Fractions

Addition, Subtraction, Multiplication and Division

Grade 5

Prime numbers: 2, 3, 5, 7, 11, 13, 17, 19

only and only two factors which 1 and the number itself.

1 ⇒ only one factor.

therefore 1 is not a prime number.

3 goats, 1 dog: 0 cat

3 goats 2 dog 1 cat

Even no. → 0, 2, 4, 6, 8, 10, 12, ... } Numbers which are completely divisible by 2.

Odd no. → 3, 5, 7, 9, 11, 13, ... } Numbers which are not completely divisible by 2.

Composite Numbers :→ Numbers having more than two factors.

4, 6, 8, etc.

Fractions

⇒ Fraction is a part of a whole (complete)

FRACTIONS

eg:
- $\frac{2}{3}$ → 2 → numerator, 3 → denominator
- $\frac{5}{9}$
- $\frac{4}{11}$

→ whole pizza with 6 slices

$\frac{1}{6}$ (shaded)

Remaining slices = $\frac{5}{6}$ (Unshaded)

Types of fractions

① **Like fractions**

fractions with same denominator.

eg: $\frac{2}{5}, \frac{3}{5}, \frac{4}{5}, \frac{1}{5}, \frac{5}{5}$ → is a whole

$\frac{5}{5} = 1$

② **Unlike fraction**

"fractions having different denominators"

eg: $\frac{1}{4}, \frac{2}{3}, \frac{6}{7}, \frac{11}{13}, \frac{2}{8}, \frac{15}{12}, \frac{12}{15}$

(3) Unit fractions

Numerator always equals to 1.

eg. $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{9}$, etc.

(4) Proper fraction

A fraction whose numerator is less than its denominator

eg: $\frac{2}{3}$, $\frac{3}{5}$, $\frac{7}{12}$, ...

(5) Improper fractions

Numerator is bigger than its denominator

for example: $\frac{7}{5}$, $\frac{12}{7}$, $\frac{13}{11}$, $\frac{17}{12}$, $\frac{100}{28}$

(6) Mixed fraction (Mixed numerals)

$\frac{7}{5} = 1\frac{2}{5}$

$\frac{7}{5} = 1\frac{2}{5}$

5) 7 (1 Quotient (Q)
−5
2 Remainder (R)

$\frac{Nu}{De} = Q\frac{R}{De}$

$\frac{\text{Numerator}}{\text{Denominator}} = \text{Denominator}\overline{)\text{Numerator}}$

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

5) 5 (1
−5
0

5) 10 (2
−10
0

Convert $\frac{23}{9}$ into mixed numeral.

(mixture of whole no. + proper fraction)

$$\frac{23}{9} = Q + \frac{R}{De}$$

$$= 2 + \frac{5}{9}$$

$$\boxed{\frac{23}{9} = 2\frac{5}{9}}$$

$$\begin{array}{r} 2 \rightarrow Q \\ 9\,)\,\overline{23}\, \\ -18 \\ \hline 5 \rightarrow R \end{array}$$

Q. (i) $\frac{23}{7} = 3\frac{2}{7}$

(ii) $\frac{37}{6} = 6\frac{1}{6}$

(iii) $\frac{49}{7} = 7\frac{0}{7} = 7$

(iv) $\frac{99}{9} = 9\frac{7}{9}$

(v) $3\frac{4}{5} = \frac{19}{5}$

Q. Write three fraction equivalent to $\frac{3}{4}$.

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

$\frac{4}{4} \times 4$

$\frac{6}{8}, \frac{9}{12}, \frac{12}{16}$ equivalent to $\frac{3}{4}$

Q. $\frac{2}{7} = \frac{8}{28}$

Q. Write a fraction equivalent to $\frac{5}{9}$, with denominator 45.

$$\frac{5}{9} \times \frac{5}{5} = \frac{\square}{45}$$

Q. Write an equivalent fraction of $\frac{35}{42}$, with denominator 18.

$$\frac{35}{42} \div \frac{7}{7} = \frac{5}{6} \times \frac{3}{3} = \frac{15}{18}$$

35 = 1, 5, 7, 35

42 = 1, 2, 3, 6, 7, ...

1, 2, 3, 6, 9, 18

Comparing two fraction

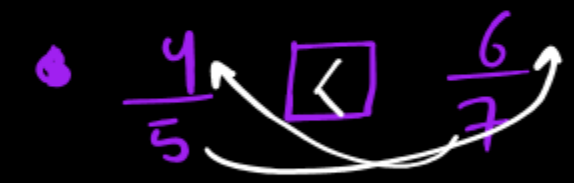
$=$, $<$, $>$

$=$ equal to

$<$ less than

$>$ greater than.

eg:



$$\frac{4 \times 7}{28} < \frac{6 \times 5}{30}$$

Check whether $\frac{3}{7}$ and $\frac{9}{21}$ are equivalent fractions

$3 \times 21 = 63$

$9 \times 7 = 63$

$$\frac{3}{7} = \frac{9}{21}$$

$21 = 20 + 1$

3×21

$3 \times (20 + 1)$

$60 + 3$

63

$\frac{9}{11}$ > $\frac{3}{7}$

$60 \times 4 = 240$

$600 \times 4 = 2400$

$6 \times 100 \times 4$

$4 \times 22 = 88$

$5 \times 21 = 105$

$2 \times 62 = 124$

$2 \times (60 + 2)$

$4 \times 63 = 240 + 12 = 252$

$4 (20 + 2)$

Q. (1) $\frac{3}{13}$ $\square$ $\frac{9}{39}$

(2) Write 3 fraction equivalent to $\frac{5}{7}$]

$$\frac{7}{5} + \frac{2}{5} = \frac{9}{5} = 1\frac{4}{5}$$

$$\frac{7 \times 3}{5 \times 3} + \frac{2 \times 5}{3 \times 5} =$$

$$\frac{21}{15} + \frac{10}{15} = \frac{31}{15} = 2\frac{1}{15}$$

$$\frac{2}{3} \times \frac{5}{5}$$

$5 \overline{)5}$

$\frac{5}{5} = 1$

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

$\frac{13}{13} = 1$

$$\frac{7 \times 3}{5 \times 3} + \frac{2 \times 5}{3 \times 5}$$

LCM of 5 and 3 = 15

$$\frac{5}{11} + \frac{7}{22} = \frac{(5 \times 22) + (7 \times 11)}{11 \times 22} = \frac{110 + 77}{242}$$

$$= \frac{187}{242}$$

$$\begin{array}{r} 11 \\ \times\ 22 \\ \hline 22 \\ 220 \\ \hline 242 \end{array}$$

$$\frac{5 \times 2}{11 \times 2} + \frac{7}{22}$$

$$\frac{10}{22} + \frac{7}{22} = \boxed{\frac{17}{22}}$$

(iii)

$$\frac{3}{4} + \frac{1 \times 2}{2 \times 2} = 1\frac{2}{8} = 1\frac{1}{4}$$

$\frac{2}{8} =$

LCM (4, 2) = 4

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

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

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

LCM of denominator

4, 5, 2

LCM = 20

$$= \frac{3 \times 5}{4 \times 5} + \frac{2 \times 4}{5 \times 4} + \frac{1 \times 10}{2 \times 10}$$

$$= \frac{15}{20} + \frac{8}{20} + \frac{10}{20} = \frac{33}{20} = 1\frac{13}{20}$$ ✓

$$\frac{5}{7} + \frac{9}{14} + \frac{1}{2}$$

$$\frac{5 \times 2}{7 \times 2} + \frac{9}{14} + \frac{1 \times 7}{2 \times 7}$$

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

$$\Rightarrow \frac{26}{14}$$

$$\Rightarrow 1\frac{12}{14}$$

$$1\frac{3}{5} + 2\frac{7}{10}$$

$$\frac{8}{5} + \frac{27}{10}$$

LCM (5, 10) = 10

$$\frac{8 \times 2}{5 \times 2} + \frac{27}{10}$$

$$\frac{16}{10} + \frac{27}{10}$$

$$\frac{43}{10} = \boxed{4\frac{3}{10}}$$

Subtract $\frac{4}{9}$ ~~from~~ from $\frac{7}{9}$

$$\frac{7}{9} - \frac{4}{9} = \frac{7-4}{9} = \frac{3 \div 3}{9 \div 3} = \boxed{\frac{1}{3}}$$

$$\boxed{\frac{7}{8} - \frac{5}{12} = \frac{11}{24}}$$

LCM of 8, 12 =

$$\frac{2}{1} - \frac{5}{9}$$

$$\frac{13}{9} = 1\frac{4}{9}$$

Q. Find the difference (Subtraction) between $\frac{4}{9}$ and $\frac{5}{12}$.

LCM of 9, 12 = 36

$$\frac{4 \times 4}{9 \times 4} = \frac{16}{36}$$

$$\frac{5 \times 3}{12 \times 3} \quad \frac{15}{36}$$

$$\frac{4}{9} - \frac{5}{12}$$

$$\frac{16}{36} - \frac{15}{36} = \frac{1}{36}$$

Q. Subtract $5\frac{1}{6}$ from $10\frac{2}{3}$

$$10\frac{2}{3} - 5\frac{1}{6}$$

$$\frac{33}{6} \begin{matrix} \div 3 \\ \div 3 \end{matrix} = \frac{11}{2} = 5\frac{1}{2}$$

$$5\frac{3}{6} = 5\frac{1}{2}$$

① Subtract $\frac{7}{10}$ from $3\frac{1}{5}$ ⇒

$2\frac{5}{10}$ = $2\frac{1}{2}$ final answer

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

② $5\frac{1}{6} - 1\frac{7}{10}$ ⇒

$3\frac{14}{30}$ ✓

$\frac{31 \times 5}{6 \times 5} - \frac{17}{10}$

$$\begin{array}{r} 31 \\ \times\ 5 \\ \hline 155 \end{array}$$

$\frac{155}{30} - \frac{51}{30} = \frac{104}{30}$ ✓

Find the difference of $\frac{1}{6}$ and $\frac{2}{3}$

$$\frac{2}{3} \ominus \frac{1}{6} = \frac{2\times6 - 1\times3}{3\times6}$$

$$= \frac{12-3}{18}$$

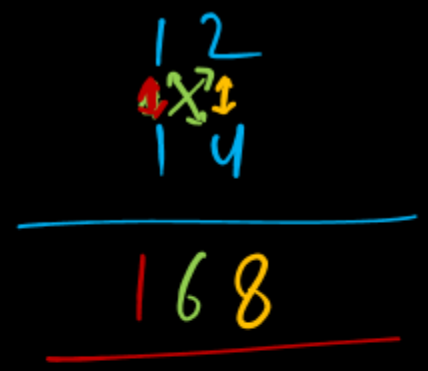
$$= \frac{9 \div 9}{18 \div 9}$$

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

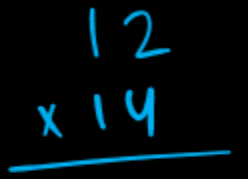
3 | 1×3 / 6 | < | 2×6 / 3 | 12

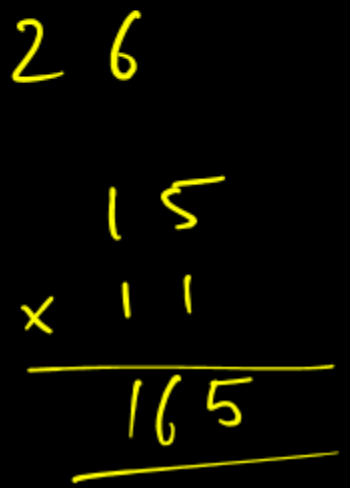
12
+13

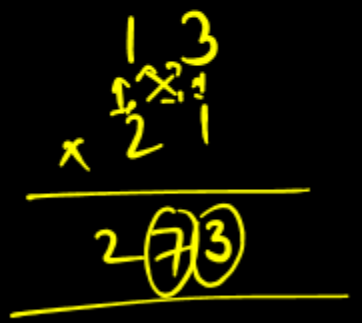
0.



4+2







$$\begin{array}{r} 39 \\ \times\ 23 \\ \hline 897 \\ \hline 22 \end{array}$$

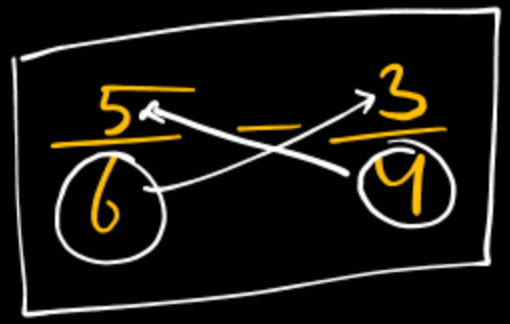
$$\begin{array}{r} 18 \\ 9 \\ \hline 27 \end{array}$$

$$\begin{array}{r} 31 \\ \times\ 33 \\ \hline 1023 \end{array}$$

$$\begin{array}{r} 54 \\ \times\ 28 \\ \hline 1512 \end{array}$$

11

Find the difference of $\frac{3}{4}$ and $\frac{5}{6}$



$$= \frac{5\times4 - 6\times3}{6\times4}$$

$$= \frac{20 - 18}{24}$$

$$= \frac{2 \div 2}{24 \div 2}$$

$$= \frac{1}{12}$$

Difference of $\frac{7}{10}$ and $\frac{8}{15}$

(i) $\frac{7}{10} > \frac{8}{15}$

(ii) $\frac{7}{10} - \frac{8}{15}$

$= \frac{15 \times 7 - 8 \times 10}{10 \times 15}$

$= \frac{105 - 80}{150}$

$= \frac{25 \div 5}{150 \div 5} = \frac{5 \div 5}{30 \div 5} = \boxed{\frac{1}{6}}$

$5 \overline{)150} \; 3$

-15

(iv) $3 - 2\frac{1}{8}$

$\frac{3}{1} - \frac{17}{8}$

$\frac{3 \times 8 - 17}{8 \times 1}$

$\frac{24 - 17}{8}$

$\boxed{\frac{7}{8}}$

24
- 17

① Simplify $\frac{7}{9} - \frac{2}{3} + \frac{5}{6}$

LCM of 9, 3 and 6 = 18

$$\frac{7 \times 2}{9 \times 2} - \frac{2 \times 6}{3 \times 6} + \frac{5 \times 3}{6 \times 3}$$

$$\Rightarrow \frac{14}{18} - \frac{12}{18} + \frac{15}{18}$$

$$\Rightarrow \frac{17}{18}$$

(11) $4\frac{1}{3} - 2\frac{3}{4} + 5\frac{1}{6}$

$6\left(\frac{9}{12}\right) = 6\frac{3}{4}$

H.W.

Q1. Subtract the sum of $5\frac{1}{2}$ and $6\frac{3}{8}$ from the sum of $7\frac{3}{4}$ and $6\frac{1}{2}$.

Q2. Subtract the difference of $6\frac{2}{3}$ and $5\frac{1}{6}$ from the difference of 4 and $2\frac{1}{3}$.

Q. What must be subtracted from $6\frac{3}{4}$ to get $4\frac{1}{6}$:-

$$6\frac{3}{4} \ominus \_\_\_ = 4\frac{1}{6}$$

$6\frac{3}{4}$

$4\frac{1}{6}$

What must be subtracted from 9 to get 3.

$9 - 3 = 6$

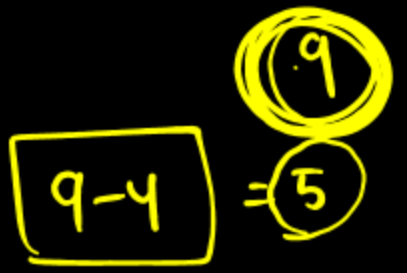
$$6\frac{3}{4} - 4\frac{1}{6} = \frac{27}{4} = \frac{21}{6}$$

$2\frac{7}{12}$

Rechecking your answer.

$$6\frac{3}{4} - 2\frac{7}{12} =$$

Q. What must be added to $4\frac{5}{6}$ to make $5\frac{2}{9}$?



Solution: $5\frac{2}{9} - 4\frac{5}{6}$

$\Rightarrow \frac{47}{9} - \frac{29}{6}$

$\Rightarrow$ LCM $(9, 6) = 18$

$\Rightarrow \frac{47 \times 2}{9 \times 2} - \frac{29 \times 3}{6 \times 3}$

$= \frac{94}{18} - \frac{87}{18}$

$= \frac{94-87}{18} = \boxed{\frac{7}{18}}$

Q. Arjun jumped 5 meters in a long jump and his friend Varun jumped $1\frac{5}{8}$ meters less than Arjun. How long was Varun's jump?

$$5 - 1\frac{5}{8} = \frac{5}{1} - \frac{13}{8} = 3\frac{3}{8} \text{ meters}$$

Q. From a rope 7 meters long, two pieces of length $2\frac{3}{5}$ meters and $3\frac{3}{10}$ meters were cut off. What is the length of the remaining rope?

⇒ P and Q are two fractions. When twice of P is subtracted from Q we get $\frac{12}{25}$. If Q is equal to $\frac{3}{4}$, then find the value of P + Q.

Multiplication and Division of fractions.

Multiplication:

$$\Rightarrow \frac{2}{5} \times \frac{3}{5} = \frac{2 \times 3}{5 \times 5} = \frac{6}{25}$$

$$\frac{1}{9} \times \frac{1}{3} = \frac{\text{Multiply all the numerators}}{\text{multiply all the denominator}}$$

$$\Rightarrow \frac{1}{9} \times \frac{1}{3} = \frac{1 \times 1}{9 \times 3} = \frac{1}{27}$$

Product of two or more fractions $= \frac{\text{Product of their numerators}}{\text{Product of their denominators}}$

Ex

(i) $\frac{3}{5} \times \frac{2}{7} = \frac{3 \times 2}{5 \times 7} = \boxed{\frac{6}{35}}$ Simplest form

(ii) $\frac{5}{9} \times 15 = \frac{5}{9} \times \frac{15}{1} = \frac{5 \times 15}{9 \times 1} = \frac{75}{9}$

(iii) $3\frac{7}{15} \times 25 = \frac{52}{15} \times \frac{25}{1} = \boxed{\frac{1300}{15}} =$

$\frac{52 \times 5}{3 \times 1} = \boxed{\frac{260}{3}}$

$3 \overline{)260}$

15×5

$15 \times 10 = \frac{150}{2} = 75$

$5 \times 15 = 5 \times 10 + 5 \times 15$
$(10 + 5)$
$= 50 + 25$
$= 75$

Multiply

(i) $\frac{1}{2} \times 5$

(ii) $\frac{21}{25} \times 10$

(iii) $\frac{3}{4} \times \frac{5}{7}$ =

(iv) $\frac{8}{21} \times 6\frac{3}{4}$ =

(v) $40\frac{6}{7} \times 2\frac{11}{22}$

H.W.

Multiply :

→ $\frac{7}{10}$ by $\frac{5}{21}$

→ $\frac{\cancel{7}^{1}}{\cancel{10}^{2}} \times \frac{\cancel{5}^{1}}{\cancel{21}^{3}}$

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

"we should simplify the fractions before actual multiplication."

Multiply $7\frac{1}{12}$ by $\frac{8}{15}$

17×2

$(10 + 7) \times 2$

$20 + 14 = 34$

$7\frac{1}{12} = \frac{85}{12}$

$\frac{85}{12} \times \frac{8}{15} = \frac{85 \times 8}{12 \times 15} = \frac{17 \times 2}{3 \times 3} = \frac{34}{9} = 3\frac{7}{9}$

17, 2, 3, 3

Multiply 35 by $6\frac{1}{14}$

$$\frac{35}{1} \times \frac{85}{14} = \frac{\overset{5}{\cancel{35}} \times 85}{1 \times \underset{2}{\cancel{14}}} = \frac{5 \times 85}{1 \times 2} = \frac{425}{2} = 212\frac{1}{2}$$

$85 \times 5 =$

Q. Multiply $\frac{3}{5} \times \frac{1}{6} \times \frac{2}{3} = \frac{3 \times 1 \times 2}{5 \times 6 \times 3} = \frac{1 \times 1 \times 1}{5 \times 3 \times 1} = \frac{1}{15}$

Q. Find the product of $6\frac{2}{3}$ and $1\frac{7}{8}$.

product of = multiply.

$\Rightarrow 6\frac{2}{3} \times 1\frac{7}{8}$

$\Rightarrow \frac{20}{3} \times \frac{15}{8} = 12\frac{1}{2}$

2 Balls ⇒ Rs. 500 ⇒ 1 Ball = 500 ÷ 2 = 250

10 Balls = 2500

Example: The cost of 1 ~~litre~~ of ~~milk~~ ball is ₹ $26\frac{3}{5}$. Find the cost of $12\frac{1}{2}$ ~~litre~~ of ~~milk~~. balls.

$14\frac{1}{10}$

Sol:

Cost of 1 litre milk : ₹ $26\frac{3}{5} = \frac{133}{5}$

Cost of $12\frac{1}{2}$ litre of milk = ₹ $12\frac{1}{2} \times \frac{133}{5}$

$= \frac{25}{2} \times \frac{133}{5}$

664 +1

$= \frac{133 \times 5}{2 \times 1} = \frac{665}{2} = ₹ 332\frac{1}{2}$

Q. Rahul can walk $5\frac{2}{5}$ km in an hour. How much distance will he cover in 3 hours?

Sol: Distance covered by Rahul in 1 hour = $5\frac{2}{5}$ km = $\frac{27}{5}$ km.

So, Distance covered by Rahul in 3 hrs = $\frac{3}{1} \times \frac{27}{5}$

$$= \frac{3 \times 27}{1 \times 5} = \frac{81}{5}$$

$$= 16\frac{1}{5} \text{ km}$$

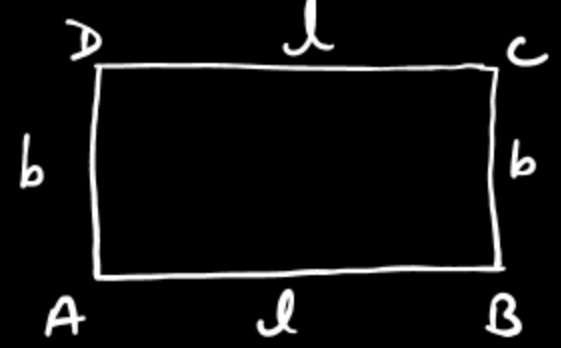
27
× 3

5 km	in	1 hour.
(5×3) km	=	3 hours

$16\frac{1}{5}$ =

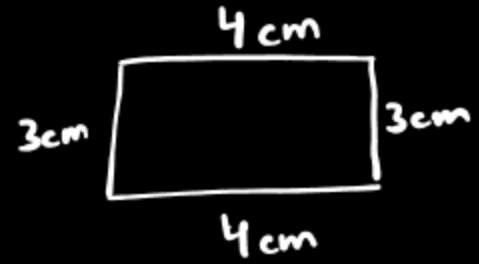
- Units are very important
- Without unit numerical value makes no sense.

Perimeter of rectangle



Perimeter of rectangle = $l + b + l + b$

$= 2(l+b)$



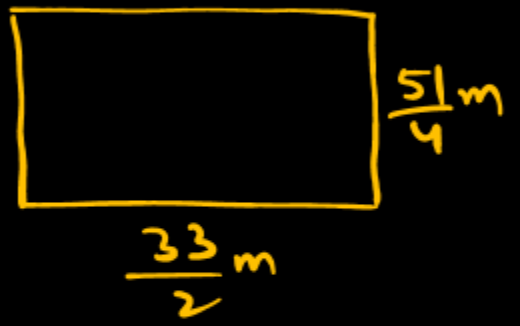
Perimeter $= 2(l+b)$

$= 2(4+3) = 14$ cm

Q. Find the perimeter of a rectangle whose length and breadth are $16\frac{1}{2}$ m and $12\frac{3}{4}$ m respectively.

Sol. length $= 16\frac{1}{2}\text{ m} = \frac{33}{2}\text{ m}$

breadth $= 12\frac{3}{4}\text{ m} = \frac{51}{4}\text{ m}$



Perimeter $= 2\,(\text{length} + \text{breadth})$ m

$= 2\left(\frac{33}{2} + \frac{51}{4}\right)$ m

Fraction of a Fraction

multiplication ⇒ fraction of a whole number

(i) ⇒ what is $\frac{2}{3}$ of 9 ?

⇒ $\frac{2}{3} \times \frac{9}{1} = \frac{2 \times 9^{3}}{3 \times 1_{1}}$

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

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

(ii) $\frac{1}{2}$ of 4

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

fraction of a fraction.

Ex. ① $\frac{1}{2}$ of $\frac{1}{4}$

$$\frac{1}{2} \text{ of } \frac{1}{4} = \frac{1}{4} \times \frac{1}{2} = \frac{1 \times 1}{4 \times 2} = \frac{1}{8}$$

Q. Find $\frac{3}{4}$ of $\frac{2}{3}$

$$\frac{3}{4} \text{ of } \frac{2}{3} = \frac{\cancel{2}^{1}}{\cancel{3}_{1}} \times \frac{\cancel{3}^{1}}{\cancel{4}_{2}} = \frac{1 \times 1}{1 \times 2} = \boxed{\frac{1}{2}}$$

Q. Find $\frac{3}{4}$ of $4\frac{2}{3}$

$$\frac{3}{4} \text{ of } 4\frac{2}{3} = \frac{\cancel{14}^{7}}{\cancel{3}_{1}} \times \frac{\cancel{3}^{1}}{\cancel{4}_{2}} = \frac{7 \times 1}{1 \times 2} = \frac{7}{2} = \boxed{3\frac{1}{2}}$$

Q Find $\frac{5}{7}$ of 42

$$\frac{5}{7} \text{ of } 42 = 42 \times \frac{5}{7} = \frac{\cancel{42}^{6} \times 5}{1 \times \cancel{7}} = \frac{6 \times 5}{1 \times 1} = \frac{30}{1} = 30$$

Q. Tanvy bought $7\frac{1}{2}$ kg of apples. Later she found that $\frac{1}{5}$ of them were rotten. Find the weight of rotten apples and that of good ones.

Sol: Total weight of apples = $7\frac{1}{2}$ kg = $\frac{15}{2}$ kg.

Weight of rotten apples. = $\frac{1}{5}$ of $7\frac{1}{2}$

$= \left(\frac{1}{5} \text{ of } \frac{15}{2}\right)$ kg

$= \left(\frac{15}{2} \times \frac{1}{5}\right)$ kg

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

Weight of good apples = $7\frac{1}{2}$ kg $- 1\frac{1}{2}$ kg

$= \frac{15}{2}$ kg $- \frac{3}{2}$ kg $= \frac{12}{2}$ kg $= 6$ kg.

Q. A parking lot can hold 96 cars at a time. At a certain instant it was found that $\frac{7}{8}$ of the parking was occupied. How many more cars it could accomodate at that time?

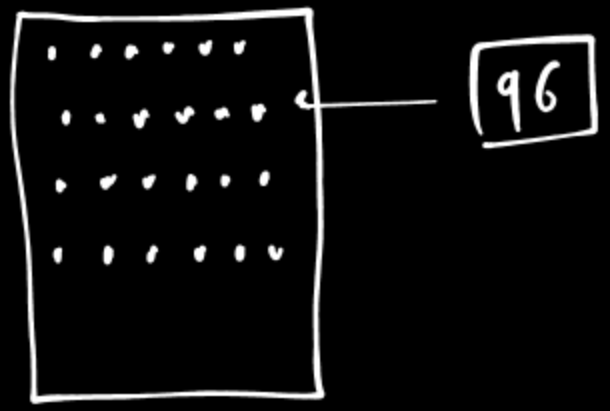
Sol: No. of cars that can be parked = 96

No. of cars parked at a time = $\frac{7}{8}$ of 96

$= \frac{\cancel{96}^{12}}{1} \times \frac{7}{\cancel{8}_{1}}$

$= \frac{12}{1} \times \frac{7}{1}$

$= \frac{12 \times 7}{1 \times 1} = 84$



No. of more cars that can be accomodated = 96 − 84 = 12.

Hence, 12 more cars could be accomodated at that time.

Q. $\frac{2}{3}$ of the students in a school are boys and $\frac{3}{4}$ of these boys are player. What fraction of the students are male players?

Sol: Male players = $\frac{3}{4}$ of $\frac{2}{3}$ of all student.

$= \left(\frac{2}{3} \times \frac{3}{4}\right)$ of all students

$= \frac{1}{2}$ of all the student.

Q. There are 140 members of a committee. In a meeting, three-fourths of the members were present. How many members were absent?

Sol:

Total no. of members = 140

Members present = $\frac{3}{4}$ of 140

$= 140 \times \frac{3}{4} = 105$

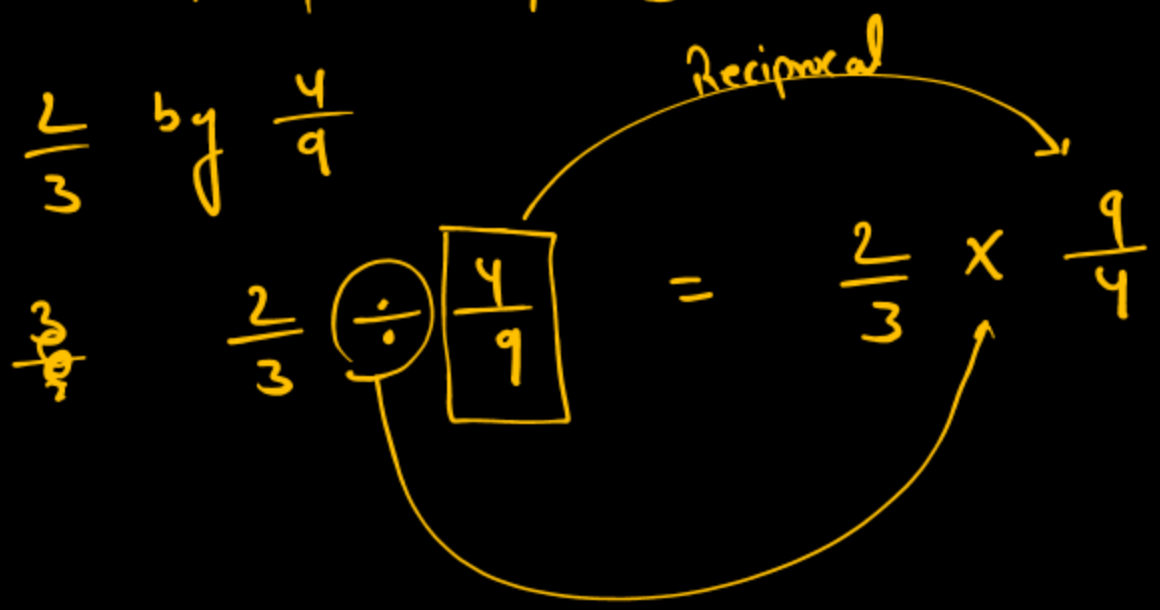
Member's absent = $140 - 105 = 35$

Division of fraction

$\frac{2}{3}$ is a fraction

"Reciprocal of $\frac{2}{3}$ is $\frac{3}{2}$"

Divide $\frac{2}{3}$ by $\frac{4}{9}$



(1) $\frac{3}{14} \div \frac{2}{7}$

$\frac{3}{14}$ ↑ Dividend ÷ $\frac{2}{7}$ ↑ Divisor

Dividend × Reciprocal of divisor

(i) $\frac{3}{14} \div \frac{2}{7} \Rightarrow \frac{3}{14} \times \frac{7}{2} = \frac{3 \times \cancel{7}^{1}}{\cancel{14}_{2} \times 2} = \frac{3 \times 1}{2 \times 2} = \frac{3}{4}$

Solve: $14\frac{1}{4} \div \frac{3}{4}$

$\Rightarrow \frac{57}{4} \times \frac{4}{3}$

$\Rightarrow \frac{19 \times 1}{1 \times 1} = 19$

$$\begin{array}{r} 19 \\ 3\overline{)57} \end{array}$$

Solve: $19\frac{3}{5} \div 1\frac{13}{15}$

$$\frac{98}{5} \div \frac{28}{15}$$

$\Rightarrow$ [Reciprocal of divisor : $\frac{15}{28}$]

$$\frac{\cancel{98}^{\,7\times14}}{\cancel{5}_{\,1}} \times \frac{\cancel{15}^{\,3}}{\cancel{28}_{\,\cancel{14}\,2}}$$

$$= \frac{7 \times 3}{1 \times 2} = \frac{21}{2} = 10\frac{1}{2}$$

1 , 2

Reciprocal of $\frac{3}{4}$ is $\frac{4}{3}$

$\frac{0}{1} = \boxed{\frac{1}{0}}$

$\frac{5}{0}$ = Not Defined

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

Reciprocal of 2 is $\frac{1}{2}$

Reciprocal of 9 is $\frac{1}{9}$

Reciprocal of 1 is 1

$\frac{0}{5} = 0$

$\frac{0}{9} = 0$

$\frac{9}{0} \Rightarrow$ Not Defined

Reciprocal of 0 (zero) is $\left(\frac{1}{0}\right) \Rightarrow$ Not defined.

[Reciprocal of zero does not exist]

Division by zero is not defined

[Reciprocal] is also known by another name

↓

which is ...

[Multiplicative Inverse]

* Product of a number (fraction) and its reciprocal is always 1.

* **Multiplicative inverse** of $\frac{5}{7}$ is $\frac{7}{5}$

or Reciprocal

$\Rightarrow \frac{3}{7} \times$ Reciprocal of $\frac{3}{7}$

$\Rightarrow \frac{3}{7} \times \frac{7}{3} = 1$

Find the Product of 9 and its multiplicative inverse.

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

Q. Find multiplicative inverse of $1\frac{2}{15}$.

$$1\frac{2}{15} = \frac{17}{15}$$

$\therefore$ multiplicative inverse of $\frac{17}{15}$ is $\frac{15}{17}$

Solve: $\frac{7}{11} \div 14$

Reciprocal of $14 = \frac{1}{14}$

$\frac{\cancel{7}^{1}}{11} \times \frac{1}{\cancel{14}_{2}}$

$\frac{1}{11} \times \frac{1}{2} = \frac{1 \times 1}{11 \times 2} = \frac{1}{22}$

Solve: $8\frac{1}{3} \div 5$

$\frac{\cancel{25}^{5}}{3} \times \frac{1}{\cancel{5}} = \frac{5}{3} = 1\frac{2}{3}$

Q. Write 5 paise as the fraction of a rupee.

Sol: 1 rupee = 100 paise

∴ Required fraction = $5 \div 100 = \frac{1}{5} \times \frac{1}{100} = \frac{1}{20}$

Division

↳ ⇒ Breaking down into smaller pieces/quantities/numbers

Q. Express 25 minutes as a fraction of an hour.

Sol: 1 hour = 60 minutes

Required fraction = $25 \div 60 = \frac{\cancel{25}^{5}}{\cancel{60}_{12}} \times \frac{1}{\cancel{60}_{12}} = \frac{5}{12}$

Q Ex

$$\frac{4}{3} \div \frac{24}{7} = \frac{4 \div 24}{3 \div 7} \times = \frac{4}{3} \times \frac{7}{24_6} = \frac{4 \times 7}{3 \times 24}$$

$$= \frac{1 \times 7}{3 \times 6} = \frac{7}{18}$$

$$\frac{4}{3} \times \frac{24}{7} = \frac{4 \times 24}{3 \times 7}$$

$$88 \div 3\frac{1}{7}$$

$$\frac{88}{1} \div \frac{22}{7}$$

$$\frac{\overset{4}{\cancel{88}}}{1} \times \frac{7}{\frac{\cancel{22}}{2}} = \frac{\cancel{8} \times 7}{\cancel{2}_1} = \boxed{28}$$

① $5\frac{7}{10} \div 3\frac{1}{6}$

$2\frac{3}{190}$

$\frac{57}{10} \div \frac{19}{6}$

$\frac{\cancel{57}^{3}}{\cancel{10}_{5}} \times \frac{\cancel{6}^{3}}{\cancel{19}_{1}}$

$\frac{3 \times 3}{5 \times 1} = \frac{9}{5} = 1\frac{4}{5}$

$10\frac{5}{7} \div 1\frac{11}{14}$

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

$16\frac{2}{3} \div 2\frac{2}{9}$

$7\frac{1}{2}$

$\frac{9}{26} \div 4\frac{2}{13} \quad \frac{1}{6}$ $\frac{1}{12}$

$\frac{9}{26} \div \frac{54}{13}$

$\frac{9}{\cancel{26}_{2}} \times \frac{\cancel{13}^{1}}{54} = \frac{1}{12}$ ✓

$8\frac{1}{6} \div 4\frac{2}{3}$

$1\frac{13}{28}$

$\frac{49}{6} \div \frac{14}{3}$

$\frac{49}{6} \times \frac{3}{14}$

$\boxed{1\frac{3}{4}}$

$57\frac{3}{4} \div 3\frac{1}{2}$

$\frac{231}{4} \div \frac{7}{2}$

$\frac{\overset{33}{\cancel{231}}}{\underset{2}{\cancel{4}}} \times \frac{\overset{1}{\cancel{2}}}{\underset{1}{\cancel{7}}} = \frac{33 \times 1}{2 \times 1}$

$= \frac{33}{2} = 16\frac{1}{2}$

~~237~~

3

231

7

Q. The cost of 3 metres of cloth is ₹ 57. Find the cost of 1 metre of cloth.

Solution

Cost of 3 m cloth = ₹ 57

Cost of 1 m cloth = ₹ 57 ÷ 3 = 3

= ₹ $\frac{57}{3}$ =

= ₹ 19

Q. The cost of $3\frac{1}{2}$ metres of cloth is ₹ $57\frac{3}{4}$. Find the cost of 1 metre of cloth.

Sol:

Cost of $3\frac{1}{2}$ m cloth = ₹ $57\frac{3}{4}$

Cost of 1 m cloth = ₹ $\left(57\frac{3}{4} \div 3\frac{1}{2}\right)$

= ₹ ( )

Cost of 2 mangos is ₹ 100.

Cost of 1 mango = 100 ÷ 2 = 50

(cost, no. of mangos)

Cost of 5 mangoes is ₹ 100

Cost of 1 mango = ₹ 100 ÷ 5 = ₹20

Cost of 5 m cloth is ₹ 200

Cost of 1 m cloth = ₹ 200 ÷ 5 = ₹40

Cost of $5\frac{1}{2}$ mango is ₹ $100\frac{3}{4}$.

Cost of 1 mango $= 100\frac{3}{4} \div 5\frac{1}{2}$

$= \frac{403}{4} \div \frac{11}{2}$

$= \frac{403}{\cancel{4}_{2}} \times \frac{\cancel{2}^{1}}{11} = ₹\frac{403}{22} = ₹ 18\frac{7}{22}$

$$\begin{array}{r} 18 \\ 22\overline{)\,403} \\ -22 \\ \hline 183 \\ -176 \\ \hline 7 \end{array}$$

Cost of $5\frac{1}{2}$ metre cloth is ₹ $50\frac{1}{2}$.

Cost of 1 m cloth $= \left(50\frac{1}{2} \div 5\frac{1}{2}\right)$

$= \frac{101}{2} \div \frac{11}{2} = \frac{101}{\cancel{2}_{1}} \times \frac{\cancel{2}^{1}}{11} = \frac{101 \times 1}{1 \times 11} = \frac{101}{11} = ₹ 9\frac{2}{11}$

Q1. A cord of length $71\frac{1}{2}$ m has been cut into 26 pieces of equal length. What is the length of each piece?

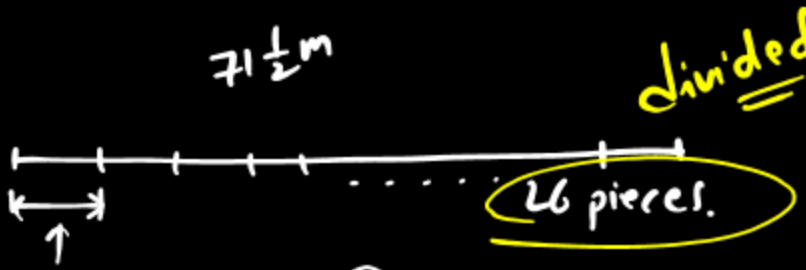
cut → divide

Sol:

Whole length of cord = $71\frac{1}{2}$ m

$= \frac{143}{2}$ m

Number of pieces formed = 26



Length of each piece

Length of 1 piece

each

Length of each piece = $\frac{143}{2} \div \frac{26}{1}$

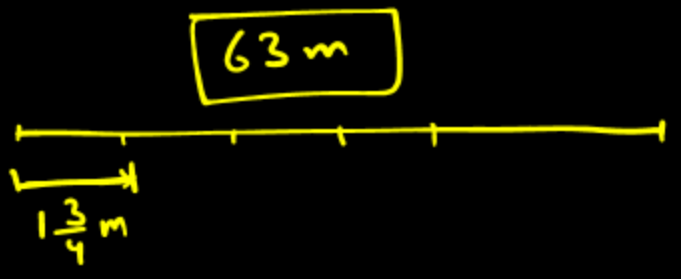
$= \frac{143}{2} \times \frac{1}{26_2}$

$= \frac{11 \times 1}{2 \times 2} = \frac{11}{4}$ m $= 2\frac{3}{4}$ m

$\begin{array}{r} 13 \\ \times 11 \\ \hline \end{array}$

times ⇒ multiply

Q. How many pieces of length $1\frac{3}{4}$ metres can be cut from a ribbon of length 63 metres?



Sol:

Whole length of ribbon = 63m

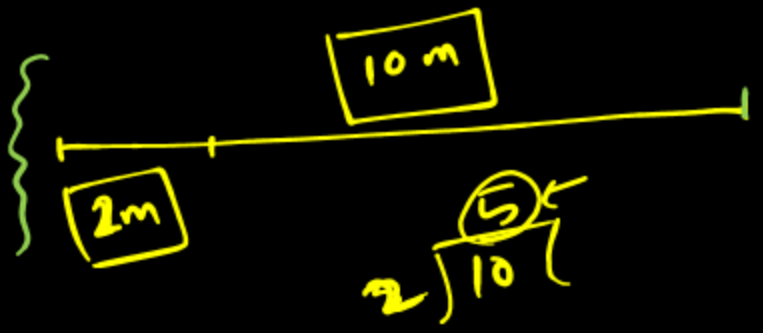
Length of each piece = $1\frac{3}{4}$ m = $\frac{7}{4}$

Number of pieces = $63 \div 1\frac{3}{4}$

$= 63 \div \frac{7}{4}$

$= \frac{\cancel{63}^{9}}{1} \times \frac{4}{\cancel{7}_{1}}$

$= \frac{9 \times 4}{1 \times 1} = \underline{\underline{36}}$



Q. The product of two fractions is $9\frac{3}{5}$. If one of the fraction is $9\frac{3}{7}$, find the other.

multiply

Sol: Product of two fractions = $9\frac{3}{5} = \frac{48}{5}$

One of the fraction: $9\frac{3}{7} = \frac{66}{7}$

The other fraction = $\frac{48}{5} \div \frac{66}{7}$

$= \frac{\cancel{48}^{8}}{5} \times \frac{7}{\cancel{66}_{11}}$

$= \frac{8 \times 7}{5 \times 11} = \frac{56}{55} = 1\frac{1}{55}$

[Product of two numbers is 50. If one of the number is 2, find the other.]

$5\sqrt{10}$

8

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

Q. Product of two fractions is 5. If one of them is $13\frac{4}{7}$, find the other.

[4 min]

$\frac{7}{19}$

$13\frac{4}{7} = \frac{95}{7}$

$5 \div \frac{95}{7} = 5 \times \frac{7}{95} = \frac{7}{19}$

Q. If a car travels $283\frac{1}{3}$ km in $4\frac{2}{3}$ hours. How far does it go in 1 hour.

$283\frac{1}{3} \div 4\frac{2}{3}$

$\frac{850}{3} \div \frac{14}{3}$

[4 min]

$\frac{\cancel{850}^{425}}{\cancel{3}_{1}} \times \frac{\cancel{3}^{1}}{\cancel{14}_{7}} = \frac{425 \times 1}{1 \times 7}$

$\frac{425}{7} = 60\frac{5}{7}$ km

$$\frac{9}{8} \div \frac{24}{63}$$

$$\frac{9}{8} \div \frac{24}{63} = \frac{\cancel{9}^{3}}{8} \times \frac{63}{\cancel{24}_{8}} = \frac{3 \times 63}{8 \times 8} = \frac{189}{64}$$

$$= 2\frac{61}{64} \checkmark$$

$$64 \overline{)189} \quad 2$$

Q. Divide the product of $1\frac{4}{13}$ and $7\frac{4}{5}$ by $3\frac{12}{13}$.

H.W.

Sol:

Step 1:

$$1\frac{4}{13} \times 7\frac{4}{5}$$

$$\frac{17}{\cancel{13}} \times \frac{\cancel{39}^{3}}{5}$$

$$\frac{17 \times 3}{1 \times 5} = \boxed{\frac{51}{5}}$$

Product $= \frac{51}{5}$

Step 2:

$$\frac{51}{5} \div 3\frac{12}{13}$$

$$\Rightarrow \boxed{\frac{51}{5} \div \frac{51}{13}}$$

$$\Rightarrow \frac{\cancel{51}^{1}}{5} \times \frac{13}{\cancel{51}_{1}}$$

$$\Rightarrow \frac{1 \times 13}{5 \times 1} = \frac{13}{5} = 2\frac{3}{5}$$

$\frac{72}{90}$ in simplest form

4
~~12~~
~~36~~

$\frac{72}{90} = \frac{4}{5}$

~~45~~
~~15~~
5

$$2\overline{)72}\,(36$$
$$-6$$
$$12$$
$$-12$$

2
7,2
·2

1. A vessel had $5\frac{1}{4}$ L of milk. A cat drink $\frac{5}{8}$ L from vessel. How much milk was left in the vessel.

$\frac{5}{8} - 5\frac{1}{4}$ ✗

Sol.

$$5\frac{1}{4} - \frac{5}{8}$$

$$\frac{21 \times 2}{4 \times 2} - \frac{5}{8}$$

$$\frac{42}{8} - \frac{5}{8}$$

$$\frac{37}{8}\ L = 4\frac{5}{8}\ L$$

Q. In a multi-story building, $\frac{1}{6}$ of the 546 residents watch the sports channel. Find the no. of people who do not watch this channel.

$\frac{1}{6}$ of 546 watch the channel.

$\frac{1}{6}$ of 546 $\xrightarrow{(\times)}$ $546 \times \frac{1}{6}$

$$\frac{\cancel{546}^{273}}{1} \times \frac{1}{\cancel{6}_{3}} = \frac{273 \times 1}{1 \times 3} = \frac{\cancel{273}^{91}}{\cancel{3}_{1}} = 91$$

91 residents watch the channel.

No. of people who do not watch = $546 - 91$

$= 455$

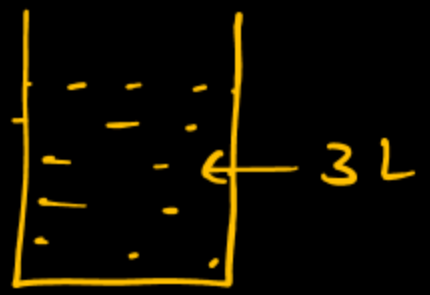
3. Billy ate $\frac{5}{4}$ pizza and John ate $\frac{3}{4}$ pizzas. How much more pizza did Billy eat than John?

Sol.

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

$$\frac{2}{4} = \boxed{\frac{1}{2}}$$

4. Ms. Priya bought 3 L of milk in the morning. There was $\frac{5}{8}$ L left in the evening. How much milk was used during the day?



$\left(3 - \frac{5}{8}\right)$ L

$\frac{19}{8}$

$2\frac{3}{8}$ L

5. The health club advises every child to drink $2\frac{3}{4}$ L of water in the morning, $1\frac{7}{8}$ L in the afternoon and $\frac{1}{2}$ L before going to bed. How much water should a child drink in whole day?

$5\frac{1}{8}$ L

$>, <, =$

$\frac{1}{2}$ $\boxed{>}$ $\frac{40}{100}$

$\frac{6}{10}$ $\boxed{>}$ $\frac{42}{100}$

$\frac{3}{4}$ $\boxed{=}$ $\frac{75}{100}$

Arrange $\frac{1}{2}, \frac{4}{5}, \frac{3}{8}$ in ascending order.

LCM of $(2, 5, 8) = 40$

$\frac{1 \times 20}{2 \times 20} = \frac{20}{40}$

$\frac{4 \times 8}{5 \times 8} = \frac{32}{40}$

$\frac{3 \times 5}{8 \times 5} = \frac{15}{40}$

$\frac{15}{40} < \frac{20}{40} < \frac{32}{40}$

$\frac{3}{8} < \frac{1}{2} < \frac{4}{5}$

$\frac{2}{3}, \frac{2}{5}, \frac{1}{4}, \frac{3}{5}$ in ascending order.

$\frac{2}{3} = \frac{2 \times 20}{3 \times 20} = \frac{40}{60}$

$\frac{2}{5} = \frac{2 \times 12}{5 \times 12} = \frac{24}{60}$

$\frac{1}{4} = \frac{1 \times 15}{4 \times 15} = \frac{15}{60}$

$\frac{3}{5} = \frac{3 \times 12}{5 \times 12} = \frac{36}{60}$

LCM of 3, 5, 4, 5 = $3 \times 5 \times 4 = 60$

(3)	3, 5, 4, 5
2	1, 5, 4, 5
2	1, 5, 2, 5
5	1, 5, 1, 5
	1, 1, 1, 1

$\frac{15}{60} < \frac{24}{60} < \frac{36}{60} < \frac{40}{60}$

$\frac{1}{4} < \frac{2}{5} < \frac{3}{5} < \frac{2}{3}$ ✓

End of the chapter.