FRACTIONS AND DECIMALS

(A) Main Concepts and Results

- A fraction is either a proper fraction or an improper fraction.

- A proper fraction is a number representing a part of a whole. This whole may be a single object or a group of objects. An improper fraction is a number in which numerator is greater than denominator.

- A mixed fraction is a combination of a natural number and a proper fraction.

- Two fractions are multiplied by multiplying their numerators and denominators separately and writing the product as

  $\dfrac{\text{product of numerators}}{\text{product of denominators}}$. For example, $\dfrac{2}{5} \times \dfrac{3}{4} = \dfrac{2 \times 3}{5 \times 4} = \dfrac{6}{20}$.

- A fraction acts as an operator 'of'. For example, $\dfrac{1}{3}$ of 3 is $\dfrac{1}{3} \times 3 = 1$.

- The product of two proper fractions is less than each of the fractions,

  For example, $\dfrac{1}{2} \times \dfrac{1}{3} = \dfrac{1}{6}$ and $\dfrac{1}{6}$ is less than both $\dfrac{1}{2}$ and $\dfrac{1}{3}$.

- The product of a proper and an improper fraction is less than the improper fraction and greater than the proper fraction. For example,

  $\dfrac{1}{2} \times \dfrac{3}{2} = \dfrac{3}{4}$ and $\dfrac{3}{4}$ is less than $\dfrac{3}{2}$ but greater than $\dfrac{1}{2}$.

- The product of two improper fractions is greater than the two fractions.

  For example, $\dfrac{3}{2} \times \dfrac{7}{4} = \dfrac{21}{8}$ and $\dfrac{21}{8}$ is greater than both $\dfrac{3}{2}$ and $\dfrac{7}{4}$.

- The reciprocal of a non-zero fraction is obtained by interchanging its numerator and denominator. For example, reciprocal of $\frac{3}{2}$ is $\frac{2}{3}$.

- While dividing a whole number by a fraction, we multiply the whole number with the reciprocal of that fraction. For example, $3 \div \frac{1}{2} = 3 \times \frac{2}{1}$.

- While dividing a fraction by a natural number, we multiply the fraction by the reciprocal of the natural number. For example, $\frac{1}{4} \div 2 = \frac{1}{4} \times \frac{1}{2}$.

- While dividing one fraction by another fraction, we multiply the first fraction by the reciprocal of the other. For example, $\frac{1}{2} \div \frac{1}{3} = \frac{1}{2} \times \frac{3}{1}$.

- While multiplying two decimal numbers, first multiply them as whole numbers. Count the number of digits to the right of the decimal point in both the decimal numbers. Add the number of digits counted. Put the decimal point in the product by counting the number of digits equal to sum obtained from its rightmost place. For example, $1.2 \times 1.24 = 1.488$.

- To multiply a decimal number by 10, 100 or 1000, we move the decimal point in the number to the right by as many places as many zeros (0) are the right of one. For example, $1.33 \times 10 = 13.3$.

- To divide a decimal number by a natural number, we first take the decimal number as natural number and divide by the given natural number. Then place the decimal point in the quotient as in the decimal number. For example, $\frac{1.2}{4} = 0.3$

- To divide a decimal number by 10, 100 or 1000, shift the decimal point in the decimal number to the left by as many places as there are zeros over 1, to get the quotient. For example, $\frac{1.34}{100} = 0.0134$

- While dividing one decimal number by another, first shift the decimal points to the right by equal number of places in both, to convert the divisor to a natural number and then divide. For example $\frac{1.44}{1.2} = \frac{14.4}{12} = 1.2$.

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(B) Solved Examples

In Examples 1 to 11, there are four options, out of which one is correct. Write the correct one.

Example 1: Savita is dividing $1\dfrac{3}{4}$ kg of sweets equally among her seven friends. How much does each friend receive?

(a) $\dfrac{3}{4}$ kg   (b) $\dfrac{1}{4}$ kg   (c) $\dfrac{1}{2}$ kg   (d) $\dfrac{3}{28}$ kg

Solution: Correct answer is (b)

Example 2: If $\dfrac{3}{4}$ of a number is 12, the number is

(a) 9   (b) 16   (c) 18   (d) 32

Solution: Correct answer is (b)

Example 3: Product of fractions $\dfrac{2}{7}$ and $\dfrac{5}{9}$ is

(a) $\dfrac{2\times 5}{7+9}$ (b) $\dfrac{2+5}{2+9}$ (c) $\dfrac{2\times 9}{5\times 7}$ (d) $\dfrac{2\times 5}{7\times 9}$

Solution: Correct answer is (d)

Example 4: Given that $0 < p < q < r < s$ and p, q, r, s are integers, which of the following is the smallest?

(a) $\dfrac{p+q}{r+s}$ (b) $\dfrac{p+s}{q+r}$ (c) $\dfrac{q+s}{p+r}$ (d) $\dfrac{r+s}{p+q}$

Solution: Correct answer is (a)

Example 5: The next number of the pattern

60, 30, 15, _____ is

(a) 10   (b) 5   (c) $\dfrac{15}{4}$ (d) $\dfrac{15}{2}$

Solution: Correct answer is (d)

Example 6:   The decimal expression for 8 rupees 8 paise (in Rupees) is

(a) 8.8   (b) 8.08   (c) 8.008   (d) 88.0

Solution: Correct answer is (b)

Example 7:   Each side of a regular hexagon is 3.5cm long. The perimeter of the given polygon is

(a) 17.5cm   (b) 21cm   (c) 18.3cm   (d) 20cm

Solution: Correct answer is (b)

Example 8:   2.5 ÷ 1000 is equal to

(a) 0.025   (b) 0.0025   (c) 0.2500   (d) 25000

Solution :   Correct answer is (b)

Example 9:   Which of the following has the smallest value?

(a) 0.0002   (b) $\dfrac{2}{1000}$ (c) $\dfrac{(0.2)^2}{2}$ (d) $\dfrac{2}{100} \div 0.01$

Solution: Correct answer is (a)

Example 10:   Which of the following has the largest value?

(a) $\dfrac{32}{0.05}$ (b) $\dfrac{0.320}{50}$ (c) $\dfrac{3.2}{0.05}$ (d) $\dfrac{3.2}{50}$

Solution: Correct answer is (a)

Example 11:   The largest of the following is

(a) 0.0001   (b) $\dfrac{1}{1000}$ (c) $(0.100)^2$ (d) $\dfrac{1}{10} \div 0.1$

Solution: Correct answer is (d)

In Examples 12 to 19, fill in the blanks to make the statement true.

Example 12:   A fraction acts as an operator_____

Solution: of

Example 13: Fraction which is reciprocal of $\dfrac{2}{3}$ is _____.

Solution: $\dfrac{3}{2}$

Example 14: Product of a proper and improper fraction is _____ the improper fraction.

Solution: less than.

Example 15: The two non-zero fractions whose product is 1, are called the _____ of each other.

Solution: Reciprocal

Example 16: 5 rupees 5 paise = ₹ _____.

Solution: 5.05

Example 17: 45mm = _____ m.

Solution: 0.045

Example 18: 2.4 × 1000 = _____.

Solution: 2400

Example 19: To divide a decimal number by 100, we shift the decimal point in the number to the _____ by _____ places.

Solution: left, two

In Examples 20 to 23 state whether the statements are True or False.

Example 20: Reciprocal of an improper fraction is an improper fraction.

Solution: False

Example 21: $2\dfrac{2}{5} \div 2\dfrac{1}{5} = 2$

Solution: False $\left[\text{because } 2\dfrac{2}{5} \div 2\dfrac{1}{5} = \dfrac{12}{5} \times \dfrac{5}{11} = \dfrac{12}{11}\right]$

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Example 22: 0.04 ÷ 0.2 = 0.2

Solution: True

Example 23: 0.2 × 0.3 = 0.6

Solution: False [as 0.2 × 0.3 = 0.06]

Example 24: Find $\dfrac{2}{3}$ of 6 using circles with shaded parts.
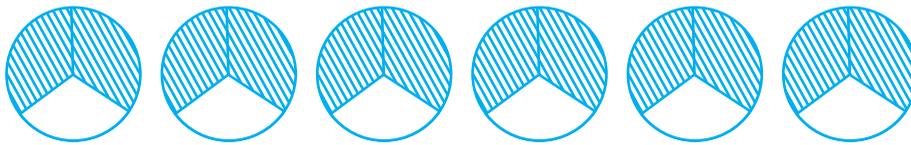

Fig. 2.1

Solution: From the following figure, try to find out $\dfrac{2}{3}$ of 6.

There are 12 shaded parts out of 18 parts which can be taken as shown

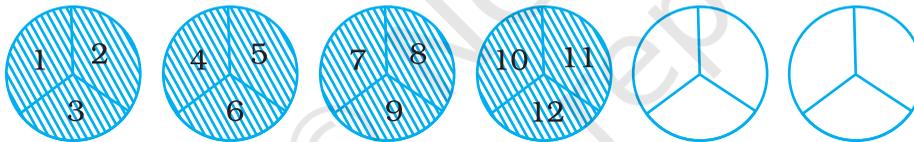below (Fig. 2.2), which means 4 wholes. Thus $\dfrac{2}{3}$ of 6 is 4.

Fig. 2.2

Example 25: Find the value of

$$\dfrac{1}{4\,\dfrac{2}{7}} \;+\; \dfrac{1}{3\dfrac{11}{13}} \;+\; \dfrac{1}{\left(\dfrac{5}{9}\right)}$$

Solution: Given expression =

$$\dfrac{1}{\left(\dfrac{30}{7}\right)} \;+\; \dfrac{1}{\left(\dfrac{50}{13}\right)} \;+\; \dfrac{1}{\left(\dfrac{5}{9}\right)}$$

$$= \dfrac{7}{30} \;+\; \dfrac{13}{50} \;+\; \dfrac{9}{5}$$

$$= \frac{35}{150} + \frac{39}{150} + \frac{270}{150} = \frac{35 + 39 + 270}{150} = \frac{172}{75}$$

Example 26: There is a $3 \times 3 \times 3$ cube which consists of twenty seven $1 \times 1 \times 1$ cubes (see Fig. 2.3). It is 'tunneled' by removing cubes from the coloured squares.
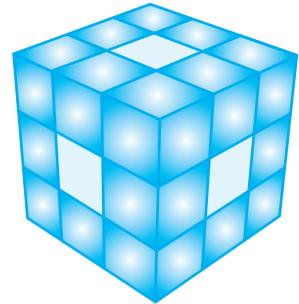
Find:

  (i) Fraction of number of small cubes removed to the number of small cubes left in given cube.

Fig. 2.3

  (ii) Fraction of the number of small cubes removed to the total number of small cubes.

  (iii) What part is (ii) of (i)?

Solution: (i) Number of small cubes removed $= 1 + 1 + 1 + 1 + 1 + 1 + 1 = 7$

So, required fraction $= \dfrac{7}{20}$

  (ii) Required fraction $= \dfrac{7}{27}$

  (iii) Required part is $\dfrac{7}{27} \div \dfrac{7}{20} = \dfrac{7}{27} \times \dfrac{20}{7} = \dfrac{20}{27}$

Example 27: Ramu finishes $\dfrac{1}{3}$ part of a work in 1 hour. How much part of the work will be finished in $2\dfrac{1}{5}$ hours?

Solution: The part of the work finished by Ramu in 1 hour $= \dfrac{1}{3}$

So, the part of the work finished by Ramu in $2\dfrac{1}{5}$ hours

$$= 2\frac{1}{5} \times \frac{1}{3} = \frac{11}{5} \times \frac{1}{3} = \frac{11 \times 1}{5 \times 3} = \frac{11}{15}$$

Ramu will finish $\dfrac{11}{15}$ part of the work in $2\dfrac{1}{5}$ hours.

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Example 28: How many $\dfrac{2}{3}$ kg pieces can be cut from a cake of weight 4 kg?

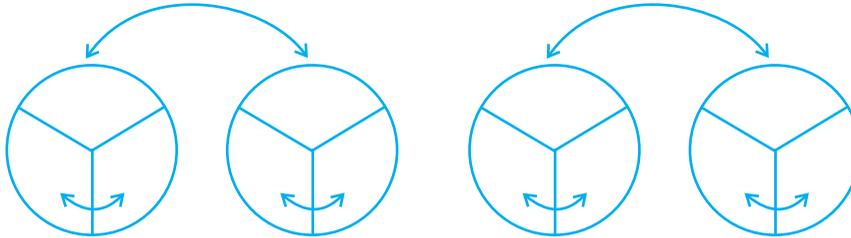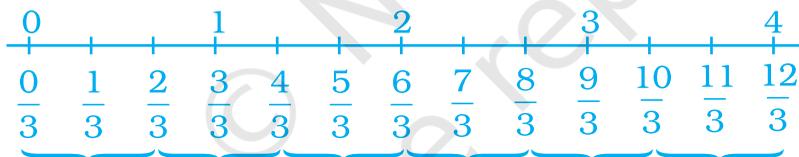**Solution:** Observe the following figure representing 4 cakes each of 1 kg and try to give the answer.

Fig. 2.4

In the above figure we look for 'how many $\dfrac{2}{3}$ s are there in these 4 cakes?'

That is, $4 \div \dfrac{2}{3} = 4 \times \dfrac{3}{2} = 6$

Alternate Method

This can be observed also in the following way.

We get the answer as 6.

Example 29: Harmeet purchased 3.5kg of potatoes at the rate of ₹13.75 per kg. How much money should she pay in nearest rupees?

Solution: Cost of 1 kg of potatoes = ₹ 13.75.

Cost of 3.5 kg of potatoes = ₹ 13.75 × 3.5

$$
\begin{array}{r}
13.75 \\
\times\,3.5 \\
\hline
6\,8\,7\,5 \\
4\,1\,2\,5\times \\
\hline
4\,8.1\,2\,5 \\
\hline
\end{array}
$$

So, cost of 3.5 kg of potatoes = ₹ 48, to the nearest rupees.

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Example 30: Kavita had a piece of rope of length 9.5 m. She needed some small pieces of rope of length 1.9 m each. How many pieces of the required length will she get out of this rope?

Solution : The length of the rope = 9.5m

The length of a small piece of rope = 1.9m

Number of small pieces = 9.5 m ÷ 1.9m

$$= \frac{9.5}{1.9} = \frac{9.5 \times 10}{1.9 \times 10}$$

$$= \frac{95}{19} = 5$$

So, she will get 5 small pieces of rope.

Example 31: Three boys earned a total of ₹ 235.50. What was the average amount earned per boy?

Solution : Three boys earned = ₹ 235.50

The average amount earned per boy = ₹ $\dfrac{235.50}{3}$

$$\begin{array}{r} 78.50 \\ 3\overline{)235.50}(\\ \underline{21} \\ 25 \\ \underline{24} \\ 15 \\ \underline{15} \\ 0 \end{array}$$

The average amount earned per boy is ₹ 78.50.

Example 32: Find the product of

(i) $\dfrac{1}{2}$ and $\dfrac{5}{8}$ (ii) $\dfrac{1}{3}$ and $\dfrac{7}{5}$ (iii) $\dfrac{4}{3}$ and $\dfrac{5}{2}$

Solution : (i) $\dfrac{1}{2} \times \dfrac{5}{8} = \dfrac{1 \times 5}{2 \times 8} = \dfrac{5}{16}$

(ii) $\dfrac{1}{3} \times \dfrac{7}{5} = \dfrac{1 \times 7}{3 \times 5} = \dfrac{7}{15}$

(iii) $\dfrac{4}{3} \times \dfrac{5}{2} = \dfrac{4 \times 5}{3 \times 2} = \dfrac{20}{6} = \dfrac{10}{3}$

Example 33: Observe the 3 products given in Example 32 and now give the answers of the following questions.

(i) Does interchanging the fractions in the example, $\dfrac{1}{2} \times \dfrac{5}{8}$, affect the answer?

(ii) Is the value of the fraction in the product greater or less than the value of either fraction?

Solution : (i) By interchanging $\dfrac{1}{2} \times \dfrac{5}{8}$ we get $\dfrac{5}{8} \times \dfrac{1}{2}$

$\dfrac{5}{8} \times \dfrac{1}{2} = \dfrac{5 \times 1}{8 \times 2} = \dfrac{5}{16}$ which is same as the product we get

in Example 32 by multiplying $\dfrac{1}{2}$ and $\dfrac{5}{8}$. This means that interchanging the fractions does not affect the answer.

(ii) By observing the 3 products given in the solution of Example 32, we come to know that the value of the fractions in the products are as follows

(a) The product of two fractions whose value is less than 1 i.e. the proper fractions is less than each of the fractions that are multiplied.

(b) The product of a proper and an improper fraction is less than the improper fractions and greater than the proper fraction.

(c) The product of two improper fractions is greater than each of the two fractions.

Example 34 : Reshma uses $\dfrac{3}{4}$ m of cloth to stitch a shirt. How many shirts can she make with $2\dfrac{1}{4}$ m cloth?

Solution : Study the following figures :

Let ⬜ represent $\dfrac{1}{4}$ m

Then,

$$\frac{\overbrace{\square\square\square\square}^{1\ m}\ \overbrace{\square\square\square\square}^{1\ m}\ \overbrace{\square}^{\frac{1}{4}\,m}}{\square\square\square} = \frac{9\ \text{fourths}}{3\ \text{fourths}} = 3$$

In fact, we calculate that "how many $\dfrac{3}{4}$ are in $2\dfrac{1}{4}$?"

And it is calculated as,

$$2\frac{1}{4} \div \frac{3}{4} = \frac{9}{4} \div \frac{3}{4} = \frac{9}{4} \times \frac{4}{3} = \frac{9 \times 4}{4 \times 3} = \frac{9}{3} = 3$$

Thus, 3 shirts can be made with $2\dfrac{1}{4}$ m of cloth.

MATHEMATICS IN MUSIC

How Does a Music Composer Use Maths?
Music composers write notes that can vary in length. There are whole notes, half notes, quarter notes, eight notes and sixteen notes.

Example 35 : If the fraction of the frequencies of two notes have a common factor between the numerator and denominator, the two notes are harmonious. Use the graphic below to find the fraction of frequency of notes D and B.

C	D	E	F	G	A	B
264	297	330	352	396	440	495

Frequency Chart

Fig. 2.5

Solution: Fraction of frequencies of notes D and B is

$$= \frac{\text{Frequency of note D}}{\text{Frequency of note B}} = \frac{297}{495} = \frac{3 \times 3 \times 3 \times 11}{3 \times 3 \times 5 \times 11}$$

So, the fraction of the frequencies of notes D and B is $\frac{3}{5}$.

Clearly, the notes D and B are harmonies. Find other pairs of notes which are harmonious.

Application on Problem Solving Strategy

Example 36

Khilona said that we have gone about 120km or $\frac{2}{3}$ of the way to the camp site. So, how much farther do we have to go?

Solution :   ┌─────────────────────────────────┐
                  │ Understand and Explore the Problem │
                  └─────────────────────────────────┘

- What do you know?

- We know that 120km is about $\frac{2}{3}$ of the total distance.

┌──────────────────┐
│ **Plan a Strategy** │
└──────────────────┘

- Draw a diagram showing the distance that Khilona has already gone and the fractional part that it represents.
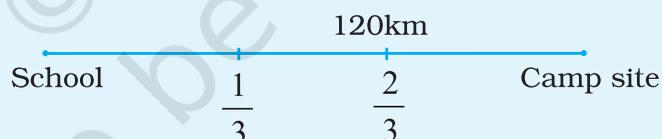
┌──────────┐
│ **Solve** │
└──────────┘

- If $\frac{2}{3}$ of the distance is 120km, then $\frac{1}{3}$ of the distance would be $\frac{1}{2}$ of 120km i.e. 60km.

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The total distance is (120 + 60) km or 180km.

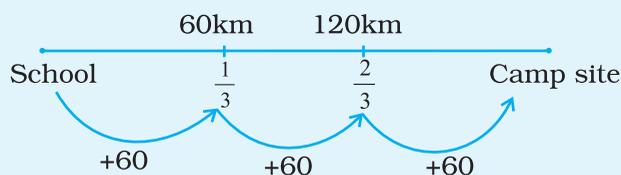**Revise :** Since $\dfrac{2}{3}$ of the total distance, denoted by x, equals 120km, so the equation $\dfrac{2x}{3} = 120$ represents this problem. By solving we get $x = 180$ km. Thus the solution is checked.

Think and Discuss

1. If $\dfrac{1}{3}$ of the total distance is 120 km, then how far is the camp site?

2. Apply both strategies i.e. by drawing and by using equation, to solve other problems and discuss with your friends that which method is easy.

(C) EXERCISE

In questions 1 to 20, out of four options, only one is correct. Write the correct answer.

1. $\dfrac{2}{5} \times 5\dfrac{1}{5}$ is equal to:

    (a) $\dfrac{26}{25}$ (b) $\dfrac{52}{25}$ (c) $\dfrac{2}{5}$ (d) 6

2. $3\dfrac{3}{4} \div \dfrac{3}{4}$ is equal to:

    (a) 3 (b) 4 (c) 5 (d) $\dfrac{45}{16}$

3. A ribbon of length $5\dfrac{1}{4}$ m is cut into small pieces each of length $\dfrac{3}{4}$ m. Number of pieces will be:

    (a) 5 (b) 6 (c) 7 (d) 8

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4. The ascending arrangement of $\dfrac{2}{3}, \dfrac{6}{7}, \dfrac{13}{21}$ is:

(a) $\dfrac{6}{7}, \dfrac{2}{3}, \dfrac{13}{21}$ (b) $\dfrac{13}{21}, \dfrac{2}{3}, \dfrac{6}{7}$ (c) $\dfrac{6}{7}, \dfrac{13}{21}, \dfrac{2}{3}$ (d) $\dfrac{2}{3}, \dfrac{6}{7}, \dfrac{13}{21}$

5. Reciprocal of the fraction $\dfrac{2}{3}$ is:

(a) 2   (b) 3   (c) $\dfrac{2}{3}$ (d) $\dfrac{3}{2}$

6. The product of $\dfrac{11}{13}$ and 4 is:

(a) $3\dfrac{5}{13}$ (b) $5\dfrac{3}{13}$ (c) $13\dfrac{3}{5}$ (d) $13\dfrac{5}{3}$

7. The product of 3 and $4\dfrac{2}{5}$ is:

(a) $17\dfrac{2}{5}$ (b) $\dfrac{24}{5}$ (c) $13\dfrac{1}{5}$ (d) $5\dfrac{1}{13}$

8. Pictorial representation of $3 \times \dfrac{2}{3}$ is:
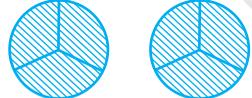
9. $\dfrac{1}{5} \div \dfrac{4}{5}$ equal to:

(a) $\dfrac{4}{5}$ (b) $\dfrac{1}{5}$ (c) $\dfrac{5}{4}$ (d) $\dfrac{1}{4}$

10. The product of 0.03 × 0.9 is:

(a) 2.7   (b) 0.27   (c) 0.027   (d) 0.0027

11. $\dfrac{5}{7} \div 6$ is equal to:

(a) $\dfrac{30}{7}$ (b) $\dfrac{5}{42}$ (c) $\dfrac{30}{42}$ (d) $\dfrac{6}{7}$

12. $5\dfrac{1}{6} \div \dfrac{9}{2}$ is equal to

(a) $\dfrac{31}{6}$ 　　(b) $\dfrac{1}{27}$ 　　(c) $5\dfrac{1}{27}$ 　　(d) $\dfrac{31}{27}$

13. Which of the following represents $\dfrac{1}{3}$ of $\dfrac{1}{6}$?

(a) $\dfrac{1}{3} + \dfrac{1}{6}$ 　　(b) $\dfrac{1}{3} - \dfrac{1}{6}$ 　　(c) $\dfrac{1}{3} \times \dfrac{1}{6}$ 　　(d) $\dfrac{1}{3} \div \dfrac{1}{6}$

14. $\dfrac{3}{7}$ of $\dfrac{2}{5}$ is equal to

(a) $\dfrac{5}{12}$ 　　(b) $\dfrac{5}{35}$ 　　(c) $\dfrac{1}{35}$ 　　(d) $\dfrac{6}{35}$

15. One packet of biscuits requires $2\dfrac{1}{2}$ cups of flour and $1\dfrac{2}{3}$ cups of sugar. Estimated total quantity of both ingredients used in 10 such packets of biscuits will be

(a) less than 30 cups

(b) between 30 cups and 40 cups

(c) between 40 cups and 50 cups

(d) above 50 cups

Vocabulary

1. A number that consists of a whole number and a fraction is called a/an _____?

2. An_____ is a number that represents a part of a whole.

3. A fraction whose numerical (abrolute) value is greater than 1 is called a/an _____, and a fraction whose numerical value is between 0 and 1 is called a/an _____

4. _____ mean the same value.

- **Equivalent Fraction**
- **Fraction**
- **Improper Fraction**
- **Mixed Number**
- **Proper Fraction**

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16. The product of 7 and $6\dfrac{3}{4}$ is

(a) $42\dfrac{1}{4}$ (b) $47\dfrac{1}{4}$ (c) $42\dfrac{3}{4}$ (d) $47\dfrac{3}{4}$

17. On dividing 7 by $\dfrac{2}{5}$, the result is

(a) $\dfrac{14}{2}$ (b) $\dfrac{35}{4}$ (c) $\dfrac{14}{5}$ (d) $\dfrac{35}{2}$

18. $2\dfrac{2}{3} \div 5$ is equal to

(a) $\dfrac{8}{15}$ (b) $\dfrac{40}{3}$ (c) $\dfrac{40}{5}$ (d) $\dfrac{8}{3}$

19. $\dfrac{4}{5}$ of 5 kg apples were used on Monday. The next day $\dfrac{1}{3}$ of what was left was used. Weight (in kg) of apples left now is

(a) $\dfrac{2}{7}$ (b) $\dfrac{1}{14}$ (c) $\dfrac{2}{3}$ (d) $\dfrac{4}{21}$

20. The picture

interprets

(a) $\dfrac{1}{4} \div 3$ (b) $3 \times \dfrac{1}{4}$ (c) $\dfrac{3}{4} \times 3$ (d) $3 \div \dfrac{1}{4}$

In Questions 21 to 44, fill in the blanks to make the statements true.

21. Rani ate $\dfrac{2}{7}$ part of a cake while her brother Ravi ate $\dfrac{4}{5}$ of the remaining. Part of the cake left is _____

22. The reciprocal of $\dfrac{3}{7}$ is _____

23. $\dfrac{2}{3}$ of 27 is _____

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24. $\dfrac{4}{5}$ of 45 is _____

25. $4 \times 6\dfrac{1}{3}$ is equal to _____

26. $\dfrac{1}{2}$ of $4\dfrac{2}{7}$ is _____

27. $\dfrac{1}{9}$ of $\dfrac{6}{5}$ is _____

Think and Discuss

1. **Explain** whether you need to find a common denominator to compare $\dfrac{2}{3}$ and $-\dfrac{1}{2}$.

2. **Describe** the steps you would use to compare 0.235 and 0.239.

28. The lowest form of the product $2\dfrac{3}{7} \times \dfrac{7}{9}$ is _____

29. $\dfrac{4}{5} \div 4$ is equal to _____

30. $\dfrac{2}{5}$ of 25 is _____

31. $\dfrac{1}{5} \div \dfrac{5}{6} = \dfrac{1}{5}$ ____ $\dfrac{6}{5}$

32. 3.2 × 10 = _____

33. 25.4 × 1000 = _____

34. 93.5 × 100 = _____

35. 4.7 ÷ 10 = _____

36. 4.7 ÷ 100 = _____

37. 4.7 ÷ 1000 = _____

38. The product of two proper fractions is _____ than each of the fractions that are multiplied.

39. While dividing a fraction by another fraction, we _____ the first fraction by the _____ of the other fraction.

40. 8.4 ÷ _____ = 2.1

41. 52.7 ÷ _____ = 0.527

42. 0.5 _____ 0.7 = 0.35

43. 2 ____ $\dfrac{5}{3}$ = $\dfrac{10}{3}$

44. 2.001 ÷ 0.003 = _____

In each of the Questions 45 to 54, state whether the statement is True or False.

45. The reciprocal of a proper fraction is a proper fraction.

46. The reciprocal of an improper fraction is an improper fraction.

47. Product of two fractions $= \dfrac{\text{Product of their denominators}}{\text{Product of their numerators}}$

48. The product of two improper fractions is less than both the fractions.

49. A reciprocal of a fraction is obtained by inverting it upside down.

50. To multiply a decimal number by 1000, we move the decimal point in the number to the right by three places.

51. To divide a decimal number by 100, we move the decimal point in the number to the left by two places.

52. 1 is the only number which is its own reciprocal.

53. $\dfrac{2}{3}$ of 8 is same as $\dfrac{2}{3}$ ÷ 8.

54. The reciprocal of $\dfrac{4}{7}$ is $\dfrac{4}{7}$.

55. If 5 is added to both the numerator and the denominator of the fraction $\dfrac{5}{9}$, will the value of the fraction be changed? If so, will the value increase or decrease?

56. What happens to the value of a fraction if the denominator of the fraction is decreased while numerator is kept unchanged?

57. Which letter comes $\dfrac{2}{5}$ of the way among A and J?

58. If $\dfrac{2}{3}$ of a number is 10, then what is 1.75 times of that number?

59. In a class of 40 students, $\dfrac{1}{5}$ of the total number of students like to eat rice only, $\dfrac{2}{5}$ of the total number of students like to eat chapati only and the remaining students like to eat both. What fraction of the total number of students like to eat both?

60. Renu completed $\dfrac{2}{3}$ part of her home work in 2 hours. How much part of her home work had she completed in $1\dfrac{1}{4}$ hours?

61. Reemu read $\dfrac{1}{5}$ th pages of a book. If she reads further 40 pages, she would have read $\dfrac{7}{10}$ th pages of the book. How many pages are left to be read?

62. Write the number in the box $\square$ such that

$$\dfrac{3}{7} \times \square = \dfrac{15}{98}$$

63. Will the quotient $7\dfrac{1}{6} \div 3\dfrac{2}{3}$ be a fraction greater than 1.5 or less than 1.5? Explain.

**64.** Describe two methods to compare $\dfrac{13}{17}$ and 0.82. Which do you think is easier and why?

Think and Discuss

1. **Give an example** of an addition problem that involves connecting an improper fraction in the final step.

2. **Explain** why $\dfrac{7}{9} + \dfrac{7}{9}$ does not equal $\dfrac{14}{18}$.

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65. **Health:** The directions for a pain reliever recommend that an adult of 60 kg and over take 4 tablets every 4 hours as needed, and an adult who weighs between 40 and 50 kg take only $2\frac{1}{2}$ tablets every 4 hours as needed. Each tablet weighs $\frac{4}{25}$ gram.

(a) If a 72 kg adult takes 4 tablets, how many grams of pain reliever is he or she receivings?

(b) How many grams of pain reliever is the recommended dose for an adult weighing 46 kg?

66. **Animals:** The label on a bottle of pet vitamins lists dosage guidelines. What dosage would you give to each of these animals?

(a) a 18 kg adult dog

(b) a 6 kg cat

(c) a 18 kg pregnant dog

Do Good Pet Vitamins

• Adult dogs:

$\frac{1}{2}$ tsp (tea spoon full) per 9kg body weight

• Puppies, pregnant dogs, or nursing dogs:

$\frac{1}{2}$ tsp per 4.5kg body weight

• Cats:

$\frac{1}{4}$ tsp per 1kg body weight
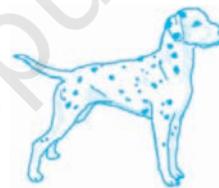
67. How many $\frac{1}{16}$ kg boxes of chocolates can be made with $1\frac{1}{2}$ kg chocolates?

68. Anvi is making bookmarker like the one shown in Fig. 2.6. How many bookmarker can she make from a 15 m long ribbon?
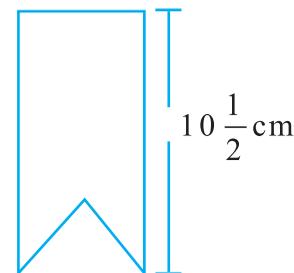
$10\frac{1}{2}$ cm

Fig. 2.6

69. A rule for finding the approximate length of diagonal of a square is to multiply the length of a side of the square by 1.414. Find the length of the diagonal when :

    (a)   The length of a side of the square is 8.3 cm.

    (b)   The length of a side of the square is exactly 7.875 cm.

70. The largest square that can be drawn in a circle has a side whose length is 0.707 times the diameter of the circle. By this rule, find the length of the side of such a square when the diameter of the circle is

    (a)   14.35 cm   (b)   8.63 cm

71. To find the distance around a circular disc, multiply the diameter of the disc by 3.14. What is the distance around the disc when :
    (a)   the diameter is 18.7 cm?
    (b)   the radius is 6.45 cm?

72. What is the cost of 27.5 m of cloth at ₹ 53.50 per metre?

73. In a hurdle race, Nidhi is over hurdle B and $\dfrac{2}{6}$ of the way through the race, as shown in Fig. 2.7.

Fig. 2.7

Then, answer the following:
(a)   Where will Nidhi be, when she is $\dfrac{4}{6}$ of the way through the race?

(b)   Where will Nidhi be when she is $\dfrac{5}{6}$ of the way through the race?

(c)   Give two fractions to tell what part of the race Nidhi has finished when she is over hurdle C.

74. Diameter of Earth is 12756000m. In 1996, a new planet was discovered whose diameter is $\dfrac{5}{86}$ of the diameter of Earth. Find the diameter of this planet in km.

75. What is the product of $\dfrac{5}{129}$ and its reciprocal?

76. Simplify: $\dfrac{2\dfrac{1}{2}+\dfrac{1}{5}}{2\dfrac{1}{2}\div\dfrac{1}{5}}$

77. Simplify: $\dfrac{\dfrac{1}{4}+\dfrac{1}{5}}{1-\dfrac{3}{8}\times\dfrac{3}{5}}$

78. Divide $\dfrac{3}{10}$ by $\left(\dfrac{1}{4}\text{ of }\dfrac{3}{5}\right)$

79. $\dfrac{1}{8}$ of a number equals $\dfrac{2}{5}\div\dfrac{1}{20}$. What is the number?

80. Heena's father paid an electric bill of ₹ 385.70 out of a 500 rupee note. How much change should he have received?

81. The normal body temperature is 98.6°F. When Savitri was ill her temperature rose to 103.1°F. How many degrees above normal was that?

Think and Discuss

1. **Name** the number of decimal places in the product of 5.625 and 2.75.
2. **Give an example** of two fractions whose product is an integer due to common factors.

82. **Meteorology:** One measure of average global temperature shows how each year varies from a base measure. The table shows results for several years.

| Year	1958	1964	1965	1978	2002
Difference from Base	0.10°C	−0.17°C	−0.10°C	$\left(\dfrac{1}{50}\right)^{o}$ C	0.54°C

See the table and answer the following:
(a) Order the five years from coldest to warmest.
(b) In 1946, the average temperature varied by −0.03°C from the base measure. Between which two years should 1946 fall when the years are ordered from coldest to warmest?
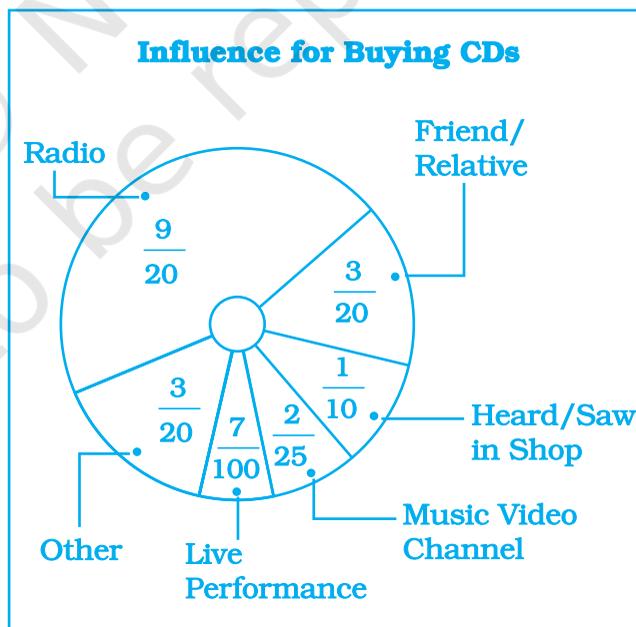
Science Application

83. In her science class, Jyoti learned that the atomic weight of Helium is 4.0030; of Hydrogen is 1.0080; and of Oxygen is 16.0000. Find the difference between the atomic weights of:
(a) Oxygen and Hydrogen
(b) Oxygen and Helium
(c) Helium and Hydrogen

84. Measurement made in science lab must be as accurate as possible. Ravi measured the length of an iron rod and said it was 19.34 cm long; Kamal said 19.25 cm; and Tabish said 19.27 cm. The correct length was 19.33 cm. How much of error was made by each of the boys?

85. When 0.02964 is divided by 0.004, what will be the quotient?

86. What number divided by 520 gives the same quotient as 85 divided by 0.625?

87. A floor is 4.5 m long and 3.6 m wide. A 6 cm square tile costs ₹ 23.25. What will be the cost to cover the floor with these tiles?

88. Sunita and Rehana want to make dresses for their dolls. Sunita has $\frac{3}{4}$ m of cloth, and she gave $\frac{1}{3}$ of it to Rehana. How much did Rehana have?

89. A flower garden is 22.50 m long. Sheela wants to make a border along one side using bricks that are 0.25 m long. How many bricks will be needed?

90. How much cloth will be used in making 6 shirts, if each required $2\frac{1}{4}$ m of cloth, allowing $\frac{1}{8}$ m for waste in cutting and finishing in each shirt?

91. A picture hall has seats for 820 persons. At a recent film show, one usher guessed it was $\frac{3}{4}$ full, another that it was $\frac{2}{3}$ full. The ticket office reported 648 sales. Which usher (first or second) made the better guess?

92. For the celebrating children's students of Class VII bought sweets for ₹ 740.25 and cold drink for ₹ 70. If 35 students contributed equally what amount was contributed by each student?

93. The time taken by Rohan in five different races to run a distance of 500 m was 3.20 minutes, 3.37 minutes, 3.29 minutes, 3.17 minutes and 3.32 minutes. Find the average time taken by him in the races.

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94. A public sewer line is being installed along $80\frac{1}{4}$ m of road. The supervisor says that the labourers will be able to complete 7.5 m in one day. How long will the project take to complete?

$$80\frac{1}{4}\,\text{m}$$

7.5 m
(Sewer line)
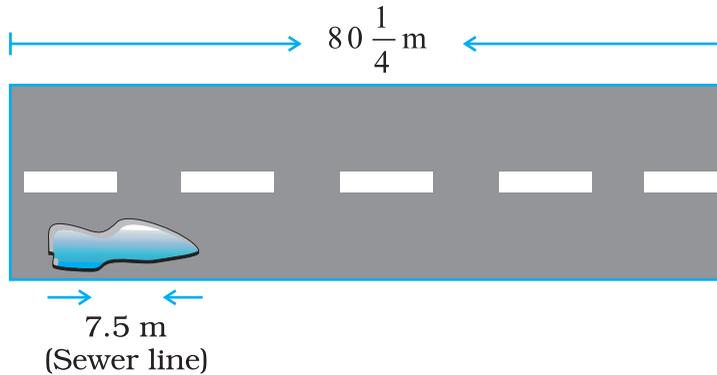
95. The weight of an object on moon is $\frac{1}{6}$ its weight on Earth. If an object weighs $5\frac{3}{5}$ kg on Earth, how much would it weigh on the moon?

96. In a survey, 200 students were asked what influenced them most to buy their latest CD. The results are shown in the circle graph.

Influence for Buying CDs

Radio

Friend/ Relative

$\frac{9}{20}$

$\frac{3}{20}$

$\frac{3}{20}$

$\frac{1}{10}$

$\frac{7}{100}$ $\frac{2}{25}$

Heard/Saw in Shop

Other

Live Performance

Music Video Channel

(a) How many students said radio influenced them most?

(b) How many more students were influenced by radio than by a music video channel?

(c) How many said a friend or relative influenced them or they heard the CD in a shop?

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97. In the morning, a milkman filled $5\frac{1}{2}$ L of milk in his can. He sold to Renu, Kamla and Renuka $\frac{3}{4}$ L each; to Shadma he sold $\frac{7}{8}$ L; and to Jassi he gave $1\frac{1}{2}$ L. How much milk is left in the can?

98. Anuradha can do a piece of work in 6 hours. What part of the work can she do in 1 hour, in 5 hours, in 6 hours?

99. What portion of a 'saree' can Rehana paint in 1 hour if it requires 5 hours to paint the whole saree? In $4\frac{3}{5}$ hours? In $3\frac{1}{2}$ hours?

100. Rama has $6\frac{1}{4}$ kg of cotton wool for making pillows. If one pillow takes $1\frac{1}{4}$ kg, how many pillows can she make?

101. It takes $2\frac{1}{3}$ m of cloth to make a shirt. How many shirts can Radhika make from a piece of cloth $9\frac{1}{3}$ m long?

102. Ravi can walk $3\frac{1}{3}$ km in one hour. How long will it take him to walk to his office which is 10 km from his home?

103. Raj travels 360 km on three fifths of his petrol tank. How far would he travel at the same rate with a full tank of petrol?

104. Kajol has ₹ 75. This is $\frac{3}{8}$ of the amount she earned. How much did she earn?

Think and Discuss

1. **Explain** how you can be sure that a fraction is simplified.
2. **Give** the sign of a fraction in which the numerator is negative and the denominator is negative.

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105. It takes 17 full specific type of trees to make one tonne of paper. If there are 221 such trees in a forest, then (i) what fraction of forest will be used to make;

(a) 5 tonnes of paper.   (b) 10 tonnes of paper.

(ii) To save $\dfrac{7}{13}$ part of the forest how much of paper we have to save.

106. Simplify and write the result in decimal form :

$$\left(1 \div \frac{2}{9}\right) + \left(1 \div 3\frac{1}{5}\right) + \left(1 \div 2\frac{2}{3}\right)$$

107. Some pictures (a) to (f) are given below. Tell which of them show:

(1) $2 \times \dfrac{1}{4}$ (2) $2 \times \dfrac{3}{7}$ (3) $2 \times \dfrac{1}{3}$

(4) $\dfrac{1}{4} \times 4$ (5) $3 \times \dfrac{2}{9}$ (6) $\dfrac{1}{4} \times 3$

(a)

(b)

(c)

(d)

(e)

(f)

108. Evaluate : $(0.3) \times (0.3) - (0.2) \times (0.2)$

109. Evaluate $\dfrac{0.6}{0.3} + \dfrac{0.16}{0.4}$

110. Find the value of : $\dfrac{(0.2 \times 0.14) + (0.5 \times 0.91)}{(0.1 \times 0.2)}$

111. A square and an equilateral triangle have a side in common. If side of triangle is $\dfrac{4}{3}$ cm long, find the perimeter of figure formed (Fig. 2.8).
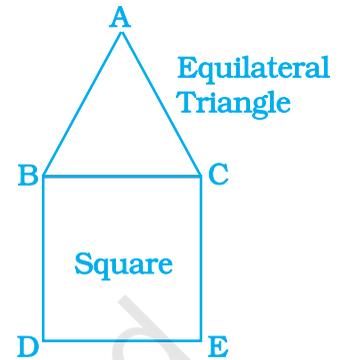

Fig. 2.8

112. Rita has bought a carpet of size 4 m $\times$ $6\dfrac{2}{3}$ m. But her room size is $3\dfrac{1}{3}$ m $\times$ $5\dfrac{1}{3}$ m. What fraction of area should be cut off to fit wall to wall carpet into the room?

113. Family photograph has length $14\dfrac{2}{5}$ cm and breadth $10\dfrac{2}{5}$ cm. It has border of uniform width $2\dfrac{3}{5}$ cm. Find the area of framed photograph.

114. Cost of a burger is ₹ $20\dfrac{3}{4}$ and of Macpuff is ₹ $15\dfrac{1}{2}$. Find the cost of 4 burgers and 14 macpuffs.

115. A hill, $101\dfrac{1}{3}$ m in height, has $\dfrac{1}{4}$th of its height under water. What is the height of the hill visible above the water?

116. *Sports*: Reaction time measures how quickly a runner reacts to the starter pistol. In the 100 m dash at the 2004 Olympic Games, Lauryn Williams had a reaction time of 0.214 second. Her total race time, including reaction time, was 11.03 seconds. How long did it take her to run the actual distance?
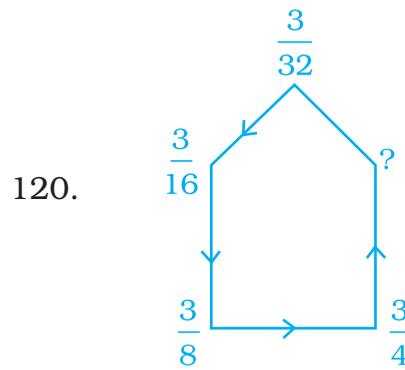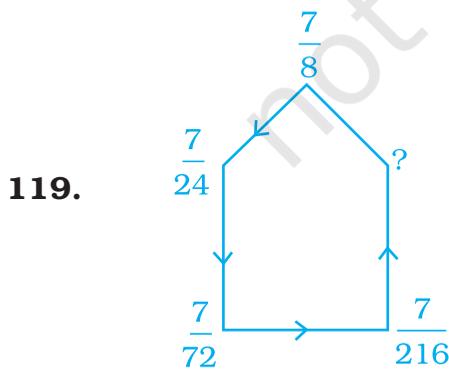
117. State whether the answer is greater than 1 or less than 1. Put a '✓' mark in appropriate box.

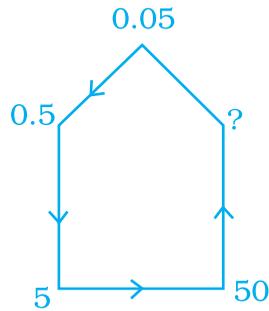| Questions	Greater than 1	Less than 1
$\dfrac{2}{3} \div \dfrac{1}{2}$		
$\dfrac{2}{3} \div \dfrac{2}{1}$		
$6 \div \dfrac{1}{4}$		
$\dfrac{1}{5} \div \dfrac{1}{2}$		
$4\dfrac{1}{3} \div 3\dfrac{1}{2}$		
$\dfrac{2}{3} \times 8\dfrac{1}{2}$		

118. There are four containers that are arranged in the ascending order of their heights. If the height of the smallest container given in the figure is expressed as $\dfrac{7}{25}x = 10.5$ cm. Find the height of the largest container.
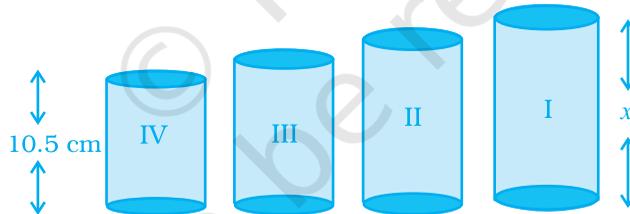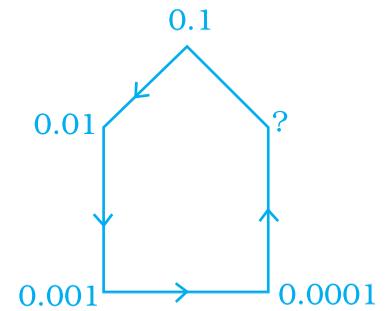

In Questions 119 to 122, replace '?' with appropriate fraction.

119.

120.

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121.

```
        0.05
    0.5      ?

  5  →  50
```

122.

```
         0.1
  0.01       ?

 0.001  →  0.0001
```
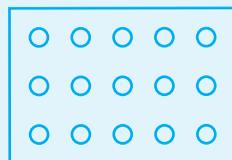
What is the Error in each of question 123 to 125?

123. A student compared $-\dfrac{1}{4}$ and –0.3. He changed $-\dfrac{1}{4}$ to the decimal –0.25 and wrote, "Since 0.3 is greater than 0.25, –0.3 is greater than –0.25". What was the student's error?

124. A student multiplied two mixed fractions in the following manner: $2\dfrac{4}{7}\times3\dfrac{1}{4}=6\dfrac{1}{7}$. What error the student has done?

125. In the pattern $\dfrac{1}{3}+\dfrac{1}{4}+\dfrac{1}{5}+\cdots$ which fraction makes the sum greater than 1 (first time)? Explain.

(D) Applications

Game 1: Shade (i) $\dfrac{1}{3}$ of the circles in box (a)

(ii) $\dfrac{2}{5}$ of the triangles in box (b)

(iii) $\dfrac{1}{5}$ of the squares in box (c)

(a)

(b)

(c)

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