

NCERT QUESTIONS WITH SOLUTIONS

FIGURE IT OUT

7.1 FRACTIONAL UNITS AND EQUAL SHARES

Fill in the blanks with fractions.

1. Three guavas together weight 1 kg. If they are roughly of the same size, each guava will roughly weigh _____ kg.

Sol. Since three guavas weight 1 kg., So, one unit will be divided into three part to get weight of each guava.

Each guava weight $\frac{1}{3}$ kg.

2. A wholesale merchant packed 1 kg of rice in four packets of equal weight. The weight of each packet is _____ kg.

Sol. Since 1 kg of rice is packed in four packets of equal weight. Weight of each packet is $\frac{1}{4}$ kg.

3. Four friends ordered 3 glasses of sugarcane juice and shared it equally among themselves. Each one drank ____ glass of sugarcane juice.

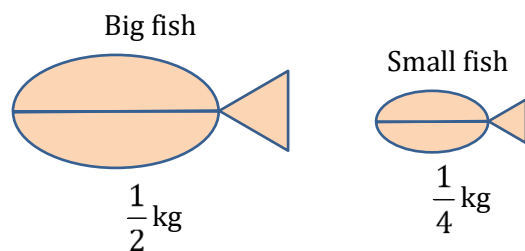
Sol. Since 3 glasses of sugarcane juice is to be shared equally among four friends, so each one drank $\frac{3}{4}$ glass of sugarcane juice.

4. The big fish weighs $\frac{1}{2}$ kg. The small one weighs $\frac{1}{4}$ kg. Together they weigh ____ kg.

Sol. Total weight of both fish = $\frac{1}{2} + \frac{1}{4}$

$$\frac{1 \times 2}{2 \times 2} = \frac{2}{4} ; \frac{1 \times 1}{4 \times 1} = \frac{1}{4}$$

$$\frac{1}{2} + \frac{1}{4} = \frac{2}{4} + \frac{1}{4} = \frac{2+1}{4} = \frac{3}{4} \text{ kg.}$$



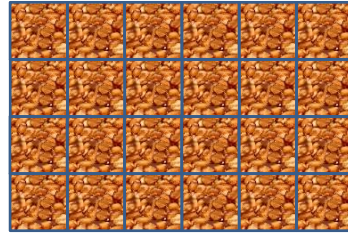
5. Arrange these fraction words in order of size from the smallest to the biggest in the empty box below:

One and a half, three quarters, one and a quarter, half, quarter, two and a half

Sol. One and a half = $1 + \frac{1}{2} = 1\frac{1}{2}$, half = $\frac{1}{2}$, quarter = $\frac{1}{4}$

One and a quarter = $1 + \frac{1}{4} = 1\frac{1}{4}$, two and a half = $2 + \frac{1}{2} = 2\frac{1}{2}$

7.2 FRACTIONAL UNITS AS PARTS OF A WHOLE



A whole chikki

The figures below show different fractional units of a whole chikki. How much of a whole chikki is each piece?

a.

b.

c.

d.

e.

f.

g.

h.

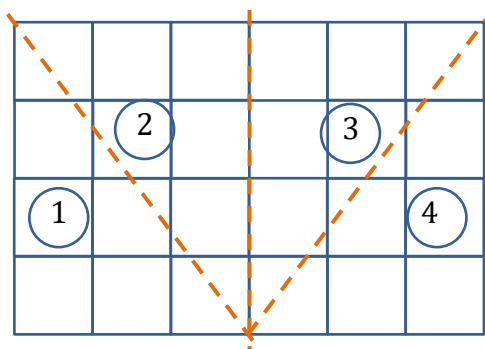
Sol.

a. We get the required piece by dividing the whole chikki into 12 equal pieces.

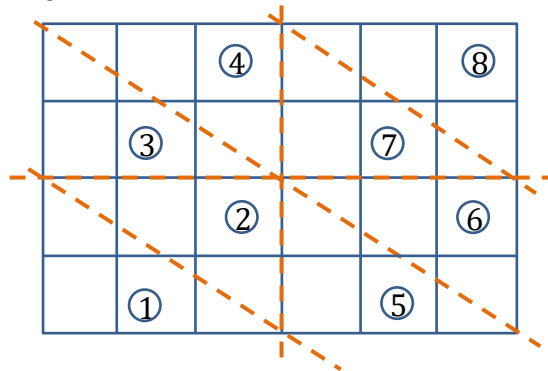
So, the required piece is $\frac{1}{12}$ chikki.

b. We get the required piece by dividing the whole chikki into 4 equal pieces.

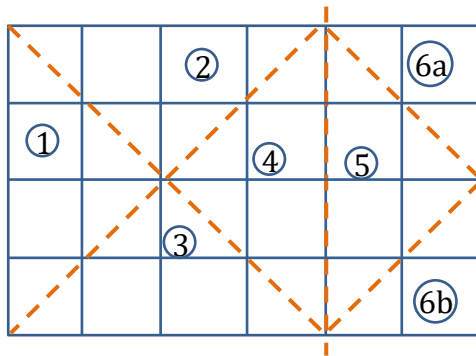
So, the required piece is $\frac{1}{4}$ chikki.



- c. We get the required piece by dividing the whole chikki into 8 equal parts.
So, the required piece is $\frac{1}{8}$ chikki.

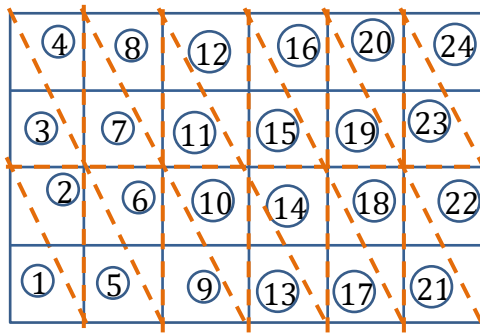


- d. We get the required piece by dividing the whole chikki into 6 equal prices.
So, the required piece is $\frac{1}{6}$ chikki.
- e. We get the required piece by dividing the whole chikki (i.e., 24 pieces) into 8 equal parts, then only we will 3 pieces of chikki in one part. So, the required piece is $\frac{1}{8}$.
- f. We get the required piece by dividing the whole chikki into 6 equals.
So, the required piece is $\frac{1}{6}$ chikki.




Note:
6a and 6b makes one piece of chikki.






- g. We get the required piece by dividing the whole chikki into 24 equal pieces.
So, the required piece is $\frac{1}{24}$ chikki.
- h. We get the required piece by dividing the whole chikki into 24 equal parts.
So, the required piece is $\frac{1}{24}$ chikki.



7.3 MEASURING USING FRACTIONAL UNITS



Let us look at another example.

 Represents a full roti (whole)


				
$\frac{1}{2}$	$\frac{1}{2} + \frac{1}{2}$	$\frac{1}{2} + \frac{1}{2} + \frac{1}{2}$	$\frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2}$	$\frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2}$
= 1 time $\frac{1}{2}$	= 2 times $\frac{1}{2}$	= 3 times $\frac{1}{2}$	= 4 times $\frac{1}{2}$	= 5 times $\frac{1}{2}$






1. Continue this table of $\frac{1}{2}$ for 2 more steps.



Sol.

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

2. Can you create a similar table for $\frac{1}{4}$?

Sol. Here  represents a whole roti.

				
$\frac{1}{4} =$	$\frac{1}{4} + \frac{1}{4}$	$\frac{1}{4} + \frac{1}{4} + \frac{1}{4}$	$\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4}$	$\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4}$
1 times $\frac{1}{4}$	2 times $\frac{1}{4}$	3 times $\frac{1}{4}$	4 times $\frac{1}{4}$	5 times $\frac{1}{4}$

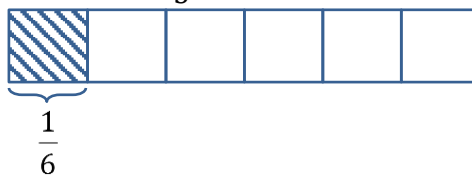
	
$\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4}$	$\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4}$
6 times $\frac{1}{4}$	7 times $\frac{1}{4}$

3. Making $\frac{1}{3}$ using a paper strip. Can you use this to also make $\frac{1}{6}$?

Sol. Making $\frac{1}{3}$ using a paper strip.



We can make $\frac{1}{6}$ by dividing the part $\frac{1}{3}$ into two equal parts.



4. Draw a picture and write an addition statement as above to show:

(a) 5 times $\frac{1}{4}$ of a roti

(b) 9 times $\frac{1}{4}$ of a roti

Sol. (a) 5 times $\frac{1}{4}$ of a roti.



$$\Rightarrow \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{5}{4}$$

\Rightarrow Here, one full roti and $\frac{1}{4}$ part of roti.

(b) 9 times $\frac{1}{4}$ of a roti.



$$\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{9}{4}$$

$$\underbrace{\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4}}_1 + \underbrace{\frac{1}{4} + \frac{1}{4} + \frac{1}{4}}_1 + \frac{1}{4} = 2 + \frac{1}{4}$$

\Rightarrow Here, 2 full rotis and $\frac{1}{4}$ part of roti.

5. Match each fractional unit with the correct picture:

$\frac{1}{3}$



$\frac{1}{5}$



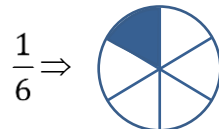
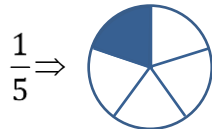
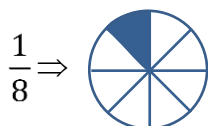
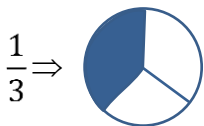
$\frac{1}{8}$



$\frac{1}{6}$



Sol.



7.4 MARKING FRACTION LENGTHS ON THE NUMBER LINE

1. On a number line, draw lines of lengths $\frac{1}{10}$, $\frac{3}{10}$, and $\frac{4}{5}$.

Sol. To represent $\frac{1}{10}, \frac{3}{10}, \frac{4}{5} (= \frac{8}{10})$ on a number line, divide the distance between '0' and 1 to 10 equal parts.



Point P represents $\frac{1}{10}$

Point Q represents $\frac{3}{10}$

Point R represents $\frac{8}{10}$ or $\frac{4}{5}$

2. Write five more fractions of your choice and mark them on the number line.

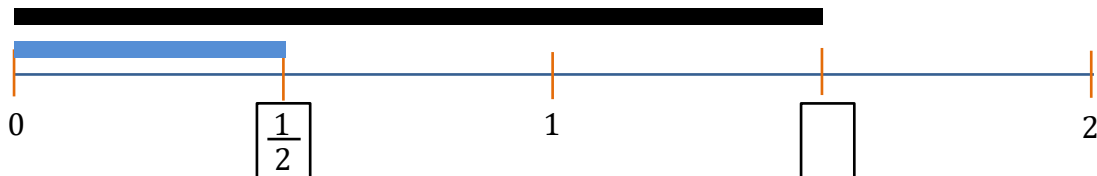
Sol. Do it yourself.

3. How many fractions lie between 0 and 1? Think, discuss with your classmates, and write your answer.

Sol. There are infinite number of fractions lie between 0 and 1.

Example : $\frac{3}{5}, \frac{4}{5}, \frac{7}{9}, \frac{8}{11}, \frac{5}{6}$ etc.

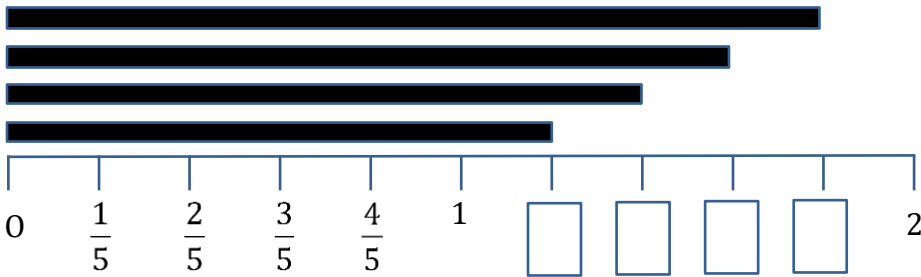
4. What is the length of the blue line and black line shown below? The distance between 0 and 1 is 1 unit long, and it is divided into two equal parts. The length of each part is $\frac{1}{2}$. So, the blue line is $\frac{1}{2}$ units long. Write the fraction that gives the length of the black line in the box.



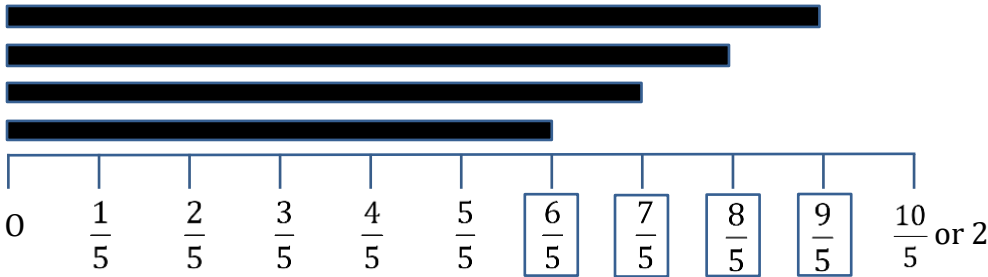
Sol. Length of blue line = $\frac{1}{2}$

Length of black line = $\frac{1}{2} + \frac{1}{2} + \frac{1}{2} = \frac{3}{2}$

5. Write the fraction that gives the lengths of the black lines in the respective boxes.



Sol.



7.5 MIXED FRACTIONS

1. How many whole units are there in $\frac{7}{2}$?

Sol. $\frac{7}{2} = 3 + \frac{1}{2}$

There are 3 whole units in $\frac{7}{2}$.

2. How many whole units are there in $\frac{4}{3}$ and in $\frac{7}{3}$?

Sol. $\frac{4}{3} = 1 + \frac{1}{3}$ and $\frac{7}{3} = 2 + \frac{1}{3}$

There is 1 whole unit in $\frac{4}{3}$ and 2 whole units in $\frac{7}{3}$.

7.5 MIXED FRACTIONS

1. Figure out the number of whole units in each of the following fractions:

- (a) $\frac{8}{3}$ (b) $\frac{11}{5}$ (c) $\frac{9}{4}$

Sol. (a) $\frac{8}{3} = 2 + \frac{2}{3} = 2\frac{2}{3}$

(b) $\frac{11}{5} = 2 + \frac{1}{5} = 2\frac{1}{5}$

(c) $\frac{9}{4} = 2 + \frac{1}{4} = 2\frac{1}{4}$

2. Can all fractions greater than 1 be written as such mixed numbers?

Sol. Yes, all fractions greater than 1 can be written as mixed numbers/ mixed fraction.

$$\text{Ex :- } \frac{12}{7} = 1 + \frac{5}{7} = 1\frac{5}{7}$$

3. Write the following fractions as mixed fractions (e.g., $\frac{9}{2} = 4\frac{1}{2}$):

(a) $\frac{9}{2}$

(b) $\frac{9}{5}$

(c) $\frac{21}{19}$

(d) $\frac{47}{9}$

(e) $\frac{12}{11}$

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

Sol. (a) $\frac{9}{2} = 4 + \frac{1}{2} = 4\frac{1}{2}$

(b) $\frac{9}{5} = 1 + \frac{4}{5} = 1\frac{4}{5}$

(c) $\frac{21}{19} = 1 + \frac{2}{19} = 1\frac{2}{19}$

(d) $\frac{47}{9} = 5 + \frac{2}{9} = 5\frac{2}{9}$

(e) $\frac{12}{11} = 1 + \frac{1}{11} = 1\frac{1}{11}$

(f) $\frac{19}{6} = 3 + \frac{1}{6} = 3\frac{1}{6}$

7.5 MIXED FRACTIONS

Write the following mixed numbers as fractions:

(a) $3\frac{1}{4}$

(b) $7\frac{2}{3}$

(c) $9\frac{4}{9}$

(d) $3\frac{1}{6}$

(e) $2\frac{3}{11}$

(f) $3\frac{9}{10}$

Sol. (a) $3\frac{1}{4} = 3 + \frac{1}{4} = \frac{3 \times 4 + 1}{4} = \frac{13}{4}$

(b) $7\frac{2}{3} = 7 + \frac{2}{3} = \frac{7 \times 3 + 2}{3} = \frac{22}{3}$

(c) $9\frac{4}{9} = 9 + \frac{4}{9} = \frac{9 \times 9 + 4}{9} = \frac{85}{9}$

(d) $3\frac{1}{6} = 3 + \frac{1}{6} = \frac{3 \times 6 + 1}{6} = \frac{19}{6}$

(e) $2\frac{3}{11} = 2 + \frac{3}{11} = \frac{2 \times 11 + 3}{11} = \frac{25}{11}$

(f) $3\frac{9}{10} = 3 + \frac{9}{10} = \frac{3 \times 10 + 9}{10} = \frac{39}{10}$

7.6 EQUIVALENT FRACTIONS

1. Are $\frac{3}{6}$, $\frac{4}{8}$, $\frac{5}{10}$ equivalent fractions? Why?

Sol. Since, $\frac{3}{6} \Rightarrow \frac{3 \div 3}{6 \div 3} = \frac{1}{2}$

$\frac{4}{8} \Rightarrow \frac{4 \div 4}{8 \div 4} = \frac{1}{2}$ and $\frac{5}{10} \Rightarrow \frac{5 \div 5}{10 \div 5} = \frac{1}{2}$

Since three fractions have same value when simplified, so they are equivalent fractions.

2. Write two equivalent fractions for $\frac{2}{3}$.

Sol. $\frac{2}{6} \Rightarrow \frac{2 \times 2}{6 \times 2} = \frac{4}{12}$

$\Rightarrow \frac{2 \times 3}{6 \times 3} = \frac{6}{18}$

3. $\frac{4}{6} = \frac{\square}{\square} = \frac{\square}{\square} = \frac{\square}{\square} = \dots\dots\dots$ (write as many you can)

$\frac{4}{6} = \frac{8}{12} = \frac{12}{18} = \frac{16}{24} = \dots\dots\dots$

Sol. $\frac{4}{6} \Rightarrow \frac{4 \times 2}{6 \times 2} = \frac{8}{12}$; $\frac{4 \times 3}{6 \times 3} = \frac{12}{18}$; $\frac{4 \times 4}{6 \times 4} = \frac{16}{24}$; $\dots\dots\dots$

$\frac{4}{6} = \frac{8}{12} = \frac{12}{18} = \frac{16}{24} = \dots\dots\dots$

7.6 EQUIVALENT FRACTIONS

1. Three rotis are shared equally by four children. Show the division in the picture and write a fraction for how much each child gets. Also, write the corresponding division facts, addition facts, and, multiplication facts.

Fraction of roti each child gets is _____.

Division fact:

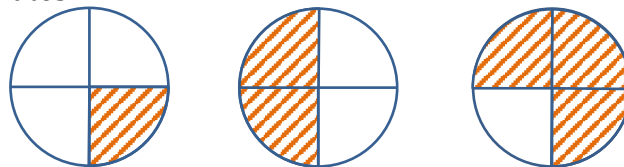
Addition fact:

Multiplication fact:

Compare your picture and answers with your classmates!



Sol.



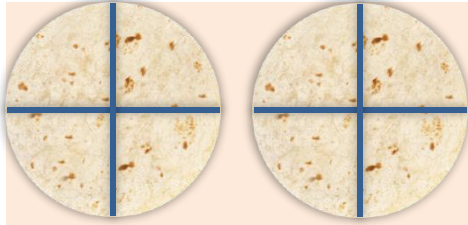
Division fact \Rightarrow 3 wholes divided in 4 parts $= 3 \div 4 = \frac{3}{4}$

Addition fact \Rightarrow Four times $\frac{3}{4}$ added gives 3 wholes $= \frac{3}{4} + \frac{3}{4} + \frac{3}{4} + \frac{3}{4} = \frac{12}{4} = 3$

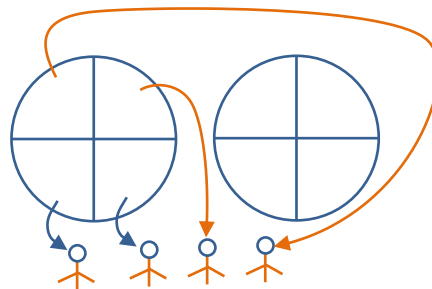
Multiplication fact \Rightarrow 4 parts of $\frac{3}{4}$ make 3 wholes $= 4 \times \frac{3}{4} = 3$

2. Draw a picture to show how much each child gets when 2 rotis are shared equally by 4 children. Also, write the corresponding division facts, addition facts, and multiplication facts.

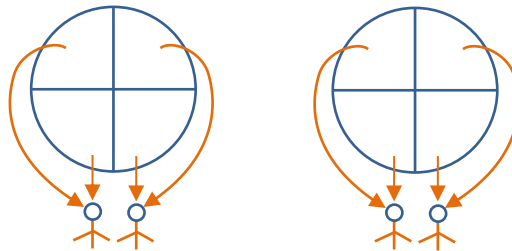
Sol. As 2 rotis have to be shared equally by 4 children we divide each roti in 4 parts and give



(a) 1 part of each roti to each-child as shown below :



(b) 2 parts to each child as shown below :



Division fact \Rightarrow 2 whole divides in 4 parts

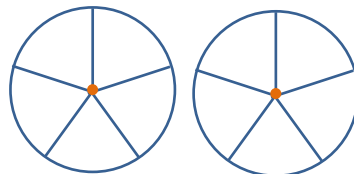
$$2 \div 4 \text{ or } \frac{2}{4} = \frac{1}{2}$$

$$\text{Addition fact } \Rightarrow \frac{2}{4} + \frac{2}{4} + \frac{2}{4} + \frac{2}{4} = \frac{8}{4} = 2$$

$$\text{Multiplication fact } = 4 \times \frac{2}{4} = 2$$

3. Anil was in a group where 2 cakes were divided equally among 5 children. How much cake would Anil get?

Sol.



Each cake gets divided into 5 parts and Anil gets one part from each cake i.e. $\frac{1}{5} + \frac{1}{5} = \frac{2}{5}$.

7.6 EQUIVALENT FRACTIONS

Find the missing numbers:

- (a) 5 glasses of juice shared equally among 4 friends is the same as ___ glasses of juice shared equally among 8 friends.

$$\text{So, } \frac{5}{4} = \frac{\square}{8}$$

- (b) 4 kg of potatoes divided equally in 3 bags is the same as 12 kgs of potatoes divided equally in ___ bags.

$$\text{So, } \frac{4}{3} = \frac{12}{\square}$$

- (c) 7 rotis divided among 5 children is the same as _____ rotis divided among _____ children.

$$\text{So, } \frac{7}{5} = \frac{\square}{\square}$$

Sol. (a) $\frac{5}{4} = \frac{\square}{8}$

$$\text{Since } 4 \times 2 = 8$$

$$\text{So, } 5 \times 2 = 10$$

$$\Rightarrow \frac{5}{4} = \frac{10}{8}$$

(b) $\frac{4}{3} = \frac{12}{\square}$

$$\text{Since } 4 \times 3 = 12$$

$$\text{So, } 3 \times 3 = 9$$

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

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

$$7 \times 2 = 14; 7 \times 3 = 21; 7 \times 4 = 28$$

$$5 \times 2 = 10; 5 \times 3 = 15; 5 \times 4 = 20$$

$$\frac{7}{5} = \frac{14}{10} ; \frac{7}{5} = \frac{21}{15} ; \frac{7}{5} = \frac{28}{10}$$

7.6 EQUIVALENT FRACTIONS

Find equivalent fractions for the given pairs of fractions such that the fractional units are the same.

- | | | | |
|-------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| (a) $\frac{7}{2}$ and $\frac{3}{5}$ | (b) $\frac{8}{3}$ and $\frac{5}{6}$ | (c) $\frac{3}{4}$ and $\frac{3}{5}$ | (d) $\frac{6}{7}$ and $\frac{8}{5}$ |
| (e) $\frac{9}{4}$ and $\frac{5}{2}$ | (f) $\frac{1}{10}$ and $\frac{2}{9}$ | (g) $\frac{8}{3}$ and $\frac{11}{4}$ | (h) $\frac{13}{6}$ and $\frac{1}{9}$ |

Sol. (a) The smallest common multiple of 2 and 5 is 10.

$$\frac{7 \times 5}{2 \times 5} = \frac{35}{10}; \quad \frac{3 \times 2}{5 \times 2} = \frac{6}{10}$$

(b) The smallest common multiple of 3 and 6 is 6.

$$\frac{8 \times 2}{3 \times 2} = \frac{16}{6} = \frac{5 \times 1}{6 \times 1} = \frac{5}{6}$$

(c) The smallest common multiple of 4 and 5 is 20.

$$\frac{3 \times 5}{4 \times 5} = \frac{15}{20}; \quad \frac{3 \times 4}{5 \times 4} = \frac{12}{20}$$

(d) The smallest common multiple of 7 and 5 is 35.

$$\frac{6 \times 5}{7 \times 5} = \frac{30}{35}; \quad \frac{8 \times 7}{5 \times 7} = \frac{42}{35}$$

(e) The smallest common multiple of 4 and 2 is 4.

$$\frac{9 \times 1}{4 \times 1} = \frac{9}{4} = \frac{5 \times 2}{2 \times 2} = \frac{10}{4}$$

(f) The smallest common multiple of 10 and 9 is 90.

$$\frac{1 \times 9}{10 \times 9} = \frac{9}{90}; \quad \frac{2 \times 10}{9 \times 10} = \frac{20}{90}$$

(i) The smallest common multiple of 3 and 4 is 12.

$$\frac{8 \times 4}{3 \times 4} = \frac{32}{12} = \frac{11 \times 3}{4 \times 3} = \frac{33}{12}$$

(h) The smallest common multiple of 6 and 9 is 18.

$$\frac{13 \times 3}{6 \times 3} = \frac{39}{18}; \quad \frac{1 \times 2}{9 \times 2} = \frac{2}{18}$$

7.6 EQUIVALENT FRACTIONS

Express the following fractions in lowest terms:

(a) $\frac{17}{51}$

(b) $\frac{64}{144}$

(c) $\frac{126}{147}$

(d) $\frac{525}{112}$

Sol. (a) Since, 17 is common factor of 17 and 51,

$$\text{So, } \frac{17 \div 17}{51 \div 17} = \frac{1}{3}$$

(b) $\frac{64}{144} \Rightarrow \frac{64 \div 2}{144 \div 2} = \frac{32}{72} \Rightarrow \frac{32 \div 2}{72 \div 2} = \frac{16}{36}$

$$\Rightarrow \frac{16 \div 2}{36 \div 2} = \frac{8}{18} \Rightarrow \frac{8 \div 2}{18 \div 2} = \frac{4}{9}$$

(c) Since 3 is common factor of 126 and 147,

$$\frac{126 \div 3}{147 \div 3} = \frac{42}{49} \Rightarrow \frac{42 \div 7}{49 \div 7} = \frac{6}{7}$$

(d) Since 7 as common multiple of 525 and 112,

$$\frac{525 \div 7}{112 \div 7} = \frac{75}{16}$$

7.7 COMPARING FRACTIONS

1. Compare the following fractions and justify your answers:

(a) $\frac{8}{3}, \frac{5}{2}$

(b) $\frac{4}{9}, \frac{3}{7}$

(c) $\frac{7}{10}, \frac{9}{14}$

(d) $\frac{12}{5}, \frac{8}{5}$

(e) $\frac{9}{4}, \frac{5}{2}$

Sol. (a) The smallest common multiple of 3 and 2, 4, 6.

$$\frac{8 \times 2}{3 \times 2} = \frac{16}{6}; \frac{5 \times 3}{2 \times 3} = \frac{15}{6}$$

Since $\frac{16}{6} > \frac{15}{6}$

$$\frac{8}{3} > \frac{5}{2}$$

(b) The smallest common multiple of 9, 7 is 63.

$$\frac{4}{9} \times \frac{7}{7} = \frac{28}{63}; \frac{3}{7} \times \frac{9}{9} = \frac{27}{63}$$

$\therefore \frac{28}{63} > \frac{27}{63}$

Now $\frac{4}{9} > \frac{3}{7}$

(c) The smallest common multiple of 10, 14, is 70.

$$\frac{7 \times 7}{10 \times 7} = \frac{49}{70}; \frac{9}{14} \times \frac{5}{5} = \frac{45}{70}$$

$\therefore \frac{49}{70} > \frac{45}{70}$

$\Rightarrow \frac{7}{10} > \frac{9}{14}$

(d) \therefore Both fraction have same denominators, $\frac{12}{5} > \frac{8}{5}$

(e) The smallest common multiple of 4, 2 is 4.

$$\frac{9}{4} \times \frac{1}{2} = \frac{9}{4}; \frac{5 \times 2}{2 \times 2} = \frac{10}{4}$$

$\therefore \frac{9}{4} < \frac{10}{4}$

$\Rightarrow \frac{9}{4} < \frac{5}{2}$

2. Write the following fractions in ascending order.

(a) $\frac{7}{10}, \frac{11}{15}, \frac{2}{5}$

(b) $\frac{19}{24}, \frac{5}{6}, \frac{7}{12}$

Sol. (a) The smallest common multiple of 10, 15, 5, is 30.

$$\frac{7 \times 3}{10 \times 3} = \frac{21}{30}; \frac{11 \times 2}{15 \times 2} = \frac{22}{30}; \frac{2 \times 4}{5 \times 4} = \frac{8}{20}$$

$$\therefore \frac{8}{20} < \frac{21}{30} < \frac{22}{30}$$

$$\Rightarrow \frac{2}{5} < \frac{7}{10} < \frac{11}{15} \quad (\text{ascending order})$$

(b) The smallest common multiple of 24, 6, 12, is 24.

$$\frac{19 \times 1}{24 \times 1} = \frac{19}{24}; \frac{5 \times 4}{6 \times 4} = \frac{20}{24}; \frac{7 \times 2}{12 \times 2} = \frac{14}{24}$$

$$\Rightarrow \frac{7}{12} < \frac{19}{24} < \frac{5}{6} \quad (\text{ascending order})$$

3. Write the following fractions in descending order.

(a) $\frac{25}{16}, \frac{7}{8}, \frac{13}{4}, \frac{17}{32}$

(b) $\frac{3}{4}, \frac{12}{5}, \frac{7}{12}, \frac{5}{4}$

Sol. (a) The smallest common multiple of 16, 8, 9, 32 is 32

$$\frac{25 \times 2}{16 \times 2} = \frac{50}{32}; \frac{7 \times 4}{8 \times 4} = \frac{28}{32}; \frac{13 \times 8}{4 \times 8} = \frac{104}{32}; \frac{17 \times 1}{32 \times 1} = \frac{17}{32}$$

$$\therefore \frac{104}{32} > \frac{50}{32} > \frac{28}{32} > \frac{17}{32}$$

$$\Rightarrow \frac{13}{4} > \frac{25}{16} > \frac{7}{8} > \frac{17}{32} \quad (\text{descending order})$$

(b) The smallest common multiple of 4, 5, 12, is 60.

$$\frac{3 \times 15}{4 \times 15} = \frac{45}{60}; \frac{12 \times 12}{5 \times 12} = \frac{144}{60}; \frac{7 \times 5}{12 \times 5} = \frac{35}{60}; \frac{5 \times 15}{4 \times 15} = \frac{75}{60}$$

$$\therefore \frac{144}{60} > \frac{75}{60} > \frac{45}{60} > \frac{35}{60}$$

$$\Rightarrow \frac{12}{5} > \frac{5}{4} > \frac{3}{4} > \frac{7}{12} \quad (\text{descending order})$$

7.8 ADDITION AND SUBTRACTION OF FRACTIONS

1. Add the following fractions using Brahmagupta's method:

(a) $\frac{2}{7} + \frac{5}{7} + \frac{6}{7}$

(b) $\frac{3}{4} + \frac{1}{3}$

(c) $\frac{2}{3} + \frac{5}{6}$

(d) $\frac{2}{3} + \frac{2}{7}$

(e) $\frac{2}{3} + \frac{4}{5}$

(g) $\frac{4}{5} + \frac{2}{3}$

(h) $\frac{3}{5} + \frac{5}{8}$

(i) $\frac{9}{2} + \frac{5}{4}$

(j) $\frac{8}{3} + \frac{2}{7}$

(k) $\frac{3}{4} + \frac{1}{3} + \frac{1}{5}$

(l) $\frac{2}{5} + \frac{4}{5} + \frac{3}{7}$

(m) $\frac{9}{2} + \frac{5}{4} + \frac{7}{6}$

Sol. (a) $\frac{2}{7} + \frac{5}{7} + \frac{6}{7} = \frac{2+5+6}{7} = \frac{13}{7}$

(b) $\frac{3}{4} \times \frac{3}{3} = \frac{9}{12}$; $\frac{1}{3} \times \frac{4}{4} = \frac{4}{12}$
 $\frac{3}{4} + \frac{1}{3} = \frac{9}{12} + \frac{4}{12} = \frac{9+4}{12} = \frac{13}{12}$

(c) $\frac{2}{3} \times \frac{2}{2} = \frac{4}{6}$; $\frac{5 \times 1}{6 \times 1} = \frac{5}{6}$
 $\frac{2}{3} + \frac{5}{6} = \frac{4}{6} + \frac{5}{6} = \frac{4+5}{6} = \frac{10}{6} = \frac{10 \div 2}{6 \div 2} = \frac{5}{3}$

(d) $\frac{2 \times 7}{3 \times 7} = \frac{14}{21}$; $\frac{2 \times 3}{7 \times 3} = \frac{6}{21}$
 $\frac{2}{3} + \frac{2}{7} = \frac{14}{21} + \frac{6}{21} = \frac{14+6}{21} = \frac{20}{21}$

(e) $\frac{3}{4} + \frac{1}{3} + \frac{1}{5}$

The smallest common multiple of 3, 4, 5 is 60.

$\frac{3 \times 15}{4 \times 15} = \frac{45}{60}$; $\frac{1 \times 20}{3 \times 20} = \frac{20}{60}$; $\frac{1 \times 12}{5 \times 12} = \frac{12}{60}$
 $\frac{3}{4} + \frac{1}{3} + \frac{1}{5} = \frac{45}{60} + \frac{20}{60} + \frac{12}{60} = \frac{45+20+12}{60} = \frac{77}{60}$

(f) $\frac{2 \times 5}{3 \times 5} = \frac{10}{15}$; $\frac{4 \times 3}{5 \times 3} = \frac{12}{15}$
 $\frac{2}{3} + \frac{4}{5} = \frac{10}{15} + \frac{12}{15} = \frac{10+12}{15} = \frac{22}{15}$

(g) $\frac{4 \times 3}{5 \times 3} = \frac{12}{15}$; $\frac{2 \times 5}{3 \times 5} = \frac{10}{15}$
 $\frac{4}{5} + \frac{2}{3} = \frac{12}{15} + \frac{10}{15} = \frac{12+10}{15} = \frac{22}{15}$

(h) The smallest common multiple of 5 and 8 is 40

$\frac{3 \times 8}{5 \times 8} = \frac{24}{40}$; $\frac{5 \times 5}{8 \times 5} = \frac{25}{40}$
 $\frac{24}{40} + \frac{25}{40} = \frac{24+25}{40} = \frac{49}{40}$

(i) $\frac{9 \times 2}{2 \times 2} = \frac{18}{4}$; $\frac{5 \times 1}{4 \times 1} = \frac{5}{4}$
 $\frac{18}{4} + \frac{5}{4} = \frac{18+5}{4} = \frac{23}{4}$

(j) $\frac{8 \times 7}{3 \times 7} = \frac{56}{21}$; $\frac{2 \times 3}{7 \times 3} = \frac{6}{21}$
 $\frac{56}{21} + \frac{6}{21} = \frac{56+6}{21} = \frac{62}{21}$

(k) The smallest common multiple of 3, 4, 5 is 60.

$$\frac{3 \times 15}{4 \times 15} = \frac{45}{60}; \frac{1 \times 20}{3 \times 20} = \frac{20}{60}; \frac{1 \times 12}{8 \times 12} = \frac{12}{60}$$

$$\frac{45}{60} + \frac{20}{60} + \frac{12}{60} = \frac{45+20+12}{60} = \frac{77}{60}$$

(l) The smallest common multiple of 3, 5, 7 is 105.

$$\frac{2 \times 35}{3 \times 35} = \frac{70}{105}; \frac{4 \times 21}{5 \times 21} = \frac{84}{105}; \frac{3 \times 15}{7 \times 15} = \frac{45}{105}$$

$$\frac{70}{105} + \frac{84}{105} + \frac{45}{105} = \frac{70+84+45}{105} = \frac{199}{105}$$

(m) The smallest common multiple of 2, 4, 6, is 12.

$$\frac{9 \times 6}{2 \times 6} = \frac{54}{12}; \frac{5 \times 3}{4 \times 3} = \frac{15}{12}; \frac{7 \times 2}{6 \times 2} = \frac{14}{12}$$

$$\frac{54}{12} + \frac{15}{12} + \frac{14}{12} = \frac{54+15+14}{12} = \frac{83}{12}$$

2. Rahim mixes $\frac{2}{3}$ litres of yellow paint with $\frac{3}{4}$ litres of blue paint to make green paint. What is the volume of green paint he has made?

Sol. Volume of green paint = $\frac{2}{3} + \frac{3}{4}$

$$\frac{2 \times 4}{3 \times 4} = \frac{8}{12}; \frac{3 \times 3}{4 \times 3} = \frac{9}{12}$$

$$\frac{2}{3} + \frac{3}{4} = \frac{8}{12} + \frac{9}{12} = \frac{8+9}{12} = \frac{17}{12}$$

3. Geeta bought $\frac{2}{5}$ meter of lace and Shamim bought $\frac{3}{4}$ meter of the same lace to put a complete border on a table cloth whose perimeter is 1 meter long. Find the total length of the lace they both have bought. Will the lace be sufficient to cover the whole border?

Sol. Total length of the lace Geeta and Shamim have bought = $\frac{2}{5} + \frac{3}{4}$

The smallest common multiple of 5 and 4 is 20.

$$\frac{2 \times 4}{5 \times 4} = \frac{8}{20}; \frac{3 \times 5}{4 \times 5} = \frac{15}{20}$$

$$\frac{8}{20} + \frac{15}{20} = \frac{23}{20} \text{ m} = 1 \frac{3}{20} \text{ m}$$

$$= 1 \text{ m} + \frac{3}{20} \times 100 \text{ cm}$$

$$= 1 \text{ m } 15 \text{ cm.}$$

Since perimeter of border on table cloth as 1m.

Here, length of lack is greater than perimeter,

So, the required length of lace will be sufficient to cover the whole border.

7.8 ADDITION AND SUBTRACTION OF FRACTIONS

1. $\frac{5}{8} - \frac{3}{8}$

Sol. $\frac{5}{8} - \frac{3}{8} = \frac{5-3}{8} = \frac{2}{8} = \frac{2 \div 2}{8 \div 2} = \frac{1}{4}$

2. $\frac{7}{9} - \frac{5}{9}$

Sol. $\frac{7}{9} - \frac{5}{9} = \frac{7-5}{9} = \frac{2}{9}$

3. $\frac{10}{27} - \frac{1}{27}$

Sol. $\frac{10}{27} - \frac{1}{27} = \frac{10-1}{27} = \frac{9}{27} = \frac{9 \div 9}{27 \div 9} = \frac{1}{3}$

7.8 ADDITION AND SUBTRACTION OF FRACTIONS

1. Carry out the following subtractions using Brahmagupta’s method:

(a) $\frac{8}{15} - \frac{3}{15}$

(b) $\frac{2}{5} - \frac{4}{15}$

(c) $\frac{5}{6} - \frac{4}{9}$

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

Sol. (a) $\frac{8}{15} - \frac{3}{15}$

$\Rightarrow \frac{8-3}{15}$ {∵ same denominators}

$\Rightarrow \frac{5}{15}$

(b) $\frac{2}{5} - \frac{4}{15}$

Converting given fraction having same denominator into equivalent fraction,

$\frac{2 \times 3}{5 \times 3} = \frac{6}{15}$; $\frac{4 \times 1}{15 \times 1} = \frac{4}{15}$

$\Rightarrow \frac{6}{15} - \frac{4}{15} = \frac{6-4}{15} = \frac{2}{15}$.

(c) $\frac{5}{6} - \frac{4}{9}$

Converting given fraction into equivalent fraction having same denominator,

$\frac{5 \times 3}{6 \times 3} = \frac{15}{18}$; $\frac{4 \times 2}{9 \times 2} = \frac{8}{18}$

$\Rightarrow \frac{15}{18} - \frac{8}{18} = \frac{15-8}{18} = \frac{7}{18}$.

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

Converting given fraction into equivalent fraction having same denominator,

$$\frac{2 \times 2}{3 \times 2} = \frac{4}{6}; \quad \frac{1 \times 3}{2 \times 3} = \frac{3}{6}$$

$$\Rightarrow \frac{4}{6} - \frac{3}{6} = \frac{4-3}{6} = \frac{1}{6}$$

2. Subtract as indicated:

(a) $\frac{13}{4}$ from $\frac{10}{3}$ (b) $\frac{18}{5}$ from $\frac{23}{3}$ (c) $\frac{29}{7}$ from $\frac{45}{7}$

Sol. (a) $\frac{13}{4}$ from $\frac{10}{3} \Rightarrow \frac{10}{3} - \frac{13}{4}$

$$\frac{10 \times 4}{3 \times 4} = \frac{40}{12}; \quad \frac{13 \times 3}{4 \times 3} = \frac{39}{12}$$

$$\Rightarrow \frac{40}{12} - \frac{39}{12} = \frac{1}{12}$$

(b) $\frac{18}{5}$ from $\frac{23}{3} \Rightarrow \frac{23}{3} - \frac{18}{5}$

$$\frac{23 \times 5}{3 \times 5} = \frac{115}{15}; \quad \frac{18 \times 3}{5 \times 3} = \frac{54}{15}$$

$$\Rightarrow \frac{115}{15} - \frac{54}{15} = \frac{115-54}{15} = \frac{61}{15}$$

(c) $\frac{29}{7}$ from $\frac{45}{7} \Rightarrow \frac{45}{7} - \frac{29}{7}$

$$\frac{45-29}{7} = \frac{16}{7}$$

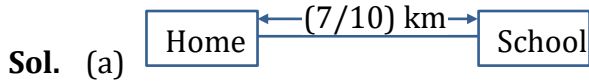
3. Solve the following problems:

(a) Jaya's school is $\frac{7}{10}$ km from her home. She takes an auto for $\frac{1}{2}$ km from her home daily,

and then walks the remaining distance to reach her school. How much does she walk daily to reach the school?

(b) Jeevika takes $\frac{10}{3}$ minutes to take a complete round of the park and her friend Namit

takes $\frac{13}{4}$ minutes to do the same. Who takes less time and by how much?



Distance between home and school = $\frac{7}{10}$ km.

Distance travelled by auto = $\frac{1}{2}$ km.

So, remaining distance travelled by walk.

$$\Rightarrow \frac{7}{10} - \frac{1}{2}$$

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

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

$$= \frac{2 \div 2}{10 \div 2} = \frac{1}{5} \text{ km.}$$

(b) Time taken by Jeevika = $\frac{10}{3}$ minutes.

Time taken by Namit = $\frac{13}{4}$ minutes.

$$\text{Now, } \frac{10 \times 4}{3 \times 4} = \frac{40}{12} ; \frac{13}{4} \times \frac{3}{3} = \frac{39}{12}$$

Comparing $\frac{40}{12}$ and $\frac{39}{12}$,

$$\frac{40}{12} > \frac{39}{12} \quad \{\text{For same denominator, fraction having greater numerator is greater}\}$$

$$\text{So, } \frac{10}{3} > \frac{13}{4}$$

Or we can say Namit takes less time.

$$\text{Also, } \frac{10}{3} - \frac{13}{4} = \frac{40}{12} - \frac{39}{12}$$

$$= \frac{40-39}{12} = \frac{1}{12} \text{ minutes}$$

Namit takes less time by $\frac{1}{12}$ minutes.