

Complete the table :-

Q.1 Add the fractions

$$(a) \quad \frac{1}{3} + \frac{1}{3} = \frac{\boxed{1} + \boxed{1}}{3} = \frac{\boxed{2}}{3}$$

$$(b) \quad \frac{4}{6} + \frac{1}{6} = \frac{\boxed{4} + \boxed{1}}{6} = \frac{\boxed{5}}{\boxed{6}}$$

$$(c) \quad \frac{5}{8} + \frac{2}{8} = \frac{\boxed{5} + \boxed{2}}{\boxed{8}} = \frac{\boxed{7}}{\boxed{8}}$$

Q.2 Subtract the fractions

$$(a) \quad \frac{9}{10} - \frac{2}{10} = \frac{\boxed{9} - \boxed{2}}{10} = \frac{\boxed{7}}{10}$$

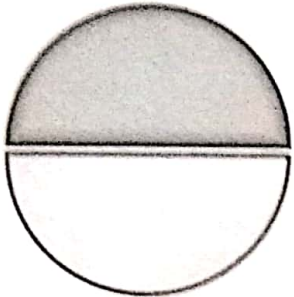
$$(b) \quad \frac{8}{9} - \frac{4}{9} = \frac{\boxed{8} - \boxed{4}}{9} = \frac{\boxed{4}}{\boxed{9}}$$

$$(c) \quad \frac{7}{4} - \frac{4}{4} = \frac{\boxed{7} - \boxed{4}}{\boxed{4}} = \frac{\boxed{3}}{\boxed{4}}$$



RECAP

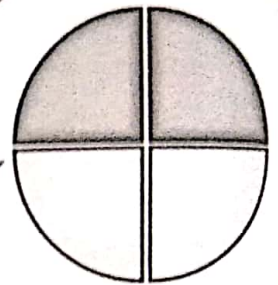
EQUIVALENT FRACTIONS



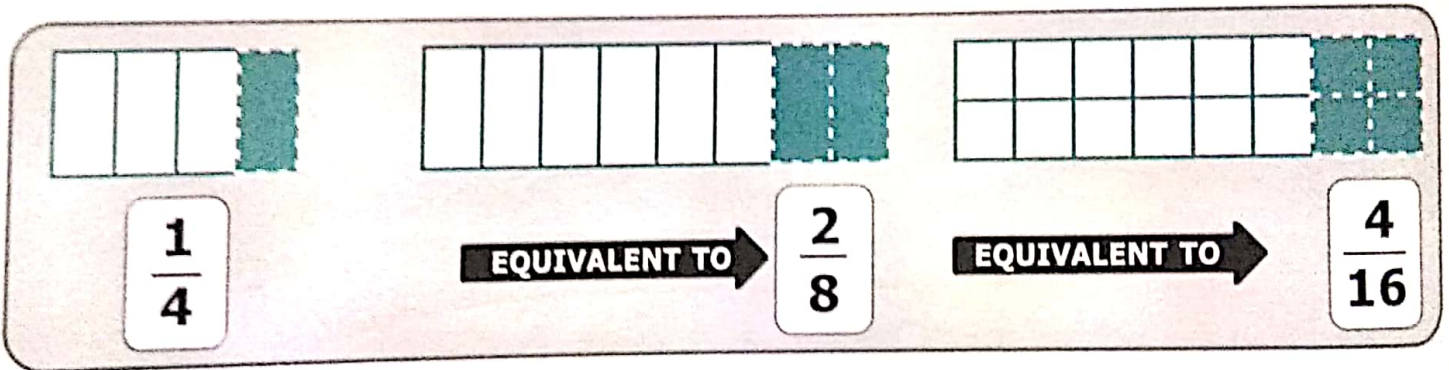
$$\frac{1}{2}$$



The value of both the fractions is same. $\frac{1}{2} = \frac{2}{4}$



$$\frac{2}{4}$$



LIKE AND UNLIKE FRACTIONS

LIKE FRACTIONS



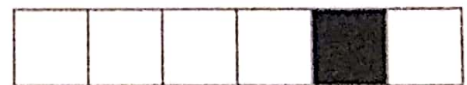
$$\frac{1}{8}$$



$$\frac{3}{8}$$

Denominators of both the fractions are same, that is 8. So, these fractions are LIKE fractions.

UNLIKE FRACTIONS



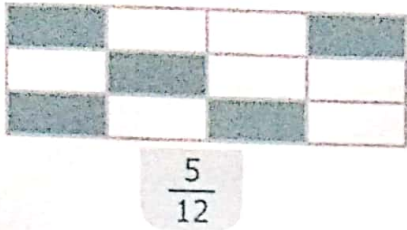
$$\frac{1}{6}$$



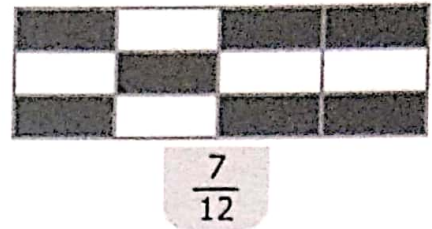
$$\frac{1}{2}$$

Denominators of the fractions are different which are 6 and 2. So, these fractions are UNLIKE fractions.

COMPARISON OF LIKE FRACTIONS



$$\frac{5}{12} < \frac{7}{12}$$



While comparing 'like' fractions, just compare the values of the numerators.

Arrange the fractions in ascending order:

$$\frac{3}{4}, \frac{1}{4}, \frac{7}{4}$$

Compare the numerators. $1 < 3 < 7$ so, $\frac{1}{4} < \frac{3}{4} < \frac{7}{4}$ Ascending Order

Write the fractions in descending order:

$$\frac{13}{29}, \frac{9}{29}, \frac{6}{29} \quad \boxed{\text{---} > \text{---} > \text{---}}$$

ADDITION AND SUBTRACTION OF LIKE FRACTIONS

Like fractions can be added and subtracted as shown below.

+ Add. $\frac{3}{7} + \frac{1}{7}$

- Add the numerators.
- Write down the same denominator.

$$\frac{3}{7} + \frac{1}{7} = \frac{3+1}{7} = \boxed{\frac{4}{7}}$$

- Subtract. $\frac{5}{9} - \frac{1}{9}$

- Subtract the numerators.
- Write down the same denominator.

$$\frac{5}{9} - \frac{1}{9} = \frac{5-1}{9} = \boxed{\frac{4}{9}}$$

EXERCISE 22

Complete the table.

1.

Add the fractions	
(a)	$\frac{1}{3} + \frac{1}{3} = \frac{\square + \square}{3} = \frac{\square}{3}$
(b)	$\frac{4}{6} + \frac{1}{6} = \frac{\square + \square}{6} = \frac{\square}{\square}$
(c)	$\frac{5}{8} + \frac{2}{8} = \frac{\square + \square}{\square} = \frac{\square}{\square}$

2.

Subtract the fractions	
(a)	$\frac{9}{10} - \frac{2}{10} = \frac{\square - \square}{10} = \frac{\square}{10}$
(b)	$\frac{8}{9} - \frac{4}{9} = \frac{\square - \square}{9} = \frac{\square}{\square}$
(c)	$\frac{7}{4} - \frac{4}{4} = \frac{\square - \square}{\square} = \frac{\square}{\square}$



Proper fraction

Any fraction having its numerator less than the denominator is called a proper fraction.

Example: $\frac{1}{3}, \frac{6}{7}, \frac{3}{11}, \frac{12}{13}$ are proper fractions.

Improper fraction

Any fraction having its numerator greater than or equal to the denominator is called an improper fraction.

Example: $\frac{7}{3}, \frac{9}{8}, \frac{11}{10}, \frac{13}{13}$ are improper fractions.

Unit fraction

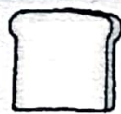
When a proper fraction has 1 as its numerator, it is called a unit fraction.

Example: $\frac{1}{3}, \frac{1}{2}, \frac{1}{5}, \frac{1}{10}$ are unit fractions.

Mixed fraction

I ate one and a half toasts.

I mean $(1 + \frac{1}{2})$ toasts
 $= 1\frac{1}{2}$ toasts



Full toast

+



Half toast

$$1 + \frac{1}{2}$$

is also

written as $1\frac{1}{2}$.

$1\frac{1}{2}$ is a mixed number.

Whenever a whole number is combined with a proper fraction, we get a mixed number.

Example: $3 + \frac{1}{4} = 3\frac{1}{4}$

or $3\frac{1}{4}$ is a mixed fraction.

EXERCISE 23

1. Circle the proper fractions.

$\frac{3}{8}$	$\frac{9}{7}$	$\frac{6}{8}$	$\frac{1}{6}$
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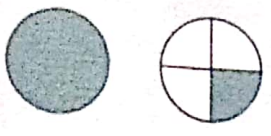
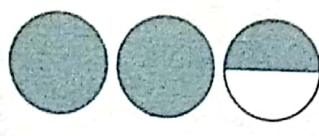

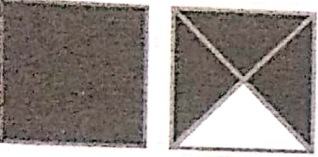


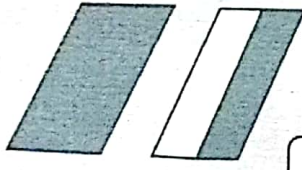

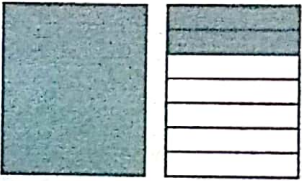

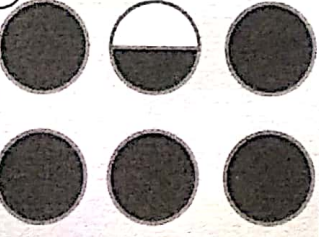
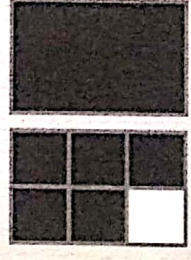
2. Circle the improper fractions.

$\frac{11}{9}$	$\frac{11}{13}$	$\frac{13}{11}$	$\frac{9}{11}$
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3. Circle the unit fractions.

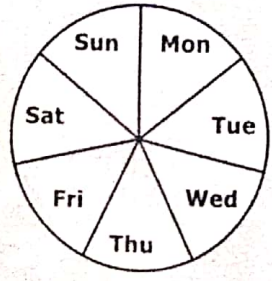
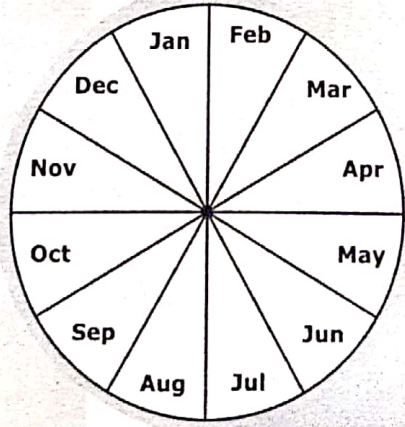
$\frac{7}{10}$	$\frac{1}{7}$	$\frac{3}{10}$	$\frac{1}{3}$
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4. Write the mixed number.

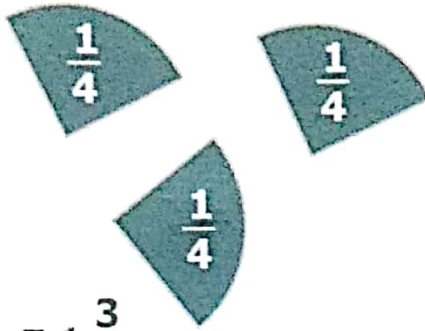
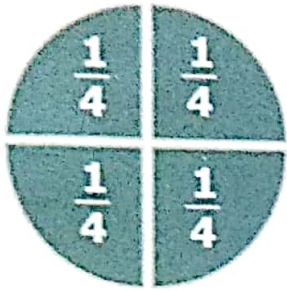
<p>a</p>  <p>$1\frac{1}{4}$</p>	<p>b</p>  <p>$2\frac{1}{2}$</p>	<p>c</p>  <p>$1\frac{2}{3}$</p>
<p>d</p>  <p>$1\frac{3}{4}$</p>	<p>e</p>  <p>$2\frac{2}{8}$</p>	<p>f</p>  <p>$2\frac{1}{4}$</p>
<p>g</p>  <p>$1\frac{1}{2}$</p>	<p>h</p>  <p>$1\frac{2}{5}$</p>	<p>i</p>  <p>$1\frac{2}{7}$</p>
<p>j</p>  <p>$3\frac{1}{4}$</p>	<p>k</p>  <p>$5\frac{1}{2}$</p>	<p>l</p>  <p>$1\frac{5}{6}$</p>

5. (a) Colour and write the fractions representing Friday and Thursday.

(b) Colour and write the fractions representing month having 30 days and 31 days.

	<table border="1"> <tr> <td style="background-color: #cccccc;">FRI</td> <td>$\frac{1}{7}$</td> </tr> <tr> <td style="background-color: #cccccc;">THU</td> <td>$\frac{1}{7}$</td> </tr> </table>	FRI	$\frac{1}{7}$	THU	$\frac{1}{7}$
FRI	$\frac{1}{7}$				
THU	$\frac{1}{7}$				
	<table border="1"> <tr> <td style="background-color: #cccccc;">30 days</td> <td>$\frac{4}{12}$</td> </tr> <tr> <td style="background-color: #cccccc;">31 days</td> <td>$\frac{7}{12}$</td> </tr> </table>	30 days	$\frac{4}{12}$	31 days	$\frac{7}{12}$
30 days	$\frac{4}{12}$				
31 days	$\frac{7}{12}$				

EXERCISE 24



$$\frac{7}{4} = 1\frac{3}{4}$$



$\frac{4}{4}$ is written as 1.
1 plus $\frac{3}{4}$ is written as $1\frac{3}{4}$.

$\frac{7}{4}$ means 7 divided by 4.

$$\begin{array}{r} 1 \\ 4 \overline{) 7} \\ \underline{-4} \\ 3 \end{array}$$

$$\frac{7}{4} = 1\frac{3}{4}$$

Q $\frac{\text{R}}{\text{D}}$ = Quotient $\frac{\text{Remainder}}{\text{Divisor}}$

1. Divide.

- (a) $\frac{4}{3} =$
- (c) $\frac{4}{2} =$
- (e) $\frac{9}{4} =$
- (g) $\frac{7}{2} =$
- (i) $\frac{11}{3} =$
- (k) $\frac{15}{3} =$
- (m) $\frac{10}{9} =$

- (b) $\frac{3}{2} =$
- (d) $\frac{5}{3} =$
- (f) $\frac{7}{5} =$
- (h) $\frac{8}{5} =$
- (j) $\frac{11}{5} =$
- (l) $\frac{5}{2} =$
- (n) $\frac{10}{7} =$

2. Divide.

- (a) $\frac{5}{4} = 1\frac{1}{4}$
- (c) $\frac{7}{3} =$
- (e) $\frac{9}{5} =$
- (g) $\frac{9}{7} =$
- (i) $\frac{21}{5} =$
- (k) $\frac{13}{8} =$
- (m) $\frac{9}{2} =$

- (b) $\frac{6}{5} =$
- (d) $\frac{8}{3} =$
- (f) $\frac{7}{6} =$
- (h) $\frac{16}{4} =$
- (j) $\frac{11}{9} =$
- (l) $\frac{14}{7} =$
- (n) $\frac{13}{3} =$

Q.1. Divide:

(a) $\frac{4}{3} = 4 \div 3$

Solution.

$$\begin{array}{r} 1 \rightarrow \text{Quotient} \\ 3 \overline{) 4} \\ \underline{-3} \\ 1 \rightarrow \text{Remainder} \end{array}$$

Divisor

$\Rightarrow \frac{4}{3} = \frac{Q}{D} \frac{R}{D} = 1 \frac{1}{3} \text{ ans.}$

(b) $\frac{3}{2} = 3 \div 2$

$$\begin{array}{r} 1 \rightarrow Q \\ D-2 \overline{) 3} \\ \underline{-2} \\ 1 \rightarrow R \end{array}$$

$\Rightarrow \frac{3}{2} = 1 \frac{1}{2} \text{ ans.}$

(c) $\frac{4}{2} = 4 \div 2$

$$\begin{array}{r} 2 \\ 2 \overline{) 4} \\ \underline{-4} \\ 0 \end{array}$$

$\Rightarrow \frac{4}{2} = 2 \text{ ans.}$

(d) $\frac{5}{3} = 5 \div 3$

$$\begin{array}{r} 1 \\ 3 \overline{) 5} \\ \underline{-3} \\ 2 \end{array}$$

$\Rightarrow \frac{5}{3} = 1 \frac{2}{3} \text{ ans.}$

Q.2. Divide:-

(b) $\frac{6}{5} = 6 \div 5$

$$\begin{array}{r} 1 \\ 5 \overline{) 6} \\ \underline{-5} \\ 1 \end{array}$$

$\Rightarrow \frac{6}{5} = 1 \frac{1}{5} \text{ ans.}$

(c) $\frac{7}{3} = 7 \div 3$

$$\begin{array}{r} 2 \\ 3 \overline{) 7} \\ \underline{-6} \\ 1 \end{array}$$

$\Rightarrow \frac{7}{3} = 2 \frac{1}{3} \text{ ans.}$

Solve rest of question of ex.24 by yourself as solved above.

Converting a mixed number into an improper fraction:-

Step 1 → Multiply the whole number with the denominator of the proper fraction.

Step 2 → Add the product to the numerator of the proper fraction.

Step 3 → Write the sum of the product and the numerator of the proper fraction above the denominator of the proper fraction.

EX-25

Q.1 Express each fraction as an improper fraction.

$$(1) \quad 4\frac{1}{3} \Rightarrow \begin{array}{c} \xrightarrow{+} \xrightarrow{1} \\ 4 \times 3 \\ \xrightarrow{+} \end{array} = \frac{3 \times 4 + 1}{3} = \frac{12 + 1}{3} = \frac{13}{3}$$

$$(2) \quad 2\frac{2}{9} \Rightarrow \begin{array}{c} +2 \\ \times 9 \\ + \end{array} = \frac{9 \times 2 + 2}{9} = \frac{18 + 2}{9} = \frac{20}{9}$$

$$(3) \quad 2\frac{1}{9} \Rightarrow \begin{array}{c} +1 \\ \times 9 \\ + \end{array} = \frac{9 \times 2 + 1}{9} = \frac{18 + 1}{9} = \frac{19}{9}$$

$$(4) \quad 1\frac{7}{8} \Rightarrow \begin{array}{c} +7 \\ \times 8 \\ + \end{array} = \frac{8 \times 1 + 7}{8} = \frac{8 + 7}{8} = \frac{15}{8}$$

Solve rest of questions of ex. 25 by yourself as solved above.

Converting a mixed number into an improper fraction

Convert $3\frac{1}{2}$ into an improper fraction.

Step 1 Multiply the whole number with the denominator of the proper fraction.

$$3 \times 2 = 6$$

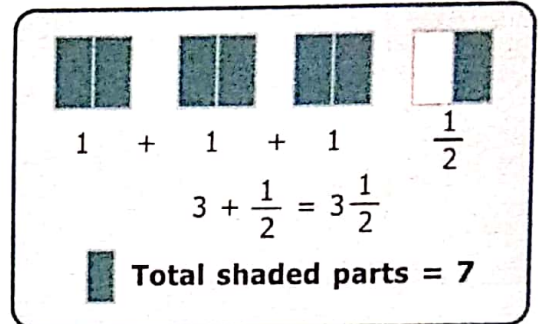
product

Step 2 Add the product to the numerator of the proper fraction.

$$6 + 1 = 7$$

Step 3 Write the sum of the product and the numerator of the proper fraction above the denominator of the proper fraction.

$$\frac{6 + 1}{2} = \frac{7}{2}$$



REMEMBER

The denominator of the mixed number and the improper fraction always remains the same.



$$3\frac{1}{2} = \frac{2 \times 3 + 1}{2} = \frac{7}{2}$$

EXERCISE 25

Express each fraction as an improper fraction.

$$6\frac{2}{5}$$

$$6 \times 5 = 30$$

$$30 + 2 = 32$$

Improper fraction = $\frac{32}{5}$

Hey! I can do the mental calculations.

Multiply 6×5 . Now, add 2.

$$30 + 2 = 32$$

So, $32/5$ is the answer.

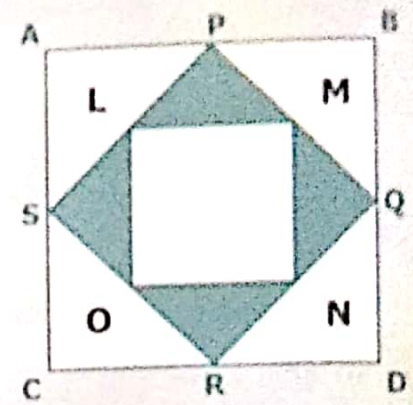


1 $4\frac{1}{3}$	2 $2\frac{2}{9}$	3 $2\frac{1}{9}$	4 $1\frac{7}{8}$
5 $5\frac{3}{10}$	6 $3\frac{3}{8}$	7 $5\frac{1}{7}$	8 $6\frac{2}{3}$
9 $7\frac{1}{3}$	10 $8\frac{1}{3}$	11 $8\frac{2}{3}$	12 $7\frac{7}{8}$
13 $9\frac{1}{2}$	14 $5\frac{4}{5}$	15 $10\frac{1}{2}$	16 $11\frac{1}{11}$

TRICKY MATHS



ABCD is a square. Square PQRS is made by joining the centres of the sides. Likewise square LMNO is formed by joining the centres of the sides of square PQRS. Can you find the fraction of the shaded area of the square ABCD?



EXERCISE 26

Complete the table.

Solve by yourself

AS FRACTIONS		AS DIVISION SUMS		
①	$\frac{5}{12}$		②	$\frac{0}{6}$
③	$\frac{20}{40}$	$20 \div 40$	④	$\frac{11}{9}$
⑤	$\frac{3}{7}$	$3 \div 7$	⑥	$13 \div 29$
⑦	$\frac{15}{8}$	$15 \div 8$	⑧	$\frac{3}{7}$
⑨	$\frac{0}{9}$	$0 \div 9$	⑩	$18 \div 25$
⑪	$\frac{11}{23}$	$11 \div 23$	⑫	$\frac{10}{31}$
⑬	$\frac{0}{7}$	$0 \div 7$	⑭	$7 \div 19$
⑮	$\frac{11}{11}$	$11 \div 11$	⑯	$\frac{13}{19}$
⑰	$\frac{21}{87}$	$21 \div 87$	⑲	$\frac{13}{29}$
⑱	$\frac{7}{12}$	$7 \div 12$	⑳	$8 \div 13$
㉑	$\frac{11}{39}$	$11 \div 39$	㉒	$\frac{17}{21}$

Converting an improper fraction into a mixed number:-

Step 1 \rightarrow Divide, Dividend by divisor.

Step 2 \rightarrow Now, write the fraction

as $Q \frac{R}{D}$ where $Q = \text{Quotient}$

$R = \text{Remainder}$ and $D = \text{Divisor}$

When there is no remainder, answer will be a whole number.

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Ex-27

Unit-4

Convert into a mixed number.

$$(1) \frac{11}{2} = \underset{D}{2} \overline{) 11} \begin{array}{r} 5 \rightarrow Q \\ -10 \\ \hline 01 \rightarrow R \end{array} \Rightarrow \frac{11}{2} = 5 \frac{1}{2} = Q \frac{R}{D} \text{ ans.}$$

$$(2) \frac{15}{4} = \underset{D}{4} \overline{) 15} \begin{array}{r} 3 \rightarrow Q \\ -12 \\ \hline 03 \rightarrow R \end{array} \Rightarrow \frac{15}{4} = 3 \frac{3}{4} = Q \frac{R}{D}$$

$$(3) \frac{17}{6} = \underset{D}{6} \overline{) 17} \begin{array}{r} 2 \rightarrow Q \\ -12 \\ \hline 05 \rightarrow R \end{array} \Rightarrow \frac{17}{6} = 2 \frac{5}{6} = Q \frac{R}{D}$$

Solve rest of questions by yourself.

Converting an improper fraction into a mixed number

Convert $\frac{13}{2}$ into a mixed number.

Step 1 Divide 13 by 2
or $13 \div 2$.

$$\begin{array}{r} 6 \\ 2 \overline{) 13} \\ \underline{-12} \\ 1 \end{array}$$

← **Quotient (Q)**

Divisor (D) →

← **Remainder (R)**

Step 2 Now, write the fraction
as $Q \frac{R}{D}$.

$$Q \frac{R}{D} = 6 \frac{1}{2} \quad \text{So, } \frac{13}{2} = 6 \frac{1}{2}$$



REMEMBER

$$\text{Mixed Number} = Q \frac{R}{D}$$

where,
Q = Quotient
R = Remainder
D = Divisor



EXERCISE 27

Convert into a mixed number.

1 $\frac{11}{2}$	2 $\frac{15}{4}$	3 $\frac{17}{6}$	
4 $\frac{13}{3}$	5 $\frac{19}{6}$	6 $\frac{21}{4}$	
7 $\frac{13}{12}$	8 $\frac{39}{14}$	9 $\frac{52}{3}$	10 $\frac{86}{5}$
11 $\frac{34}{13}$	12 $\frac{97}{9}$	13 $\frac{89}{11}$	14 $\frac{34}{3}$
15 $\frac{60}{7}$	16 $\frac{97}{18}$	17 $\frac{59}{19}$	18 $\frac{79}{12}$



REMEMBER

When there is no remainder, your answer will be a whole number instead of a mixed number.

Example: $\frac{15}{3} = 5$

Q.1 multiply the given fractions first with 2, then with 3 to get equivalent fractions.

(b) $\frac{2}{7}$

solution Equivalent fractions of $\frac{2}{7}$ are

$$\frac{2 \times 2}{7 \times 2} = \frac{4}{14} \quad \text{and} \quad \frac{2 \times 3}{7 \times 3} = \frac{6}{21}$$

Ans. $\frac{2}{7}, \frac{4}{14}, \frac{6}{21}$

(c) $\frac{5}{7}$

Solution:- Equivalent fractions of $\frac{5}{7}$ are

$$\frac{5 \times 2}{7 \times 2} = \frac{10}{14} \quad \text{and} \quad \frac{5 \times 3}{7 \times 3} = \frac{15}{21}$$

Ans. $\frac{5}{7}, \frac{10}{14}, \frac{15}{21}$

(d) $\frac{2}{5}$

Solution:- Equivalent fractions of $\frac{2}{5}$ are

$$\frac{2}{5} \times \frac{2}{2} = \frac{4}{10} \quad \text{and} \quad \frac{2}{5} \times \frac{3}{3} = \frac{6}{15}$$

Ans. $\frac{2}{5}, \frac{4}{10}, \frac{6}{15}$

Solve rest of questions by yourself.

Q.2 Cross-multiply to check whether the fractions of the given pairs are equivalent or not. Tick (✓) the equivalent fractions.

Solution :- (a) $\frac{2}{7}$ and $\frac{4}{14}$

$$\frac{2}{7} \checkmark \frac{4}{14} \Rightarrow 2 \times 14 = 4 \times 7$$

$$\Rightarrow 28 = 28$$

\therefore they are equivalent fractions.

(b) $\frac{3}{5}$ and $\frac{5}{3}$

Solution :- $\frac{3}{5} \times \frac{5}{3} \Rightarrow 3 \times 3 = 5 \times 5$
 $9 = 25$

\therefore they are not equivalent.

(c) $\frac{3}{8}$ and $\frac{12}{32}$

Solution . $\frac{3}{8} \checkmark \frac{12}{32} \Rightarrow 3 \times 32 = 12 \times 8$
 $\Rightarrow 96 = 96$

\therefore they are equivalent.

(d) $\frac{1}{3}$ and $\frac{4}{9}$

Solution :- $\frac{1}{3} \times \frac{4}{9} \Rightarrow 1 \times 9 = 4 \times 3$
 $9 = 12$

\therefore they are not equivalent.

Solve rest of questions by yourself.

EXERCISE 28

1. Multiply the given fractions first with 2, then with 3 to get equivalent fractions.

(a) $\frac{3}{4}$	$\frac{6}{8}, \frac{9}{12}$	(b) $\frac{2}{7}$		(c) $\frac{5}{7}$	
(d) $\frac{2}{5}$		(e) $\frac{1}{5}$		(f) $\frac{3}{8}$	
(g) $\frac{3}{5}$		(h) $\frac{2}{3}$		(i) $\frac{9}{11}$	
(j) $\frac{4}{5}$		(k) $\frac{6}{17}$		(l) $\frac{9}{19}$	

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2. Cross-multiply to check whether the fractions of the given pairs are equivalent or not. Tick (✓) the equivalent fractions.

(a) $\frac{2}{7}$ and $\frac{4}{14}$ <input type="checkbox"/>	(b) $\frac{3}{5}$ and $\frac{5}{3}$ <input type="checkbox"/>	(c) $\frac{3}{8}$ and $\frac{12}{32}$ <input type="checkbox"/>
(d) $\frac{1}{3}$ and $\frac{4}{9}$ <input type="checkbox"/>	(e) $\frac{10}{11}$ and $\frac{30}{33}$ <input type="checkbox"/>	(f) $\frac{2}{3}$ and $\frac{10}{12}$ <input type="checkbox"/>
(g) $\frac{6}{11}$ and $\frac{3}{22}$ <input type="checkbox"/>	(h) $\frac{4}{9}$ and $\frac{12}{27}$ <input type="checkbox"/>	(i) $\frac{24}{31}$ and $\frac{48}{95}$ <input type="checkbox"/>
(j) $\frac{5}{16}$ and $\frac{30}{96}$ <input type="checkbox"/>	(k) $\frac{21}{23}$ and $\frac{105}{69}$ <input type="checkbox"/>	(l) $\frac{19}{21}$ and $\frac{76}{84}$ <input type="checkbox"/>
(m) $\frac{2}{9}$ and $\frac{14}{27}$ <input type="checkbox"/>	(n) $\frac{18}{29}$ and $\frac{36}{58}$ <input type="checkbox"/>	(o) $\frac{11}{17}$ and $\frac{29}{51}$ <input type="checkbox"/>

Q.1 Reduce the fraction to the lowest terms.

(b) $\frac{2}{8} =$

Solution:- A fraction can be reduced to its lowest terms by dividing its numerator and denominator by their HCF.

H.C.F. of 2 and 8 is 2.

$$\frac{2}{8} = \frac{2 \div 2}{8 \div 2} = \frac{1}{4} \text{ ans.}$$

(c) $\frac{4}{8}$

Solution:- HCF of 4 and 8 is 4.

$$\frac{4}{8} = \frac{4 \div 4}{8 \div 4} = \frac{1}{2} \text{ ans.}$$

(d) $\frac{4}{16}$

Solution:- HCF of 4 and 16 is 4.

$$\frac{4}{16} = \frac{4 \div 4}{16 \div 4} = \frac{1}{4} \text{ ans.}$$

Solve rest of questions by yourself.

Q.2 Simplify the fractions.

(b) $\frac{12}{27}$

Solution:- HCF of 12 and 27

$$\begin{array}{r|l} 2 & 12 \\ \hline 2 & 6 \\ \hline 3 & 3 \\ \hline & 1 \end{array} \qquad \begin{array}{r|l} 3 & 27 \\ \hline 3 & 9 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$$

$$12 = 2 \times 2 \times \boxed{3}$$
$$27 = 3 \times 3 \times \boxed{3}$$

Common factor of 12 and 27 is 3.

So, HCF = 3

$$\frac{12}{27} = \frac{12 \div 3}{27 \div 3} = \frac{4}{9}$$

(i) $\frac{36}{48}$

Solution:-

$$\begin{array}{r|l} 2 & 36 \\ \hline 2 & 18 \\ \hline 3 & 9 \\ \hline 3 & 3 \\ \hline & 1 \end{array} \qquad \begin{array}{r|l} 2 & 48 \\ \hline 2 & 24 \\ \hline 2 & 12 \\ \hline 2 & 6 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$$

$$36 = \boxed{2} \times \boxed{2} \times 3 \times \boxed{3}$$
$$48 = \boxed{2} \times \boxed{2} \times 2 \times 2 \times \boxed{3}$$

Multiply of common factors of 36 and 48 =

$$2 \times 2 \times 3 = 12$$

HCF = 12



When we multiply both the numerator and the denominator of a fraction by the same number, we get an equivalent fraction of the fraction.

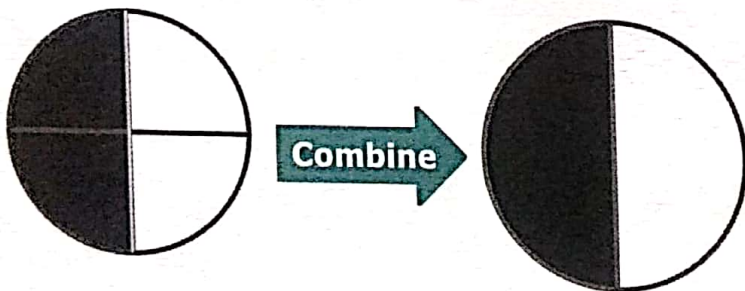
$$\frac{1}{4} \times \frac{2}{2} = \frac{2}{8} \quad \rightarrow \quad \frac{1}{4} \times \frac{3}{3} = \frac{3}{12} \quad \rightarrow \quad \text{So, } \frac{1}{4} \times \frac{4}{4} = \frac{4}{16}$$

$\frac{1}{4}$, $\frac{2}{8}$, $\frac{3}{12}$ and $\frac{4}{16}$ are all equivalent fractions.

REDUCING A FRACTION TO ITS LOWEST TERMS

Likewise, a fraction can be reduced to its lowest terms by dividing its numerator and denominator by the HCF of the numerator and the denominator. Let us consider an example to understand this.

Combine 2 equal parts –



$$\frac{2}{4} = \frac{2 \div 2}{4 \div 2} = \frac{2 / 2}{4 / 2} = \frac{1}{2}$$

2 is the HCF of 2 and 4.



$$\therefore \frac{2}{4} = \frac{1}{2} \quad \leftarrow \text{Dividing the numerator and the denominator each by 2}$$

EXERCISE 29

1. Reduce the fraction to the lowest terms.

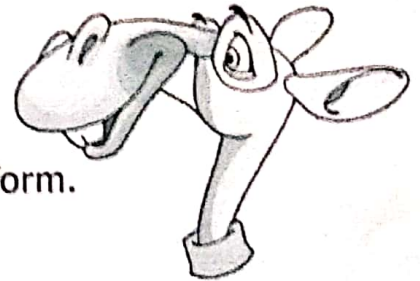
a) $\frac{2}{6} = \frac{1}{3}$	b) $\frac{2}{8} = \frac{\quad}{\quad}$	c) $\frac{4}{8} = \frac{\quad}{\quad}$	d) $\frac{4}{16} = \frac{\quad}{\quad}$
e) $\frac{10}{12} = \frac{\quad}{\quad}$	f) $\frac{2}{12} = \frac{\quad}{\quad}$	g) $\frac{10}{16} = \frac{\quad}{\quad}$	h) $\frac{24}{32} = \frac{\quad}{\quad}$

2. Simplify the fractions.

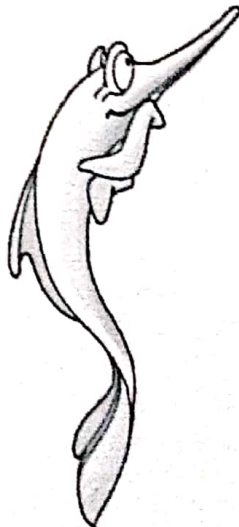
a	$\frac{3}{9} = \frac{1}{3}$	b	$\frac{12}{27} = \frac{\quad}{\quad}$	c	$\frac{3}{12} = \frac{\quad}{\quad}$	d	$\frac{9}{12} = \frac{\quad}{\quad}$
e	$\frac{15}{21} = \frac{\quad}{\quad}$	f	$\frac{12}{9} = \frac{\quad}{\quad}$	g	$\frac{18}{21} = \frac{\quad}{\quad}$	h	$\frac{24}{15} = \frac{\quad}{\quad}$
i	$\frac{36}{48} = \frac{\quad}{\quad}$	j	$\frac{19}{133} = \frac{\quad}{\quad}$	k	$\frac{64}{192} = \frac{\quad}{\quad}$	l	$\frac{120}{75} = \frac{\quad}{\quad}$

$\frac{1}{4}, \frac{2}{8}, \frac{3}{12}, \frac{4}{16}$ are all equivalent fractions.

However, $\frac{1}{4}$ is the fraction which is in its simplest form.



We can say that a fraction is in its lowest terms when the only common factor between the numerator and the denominator is 1.



Fractions - $\frac{2}{3}, \frac{1}{5}, \frac{3}{7}$ are all in their simplest form as their numerators and denominators cannot be exactly divided by any number except 1.

But, $\frac{6}{8}$ is not in its simplest form because it is exactly divisible by the HCF of 6 and 8 which is 2.

$$\frac{6 (\div 2)}{8 (\div 2)} = \frac{3}{4}$$

We can reduce a fraction to its lowest terms simply by dividing the numerator and the denominator by their HCF.

$$\frac{36}{48} = \frac{36 \div 12}{48 \div 12} = \frac{3}{4} \text{ ans.}$$

solve rest of questions by yourself.

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EX-30

Unit-4

Reduce the fractions to their lowest terms.

(1) $\frac{90}{180}$

Solution | -

$$\begin{array}{r} 2 \overline{) 90} \\ 3 \overline{) 45} \\ 3 \overline{) 15} \\ 5 \overline{) 5} \\ 1 \end{array}$$

$$\begin{array}{r} 2 \overline{) 180} \\ 2 \overline{) 90} \\ 3 \overline{) 45} \\ 3 \overline{) 15} \\ 5 \overline{) 5} \\ 1 \end{array}$$

$$90 = 2 \times 3 \times 3 \times 5$$

$$180 = 2 \times 2 \times 3 \times 3 \times 5$$

multiply of common factors of 90 and 180.

$$= 2 \times 3 \times 3 \times 5 = 90$$

So, HCF = 90

$$\frac{90}{180} = \frac{90 \div 90}{180 \div 90} = \frac{1}{2}$$

lowest term of $\frac{90}{180}$ is $\frac{1}{2}$.

$$(8) \frac{45}{405}$$

solution:-

$$\begin{array}{r|l} 3 & 45 \\ \hline 3 & 15 \\ \hline 5 & 5 \\ \hline & 1 \end{array}$$

$$\begin{array}{r|l} 3 & 405 \\ \hline 3 & 135 \\ \hline 3 & 45 \\ \hline 3 & 15 \\ \hline 5 & 5 \\ \hline & 1 \end{array}$$

$$45 = 3 \times 3 \times 5$$

$$405 = 3 \times 3 \times 3 \times 3 \times 5$$

multiply of common factors of 45 and 405

$$= 3 \times 3 \times 5 = 45$$

so, HCF = 45

$$\frac{45}{405} = \frac{45 \div 45}{405 \div 45} = \frac{1}{9} \text{ ans.}$$

$$(15) \frac{145}{360}$$

solution:-

$$\begin{array}{r|l} 5 & 145 \\ \hline 29 & 29 \\ \hline & 1 \end{array}$$

$$\begin{array}{r|l} 2 & 360 \\ \hline 2 & 180 \\ \hline 2 & 90 \\ \hline 3 & 45 \\ \hline 3 & 15 \\ \hline 5 & 5 \\ \hline & 1 \end{array}$$

$$45 = 5 \times 29$$

$$360 = 2 \times 2 \times 2 \times 3 \times 3 \times 5$$

Common factor of 45 and 360 is 5.

so, HCF = 5

$$\frac{45}{360} = \frac{45 \div 5}{360 \div 5} = \frac{29}{72} \text{ ans.}$$

$$Q(22) \quad \frac{32}{288}$$

Solution:-

$$\begin{array}{r} 2 \overline{) 32} \\ 2 \overline{) 16} \\ 2 \overline{) 8} \\ 2 \overline{) 4} \\ 2 \overline{) 2} \\ \hline 1 \end{array}$$

$$\begin{array}{r} 2 \overline{) 288} \\ 2 \overline{) 144} \\ 2 \overline{) 72} \\ 2 \overline{) 36} \\ 2 \overline{) 18} \\ 3 \overline{) 9} \\ 3 \overline{) 3} \\ \hline 1 \end{array}$$

$$32 = 2 \times 2 \times 2 \times 2 \times 2$$

$$288 = 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3$$

multiply of common factors of 32 and 288 =

$$= 2 \times 2 \times 2 \times 2 \times 2$$

$$= 32$$

$$\text{So, HCF} = 32$$

$$\frac{32}{288} = \frac{32 \div 32}{288 \div 32} = \frac{1}{9} \quad \text{ans.}$$

$$Q(29) \quad \frac{232}{384}$$

Solution.

$$\begin{array}{r} 2 \overline{) 232} \\ 2 \overline{) 116} \\ 2 \overline{) 58} \\ 29 \overline{) 29} \\ \hline 1 \end{array}$$

$$\begin{array}{r} 2 \overline{) 384} \\ 2 \overline{) 192} \\ 2 \overline{) 96} \\ 2 \overline{) 48} \\ 2 \overline{) 24} \\ 2 \overline{) 12} \\ 2 \overline{) 6} \\ 3 \overline{) 3} \\ \hline 1 \end{array}$$

$$232 = 2 \times 2 \times 2 \times 29$$

$$384 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3$$

multiply of common factors of 232 and 384

$$= 2 \times 2 \times 2 = 8$$

$$\text{So, HCF} = 8$$

$$\frac{232}{384} = \frac{232 \div 8}{384 \div 8} = \frac{29}{48}$$

$$(36) \frac{20}{120}$$

Solution:-

$$\begin{array}{r|l} 2 & 20 \\ \hline 2 & 10 \\ \hline 5 & 5 \\ \hline & 1 \end{array}$$

$$\begin{array}{r|l} 2 & 20 \\ \hline 2 & 60 \\ \hline 2 & 30 \\ \hline 3 & 15 \\ \hline 5 & 5 \\ \hline & 1 \end{array}$$

$$20 = 2 \times 2 \times 5$$

$$120 = 2 \times 2 \times 2 \times 3 \times 5$$

multiply of common factors of 20 and 120

$$= 2 \times 2 \times 5 = 20$$

$$\text{So, HCF} = 20$$

$$\frac{20}{120} = \frac{20 \div 20}{120 \div 20} = \frac{1}{6}$$

$$(43) \frac{21}{333}$$

Solution:-

$$\begin{array}{r|l} 3 & 21 \\ \hline 7 & 7 \\ \hline & 1 \end{array}$$

$$\begin{array}{r|l} 3 & 333 \\ \hline 111 & 111 \\ \hline & 1 \end{array}$$

$$21 = 3 \times 7$$

$$333 = 3 \times 111$$

Common factor of 21 and 333 is 3.

$$\text{So, HCF} = 3$$

$$\frac{21}{333} = \frac{21 \div 3}{333 \div 3} = \frac{7}{111} \quad \underline{\text{ans.}}$$

Solve rest of questions by yourself as solved above.

EXERCISE 30

Reduce the fractions to their lowest terms.

$$\textcircled{1} \frac{90}{180}$$

$$\textcircled{2} \frac{125}{250}$$

$$\textcircled{3} \frac{105}{140}$$

$$\textcircled{4} \frac{90}{162}$$

$$\textcircled{5} \frac{204}{272}$$

$$\textcircled{6} \frac{180}{300}$$

$$\textcircled{7} \frac{165}{140}$$

$$\textcircled{8} \frac{45}{405}$$

$$\textcircled{9} \frac{245}{355}$$

$$\textcircled{10} \frac{99}{231}$$

$$\textcircled{11} \frac{25}{350}$$

$$\textcircled{12} \frac{72}{144}$$

$$\textcircled{13} \frac{117}{255}$$

$$\textcircled{14} \frac{220}{495}$$

$$\textcircled{15} \frac{145}{360}$$

$$\textcircled{16} \frac{95}{260}$$

$$\textcircled{17} \frac{76}{608}$$

$$\textcircled{18} \frac{49}{343}$$

$$\textcircled{19} \frac{312}{666}$$

$$\textcircled{20} \frac{99}{264}$$

$$\textcircled{21} \frac{87}{435}$$

$$\textcircled{22} \frac{32}{288}$$

$$\textcircled{23} \frac{16}{336}$$

$$\textcircled{24} \frac{14}{168}$$

$$\textcircled{25} \frac{23}{391}$$

$$\textcircled{26} \frac{21}{420}$$

$$\textcircled{27} \frac{46}{230}$$

$$\textcircled{28} \frac{26}{338}$$

$$\textcircled{29} \frac{232}{384}$$

$$\textcircled{30} \frac{555}{660}$$

$$\textcircled{31} \frac{121}{660}$$

$$\textcircled{32} \frac{24}{244}$$

$$\textcircled{33} \frac{26}{122}$$

$$\textcircled{34} \frac{98}{294}$$

$$\textcircled{35} \frac{25}{635}$$

$$\textcircled{36} \frac{20}{120}$$

$$\textcircled{37} \frac{125}{350}$$

$$\textcircled{38} \frac{110}{130}$$

$$\textcircled{39} \frac{45}{195}$$

$$\textcircled{40} \frac{96}{36}$$

$$\textcircled{41} \frac{25}{145}$$

$$\textcircled{42} \frac{49}{147}$$

$$\textcircled{43} \frac{21}{333}$$

$$\textcircled{44} \frac{40}{100}$$

$$\textcircled{45} \frac{340}{245}$$

$$\textcircled{46} \frac{93}{165}$$

$$\textcircled{47} \frac{36}{430}$$

$$\textcircled{48} \frac{82}{144}$$

$$\textcircled{49} \frac{76}{320}$$

Fraction of a whole number

Q.1 Find the value.

(a) $\frac{1}{4}$ of 28

Solution!- divide the whole number by the denominator of the fraction. Next multiply the quotient get by the numerator of the fraction.

$$\Rightarrow \frac{1}{4} \times 28$$
$$= 1 \times 7 = 7 \text{ ans.}$$

(c) $\frac{1}{6}$ of a day
(in hours)

Solution!- Total hours in a day = 24

$$\therefore \frac{1}{6} \text{ of a day} = \frac{1}{6} \times 24$$
$$= \frac{24}{6} = 4$$

$$\frac{1}{6} \text{ of a day} = 4 \text{ hours}$$

(d) $\frac{1}{3}$ of a dozen

Solution * Number of things in a dozen = 12

$$\begin{aligned} \therefore \frac{1}{3} \text{ of a dozen} &= \frac{1}{3} \times 12 \\ &= \frac{12}{3} \\ &= 4 \end{aligned}$$

$$\frac{1}{3} \text{ of a dozen} = 4 \text{ ans.}$$

(g) $\frac{1}{4}$ of 1 litre (in millilitres)

solution:- \therefore 1 litre = 1000 millilitres

$$\begin{aligned} \Rightarrow \frac{1}{4} \text{ of 1 litre} &= \frac{1}{4} \times 1000 \\ &= \frac{1000}{4} = 250 \end{aligned}$$

$$\frac{1}{4} \text{ of 1 litre} = 250 \text{ millilitres.}$$

(h) $\frac{3}{7}$ of a week.

solution:- Number of days in a week = 7

$$\begin{aligned} \therefore \frac{3}{7} \text{ of a week} &= \frac{3}{7} \times 7 \\ &= \frac{3 \times 7}{7} \\ &= 3 \end{aligned}$$

$$\frac{3}{7} \text{ of a week} = 3 \text{ days.}$$

Solve rest of questions by yourself as solved above.

Q.2 word problems:-

(a) Mina bought 500ml of milk. She drank $\frac{1}{5}$ of it. How much milk did she drink?

Solution:- Total Quantity of milk = 500ml
She drank = $\frac{1}{5}$ of 500ml
= $\frac{1}{5} \times 500$
= 100ml

Hence mina drank 100 ml of milk.

(b) Sapna lives 1000 m far from her school. She has walked $\frac{1}{2}$ of the distance. How far has she walked?

Solution:- Distance away from her school = 1000m
Distance she walked = $\frac{1}{2}$ of 1000m
= $\frac{1}{2} \times 1000$
= 500m

Hence she walked 500m.

(c) Rohit received a bouquet of 72 flowers. $\frac{3}{4}$ of the flowers were roses. How many roses were there in the bouquet?

Solution:- Total no. of flowers = 72
No. of Roses = $\frac{3}{4}$ of 72

$$= \frac{3}{4} \times 72$$

$$= 3 \times 18$$

$$= 54$$

Hence there were 54 roses.

(d) A basket has 48 balls. $\frac{3}{4}$ of the balls are blue. How many balls are blue?

Solution: - Total No. of balls = 48

$$\text{No. of blue balls} = \frac{3}{4} \text{ of } 48$$

$$= \frac{3}{4} \times 48$$

$$= 3 \times 12$$

$$= 36$$

Hence there are 36 balls.

(e) A stadium has 800 seats. $\frac{3}{8}$ of the seats are empty. How many seats are occupied by the spectators?

Solution: - Total No. of seats = 800

$$\text{No. of empty seats} = \frac{3}{8} \text{ of } 800$$

$$= \frac{3}{8} \times 800$$

$$= 3 \times 100$$

$$= 300$$

$$\text{No. of seats occupied} = 800 - 300$$

$$= 500 \text{ Ans.}$$

Q.(f) solve by yourself.

Examples :

1. How much is $\frac{1}{3}$ of an hour in minutes?

An hour has 60 min.

$\frac{1}{3}$ of 60 min is same as $60 \text{ min} \div 3$.

$$60 \text{ min} \div 3 = 20 \text{ min}$$

Ans. $\frac{1}{3}$ of an hour means 20 minutes.



2. How many hours are there in $\frac{3}{8}$ of a day?

There are 24 hours in a day.

Now, we have to find $\frac{3}{8}$ of 24 hours.

Step 1 Divide hours: $24 \div 8 = 3$ hours.

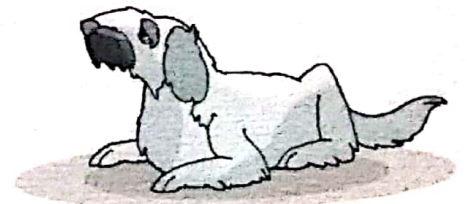
Step 2 Multiply the number obtained in step 1 by the numerator of the fraction: $3 \times 3 \text{ hr} = 9$ hours.

Ans. There are 9 hours in $\frac{3}{8}$ of a day.

EXERCISE 31

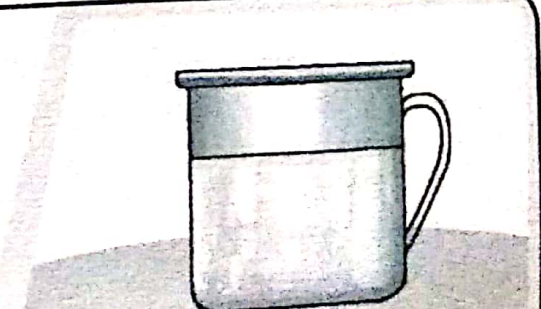
1. Find the value.

a	$\frac{1}{4}$ of 28	b	$\frac{1}{6}$ of 18	c	$\frac{1}{6}$ of a day (in hours)	d	$\frac{1}{3}$ of a dozen
e	$\frac{1}{7}$ of 49	f	$\frac{1}{5}$ of 35	g	$\frac{1}{4}$ of 1 litre (in millilitres)	h	$\frac{3}{7}$ of a week
i	$\frac{1}{8}$ of 56	j	$\frac{1}{4}$ of 164	k	$\frac{1}{2}$ of 1 kilogram (in grams)	l	$\frac{4}{5}$ of an hour (in minutes)
m	$\frac{1}{9}$ of 279	n	$\frac{1}{8}$ of 512	o	$\frac{1}{3}$ of 333		



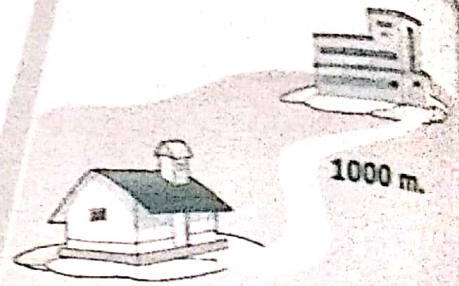
2. Word problems

- a Mina bought 500 ml of milk. She drank $\frac{1}{5}$ of it. How much milk did she drink?



b

Sapna lives 1000 m far from her school.
 She has walked $\frac{1}{2}$ of the distance.
 How far has she walked?



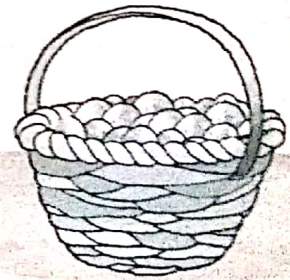
c

Rohit received a bouquet of 72 flowers.
 $\frac{3}{4}$ of the flowers were roses. How
 many roses were there in the bouquet?



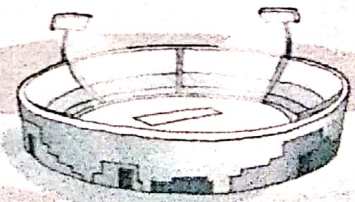
d

A basket has 48 balls. $\frac{3}{4}$ of the
 balls are blue. How many balls are
 blue?



e

A stadium has 800 seats. $\frac{3}{8}$ of the
 seats are empty. How many seats are
 occupied by the spectators?



f

Ahmed got $\frac{4}{7}$ of the 147 votes polled
 in a school election. How many votes
 did Ahmed get?



Q.1 $\frac{2}{5} + \frac{1}{2}$

Solution! - Taking LCM of 5 and 2

LCM of 5 and 2 is 10

Now convert into like fraction

$$\Rightarrow \frac{2}{5} = \frac{2 \times 2}{5 \times 2} = \frac{4}{10}$$

$$\Rightarrow \frac{1}{2} = \frac{1 \times 5}{2 \times 5} = \frac{5}{10}$$

$$\Rightarrow \frac{4}{10} + \frac{5}{10} = \frac{4+5}{10} = \frac{9}{10} \text{ ans.}$$

(4) $\frac{1}{6} + \frac{1}{2}$

Solution! - Taking LCM of 6 and 2

LCM of 6 and 2 is 6.

$$\Rightarrow \frac{1}{6} = \frac{1 \times 1}{6 \times 1} = \frac{1}{6}$$

$$\Rightarrow \frac{1}{2} = \frac{1 \times 3}{2 \times 3} = \frac{3}{6}$$

$$\Rightarrow \frac{1}{6} + \frac{3}{6}$$

$$\Rightarrow \frac{1}{6} + \frac{3}{6} = \frac{1+3}{6} = \frac{4}{6} = \frac{2}{3}$$

$$(8) \quad 23 \frac{4}{5} + 13 \frac{3}{5}$$

Solution :- Convert mixed fractions into improper fractions.

$$23 \frac{4}{5} = \frac{5 \times 23 + 4}{5} = \frac{115 + 4}{5} = \frac{119}{5}$$

$$13 \frac{3}{5} = \frac{5 \times 13 + 3}{5} = \frac{65 + 3}{5} = \frac{68}{5}$$

$$\Rightarrow \frac{119}{5} + \frac{68}{5} = \frac{119 + 68}{5} = \frac{187}{5}$$

$$\Rightarrow \frac{187}{5} = 5 \overline{) 187}$$

	37
5	<u>15</u>
	37
	<u>35</u>
	02

$$\therefore \frac{187}{5} = 37 \frac{2}{5} \text{ ans.}$$

$$(9) \quad 5 \frac{5}{6} + 3 \frac{5}{8}$$

Solution :- Convert mixed fractions into improper fractions.

$$5 \frac{5}{6} = \frac{6 \times 5 + 5}{6} = \frac{30 + 5}{6} = \frac{35}{6}$$

$$3 \frac{5}{8} = \frac{8 \times 3 + 5}{8} = \frac{24 + 5}{8} = \frac{29}{8}$$

Now convert into like fractions.

L.C.M. of 6 and 8 is 24

$$\Rightarrow \frac{35 \times 4}{6 \times 4} = \frac{140}{24}$$

$$\Rightarrow \frac{29 \times 3}{8 \times 3} = \frac{87}{24}$$

$$\Rightarrow \frac{140}{24} + \frac{87}{24} = \frac{140+87}{24} = \frac{227}{24}$$

$$\begin{array}{r} 9 \\ 24 \overline{) 227} \\ \underline{-216} \\ 011 \end{array}$$

$$\Rightarrow \frac{227}{24} = 9 \frac{11}{24} \text{ ans.}$$

$$(18) \quad 5\frac{7}{8} + 2\frac{1}{3}$$

Solution:- Convert into improper fractions.

$$5\frac{7}{8} = \frac{8 \times 5 + 7}{8} = \frac{40 + 7}{8} = \frac{47}{8}$$

$$2\frac{1}{3} = \frac{3 \times 2 + 1}{3} = \frac{6 + 1}{3} = \frac{7}{3}$$

Now convert into like fractions.

L.C.M. of 8 and 3 is 24.

$$\Rightarrow \frac{47}{8} = \frac{47 \times 3}{8 \times 3} = \frac{141}{24}$$

$$\Rightarrow \frac{7}{3} = \frac{7 \times 8}{3 \times 8} = \frac{56}{24}$$

$$\Rightarrow \frac{141}{24} + \frac{56}{24} = \frac{141+56}{24} = \frac{197}{24}$$

$$\Rightarrow \begin{array}{r} 8 \\ 24 \overline{) 197} \\ \underline{-192} \\ 005 \end{array} \Rightarrow \frac{197}{24} = 8 \frac{5}{24} \text{ ans.}$$

Solve rest of questions by yourself as solved above.

EXERCISE 32

Add the given fractions and write in the simplest form:

1 $\frac{2}{5} + \frac{1}{2}$

2 $\frac{2}{3} + \frac{1}{5}$

3 $\frac{2}{3} + \frac{3}{4}$

4 $\frac{1}{6} + \frac{1}{2}$

5 $\frac{5}{6} + \frac{1}{3}$

6 $\frac{1}{2} + \frac{7}{8}$

7 $\frac{9}{10} + \frac{7}{8}$

8 $23\frac{4}{5} + 13\frac{3}{5}$

9 $5\frac{5}{6} + 3\frac{5}{8}$

10 $8\frac{1}{3} + 3\frac{2}{9}$

11 $3\frac{11}{12} + 2\frac{5}{6}$

12 $4\frac{7}{12} + 1\frac{1}{2}$

13 $\frac{3}{4} + \frac{1}{8}$

14 $2\frac{1}{9} + \frac{1}{3}$

15 $\frac{5}{6} + \frac{1}{3}$

16 $3\frac{3}{4} + \frac{9}{10}$

17 $2\frac{7}{9} + 8\frac{1}{5}$

18 $5\frac{7}{8} + 2\frac{1}{3}$

Q A wooden board is $\frac{1}{2}$ inch thick.

Another board having $\frac{3}{8}$ inch thickness is glued to it. What is the combined thickness?

Solution:- Thickness of first board = $\frac{1}{2}$ inch

Thickness of another board = $\frac{3}{8}$ inch

Total Thickness = $(\frac{1}{2} + \frac{3}{8})$ inch

L.C.M. of 2 and 8 is 8.

$$\Rightarrow \frac{1}{2} = \frac{1 \times 4}{2 \times 4} = \frac{4}{8}$$

$$\Rightarrow \frac{4}{8} + \frac{3}{8} = \frac{4+3}{8} = \frac{7}{8} \text{ inch}$$

Hence combined thickness of the boards is $\frac{7}{8}$ inch

Q.4 Aryan jumped $5\frac{1}{3}$ feet. Rahul jumped $1\frac{1}{4}$ feet farther than Aryan. How far did Rahul jump?

Solution:- Aryan jumped = $5\frac{1}{3} = \frac{16}{3}$ feet

Distance Rahul jumped more than Aryan = $1\frac{1}{4} = \frac{5}{4}$ feet

$$\text{Total Distance jumped by Rahul} = \left(\frac{16}{3} + \frac{5}{4}\right) \text{ feet}$$

L.C.M. of 3 and 4 is 12.

$$\Rightarrow \frac{16}{3} = \frac{16 \times 4}{3 \times 4} = \frac{64}{12}$$

$$\Rightarrow \frac{5}{4} = \frac{5 \times 3}{4 \times 3} = \frac{15}{12}$$

$$\Rightarrow \frac{64}{12} + \frac{15}{12} = \frac{64+15}{12} = \frac{79}{12} = 6\frac{7}{12}$$

Hence Rahul jumped $6\frac{7}{12}$ feet.

Q5 Rajeev read $\frac{2}{5}$ hour before dinner.

After dinner, he read $\frac{5}{6}$ hour. How long did he read in minutes?

Solution:- He read before dinner = $\frac{2}{5}$ hr.

He read after dinner = $\frac{5}{6}$ hr.

Total hour he read = $\frac{2}{5} + \frac{5}{6}$

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

$$\Rightarrow \frac{2}{5} = \frac{2 \times 6}{5 \times 6} = \frac{12}{30}$$

$$\Rightarrow \frac{5}{6} = \frac{5 \times 5}{6 \times 5} = \frac{25}{30}$$

$$\Rightarrow \frac{12}{30} + \frac{25}{30} = \frac{37}{30} \text{ hr.}$$

\therefore 1 hr = 60 minutes

$$\Rightarrow \frac{37}{30} \times 60^2 \text{ minutes}$$

$$\Rightarrow 37 \times 2 \text{ minutes}$$

$$\Rightarrow 74 \text{ minutes } \underline{\text{ans.}}$$

Q.8 Jim lives $\frac{3}{8}$ km far from a stadium and $\frac{7}{8}$ km far from his school. He walked home from the school and then to the stadium. How far did he walk?

Solution:- Distance from the stadium = $\frac{3}{8}$ km

Distance from the school = $\frac{7}{8}$ km

Total distance he walked = $(\frac{3}{8} + \frac{7}{8})$ km.

$$= \frac{3+7}{8} = \frac{10}{8}$$

$$\Rightarrow \frac{10}{8} = 1\frac{2}{8} = 1\frac{1}{4} \text{ km.}$$

Hence he walked $1\frac{1}{4}$ km. from the school and then to the stadium.

Solve rest of questions by yourself.

A

What to do if the sum of fractions is not in its lowest terms?

Let us take an example.

$$\frac{2}{3} + \frac{5}{6} = ? \quad \text{LCM of 3 and 6} = 6$$

$$\frac{2 \times 2}{3 \times 2} + \frac{5}{6} = \frac{4}{6} + \frac{5}{6}$$

$$= \frac{4+5}{6} = \frac{9}{6} = \frac{3 \times 3}{3 \times 2}$$

$$= \frac{3}{2} = 1 + \frac{1}{2} = 1\frac{1}{2}$$

$$\text{So, } \frac{2}{3} + \frac{5}{6} = 1\frac{1}{2}$$

**B**

What to do if the sum of fractions is an improper fraction?

Let us take an example.

$$\frac{3}{7} + \frac{5}{6} = ? \quad \text{LCM of 7 and 6} = 42$$

$$\frac{3 \times 6}{7 \times 6} + \frac{5 \times 7}{6 \times 7}$$

$$\frac{18}{42} + \frac{35}{42} = \frac{18+35}{42} = \frac{53}{42}$$

Now, express this improper fraction as a mixed number.

$$\frac{53}{42} = 1 + \frac{11}{42} = 1\frac{11}{42}$$

$$\text{So, } \frac{3}{7} + \frac{5}{6} = 1\frac{11}{42}$$

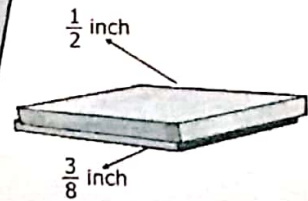
81

EXERCISE 33

①

A wooden board is $\frac{1}{2}$ inch thick.

Another board having $\frac{3}{8}$ inch thickness is glued to it. What is the combined thickness?



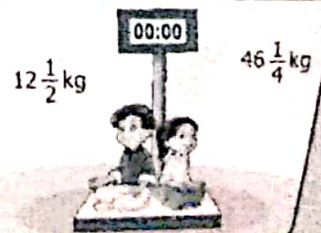
②

Sonam painted $\frac{1}{4}$ of a wall. Susie painted $\frac{2}{5}$ of the same wall. How much of the wall did they paint together?

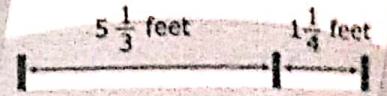


③

Mohan weighs $46\frac{1}{4}$ kg. His sister weighs $12\frac{1}{2}$ kg. What is their combined weight?



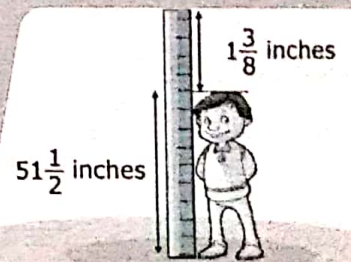
- 4 Aryan jumped $5\frac{1}{3}$ feet. Rahul jumped $1\frac{1}{4}$ feet farther than Aryan. How far did Rahul jump?



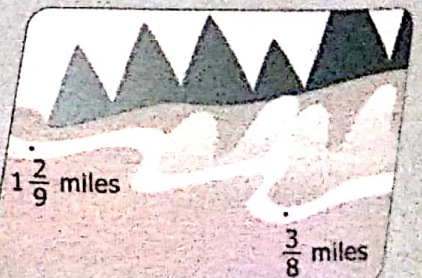
- 5 Rajeev read $\frac{2}{5}$ hour before dinner. After dinner, he read $\frac{5}{6}$ hour. How long did he read in minutes?



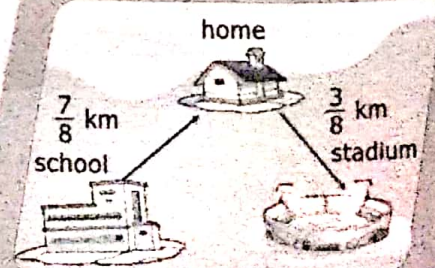
- 6 Last year, Bobby was $51\frac{1}{2}$ inches tall. Since then his height increased $1\frac{3}{8}$ inches. How tall is he now?



- 7 Rohit travels $1\frac{2}{9}$ miles everyday. Ajay travels $\frac{3}{8}$ miles more than Rohit. How far does Ajay travel?



- 8 Jim lives $\frac{3}{8}$ km far from a stadium and $\frac{7}{8}$ km far from his school. He walked home from the school and then to the stadium. How far did he walk?



Subtract and write the answer in the simplest form.

$$(1) \frac{5}{6} - \frac{3}{8}$$

Solution:- LCM of 6 and 8 is 24.

Convert into like fractions.

$$\Rightarrow \frac{5}{6} = \frac{5 \times 4}{6 \times 4} = \frac{20}{24}$$

$$\Rightarrow \frac{3}{8} = \frac{3 \times 3}{8 \times 3} = \frac{9}{24}$$

$$\Rightarrow \frac{20}{24} - \frac{9}{24} = \frac{20-9}{24} = \frac{11}{24} \text{ ans.}$$

$$(7) 2\frac{2}{3} - 1\frac{1}{2}$$

Solution:- Convert into improper fractions.

$$2\frac{2}{3} = \frac{3 \times 2 + 2}{3} = \frac{6+2}{3} = \frac{8}{3}$$

$$1\frac{1}{2} = \frac{2 \times 1 + 1}{2} = \frac{2+1}{2} = \frac{3}{2}$$

$$\Rightarrow \frac{8}{3} - \frac{3}{2}$$

Convert into like fractions.

LCM of 3 and 2 is 6.

$$\Rightarrow \frac{8}{3} = \frac{8 \times 2}{3 \times 2} = \frac{16}{6}$$

$$\Rightarrow \frac{3}{2} = \frac{3 \times 3}{2 \times 3} = \frac{9}{6}$$

$$\Rightarrow \frac{16}{6} - \frac{9}{6} = \frac{16-9}{6} = \frac{7}{6} = 1\frac{1}{6} \text{ ans.}$$

$$(19) \quad 6\frac{2}{9} - \frac{11}{12}$$

Solution:- $6\frac{2}{9} = \frac{9 \times 6 + 2}{9} = \frac{54+2}{9} = \frac{56}{9}$

$$\frac{56}{9} - \frac{11}{12}$$

Convert into like fractions.
LCM of 9 and 12 is 36.

$$\Rightarrow \frac{56}{9} = \frac{56 \times 4}{9 \times 4} = \frac{224}{36}$$

$$\Rightarrow \frac{11}{12} = \frac{11 \times 3}{12 \times 3} = \frac{33}{36}$$

$$\Rightarrow \frac{224}{36} - \frac{33}{36} = \frac{224-33}{36} = \frac{191}{36}$$

$$\Rightarrow 36 \overline{) 191} = 5\frac{11}{36} \text{ ans.}$$

$\begin{array}{r} 5 \\ \underline{180} \\ 11 \end{array}$

$$(21) \quad 2 - \frac{1}{4}$$

Solution:- $2 - \frac{1}{4}$

Convert into like fractions.

LCM of 1 and 4 is 4

$$\Rightarrow \frac{2}{1} = \frac{2 \times 4}{1 \times 4} = \frac{8}{4}$$

$$\Rightarrow \frac{8}{4} - \frac{1}{4} = \frac{8-1}{4} = \frac{7}{4} = 1\frac{3}{4} \text{ ans}$$

$$(28) \quad 3 - \frac{0}{8}$$

Solution :- $3 - \frac{0}{8}$

$$\Rightarrow \frac{3}{1} - \frac{0}{8}$$

When zero is divided by any number gives zero.

$$[\because \frac{0}{8} = 0]$$

$$\Rightarrow 3 - 0 \\ = 3 \text{ ans.}$$

$$(30) \quad 8\frac{3}{4} - \frac{3}{5}$$

Solution :- $8\frac{3}{4} = \frac{4 \times 8 + 3}{4} = \frac{32 + 3}{4} = \frac{35}{4}$

$$\Rightarrow \frac{35}{4} - \frac{3}{5}$$

L.C.M. of 4 and 5 is 20.

$$\Rightarrow \frac{35}{4} = \frac{35 \times 5}{4 \times 5} = \frac{175}{20}$$

$$\Rightarrow \frac{3}{5} = \frac{3 \times 4}{5 \times 4} = \frac{12}{20}$$

$$\Rightarrow \frac{175}{20} - \frac{12}{20} = \frac{175-12}{20} = \frac{163}{20} = 8\frac{3}{20} \text{ ans.}$$

Solve rest of questions by yourself as solved above.

Subtract to find the answer.

A $\frac{7}{10} - \frac{1}{2} = ?$

LCM of 10 and 2 is 10.

$$\frac{7}{10} - \frac{1}{2} = \frac{7}{10} - \frac{1 \times 5}{2 \times 5}$$

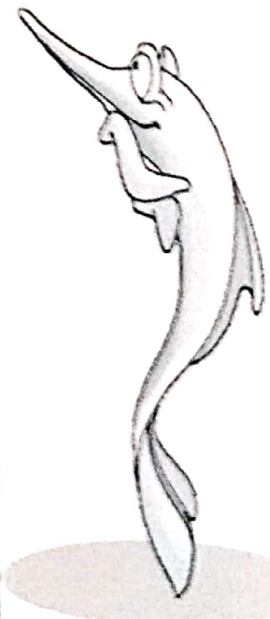
$$= \frac{7}{10} - \frac{5}{10}$$

$$= \frac{7-5}{10} = \frac{2}{10}$$

Now, change it into the lowest term.

$$\frac{2}{10} = \frac{2 \div 2}{10 \div 2} = \frac{1}{5}$$

So, $\frac{7}{10} - \frac{1}{2} = \frac{1}{5}$



B $8 - 2\frac{1}{4}$

$$8 - 2\frac{1}{4} = \frac{8}{1} - 2\frac{1}{4}$$

$$\frac{8}{1} - \frac{9}{4}$$

Convert the mixed number to improper fraction.
LCM of 1 and 4 is 4.

$$\frac{8 \times 4}{1 \times 4} - \frac{9}{4}$$

$$\frac{32}{4} - \frac{9}{4} = \frac{32-9}{4} = \frac{23}{4}$$

$$\frac{23}{4} = 5\frac{3}{4}$$

So, $8 - 2\frac{1}{4} = 5\frac{3}{4}$

EXERCISE 34

Subtract and write the answer in the simplest form.

1 $\frac{5}{6} - \frac{3}{8}$	2 $\frac{7}{8} - \frac{1}{6}$	3 $\frac{7}{8} - \frac{1}{3}$	4 $\frac{2}{3} - \frac{7}{12}$	5 $5\frac{1}{3} - 3\frac{3}{4}$	6 $3\frac{5}{6} - 2\frac{1}{12}$
7 $2\frac{2}{3} - 1\frac{1}{2}$	8 $2\frac{1}{8} - \frac{5}{12}$	9 $\frac{7}{11} - \frac{0}{10}$	10 $2\frac{4}{5} - \frac{9}{10}$	11 $1\frac{1}{3} - \frac{5}{6}$	12 $8\frac{3}{10} - 5\frac{9}{10}$
13 $\frac{11}{12} - \frac{3}{4}$	14 $6\frac{2}{9} - \frac{11}{12}$	15 $5 - 3\frac{3}{4}$	16 $3\frac{7}{8} - 2\frac{1}{6}$	17 $3\frac{5}{6} - 2\frac{1}{6}$	18 $4\frac{5}{9} - 3\frac{2}{9}$
19 $1\frac{4}{15} - \frac{7}{15}$	20 $8\frac{3}{10} - 5\frac{9}{10}$	21 $2 - \frac{1}{4}$	22 $5 - \frac{2}{5}$	23 $1 - \frac{1}{8}$	24 $2 - \frac{3}{10}$
25 $3 - \frac{0}{8}$	26 $\frac{3}{4} - \frac{1}{6}$	27 $\frac{2}{3} - \frac{1}{5}$	28 $\frac{3}{10} - \frac{1}{4}$	29 $\frac{3}{4} - \frac{5}{12}$	30 $\frac{11}{12} - \frac{3}{8}$
31 $\frac{2}{3} - \frac{4}{9}$	32 $1\frac{5}{6} - \frac{2}{9}$	33 $2\frac{7}{8} - \frac{3}{10}$	34 $3\frac{8}{9} - 2\frac{5}{6}$	35 $2\frac{9}{10} - \frac{11}{15}$	36 $8\frac{3}{4} - \frac{3}{5}$

Q.1:- A ruler is 1 foot long. Ram broke $\frac{1}{8}$ of this ruler. How much length of ruler is left?

Solution:- Length of the ruler = 1 foot
Part of ruler he broke = $\frac{1}{8}$ foot

Length of ruler left = $1 - \frac{1}{8}$

Convert into like fractions.

$\Rightarrow \frac{1}{1} = \frac{1 \times 8}{1 \times 8} = \frac{8}{8}$

$\Rightarrow \frac{8}{8} - \frac{1}{8} = \frac{8-1}{8} = \frac{7}{8}$ foot

(4) mohan ran a race in $8\frac{3}{10}$ minutes.
Ravi ran the same race in $6\frac{4}{5}$ minutes.
How much longer did it take mohan to complete the race?

Solution:- Time taken by mohan = $8\frac{3}{10} = \frac{83}{10}$ minutes

Time taken by Ravi = $6\frac{4}{5} = \frac{34}{5}$ minutes

Extra time taken by mohan = $\frac{83}{10} - \frac{34}{5}$

L.C.M. of 10 and 5 is 10.

$$\Rightarrow \frac{34}{5} = \frac{34 \times 2}{5 \times 2} = \frac{68}{10}$$

$$\Rightarrow \frac{83}{10} - \frac{68}{10} = \frac{83-68}{10} = \frac{15}{10} = \frac{3}{2}$$

$$\Rightarrow \frac{3}{2} \text{ minutes} = 1\frac{1}{2} \text{ minutes}$$

Mohan took $1\frac{1}{2}$ minutes more to complete the same race.

(6) One dog weighed $8\frac{1}{2}$ kg. Another dog weighed 6 kg. How much more did the heavier dog weigh?

Solution! - weight of first dog = $8\frac{1}{2}$ kg

weight of second dog = 6 kg.

\therefore first dog is heavier than second dog.

Extra weight first dog have = $(8\frac{1}{2} - 6)$ kg.

$$\Rightarrow 8\frac{1}{2} = \frac{2 \times 8 + 1}{2} = \frac{17}{2}$$

$$\Rightarrow \frac{17}{2} - \frac{6}{1}$$

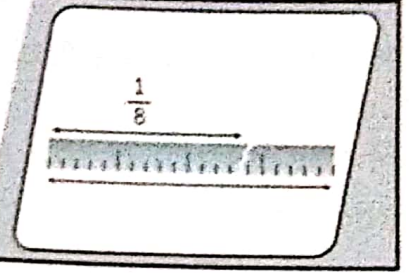
$$\Rightarrow \frac{6}{1} = \frac{6 \times 2}{1 \times 2} = \frac{12}{2}$$

$$\Rightarrow \frac{17}{2} - \frac{12}{2} = \frac{17-12}{2} = \frac{5}{2} = 2\frac{1}{2} \text{ kg.}$$

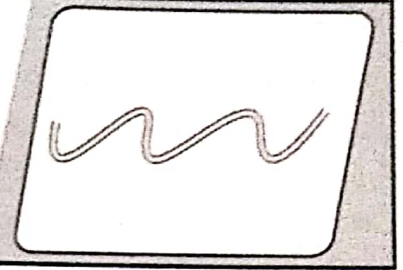
first dog weigh $2\frac{1}{2}$ kg more than second dog.
Solve rest of questions by yourself.

EXERCISE 35

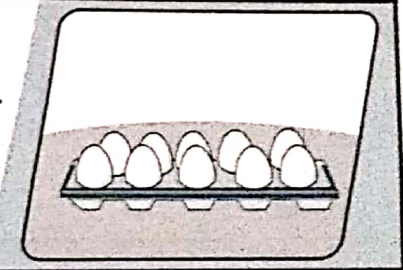
- ① A ruler is 1 foot long. Ram broke $\frac{1}{8}$ of this ruler. How much length of ruler is left?



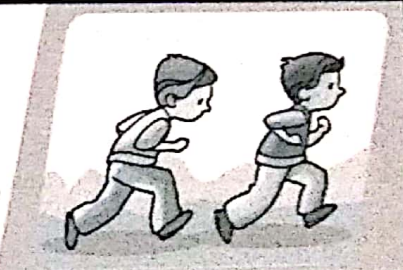
- ② A wire is $5\frac{7}{12}$ metres long. $\frac{11}{12}$ metres of this wire is used. How much wire is left?



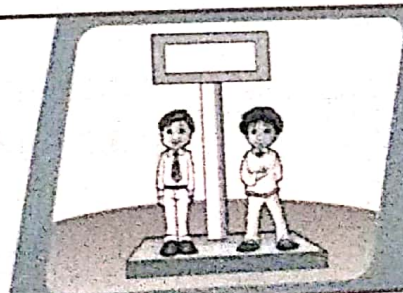
- ③ Ali had $\frac{5}{6}$ dozen of eggs. He used $\frac{5}{12}$ dozen for his lunch. How many eggs are left?



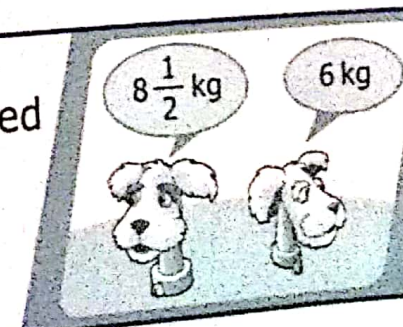
- ④ Mohan ran a race in $8\frac{3}{10}$ minutes. Ravi ran the same race in $6\frac{4}{5}$ minutes. How much longer did it take Mohan to complete the race?



- ⑤ Salim weighs $52\frac{1}{4}$ kg. Aslam weighs $50\frac{2}{5}$ kg. How much more does Salim weigh?



- ⑥ One dog weighed $8\frac{1}{2}$ kg. Another dog weighed 6 kg. How much more did the heavier dog weigh?



Multiply and write the answer into the simplest form:-

$$(1) 9 \times \frac{1}{2}$$

Solution:- Step 1 → Rewrite the whole number as fraction. $= 9 = \frac{9}{1}$

Step 2 → multiply the numerators. $\frac{9}{1} \times \frac{1}{2} = \frac{9 \times 1}{1 \times 2}$
multiply the denominators.

$$\Rightarrow \frac{9 \times 1}{1 \times 2} = \frac{9}{2}$$

Step 3 → simplify the fraction. $\frac{9}{2} = 9 \div 2$

$$2 \overline{) 9} = 4 \frac{1}{2}$$

$$\Rightarrow 9 \times \frac{1}{2} = 4 \frac{1}{2} \text{ ans.}$$

$$(3) \frac{3}{8} \times 16$$

$$\text{Solution 1 - } \frac{3}{8} \times \frac{16}{1} = \frac{3 \times 16}{8 \times 1} = \frac{48}{8} = 6$$

$$\Rightarrow \frac{3}{8} \times 16 = 6 \text{ ans.}$$

$$(6) \frac{4}{8} \times 0$$

Solution 1 - multiplication of a fraction by zero always results in zero.

Solve rest of questions by yourself.

EXERCISE 36

Multiply and write the answer into the simplest form:

1 $9 \times \frac{1}{2}$

2 $7 \times \frac{4}{5}$

3 $\frac{3}{8} \times 16$

4 $6 \times \frac{4}{5}$

5 $\frac{1}{18} \times 18$

6 $\frac{4}{8} \times 0$

7 $20 \times \frac{2}{5}$

8 $\frac{3}{4} \times 64$

9 $\frac{6}{12} \times 5$

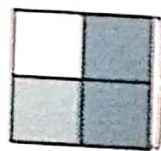
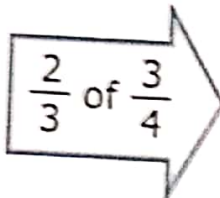
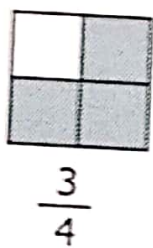
10 $\frac{9}{17} \times 1$

11 $9 \times \frac{1}{6}$

12 $0 \times \frac{11}{19}$

Multiplying a fraction by another fraction

$\frac{2}{3}$ of $\frac{3}{4}$ is same as $\frac{2}{3} \times \frac{3}{4}$.

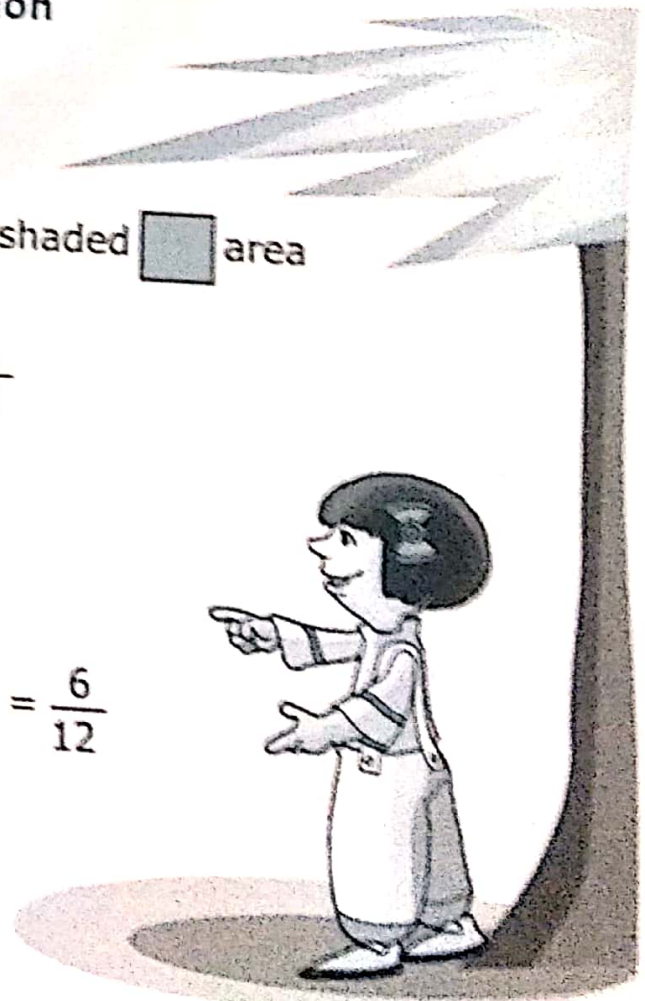


$\frac{2}{3}$ of total shaded area = $\frac{1}{2}$

$$\therefore \frac{2}{3} \times \frac{3}{4} = \frac{6}{12} = \frac{6/6}{12/6} = \frac{1}{2}$$

$$\frac{2}{3} \times \frac{3}{4} = \frac{2 \times 3}{3 \times 4} \begin{matrix} \text{(Multiply the numerators)} \\ \text{(Multiply the denominators)} \end{matrix} = \frac{6}{12}$$

Simplify $\frac{6}{12} = \frac{6/6}{12/6} = \frac{1}{2}$



EXERCISE 37

1. Multiply.

(a) $\frac{2}{3} \times \frac{4}{5} = \frac{2 \times 4}{3 \times 5} = \frac{8}{15}$	(b) $\frac{2}{5} \times \frac{1}{3} = \frac{2 \times 1}{5 \times 3} = \frac{2}{15}$
(c) $\frac{5}{6} \times \frac{1}{2} = \frac{5 \times 1}{6 \times 2} = \frac{5}{12}$	(d) $\frac{4}{5} \times \frac{2}{3} = \frac{4 \times 2}{5 \times 3} = \frac{8}{15}$
(e) $\frac{7}{8} \times \frac{1}{6} = \frac{7 \times 1}{8 \times 6} = \frac{7}{48}$	(f) $\frac{2}{3} \times \frac{2}{5} = \frac{2 \times 2}{3 \times 5} = \frac{4}{15}$
(g) $\frac{5}{8} \times \frac{3}{4} = \frac{5 \times 3}{8 \times 4} = \frac{15}{32}$	(h) $\frac{8}{7} \times \frac{2}{3} = \frac{8 \times 2}{7 \times 3} = \frac{16}{21}$

2. Multiply and express the product into the simplest form.

(a) $\frac{6}{7} \times \frac{2}{3} = \frac{6 \times 2}{7 \times 3} = \frac{12}{21} = \frac{12 \div 3}{21 \div 3} = \frac{4}{7}$	(b) $\frac{4}{7} \times \frac{3}{8}$		
(c) $\frac{5}{7} \times \frac{1}{4}$	(d) $\frac{8}{15} \times \frac{3}{2}$	(e) $\frac{5}{9} \times \frac{6}{10}$	(f) $\frac{7}{8} \times \frac{3}{4}$
(g) $\frac{3}{10} \times \frac{7}{8}$	(h) $\frac{7}{8} \times \frac{11}{12}$	(i) $\frac{9}{10} \times \frac{5}{6}$	(j) $\frac{3}{5} \times \frac{1}{2}$
(k) $\frac{5}{12} \times \frac{16}{25}$	(l) $\frac{1}{4} \times \frac{7}{8}$	(m) $\frac{4}{9} \times \frac{9}{14}$	(n) $\frac{3}{5} \times \frac{4}{9}$
(o) $\frac{4}{8} \times \frac{8}{7}$	(p) $\frac{1}{12} \times \frac{12}{1}$	(q) $\frac{6}{6} \times \frac{1}{3}$	(r) $\frac{8}{8} \times \frac{9}{9}$

Q2 multiply and express the Product into the simplest form.

(b) $\frac{4}{7} \times \frac{3}{8}$

Solution:- $\frac{4}{7} \times \frac{3}{8} = \frac{4 \times 3}{7 \times 8} = \frac{12}{56}$

HCF of 12 and 56 is 4.

$\Rightarrow \frac{12}{56} = \frac{12 \div 4}{56 \div 4} = \frac{3}{14}$ ans.

(d) $\frac{8}{15} \times \frac{3}{2}$

Solution:- $\frac{8}{15} \times \frac{3}{2} = \frac{8 \times 3}{15 \times 2} = \frac{24}{30}$

HCF of 24 and 30 is 6.

$\Rightarrow \frac{24}{30} = \frac{24 \div 6}{30 \div 6} = \frac{4}{5}$ ans.

(i) $\frac{9 \times 5^2}{10 \times 6}$

Solution:- $\frac{9 \times 5^2}{10 \times 6} = \frac{9 \times 5^2}{10 \times 6} = \frac{45^2}{60}$

HCF of 45 and 60 is 15.

$\Rightarrow \frac{45^2}{60} = \frac{45 \div 15^2}{60 \div 15^2} = \frac{3}{4}$ ans.

(m) $\frac{4}{9} \times \frac{9}{14}$

Solution:- $\frac{4}{9} \times \frac{9}{14} = \frac{4 \times 9}{9 \times 14} = \frac{36}{126}$

HCF of 36 and 126 is 18.

$\Rightarrow \frac{36}{126} = \frac{36 \div 18}{126 \div 18} = \frac{2}{7}$ ans.

Solve rest of questions by yourself as solved above.

write the reciprocal of the given numbers.

(2) 50

If the product of two fractions is 1, then they are reciprocal to each other.

solution :- $\frac{1}{50}$ is a reciprocal of 50.

$$\Rightarrow \frac{1}{50} \times 50 = \frac{1}{50} \times \frac{50}{1} = \frac{50}{50} = 1.$$

(3) $\frac{1}{10}$

solution :- 10 is the reciprocal of $\frac{1}{10}$.

(4) $\frac{8}{17}$

The reciprocal of a fraction just interchange the values of the numerator and the denominator.

solution :- $\frac{17}{8}$ is the reciprocal of $\frac{8}{17}$.

(6) $\frac{11}{19}$

solution :- $\frac{19}{11}$ is the reciprocal of $\frac{11}{19}$.

(10) $\frac{18}{1}$

solution :- $\frac{1}{18}$ is the reciprocal of $\frac{18}{1}$.

Solve the rest of questions by yourself as solved above.



There is something common in all these sums. The answer is always 1.



$$\begin{array}{ll} \frac{1}{3} \times 3 = 1 & \frac{1}{5} \times 5 = 1 \\ \frac{1}{11} \times 11 = 1 & \frac{1}{30} \times 30 = 1 \\ \frac{5}{7} \times \frac{7}{5} = 1 & \frac{7}{13} \times \frac{13}{7} = 1 \end{array}$$

Reciprocals are also known as multiplicative inverse.



If the product of two fractions is 1, we can say that the two fractions are reciprocal to each other.

$\frac{1}{6}$ is the reciprocal of 6. Likewise, 6 is the reciprocal of $\frac{1}{6}$.

Similarly, $\frac{5}{7} \times \frac{7}{5} = \frac{5 \times 7}{7 \times 5} = \frac{35}{35} = 1$

So, $\frac{5}{7}$ is the reciprocal of $\frac{7}{5}$.

If one fraction is reciprocal of the other fraction, their product will always be 1.

$$\frac{1}{6} \times 6 = \frac{1}{6} \times \frac{6}{1} = 6 \div 6 = 1$$

EXERCISE 38

Write the reciprocal of the given numbers.

1 $\frac{1}{3}$ Reciprocal \rightarrow 3

2 50 Reciprocal \rightarrow

3 $\frac{1}{10}$ Reciprocal \rightarrow

4 $\frac{8}{17}$ Reciprocal \rightarrow

5 99 Reciprocal \rightarrow

6 $\frac{11}{19}$ Reciprocal \rightarrow

7 $\frac{9}{23}$ Reciprocal \rightarrow

8 $\frac{13}{29}$ Reciprocal \rightarrow

9 $\frac{6}{13}$ Reciprocal \rightarrow

10 $\frac{18}{1}$ Reciprocal \rightarrow

11 33 Reciprocal \rightarrow

12 $\frac{5}{13}$ Reciprocal \rightarrow



IMPORTANT TIP

To find the reciprocal of a fraction, just interchange the values of the numerator and the denominator.

Example: The reciprocal of 8 is $\frac{1}{8}$ or reciprocal of $\frac{2}{3}$ is $\frac{3}{2}$.

- The reciprocal of 1 is 1.
- The reciprocal of 0 is not defined.
- If two numbers are reciprocal to each other their product is always 1.

Q.1 Simplify :

(g) $9 \div \frac{3}{7}$

Solution! - Division of a whole number by a fraction.

Step 1 \rightarrow Find the reciprocal of the divisor.

Reciprocal of $\frac{3}{7}$ is $\frac{7}{3}$.

Step 2 \rightarrow multiply the dividend ($\frac{9}{1}$) by the reciprocal

$\frac{7}{3}$. So, $\frac{9}{1} \times \frac{7}{3} = \frac{63}{3} = 21$

$\Rightarrow 9 \div \frac{3}{7} = 21$ ans.

(f) $51 \div \frac{17}{3}$

Solution! - Reciprocal of $\frac{17}{3}$ is $\frac{3}{17}$.

$\Rightarrow \frac{51}{1} \times \frac{3}{17} = \frac{51 \times 3}{1 \times 17} = \frac{153}{17} = 9$ ans.

(k) $\frac{1}{4} \div 12$

Solution! - Reciprocal of a divisor (12) is $\frac{1}{12}$.

$\Rightarrow \frac{1}{4} \times \frac{1}{12} = \frac{1 \times 1}{4 \times 12} = \frac{1}{48}$

(t) $\frac{2}{3} \div \frac{4}{9}$

Solution! - Reciprocal of a divisor ($\frac{4}{9}$) is $\frac{9}{4}$.

$\Rightarrow \frac{2}{3} \times \frac{9}{4} = \frac{2 \times 9}{3 \times 4} = \frac{18}{12}$

HCF of 18 and 12 is 6.

$$\Rightarrow \frac{18}{12} = \frac{18 \div 6}{12 \div 6} = \frac{3}{2} = 1\frac{1}{2} \text{ ans.}$$

$$(4) \frac{9}{28} \div \frac{3}{14}$$

Solution:- Reciprocal of a Divisor ($\frac{3}{14}$) is $\frac{14}{3}$.

$$\Rightarrow \frac{9}{28} \times \frac{14}{3} = \frac{9 \times 14}{28 \times 3} = \frac{126}{84}$$

HCF of 126 and 84 is 42.

$$\Rightarrow \frac{126}{84} = \frac{126 \div 42}{84 \div 42} = \frac{3}{2} = 1\frac{1}{2} \text{ ans.}$$

Solve rest of questions by yourself.

Q.2 Word Problems:-

(9) $\frac{8}{9}$ kg of sweets is to be equally distributed among 16 students. How much will each student get?

Solution:- Total quantity of sweets = $\frac{8}{9}$ kg

NO. of students = 16

Each one get = $(\frac{8}{9} \div 16)$ kg.

Reciprocal of divisor ($\frac{16}{1}$) is $\frac{1}{16}$.

$$\Rightarrow \frac{8}{9} \times \frac{1}{16} = \frac{8 \times 1}{9 \times 16} = \frac{8}{144} = \frac{1}{18} \text{ kg.}$$

Each student will get $\frac{1}{18}$ kg of sweets.

(c) How many cake pieces of $\frac{3}{8}$ kg each can be cut from a $4\frac{1}{8}$ kg cake?

Solution! - Total quantity of cake = $4\frac{1}{8} = \frac{33}{8}$ kg.

Quantity of each piece = $\frac{3}{8}$ kg.

Total No. of Pieces = $(\frac{33}{8} \div \frac{3}{8})$ kg.

Reciprocal of a divisor ($\frac{3}{8}$) is $\frac{8}{3}$.

$$\Rightarrow \frac{33}{8} \times \frac{8}{3} = \frac{33 \times 8}{8 \times 3} = \frac{264}{24}$$

$$\Rightarrow \begin{array}{r} 11 \\ 24 \overline{) 264} \\ \underline{-244} \\ 024 \\ \underline{-24} \\ 00 \end{array} = 11$$

there are total 11 pieces of cake.

(d) How many packets of sugar of $1\frac{3}{4}$ kg each can be made from $31\frac{1}{2}$ kg of sugar?

Solution! - Total quantity of sugar = $31\frac{1}{2}$ kg.

Quantity of each packet = $1\frac{3}{4}$ kg.

Number of packets that can be made

$$= 31\frac{1}{2} \div 1\frac{3}{4}$$

$$\Rightarrow \frac{63}{2} \div \frac{7}{4}$$

Reciprocal of the divisor ($\frac{2}{7}$) is $\frac{7}{2}$.

$$\Rightarrow \frac{63}{2} \times \frac{7}{2} = \frac{63 \times 7}{2 \times 2} = \frac{441}{4}$$

$$\Rightarrow 14 \overline{) 252}$$

18
<u>252</u>
-140
<u>112</u>
-112
<u>000</u>

Hence 18 packets can be made from $3\frac{1}{2}$ kg of sugar.

(f) Apple baskets of $\frac{4}{9}$ kg each are to be made from 144 kg apples. Find the number of baskets which can be made.

Solution! - Total quantity of apples = 144 kg.
Quantity of apples in each basket = $\frac{4}{9}$ kg.

$$\text{Number of baskets} = (144 \div \frac{4}{9}) \text{ kg.}$$

- Reciprocal of the divisor ($\frac{4}{9}$) is $\frac{9}{4}$.

$$\Rightarrow \frac{144 \times 9}{4} = \frac{144 \times 9}{1 \times 4} = \frac{1296}{4}$$

$$\Rightarrow 4 \overline{) 1296}$$

324
<u>1296</u>
-1200
<u>096</u>
-80
<u>16</u>
-16
<u>00</u>

Hence 324 baskets of apples can be made.

Q. (b) and (e) solve by yourself as solved above.

STEP 2 ▶ Multiply the dividend $\left(\frac{7}{8}\right)$ by the reciprocal (8) .

$$\frac{7}{8} \times 8 = \frac{7}{8} \times \frac{8}{1} = \frac{7 \times 8}{8 \times 1} = \frac{56}{8}$$



STEP 3 ▶ Simplify the fraction. $\frac{56}{8} = \frac{56 \div 8}{8 \div 8} = \frac{7}{1} = 7$

So, 7 pieces of $\frac{1}{8}$ metre each will be made from $\frac{7}{8}$ metre ribbon.

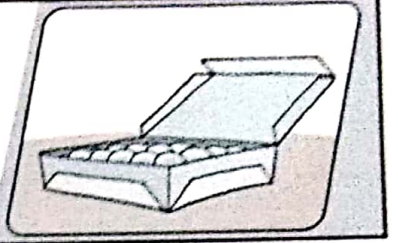
EXERCISE 39

1. Simplify.

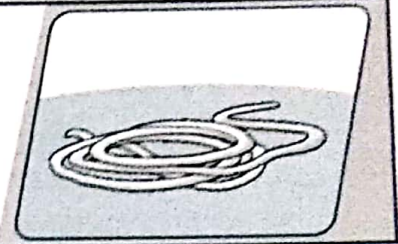
a) $9 \div \frac{3}{7}$	b) $12 \div \frac{6}{17}$	c) $12 \div \frac{9}{28}$	d) $4 \div \frac{3}{8}$	e) $0 \div \frac{8}{9}$
f) $51 \div \frac{17}{3}$	g) $4 \div \frac{8}{11}$	h) $15 \div \frac{5}{9}$	i) $\frac{2}{5} \div 9$	j) $\frac{4}{7} \div 12$
k) $\frac{1}{4} \div 12$	l) $7 \div \frac{1}{3}$	m) $8 \div \frac{1}{6}$	n) $10 \div \frac{1}{2}$	o) $6 \div \frac{3}{4}$
p) $\frac{9}{7} \div 3$	q) $\frac{2}{5} \div 2$	r) $\frac{1}{2} \div 7$	s) $\frac{7}{12} \div \frac{1}{2}$	t) $\frac{2}{3} \div \frac{4}{9}$
u) $\frac{1}{6} \div \frac{1}{6}$	v) $\frac{4}{5} \div \frac{5}{4}$	w) $\frac{0}{2} \div \frac{3}{8}$	x) $\frac{8}{11} \div \frac{8}{11}$	y) $\frac{9}{28} \div \frac{3}{14}$

2. Word problems

- a $\frac{8}{9}$ kg of sweets is to be equally distributed among 16 students. How much will each student get?



- b How many pieces of $\frac{3}{7}$ m each can be cut from a roll of $2\frac{4}{7}$ m length?



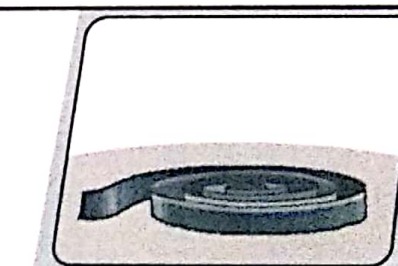
- c How many cake pieces of $\frac{3}{8}$ kg each can be cut from a $4\frac{1}{8}$ kg cake?



- d How many packets of sugar of $1\frac{3}{4}$ kg each can be made from $31\frac{1}{2}$ kg of sugar?



- e How many pieces of $\frac{3}{7}$ m each can be cut from a ribbon roll of $14\frac{1}{7}$ m length?



- f Apple baskets of $\frac{4}{9}$ kg each are to be made from 144 kg apples. Find the number of baskets which can be made.

