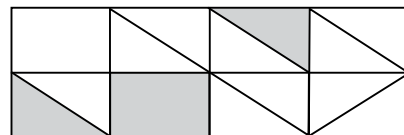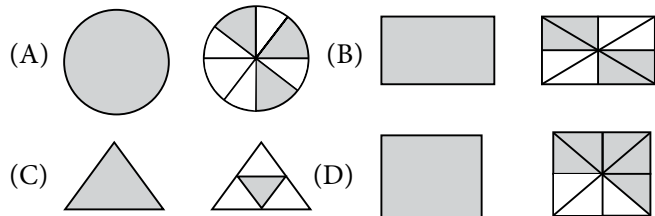**16.** Which of the following numbers are arranged in ascending order?
(A) 100.15, 115.00, 105.11, 100.51
(B) 27.10, 27.06, 24.83, 24.69
(C) 5.8. 5.83. 5.92, 5.99
(D) 12.09, 112.09, 112.18, 102.83

17. In which of the following figures, shaded fraction shows $1\frac{1}{4}$?

(A)   (B)

(C)   (D)

18. Arrange the following fractions in ascending order.
$$3\frac{1}{4}, 4\frac{1}{4}, \frac{11}{4}$$
(A) $4\frac{1}{4}, 3\frac{1}{4}, \frac{11}{4}$
(B) $4\frac{1}{4}, \frac{11}{4}, 3\frac{1}{4}$
(C) $3\frac{1}{4}, 4\frac{1}{4}, \frac{17}{4}$
(D) $\frac{11}{4}, 3\frac{1}{4}, 4\frac{1}{4}$

19. Compare and fill the box.
$$5.268 + 13.524 \;\boxed{}\; 14.814 + 3.987$$
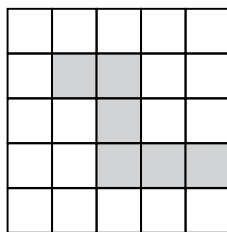(A) >
(B) <
(C) =
(D) Can't be determined

20. Find the value of X.
$$89.542 - \boxed{X} = 27.453$$
(A) 62.089
(B) 65.724
(C) 70.256
(D) 61.874

21. How many more squares must be shaded so that the given figure has $\frac{3}{5}$ shaded fraction?

(A) 9

(B) 6

(C) 7

(D) 8

22. What should be subtracted from 145.32 to get 85.8?
(A) 49.72
(B) 59.52
(C) 58.56
(D) None of these

23. A class has 75 students. $\frac{4}{5}$ of the students in the class went on a trip. How many students do not went on the trip?
(A) 50
(B) 40
(C) 15
(D) 60

24. Rohit's father bought a packet of 48 notebooks. If he gave $\frac{1}{3}$ of notebooks to Rohit, then how many notebooks were left with him?
(A) 20
(B) 18
(C) 16
(D) 32

25. Find the value of 4 tens 12 tenths + 3 tens 14 tenths + 72 thousandths.
(A) 72.672
(B) 68.472
(C) 70.574
(D) 65.372

26. How much is the sum of 48.96 and 305.72 greater than the difference 98.05 and 42.02?
(A) 304.65
(B) 298.65
(C) 302.50
(D) 252.54

27. Find the sum of shaded fractions of the given figures.
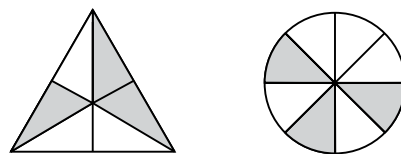
(A) $\frac{1}{8}$
(B) $\frac{7}{9}$
(C) $\frac{7}{8}$
(D) $\frac{3}{8}$

28. The given figure shows two ribbons. What is the sum of length of two ribbons?
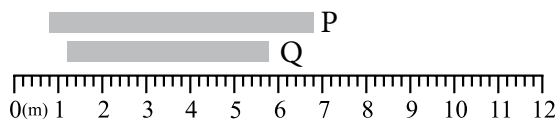
(A) 8.8 m
(B) 10.6 m
(C) 7.7 m
(D) 9.7 m

29. What fraction of the given figure is unshaded?

(A) $\frac{21}{32}$

(B) $\frac{11}{32}$

(C) $\frac{13}{32}$

(D) $\frac{19}{32}$
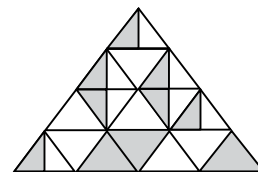
30. I am a decimal number. My decimal part is $\left[\frac{1}{4} \text{ of } 32\right]$ and my whole part is 2 more than $\left(\frac{2}{5} \text{ of } 20\right)$. Who am I?
(A) 10.8
(B) 10.08
(C) 8.86
(D) 8.68

31. Find the unit fraction whose denominator is $\left(\dfrac{14}{22} \div \dfrac{1}{11}\right)$.

(A) $\dfrac{11}{7}$ (B) $\dfrac{5}{11}$

(C) $\dfrac{6}{11}$ (D) $\dfrac{1}{7}$

32. Arrange the following decimal numbers in the descending order.

2.005, 0.255, 2.520, 0.525

(A) 0.255, 2.005, 0.525, 2.520
(B) 0.255, 0.525, 2.005, 2.520
(C) 2.520, 0.255, 0.525, 2.005
(D) 2.520, 2.005, 0.525, 0.255

33. What fraction of the given figure is shaded?

(A) 7/16   (B) 4/16
(C) 5/16   (D) 6/16

34. Find the value of $\dfrac{X-Y}{2}$.
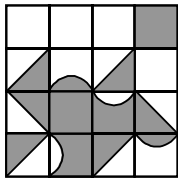
(A) 2
(B) 2.8
(C) 4.2
(D) 4

35. Which fraction is less than $\dfrac{8}{11}$ but greater than $\dfrac{4}{11}$?

(A) $\dfrac{9}{11}$ (B) $\dfrac{6}{11}$

(C) $\dfrac{3}{11}$ (D) $\dfrac{2}{11}$

36. Find the sum of place value of digits 3 and 5 in the number 2347.058.

(A) 300.05   (B) 300.50
(C) 3.05   (D) 35

37. 5 hundreds + 8 tens + 7 ones + 4 tenths + 5 hundredths can be expressed as _____.

(A) 554.45   (B) 587.04
(C) 578.45   (D) 587.45

38. I think of a decimal number. Add 3.4 to it. Subtract 2.5 from the sum obtained. Multiply the result obtained by 3, I get 9 as the answer. Find the decimal number.

(A) 0.21   (B) 2.1
(C) 21.0   (D) 0.12

39. Sonali travelled 180 km in three days. If she travelled 120 km in first two days, then what fraction of total distance did she travel on third day?

(A) $\dfrac{1}{5}$ (B) $\dfrac{2}{3}$

(C) $\dfrac{1}{3}$ (D) $\dfrac{3}{4}$

40. Find the difference between 8 and the sum of 42 tenths and 352 hundredths.

(A) 1.76   (B) 6.72
(C) 0.28   (D) 8.96

41. Which of the following figures shows $\dfrac{3}{5}$ as unshaded fraction?

(A)   (B)
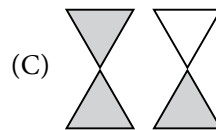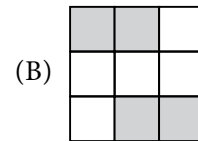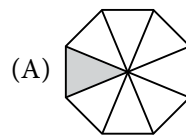
(C)   (D) None of these

42. Find the missing number.

$$3\dfrac{3}{20} \times 1\dfrac{1}{2} + 2\dfrac{1}{2} - \left(2\dfrac{1}{2} \div \dfrac{1}{2}\right) = \boxed{?} \times \dfrac{1}{4}$$

(A) $\dfrac{49}{10}$ (B) $\dfrac{41}{10}$

(C) $\dfrac{23}{10}$ (D) $\dfrac{89}{10}$

43. 5 times of a number is greater than $\dfrac{3}{5}$ of the same number by 44. Find the number.

(A) 5   (B) 10
(C) 18   (D) 24

44. The value of $4\dfrac{1}{10} - \left[3\dfrac{1}{4} + \left\{1\dfrac{1}{3} - \left(1\dfrac{2}{3} - 1\dfrac{1}{2}\right)\right\}\right] + 1$ is ____.

(A) $\dfrac{41}{60}$ (B) $\dfrac{8}{17}$

(C) $\dfrac{31}{60}$ (D) $\dfrac{13}{45}$

45. How many two-thirds make $\left(3\dfrac{1}{2} + 4\dfrac{1}{2} + 5\dfrac{1}{3}\right)$?

(A) 20   (B) 15
(C) 18   (D) 12

46. Match the figures given in Column-I with their shaded fraction given in Column-II.

Column-I	Column-II
(i)	(p) $\frac{7}{16}$
(i)	(q) $\frac{1}{2}$
(iii)	(r) $\frac{1}{5}$

(A) (i) → (q); (ii) → (q); (iii) → (p)
(B) (i) → (p); (ii) → (q); (iii) → (r)
(C) (i) → (q); (ii) → (p); (iii) → (r)
(D) (i) → (r); (ii) → (q); (iii) → (p)

47. The value of 30.5 – 30.4 + 30.3 – 30.2 + 30.1 – 30.0 + 29.9 – 29.8 + 29.7 – 29.6 + 29.5 – 29.4 + 29.3 – 29.2 + 29.1 – 29.0 = _____.

(A) 0.8   (B) 0.7
(C) 0.6   (D) 1.8

48. Select the correct option.
(A) In 181.458, the digit 4 is at hundredths place.
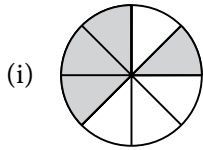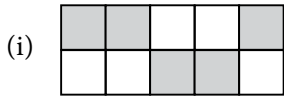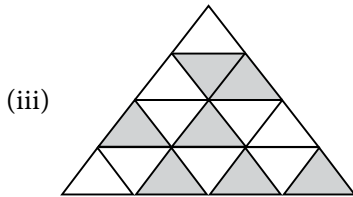(B) 5 tens 28 hundredths + 2 tens 9 tenths = 71.20
(C) Expanded form of 138.24 is $100 + 30 + 8 + \frac{2}{10} + \frac{4}{100}$.
(D) All of these

49. Read the statements carefully and select the correct option.
Statement-I : The number 5.04, 5.40, 5.45, 5.145 are arranged in ascending order.
Statement-II : The difference between (7 tens 8 tenths and 14 hundredths) and (6 tens 5 tenths) is 10.34.
(A) Both Statement-I and Statement-II are true.
(B) Both Statement-I and Statement-II are false.
(C) Statement-I is true but Statement-II is false.
(D) Statement-I is false but Statement-II is true.

50. Read the given statements carefully and state 'T' for true and 'F' for false.

(i) The shaded fraction of the given figure is $\frac{5}{8}$.
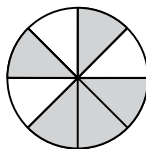
(ii) If a bag contains 7 red and 8 white balls, then fraction of red balls in the bag is $\frac{7}{15}$.

(iii) There are 24 eighths in $5\frac{1}{4}$.

	(i)	(ii)	(iii)
(A)	T	F	T
(B)	T	T	F
(C)	F	T	T
(D)	F	F	T

SOF IMO 2019 QUESTIONS

1. Find the missing value.
$$3.75 \div 3 - (0.2 \times 5.6) + \frac{13}{20} = \left(1 + \underline{\ ?\ }\right) \times \frac{1}{2}$$
(A) 0.56   (B) 0.24
(C) 1.70   (D) 1.372   *(Level-1)*

2. How many of the shapes of the given figure must be shaded so that $\frac{2}{5}$ of the figure is unshaded ?
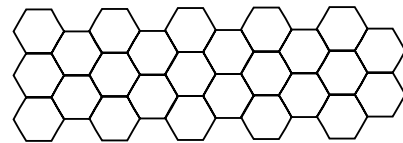
(A) 5   (B) 10
(C) 15   (D) 20   *(Level-1)*

3. Find the value of P + Q.
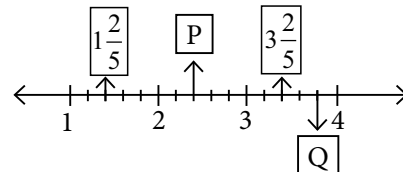
(A) $3\frac{4}{5}$ (B) $4\frac{2}{5}$
(C) $6\frac{1}{5}$ (D) $5\frac{1}{5}$ *(Level-1)*

4. On Monday, Himanshi walked $4\frac{3}{8}$ km, while on Tuesday she walked $3\frac{2}{5}$ km. How much more distance did she walk on Monday than on Tuesday?

(A) 2 km   (B) $1\frac{5}{6}$ km
(C) $1\frac{5}{12}$ km   (D) $\frac{39}{40}$ km   *(Level-1)*

5. Alka needs $\frac{3}{5}$ bowl of chopped onions and $\frac{2}{3}$ bowl of chopped tomatoes to make a dish. How much more chopped tomatoes than chopped onions did she require?

(A) $\dfrac{2}{15}$ bowl

(B) $\dfrac{1}{15}$ bowl

(C) $\dfrac{3}{10}$ bowl

(D) $\dfrac{1}{5}$ bowl   *(Level-1)*

6. On Tamanna's birthday, her mother gave three-tenth of the cake to each of her 2 neighbours and one-tenth of the cake to each of her 2 friends. What fraction of the cake is left with her?

(A) $\dfrac{7}{10}$

(B) $\dfrac{3}{10}$

(C) $\dfrac{1}{5}$

(D) $\dfrac{3}{5}$ *(Level-1)*
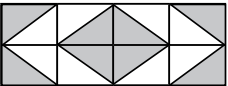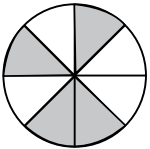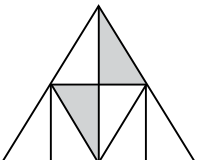
7. Read the statements carefully and state 'T' for true and 'F' for false.

(i) The value of $4.25 \div 2.5 + 3\dfrac{2}{8} - 4.2$ is 0.75.

(ii) If $\dfrac{6}{15} + \dfrac{3}{2} - \dfrac{4}{5} + y = 2\dfrac{2}{3}$, then $y = 4\dfrac{1}{5}$.

(iii) Sum of place values of 5 and 7 in the number 317.452 is 7.05.

	(i)	(ii)	(iii)
(A)	T	T	F
(B)	F	F	T
(C)	F	T	F
(D)	T	F	T

(Level-1)

8. Which of the following figures shows $\dfrac{3}{4}$ as unshaded fraction?

(A)

(B)

(C)

(D) None of these *(Level-1)*

9. Four-fifth of a number is 20 more than two-third of the same number. Find the number.

(A) 145

(B) 55

(C) 150

(D) 75   *(Level-1)*

10. Find the product of 5 and the difference between 328 tenths and 4587 thousandths. Round off your answer to 1 decimal place.

(A) 146.9

(B) 141.1

(C) 139.2

(D) 140.2   *(Level-1)*

11. Shivam and Varun ate 95 toffees altogether. Varun and Aakash ate 216 toffees altogether. If Varun ate $\dfrac{1}{5}$ of what Aakash ate, then how many toffees did Shivam eat?

(A) 59

(B) 65

(C) 70

(D) 79   *(Level-1)*

12. How many sixths are there in $2\dfrac{1}{2} + 4\dfrac{1}{2} + 3\dfrac{1}{4} + 3.75$?

(A) 56

(B) 84

(C) 94

(D) 14   *(Level-2)*

13. There are 125 passengers in a train. 20 of them are children while the rest are adults. If $\dfrac{5}{7}$ of the adults are men, then what fraction of the total passengers in the bus are women?

(A) $\dfrac{8}{25}$

(B) $\dfrac{16}{25}$

(C) $\dfrac{6}{25}$

(D) $\dfrac{2}{7}$ *(Level-2)*

14. In 15753.532, the sum of place values of 5's is _____ more than the sum of place values of 3.

(A) 5050.47

(B) 5046.97

(C) 5047.20

(D) 5047.47   *(Level-2)*

15. If $\dfrac{7}{25}$ of a number is 21 more than $\dfrac{1}{4}$ of the same number, then find the number.

(A) 800

(B) 750

(C) 600

(D) 700   *(Level-2)*

SELF TEST - 1

1. **(A) :** Shaded fraction $= \dfrac{3}{6} = \dfrac{1}{2}$

2. **(A) :** $7\dfrac{2}{5} = \dfrac{37}{5}$

3. **(A) :** $7\dfrac{1}{5} + 3\dfrac{1}{4} = \dfrac{36}{5} + \dfrac{13}{4} = \dfrac{144 + 65}{20} = \dfrac{209}{20}$

and $2\dfrac{1}{4} + 3\dfrac{1}{5} = \dfrac{9}{4} + \dfrac{16}{5} = \dfrac{45 + 64}{20} = \dfrac{109}{20}$

Now, $\dfrac{209}{20} \boxed{>} \dfrac{109}{20}$

4. **(B) :** $4\dfrac{1}{4} - 1\dfrac{3}{8} + 6\dfrac{1}{4} = \dfrac{17}{4} - \dfrac{11}{8} + \dfrac{25}{4}$

$= \dfrac{34 - 11 + 50}{8} = \dfrac{73}{8} = 9\dfrac{1}{8}$

5. **(C) :** Total number of apples = 80

Number of apples distributed $= \dfrac{4}{5} \times 80 = 64$

So, number of apples left = 80 – 64 = 16

SELF TEST - 2

1. **(C)**

2. **(A) :** Total number of equal parts = 8
Number of shaded parts = 4

∴ Shaded decimal part $= \dfrac{4}{8} = 0.5$

3. **(A)**

4. **(B) :** 814.49 – 42.35 = 772.14

5. **(B) :** 7 tens 45 hundredths $= 70 + \dfrac{45}{100} = 70.45$

8 tens 24 hundredths $= 80 + \dfrac{24}{100} = 80.24$

So, 70.45 $\boxed{<}$ 80.24

EXERCISE

1. **(D) :** Total number of equal parts = 8
Number of shaded parts = 5

∴ Shaded fraction $= \dfrac{5}{8}$

2. **(A) :** First convert the given fractions into like fractions.
L.C.M. of 2, 3, 6 = 6

So, $\dfrac{1}{2} = \dfrac{1 \times 3}{2 \times 3} = \dfrac{3}{6}; \dfrac{2}{3} = \dfrac{2 \times 2}{3 \times 2} = \dfrac{4}{6}; \dfrac{2}{6} = \dfrac{2 \times 1}{6 \times 1} = \dfrac{2}{6}$

So, ascending order is, $\dfrac{2}{6}, \dfrac{3}{6}, \dfrac{4}{6}$ *i.e.* $\dfrac{2}{6}, \dfrac{1}{2}, \dfrac{2}{3}$

3. **(B)**

4. **(B) :** Quantity of milk in vessel $= 3\dfrac{2}{3}\text{L} = \dfrac{11}{3}\text{L}$

Quantity of milk drank by dog $= \dfrac{1}{3}\text{L}$

So, quantity of milk left $= \dfrac{11}{3} - \dfrac{1}{3} = \dfrac{10}{3}\text{L} = 3\dfrac{1}{3}\text{L}$

5. **(B) :** Total number of balls = 18 + 12 = 30
So, fraction of white balls $= \dfrac{12}{30} = \dfrac{2}{5}$

6. **(C)**

7. **(A)**

8. **(D) :** Total number of equal parts = 12
Number of unshaded parts = 8

∴ Unshaded fraction $= \dfrac{8}{12} = \dfrac{2}{3}$.

9. **(C) :** Sum $= 3\dfrac{4}{5} + 8 = \dfrac{19}{5} + 8 = \dfrac{19 + 40}{5} = \dfrac{59}{5}$

∴ Required number $= \dfrac{59}{5} - 4\dfrac{3}{5} = \dfrac{59}{5} - \dfrac{23}{5} = \dfrac{36}{5} = 7\dfrac{1}{5}$

10. **(D) :** Quantity of apple sauce used in place of

every $\dfrac{1}{3}$ cup of butter $= \dfrac{1}{4}$ cup

∴ Quantity of apple sauce used in place of 1 cup of

butter $= \dfrac{1}{4} \times 3 = \dfrac{3}{4}$ cup

11. **(A) :** As, $4\dfrac{3}{4} = \dfrac{19}{4}$

So, there are $\dfrac{19}{4} \times 8 = 38$ eighths in $4\dfrac{3}{4}$.

12. **(D)**

13. **(A) :** Total number of equal parts = 25
Number of shaded parts = 12

∴ Shaded decimal part $= \dfrac{12}{25} \times \dfrac{4}{4} = \dfrac{48}{100}$

$= 0.48$

14. **(A) :** Total number of equal parts = 8
Number of shaded parts = 2

∴ Shaded fraction $= \dfrac{2}{8} = \dfrac{1}{4}$

15. **(D) :** 11 thousands + 14 hundreds + 15 hundredths
+ 8 thousandths

$= 11000 + 1400 + \dfrac{15}{100} + \dfrac{8}{1000}$

$= 11000 + 1400 + 0.15 + 0.008$

$= 12400.158$

16. (C)

17. (C)

18. (D): $3\dfrac{1}{4} = \dfrac{13}{4}; 4\dfrac{1}{4} = \dfrac{17}{4}; \dfrac{11}{4}$

Correct ascending order is : $\dfrac{11}{4}, \dfrac{13}{4}, \dfrac{17}{4}$

or $\dfrac{11}{4}, 3\dfrac{1}{4}, 4\dfrac{1}{4}$

19. (B) : 5.268 + 13.524 = 18.792

14.814 + 3.987 = 18.801

So, 18.792 $\boxed{<}$ 18.801

20. (A): $X = 89.542 - 27.453 = 62.089$

21. (A): Total number of equal parts = 25

Number of squares that must be shaded $= \dfrac{3}{5} \times 25 = 15$

Number of squares already shaded = 6

Number of more squares to be shaded = 15 – 6 = 9

22. (B) : Required number = 145.32 – 85.8 = 59.52

23. (C) : Number of students in class = 75

Number of students went on trip

$= \dfrac{4}{5} \times 75 = 60$

∴ Number of students that were not went on trip
= 75 – 60 = 15

24. (D): Total number of notebooks = 48

Number of notebooks given to Rohit $= \dfrac{1}{3} \times 48 = 16$

∴ Number of notebooks left with Rohit's father
= 48 – 16 = 32

25. (A): 4 tens 12 tenths + 3 tens 14 tenths

+ 72 thousandths

$= \left(40 + \dfrac{12}{10}\right) + \left(30 + \dfrac{14}{10}\right) + \left(\dfrac{72}{1000}\right)$

$= 41.2 + 31.4 + 0.072 = 72.672$

26. (B) : 48.96 + 305.72 = 354.68

and 98.05 – 42.02 = 56.03

∴ Required difference = 354.68 – 56.03 = 298.65

27. (C) : Sum of shaded fractions $= \dfrac{3}{6} + \dfrac{3}{8}$

$= \dfrac{12 + 9}{24} = \dfrac{21}{24} = \dfrac{7}{8}$

28. (B) : Length of ribbon P = (6.8 – 0.8) cm = 6 cm

Length of ribbon Q = (5.8 – 1.2) cm = 4.6 cm

So, sum = 6 + 4.6 = 10.6 cm

29. (D): Total number of equal parts = 32

Number of unshaded parts = 19

∴ Unshaded fraction $= \dfrac{19}{32}$

30. (A): Decimal part of the required number $= \dfrac{1}{4}$ of 32

$= \dfrac{1}{4} \times 32 = 8$

And, whole part of required number $= 2 + \left(\dfrac{2}{5} \text{ of } 20\right)$

$= 2 + \left(\dfrac{2}{5} \times 20\right) = 2 + 8 = 10$

∴ Required number = 10.8

31. (D): Denominator $= \dfrac{14}{22} \div \dfrac{1}{11} = \dfrac{14}{22} \times 11 = 7$

∴ Required unit fraction $= \dfrac{1}{7}$

32. (D)

33. (D)

34. (A) : $\dfrac{X - Y}{2} = \dfrac{5.2 - 1.2}{2} = \dfrac{4}{2} = 2$

35. (B)

36. (A) : Place value of digit 3 = 300

Place value of digit 5 = 0.05

Required sum = 300 + 0.05 = 300.05

37. (D): $500 + 80 + 7 + \dfrac{4}{10} + \dfrac{5}{100}$

$= 500 + 80 + 7 + 0.4 + 0.05 = 587.45$

38. (B) : Let X be the decimal number.

So, $(X + 3.4 - 2.5) \times 3 = 9$

$\Rightarrow X + 0.9 = 9 \div 3$

$\Rightarrow X = 3 - 0.9 = 2.1$

39. (C) : Total distance to be travelled = 180 km

Distance travelled in first two days = 120 km

∴ Distance travelled on third day = (180 – 120) km
= 60 km

∴ Required fraction $= \dfrac{60}{180} = \dfrac{1}{3}$

40. (C) : Sum of 42 tenths and 352 hundredths

$= \dfrac{42}{10} + \dfrac{352}{100} = 4.2 + 3.52 = 7.72$

∴ Required difference = 8 – 7.72 = 0.28

41. (D): (A) Unshaded fraction $= \dfrac{7}{8}$

(B) Unshaded fraction $= \dfrac{5}{9}$

(C) Unshaded fraction $= \dfrac{1}{4}$

42. (D): We have,

$3\dfrac{3}{20} \times 1\dfrac{1}{2} + 2\dfrac{1}{2} - \left(2\dfrac{1}{2} \div \dfrac{1}{2}\right) = \boxed{?} \times \dfrac{1}{4}$

$$\Rightarrow \quad \frac{63}{20} \times \frac{3}{2} + \frac{5}{2} - \left(\frac{5}{2} \times 2\right) = \boxed{?} \times \frac{1}{4}$$

$$\Rightarrow \quad \frac{189}{40} + \frac{5}{2} - 5 = \boxed{?} \times \frac{1}{4}$$

$$\Rightarrow \quad \frac{189 + 100 - 200}{40} = \boxed{?} \times \frac{1}{4}$$

$$\Rightarrow \quad \frac{89}{40} = \boxed{?} \times \frac{1}{4}$$

$$\Rightarrow \quad \frac{89}{10} \times \frac{1}{4} = \boxed{?} \times \frac{1}{4}$$

$$\Rightarrow \quad \boxed{?} = \frac{89}{10}$$

43. (B) : Let the number be X.

So, $5X = \frac{3}{5}X + 44$

$$\Rightarrow \quad 5X - \frac{3}{5}X = 44 \quad \Rightarrow \quad \frac{22}{5}X = 44$$

$$\Rightarrow \quad X = \frac{44 \times 5}{22} = 10$$

44. (A) : $4\frac{1}{10} - \left[3\frac{1}{4} + \left\{1\frac{1}{3} - \left(1\frac{2}{3} - 1\frac{1}{2}\right)\right\}\right] + 1$

$$= \frac{41}{10} - \left[\frac{13}{4} + \left\{\frac{4}{3} - \left(\frac{5}{3} - \frac{3}{2}\right)\right\}\right] + 1$$

$$= \frac{41}{10} - \left[\frac{13}{4} + \left\{\frac{4}{3} - \left(\frac{10 - 9}{6}\right)\right\}\right] + 1$$

$$= \frac{41}{10} - \left[\frac{13}{4} + \left\{\frac{4}{3} - \frac{1}{6}\right\}\right] + 1 = \frac{41}{10} - \left[\frac{13}{4} + \frac{7}{6}\right] + 1$$

$$= \frac{41}{10} - \left[\frac{39 + 14}{12}\right] + 1 = \frac{41}{10} - \frac{53}{12} + 1 = \frac{246 - 265 + 60}{60}$$

$$= \frac{41}{60}$$

45. (A)

46. (A) : (i) Total number of equal parts = 8
Number of shaded parts = 4

∴ Shaded fraction = $\frac{4}{8} = \frac{1}{2}$

(ii) Total number of equal parts = 10
Number of shaded parts = 5

∴ Shaded fraction = $\frac{5}{10} = \frac{1}{2}$

(iii) Total number of equal parts = 16
Number of shaded parts = 7

∴ Shaded decimal parts = $\frac{7}{16}$

47. (A) : We have, $(30.5 - 30.4) + (30.3 - 30.2) + (30.1 - 30.0)$
$+ (29.9 - 29.8) + (29.7 - 29.6) + (29.5 - 29.4) + (29.3 - 29.2)$
$+ (29.1 - 29.0)$
$= 0.1 + 0.1 + 0.1 + 0.1 + 0.1 + 0.1 + 0.1 + 0.1 = 0.8$

48. (C)

49. (B) : Statement-I : The correct ascending order is
5.04, 5.145, 5.40, 5.45
Statement-II : (7 tens 8 tenths and 14 hundredths)
— (6 tens 5 tenths)

$$= \left(70 + \frac{8}{10} + \frac{14}{100}\right) - \left(60 + \frac{5}{10}\right)$$

$$= 70.94 - 60.5 = 10.44$$

50. (B) : (i) True : Total number of equal parts = 8
Number of shaded parts = 5

∴ Shaded fraction = $\frac{5}{8}$

(ii) True : Total number of balls in the bag = 7 + 8 = 15

∴ Fraction of red balls = $\frac{7}{15}$

(iii) False : Number of eighths in $5\frac{1}{4} = 5\frac{1}{4} \times 8 = \frac{21}{4} \times 8 = 42$

SOF IMO 2019 QUESTIONS

1. (A) : We have,
L.H.S. = $3.75 \div 3 - (0.2 \times 5.6) + \frac{13}{20}$

$$= 3.75 \div 3 - 1.12 + \frac{13}{20} = 1.25 - 1.12 + 0.65$$

$$= 1.9 - 1.12 = 0.78$$

Now, $0.78 = (1 + ?) \times \frac{1}{2}$

$$\Rightarrow \quad 1 + ? = 2 \times 0.78$$
$$\Rightarrow \quad ? = 1.56 - 1 = 0.56$$

2. (C) : Total number of shapes = 25

Unshaded fraction = $\frac{2}{5}$

So, number of unshaded shapes = $\frac{2}{5} \times 25 = 10$

∴ Number of shapes should be shaded = 25 – 10 = 15

3. (C) :
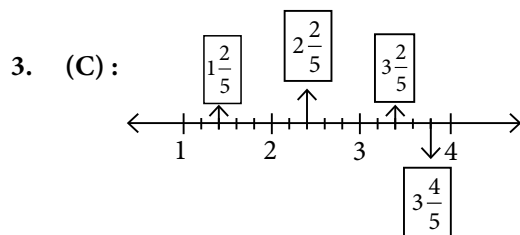
So, P + Q = $2\frac{2}{5} + 3\frac{4}{5}$

$$= \frac{12}{5} + \frac{19}{5} = \frac{12 + 19}{5} = \frac{31}{5} = 6\frac{1}{5}$$

4. (D) : Distance covered on Monday

$$= 4\frac{3}{8}\,\text{km} = \frac{35}{8}\,\text{km}$$

Distance covered on Tuesday = $3\frac{2}{5}\,\text{km} = \frac{17}{5}\,\text{km}$

∴ Required difference = $\left(\frac{35}{8} - \frac{17}{5}\right)\text{km}$

$$= \frac{175-136}{40} = \frac{39}{40}\ km$$

5. (B) : Quantity of onions $= \frac{3}{5}$ bowl

Quantity of tomatoes $= \frac{2}{3}$ bowl

$\therefore$ Required difference $= \frac{2}{3} - \frac{3}{5} = \frac{10-9}{15} = \frac{1}{15}$ bowl

6. (C)   **7. (D)**

8. (C) : (A) Unshaded fraction $= \frac{8}{16} = \frac{1}{2}$

(B) Unshaded fraction $= \frac{4}{8} = \frac{1}{2}$

(C) Unshaded fraction $= \frac{6}{8} = \frac{3}{4}$

9. (C) : Let the number be X.
According to question,

$$\frac{4}{5} \times X = \frac{2}{3} \times X + 20$$

$$\Rightarrow \left(\frac{4}{5}X - \frac{2}{3}X\right) = 20$$

$$\Rightarrow X\left[\frac{12-10}{15}\right] = 20$$

$$\Rightarrow \frac{2X}{15} = 20 \Rightarrow X = \frac{20 \times 15}{2} = 150$$

10. (B) : Difference of 328 tenths and 4587 thousandths

$$= \frac{328}{10} - \frac{4587}{1000} = 32.8 - 4.587 = 28.213$$

Now, product $= 28.213 \times 5 = 141.065$
So, round off to 1 decimal place $= 141.1$

11. (A) : Number of toffees Shivam and Varun ate altogether = 95   ...(i)

Number of toffees Varun and Akash ate altogether = 216   ...(ii)

But, number of toffees Varun ate

$= \frac{1}{5} \times$ number of toffees Akash ate

Using (ii), we have

$$\left[\frac{1}{5} \times \text{Number of toffees Akash ate}\right]$$
$$+ \text{Number of toffees Akash ate} = 216$$

$\Rightarrow$ (Number of toffees Akash ate) $\left(\frac{1}{5}+1\right) = 216$

$\Rightarrow$ Number of toffees Akash ate $= \frac{216 \times 5}{6} = 180$

$\Rightarrow$ Number of toffees Varun ate $= \frac{1}{5} \times 180 = 36$

$\Rightarrow$ Number of toffees Shivam eat $= 95 - 36 = 59$

12. (B) : $2\frac{1}{2} + 4\frac{1}{2} + 3\frac{1}{4} + 3.75 = \frac{5}{2} + \frac{9}{2} + \frac{13}{4} + \frac{15}{4} = 14$

So, there are $14 \times 6 = 84$ sixths in the given expression.

13. (C) : Total number of passengers = 125
Number of adults = 125 – 20 = 105
Number of men $= \frac{5}{7}$ of $105 = \frac{5}{7} \times 105 = 75$
So, number of women = 105 – 75 = 30

$\therefore$ Required fraction $= \frac{30}{125} = \frac{6}{25}$

14. (D) : Sum of place values of 5 = 5000 + 50 + 0.5 = 5050.5
Sum of place values of 3 = 3 + 0.03 = 3.03
$\therefore$ Required difference = 5050.5 – 3.03 = 5047.47

15. (D) : Let the number be X.
According to question, we have

$$\frac{7}{25}X - \frac{1}{4}X = 21 \Rightarrow \frac{(28-25)X}{100} = 21$$

$$\Rightarrow \frac{3X}{100} = 21 \Rightarrow X = \frac{21 \times 100}{3} = 700$$