Integers : Multiplication and Divisions

Exercise 1.1

1. (a) 15 8 (15 8) 120 (b) 25 8 (25 8) 200
(c) 25 12 (25 12) 300 (d) 17 0 (17 0) 0
(e) 1 (16) (1 16) 16 (f) (12) (18) 12 18 216
(g) (5) (20) (5 20) 100 (h) (1) (1) (1 1) 1
(i) (20) (10) (20 10) 200

2. (a) 3 (10) 4 (3 4) 10 12 10 120
(b) (5) (4) 0 (5 4) 0 120 0
(c) (1) (10) (2) (1 2) 10 2 10 20
(d) (2) (4) (6) 1 (2 4) (6 1) 8 6 48
(e) 25 (2) (6) 2 (25 2) (6 2) 50 12 600
(f) 13 (3) (2) (1) (13 1) (3 2) 13 6 78

3. (a) 6 multiplied by 1 6 1 6 (b) 10 multiplied by 1 10 1 10
(c) 1 multiplied by 1 1 1 1 (d) 0 multiplied by 1 1 1 1
(e) 1 multiplied by 1 1 1 1

4. (a) Product 20 and multiplied by 1
Then, integer $\frac{20}{1}$ 20
(b) Product 15 and multiplied by 1
Than, integer $\frac{15}{10}$ 15
(c) Product 0 and multiplied by 1
Than, integer $\frac{0}{1}$ 0
(d) Product 1 and multiplied by 1
Than integer $\frac{1}{1}$ 1
(e) Product 1 and multiplied by 1
Than integer $\frac{1}{1}$ 1

5.

	5	4	3	2	0	4	3
3	15	12	9	6	0	12	9
2	10	8	6	4	0	8	6
4	20	16	12	8	0	16	12
1	5	4	3	2	0	4	3

6. (a) < (b) < (c) < (d) = (e) > (f) =

7. (a) (ii) (b) (iii) (c) (iv) (d) (i)

8. (a) (2) (2) (2) (2) (2) (2)
[(2) (2)] [(2) (2)] [(2) (2)]
4 4 4 64
The number of negative integers in even, i.e. (6), therefore the product will be in +ve.
(b) (2) (2) (2) [(2) (2)] (2)
4 (2) 8
The number of negative integrs is odd, i.e. (3), therefore the product will be in -ve.

(c) (6) 2 6 (2) (6 2) [(6 2)]
12 (12)
12 12 24

(d) 0 (8) (4) 3 (4) 0 (384) 0 [∵ a 0 0]

9. (a) True (b) True (c) False (d) False (e) True

Exercise 1.2

1. (a) (208) $\frac{208}{8}$ 26 (b) 500 5 $\frac{500}{5}$ 100

(c) (36) (9) $\frac{36}{9}$ 4 (d) (490) (49) $\frac{490}{49}$ 10

(e) 13 [(2) 1] 13 [2 1] 13 1 $\frac{13}{1}$ 13

(f) 0 (100) $\frac{0}{100}$ 0

(g) (51) [(4) (1)] (51) [4 1] (51) 3 $\frac{51}{3}$ 17

(h) [48 12] 4 $\frac{48}{12}$ 4 4 4 $\frac{4}{4}$ 1

(i) [(25) (7)] [(2) (2)] [25 7] [2 2] 8 0 $\frac{8}{0}$ 0

2. (a) 19 **1** 19 (b) (23) **(23)** 1 (c) (602) **1** 602

(d) **93** 1 93 (e) **1** 1 1 (f) 121 **11** 11

(g) **35** (7) 5

3. Given pair 10, 2

∵ (10) 5 2

And, the equation given a 5 b

when we put b 3 in the equation a 5 3

we get, a 5 3 15

as such, we put b 4 or 5 or 6 or 7.

Than, we get a 4 5 20

a 5 5 25

a 5 5 30

a 7 5 35

So, five pairs are (15, 3); (20; 4); (25, 5); (30, 5)

4. (a) Marks given for one correct answers (5)

So, marks given for one correct answers 5 20 100

Ankit's total score 80

Marks obtained for in correct answers 80 100 20

marks given for one in correct answer 2

Thus, the number of incorrect answer $\frac{20}{2}$ 10

(b) Marks given for one correct answers 5

So, marks given for 10 correct answers 5 10 50

Bhavna's total core 0

Marks obtained for in correct answers 0 50 50

Marks given for one in correct answer 2

Thus, the number of in correct answer $\frac{50}{2}$ 25

(c) Questions attempted by Chavi 13

Marks obtained by Chavi 5

Let, Cahvi attempted correctly question x

Chavi attempted correctly question 13 x

marks given for one incorrect answers 2

Marks given for one in correct answers 5

Chavi marks obtained x 5 (13 x) 2

According to question,

Chavi's mark 5

5 $5x$ (13 x) 2

5 $5x$ 26 $2x$

26 5 $5x$ $2x$

21 $7x$

x $\frac{21}{7}$ 3

x 3

Chavi attempted correctly 3

in correctly 13 3 10

5. Speed 6 m/min

Distance 350 10 360 m

speed $\frac{\text{Distance}}{\text{time}}$

Time $\frac{\text{Distance}}{\text{Speed}}$ $\frac{360}{60}$ 60 min 60 min 1 hours

6. First number given 9

Let, other number is x

Than product of these number 9 x

According to question $9x$ 153

x $\frac{153}{9}$ 17

Then, other number is 17

7. Temperature recorded at 4 p.m 41 C

Temperature recorded at 10 p.m 29 C

Temperature fall in (10 – 4) p p.m. 6 hour 41 29 C

12 C

Temperature fall in per hour $\frac{12}{6}$ 2 C

Exercise 1.3

1. (a) 49 7 (different signs)

and, 49 7 7 (same signs)

∵ 7 7

∵ 49 7 is greater.

(b) 72 9 7 64 (72 9) 8 64

8 8 64

64 64 0

and, 9 3 12 6 (9 3) 12 6

3 12 6

36 6 30

∵ 30 0

9 3 12 6 is greater.

(c) (4) (22) 4 (3) 88 (12) 1056 (different sign same sign)

and, (2) (1) (1) (2) 2 2 4

∵ 4 (1056)

(2) (1) (1) (2) is greater.

(d) 7 6 (4) 7 24 17 (different sign same sign)

and, 8 (2) (8) (1) 8 16 (1)

8 16 24

∵ 17 24

7 6 (4) is greater.

(e) (9) 2 (2) (7) (9) [2 (2)] (7)

(9) (1) (7) 63 (same signs)

and, (9) (2) (2) 7 9 [(2) (2)] 7

9 (1) 7 63 (different signs)

∵ 63 63

(9) 2 (2) (7) is greater.

2. (a) 18 (6 4) 9 (6 4) (18 9) (division)

(6 4) 2

(2) 2 4

(b) 10 4 [3 {1 2 (4 9)}]

10 4 [3 {1 2 (5)}] (solve round bracket)

10 4 [3 {1 2 5}] (curly bracket)

10 4 [3 8] (square bracket)

10 4 [5] (multiplication)

10 4 5 (addition)

= 19

(c) 40 (1) (2) 6 3 2

40 (1 2) 6 1 (remove bar)

40 (1) 6 1 (solve bracket)

40 (1) 6 (division)

40 6 (multiplication)

34 (subtraction)

(d) 64 16 (3) 2

64 16 (3) 2 (64 16) (3) 2

4 (3) 2 (division)

12 2 (multiplication)

10 (subtraction)

(e) We simplify the expression by removing the brackets first.

3 {(4) 4 1} 3 3 { 1 1} 3

3 0 3 3 3 0

(f) 6 3 2 2 of 6

6 1 2 6 (Remove bar)

6 2 6 (division)

6 12 (multiplication)
18 (addition)

(g) 5 (48) (12) (2) 6
5 [(48) 12] (2) 6
5 [(4)] (2) 6 (division)
5 [(4) (12) (multiplication)
5 4 12 (solve brackets)
5 8 (subtraction)
13 (addition)

(h) 80 6 [3 8 20] 100
80 6 [24 20] 100 (bar)
80 6 [4) 100 (square bracket)
80 24 100 (multiplication)
24 (100 80) (subtraction)
24 20 (subtraction)
4

(i) 12 [(9 3) (4 2)] of 2 (2 4 3)
12 [(9 3) (4 2)] 2 (2 1) (Remove bar)
12 [3 2] 2 1 (division)
12 1 2 1 (slove square bracket)
12 2 2

(j) 140 12 [3 4{2 3 2 (8)}]
140 12 [3 4{2 3 16}] (remove bar)
140 12 [3 4 {22}] (solve curly bracket)
140 12 [3 88] (multiplication)
140 12 [85] (subtraction)
140 1020 (multiplication)
= 1160 (addition)

(k) 120 12[3 4{2 3 2 (8)}]
120 12[3 4{2 3 16}] (solve round bracket first)
120 12[3 4 22] (subtraction)
120 12[3 88] (subtraction)
120 12[85] (multiplication)
120 1020 (addition)
1140

(l) 15 {4 (1) (3)} 6
15 {4 (4)} 6 (remove bar)
15 {(1)} 6 (division)
15 (6) (multiplication)
15 6 (solve bracket)
21 (addition)

(m) 4 (2)[2 (6) 3 (2 6 4 4)]
4 (2)[2 (6) 3 (12 4 4)] (bar)
4 (2)[2 (6) 3 4] (solve round bracket)
4 (2)[12 12] (solve square bracket)
4 (2)[0] (subtraction)
4 0 (multiplication)

= 0 (again multiplication)

(n) 4 1[2 (6) 3(2 6 4 2)]

4 1[12 3 (12 6)] (solve round bracket first)

4 1[12 3 6] (multiplication)

4 1[12 3 6] (multiplication)

4 1[12 18] (subtraction)

4 1[6] (multiplication)

4 6 (multiplication)

= 24

(o) {60 (3)} $\overline{45 \quad (2)}$

{60 (3)} (22.5) (remove bar)

180 (22.5) (solve curly bracket)

180 22.5 (division)

8

3. (a) 6 15 (20) 6 [15 (20)] 6 [15 20] 6 [5] 6 5 1

(b) 34 10 6 4 (10 6) 4 4 1

(c) [18 4 20] 18 80 62

(d) (80 (1) (4) (10) [80 (1)] [(4) (10)]

[80 40] 120

(e) 15 3 24 (15 3) 24 5 24 29

(f) 20 16 4 20 (16 4) 20 4 5

(g) 15 12 (42) (15) [12 (42)]

(15) [12 42] (15) (30) 450

(h) (2) (2) (9) [(2) (2)] (9)

[2 2] (9) 4 9 13

4. (a) All negative integers greater than 3 and less than 3

2, 1, 0, 1, 2

(b) All the integers between 18 and 25 are as :

19, 20, 21, 22, 23, 24

(c) All integers that leave a remainder 1 when divided by 2, and lie between 0 and 10.

3, 5, 7, 9

(d) All positive integers which are opposite in sign to the integers between 5 and 0.

1, 2, 3, 4 (+ve integers)

(e) All integers divisible by 5 and lying between 0 and 25.

5, 10, 15, 20

Multiple Choice Questions

1. (b)	**2.** (b)	**3.** (c)	**4.** (a)	**5.** (b)
6. (c)	**7.** (d)	**8.** (a)	**9.** (b)	**10.** (a)

2 Rational Numbers

Exercise 2.1

1. Rational numbers : Rational numbers are the ones that can be written in the radio from *i.e.*, $\frac{p}{q}$, where p and q are integers and q 0.

Examples : $\frac{3}{5}$ and $\frac{4}{9}$ are national number.

$\frac{4}{5}$ and $\frac{8}{9}$ are rational numbers but mot fractions because rational number are the $\frac{p}{q}$ where p and q are integers.

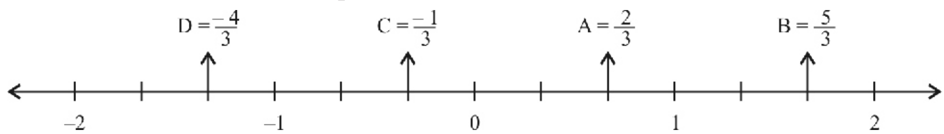
3. The negative rational numbers are $\frac{4}{5}$ and $\frac{5}{11}$.

4. (a) Rational number of 7 $\frac{7}{1}$ (b) Rational number of 0 $\frac{0}{1}$

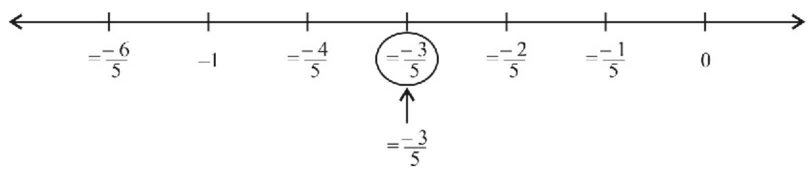
(c) Rational number of 1.6 $\frac{16}{10}$ (d) Rational number of 0.3 $\frac{3}{10}$

(e) Rational number of 53 $\frac{53}{1}$

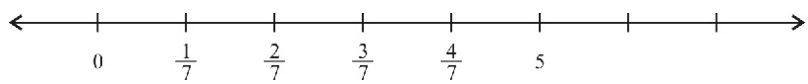
5.



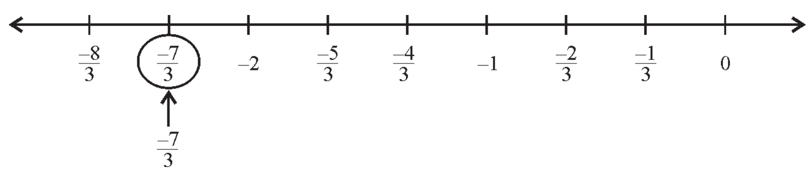
6. (a) $\frac{3}{5}$



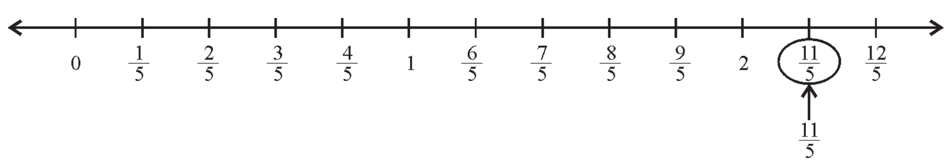
(b) $\frac{4}{7}$



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



(d) $\frac{11}{5}$



7. Standard form of Rational Numbers : A rational number $\frac{p}{q}$ is said to be in its standard form if p and q have no common factor and q is a positive integer.

In the given numbers $\frac{5}{9}, \frac{8}{11}, \frac{8}{7}, \frac{24}{36}, \frac{5}{15}, \frac{32}{96}, \frac{2}{3}, \frac{8}{7}$ and $\frac{2}{3}$ are standard form of rational number. Only these number fulfill the condition of standard form of rational members.

8. (a) Dividing $\frac{12}{16}$ by the HCF of 12 and 16.

HCF of 12 and 16 is 4. Then, $\frac{12}{16}$ $\frac{4}{4}$ $\frac{3}{4}$

(b) Dividing $\frac{84}{120}$ by the HCF of 84 and 120

HCF of 84 and 120 is 12. Then, $\frac{84}{120}$ $\frac{12}{12}$ $\frac{7}{10}$

(c) Dividing $\frac{60}{180}$ by the HCF of 60 and 180

HCF of 60 and 180 is 60 Then, $\frac{60}{180}$ $\frac{60}{60}$ $\frac{1}{3}$

(d) Dividing $\frac{39}{49}$ by the HCF of 39 and 49

HCF of 39 and 49 is 1 Then, $\frac{39 \quad 1}{49 \quad 1}$ $\frac{39}{49}$

(e) Dividing $\frac{28}{70}$ by the HCF of 28 and 70.

HCF of 28 and 70 is 7. Then, $\frac{28 \quad 14}{70 \quad 14}$ $\frac{2}{5}$

(f) Dividing $\frac{32}{96}$ by the HCF of 32 and 96.

HCF of 32 and 96 is 16. Then, $\frac{32 \quad 32}{96 \quad 32}$ $\frac{1}{3}$

9. (a) True (b) True (c) False (d) True (e) False (f) False
(g) False (h) True (i) True (j) True

Exercise 2.2

1. (a) $\frac{2}{3}$ and $\frac{8}{9}$

2 9 18
3 8 24 cross multiplication

Thus, $\frac{2}{3}$ and $\frac{8}{9}$ are not equivalent pair of rational number.

(b) Given : $\frac{5}{6}$ and $\frac{25}{30}$

5 30 150
6 25 150 cross multiplication

Thus, $\frac{5}{6}$ and $\frac{25}{30}$ are equivalent pair of rational number.

(c) Given : $\frac{1}{3}$ and $\frac{5}{15}$

1 15 15
3 5 15 cross multiplication

Thus, $\frac{1}{3}$ and $\frac{5}{15}$ are equivalent pair of rational number.

(d) Given : $\frac{4}{11}$ and $\frac{12}{22}$

$4 \quad 22 \quad\quad 88$
cross multiplication
$1 \quad 12 \quad\quad 132$

Thus $\frac{4}{11}$ and $\frac{12}{22}$ are not equivalent pair of rational number.

2. $\frac{5}{6}$ and $\frac{5}{x}$ (given)

By cross multiplication we have $5 \quad x \quad 5 \quad 6$

$5x \quad 30$

$x \quad \frac{30}{5} \quad\quad 6$

$\boxed{x \quad 6}$

3. $\frac{2}{9}$ and $\frac{2}{x}$ (given)

By cross multiplication we have $2 \quad x \quad 9 \quad 2$

$2x \quad 18$

$x \quad \frac{18}{2} \quad\quad 9$ $\boxed{x \quad -9}$

4. (a) Four rational number equivalent to $\frac{3}{7}$ are :

$\frac{3 \quad 2}{7 \quad 2} \boxed{\frac{6}{14}}$; $\frac{3 \quad 3}{7 \quad 3} \boxed{\frac{9}{21}}$; $\frac{3 \quad 4}{7 \quad 4} \boxed{\frac{12}{28}}$

$\frac{3 \quad 5}{7 \quad 5} \boxed{\frac{15}{35}}$

(b) Four rational number equivalent to $\frac{4}{9}$ are :

$\frac{4 \quad 2}{9 \quad 2} \boxed{\frac{18}{8}}$; $\frac{4 \quad 3}{9 \quad 3} \boxed{\frac{12}{21}}$; $\frac{4 \quad 4}{9 \quad 4} \boxed{\frac{16}{36}}$

$\frac{4 \quad 5}{9 \quad 5} \boxed{\frac{20}{45}}$

(c) Four rational number equivalent to $\frac{5}{11}$ are :

$\frac{5 \quad 2}{11 \quad 2} \boxed{\frac{10}{22}}$; $\frac{5 \quad 3}{11 \quad 3} \boxed{\frac{15}{33}}$; $\frac{5 \quad 4}{11 \quad 4} \boxed{\frac{20}{44}}$

$\frac{5 \quad 5}{11 \quad 5} \boxed{\frac{25}{55}}$

5. (a) $\frac{4}{13} \quad \frac{4 \quad\quad 1}{13 \quad\quad 1} \quad \frac{4}{13}$ (b) $\frac{3}{5} \quad \frac{3 \quad\quad 1}{5 \quad\quad 1} \quad \frac{3}{5}$

(c) $\frac{1}{9} \quad \frac{1 \quad\quad 1}{9 \quad\quad 1} \quad \frac{1}{9}$ (d) $\frac{7}{15} \quad \frac{7 \quad\quad 1}{15 \quad\quad 1} \quad \frac{7}{15}$

6. (a) $\frac{12}{5}$ we need numerator 48 $\frac{12 \quad 4}{5 \quad 4} \quad \frac{48}{20}$

(b) $\frac{12}{5}$ we and need numeration 84s $\frac{12 \quad\quad 7}{5 \quad\quad 7} \quad \frac{84}{35} \quad \frac{84}{35}$

(c) $\frac{12}{5}$ we need denominator 25 $\quad \frac{12 \quad 5}{5 \quad 5} \quad \frac{60}{25}$

(d) $\frac{12}{5}$ we need denominator 30 $\quad \frac{12 \quad 6}{5 \quad 6} \quad \frac{72}{30}$

7. (a) $\frac{2}{7} \quad \frac{?}{49} \quad \frac{12}{?}$

By which number was 7 multiplied to obtain 49? clearly the number is

$\frac{2}{7} \quad \frac{2 \quad 7}{7 \quad 7} \quad \frac{14}{49}$

Again by what number is 2 multiplied to get 12?

The number 12 2 6

$\frac{2}{7} \quad \frac{2 \quad 6}{7 \quad 6} \quad \frac{12}{42}$

Hence, $\frac{2}{7} \quad \frac{\boxed{14}}{49} \quad \frac{12}{\boxed{42}}$

(b) $\frac{4}{5} \quad \frac{?}{30} \quad \frac{28}{?}$

By which number was 5 multiplied to obtain 30?

clearly, The number is 30 5 6

$\frac{4}{5} \quad \frac{4 \quad 6}{5 \quad 6} \quad \frac{24}{30}$

Again by what number is 4 multiplied to get 28.

The number is, 28 4 7

$\frac{4}{5} \quad \frac{4 \quad 7}{5 \quad 7} \quad \frac{28}{35}$

Hence, $\frac{4}{5} \quad \frac{24}{30} \quad \frac{28}{35}$

8. (a) $\frac{1}{5} \quad \frac{8}{x}$ (given)

By cross multiplication we have

$1 \quad x \quad 8 \quad 5$

$1x \quad 40$

$x \quad \frac{40}{1} \quad 40$

(b) $\frac{7}{3} \quad \frac{x}{6}$ (given)

By cross multiplication we have

$7 \quad 6 \quad 3 \quad x$

$42 \quad 3x$

$x \quad \frac{42}{3} \quad 14$

(c) $\frac{13}{6} \quad \frac{65}{x}$ (given)

By cross multiplication we have

$13 \quad x \quad 65 \quad 16$

$13x \quad 1040$

$x \quad \frac{1040}{13} \quad 80$

(d) $\frac{16}{x} \quad 4$ (given)

By cross multiplication we have

$4 \quad x \quad 16 \quad 1$

$4x \quad 16$

$x \quad \frac{16}{4} \quad 4$

9. (a) $\frac{3}{9}$ and $\frac{3}{7}$:

Since a positive rational number is greater than negative rational number.

$$\frac{3}{7} \quad \frac{3}{7}$$

$\frac{3}{7}$ is greater rational number to $\frac{3}{7}$.

(b) $\frac{11}{15}$ and 0 :

Since a zero is greater than negative rational number.

$$\frac{11}{15} \quad 0$$

0 is greater than $\frac{11}{15}$ rational number.

(c) $\frac{4}{9}$ and $\frac{7}{9}$

Since they have the same positive denominators we compare the numerator 4 7

$$\frac{4}{9} \quad \frac{7}{9}$$

$\frac{4}{9}$ is greater rational number to $\frac{7}{9}$.

(d) $\frac{3}{8}$ and $\frac{8}{12}$

Making the denominator positive, we have $\frac{3}{8}$ and $\frac{8}{12}$

LCM of 8 and 12 24 and $\frac{3}{8} \quad \frac{3}{3} \quad \frac{9}{24}$;

$$\frac{8}{12} \quad \frac{2}{2} \quad \frac{16}{24}$$

Since They have the same positive denominators we compare the numerator 9 16

$$\frac{9}{24} \quad \frac{16}{24}$$

$$\frac{3}{8} \quad \frac{8}{12}$$

$\frac{3}{8}$ is greater rational number to $\frac{8}{12}$

(e) $\frac{6}{11}$ and $\frac{6}{11}$

Making the denominator positive, we have $\frac{6}{11}$ and $\frac{6}{11}$.

Since, positive rational number is greater than a negative rational number.

$$\frac{6}{11} \quad \frac{6}{11}$$

$$\frac{6}{11} \quad \frac{6}{11}$$

$\frac{6}{11}$ is greater rational number to $\frac{6}{11}$.

10. (a) $\frac{2}{3}, \frac{5}{11}$

Making the denominator positive, we have $\frac{2}{3}$ and $\frac{5}{11}$

LCM of 3 and 11 33

and $\frac{2}{3} \quad \frac{11}{11} \quad \frac{22}{33}$

$$\frac{5}{11} \quad \frac{3}{3} \quad \frac{15}{33}$$

Since, they have same positive denominators we compare the numerator 22 15.

$$\frac{22}{33} \quad \frac{15}{33}$$

$$\frac{2}{3} \quad \frac{5}{11}$$

$\frac{5}{11}$ is smaller rational number to $\frac{2}{3}$.

(b) $\frac{7}{12}$ and $\frac{5}{9}$

LCM of 12 and 9 36

$$\frac{7}{12} \quad \frac{7 \quad 3}{12 \quad 3} \quad \frac{21}{36}$$

$$\frac{5}{9} \quad \frac{5 \quad 4}{9 \quad 4} \quad \frac{20}{36}$$

Since they have same positive denominators we compare the numerator 21   20:

$$\frac{21}{36} \quad \frac{20}{36}$$

$$\frac{7}{12} \quad \frac{5}{9}$$

$\frac{7}{12}$ is smaller rational number to $\frac{5}{9}$

(c) $\frac{13}{5}$ and 3

LCM of 5 and 1 5

$$\frac{13 \quad 1}{5 \quad 1} \quad \frac{13}{1}$$

$$\frac{3 \quad 5}{1 \quad 5} \quad \frac{15}{5}$$

Since they have same positive denominators we compare the numerator 13   15

$$\frac{13}{5} \quad \frac{15}{5}$$

$$\frac{13}{5} \quad 3$$

$\frac{3}{1}$ is smaller rational number to $\frac{13}{5}$

(d) $\frac{5}{6}$ and $\frac{4}{5}$

LCM of 6 and 5 30

$$\frac{5 \quad 5}{6 \quad 5} \quad \frac{25}{30}$$

$$\frac{4 \quad 6}{5 \quad 6} \quad \frac{24}{30}$$

Since they have same positive denomination we compare the numerator :

25 24

$$\frac{25}{30} \quad \frac{25}{30} \qquad\qquad \frac{5}{6} \quad \frac{4}{5}$$

$\frac{5}{6}$ is smaller Rational number to $\frac{4}{5}$.

11. (a) Compression between $\frac{3}{4}$ and $\frac{1}{4}$

Since they have same positive denominators than we compare the numerator.

3 1

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

(b) Compression between $\frac{5}{6}$ and $\frac{10}{12}$

making same denominators

LCM of 6 and 12 is 12 :

$$\frac{5 \quad 2}{6 \quad 2} \quad \frac{10}{12}$$

$$\frac{10 \quad 1}{12 \quad 1} \quad \frac{10}{12}$$

Since they have same numerator and denominators.

$$\frac{10}{12} \square \frac{10}{12}$$

(c) Comparestion between $\frac{2}{3}$ and $\frac{1}{3}$

Since they have same positive denominators and a positive rational number is greater than a negative rational number.

$$\frac{2}{3} \square \frac{1}{3}$$

(d) Comparestion between 0 and $\frac{5}{6}$:

Since zero is smaller positive rational number.

$$0 \square \frac{5}{6}$$

(e) Comparestion 6 and $\frac{26}{5}$

Making some denominators

LCM of 1 and 5 is 5.

$$\frac{6 \quad 5}{1 \quad 5} \quad \frac{30}{5}$$

$$\frac{26 \quad 1}{5 \quad 1} \qquad \frac{26}{5}$$

Since they have same positive denominators than we compare the numerator ; 30 26

$$\frac{30}{5} \qquad \frac{26}{5}$$

$$6 \square \frac{26}{5}$$

(f) Comparestion between $\frac{4}{5}$ and $\frac{7}{10}$

Making the denominator positive $\frac{4}{5}$ and $\frac{7}{10}$

Making the denominator same.

LCM of 5 and 10 10

$$\frac{4 \quad 2}{5 \quad 2} \qquad \frac{8}{10}$$

$$\frac{7 \quad 1}{10 \quad 1} \qquad \frac{7}{10}$$

Since they have same positive denominator than we compare the numerator

$$8 \qquad 7$$

$$\frac{8}{10} \qquad \frac{7}{10}$$

$$\frac{4}{5} \square \frac{7}{10}$$

12. (a) To find order in the above rational number, we shall first make the denominator positive. So we have

$$\frac{4}{9}, \frac{5}{6}, \frac{2}{3}, \frac{11}{18}$$

$\frac{11}{18}$ being positive is the largest.

Remember that a positive rational number is always greater than the negative rational number.

To compare $\frac{4}{9}, \frac{5}{6}$ and $\frac{2}{3}$

LCM of 9, 6 and 3 18

Thus,

$$\frac{4}{9} \qquad \frac{4 \quad 2}{9 \quad 2} \qquad \frac{8}{18}$$

$$\frac{5}{6} \qquad \frac{5 \quad 3}{6 \quad 3} \qquad \frac{15}{18}$$

$$\frac{2}{3} \qquad \frac{2 \quad 6}{3 \quad 6} \qquad \frac{12}{18}$$

Since the same positive denominations we compare the numerator as 15 12 8 we have

$$\frac{5}{6} \qquad \frac{2}{3} \qquad \frac{4}{9}$$

Ascending order $\frac{5}{6}$ $\frac{2}{3}$ $\frac{4}{9}$ $\frac{11}{18}$

(b) To find order in the above rational number we shall first make the denominator positive. So se have

$$\frac{7}{5}, \frac{19}{30}, \frac{3}{10}, \frac{8}{15}$$

$\frac{19}{30}$ and $\frac{3}{10}$ are positive rational number

LCM of 30 and 10 3

$\frac{19}{30}$ $\frac{1}{1}$ $\frac{19}{30}$; $\frac{3 \quad 3}{10 \quad 3}$ $\frac{9}{10}$

Denominator are same we compare numeration than

$$19 \quad 9$$

$\frac{19}{30}$ $\frac{9}{10}$

$\frac{9}{10}$ is largest positive rational number.

Remember that a positive rational number is always greater than the negative rational number.

Again, to compar $\frac{7}{5}$ and $\frac{8}{15}$

LCM of 5 and 15 15

$$\frac{7}{5} \quad \frac{7 \quad 3}{5 \quad 3} \quad \frac{21}{15}$$

$$\frac{8}{15} \quad \frac{8 \quad 1}{15 \quad 1} \quad \frac{8}{15}$$

Some positive denominator than we compare the numerator.

$$21 \quad 8$$

$$\frac{21}{15} \quad \frac{8}{15}$$

we have, $\frac{7}{5}$ $\frac{8}{15}$

Ascending order $\frac{7}{5}$ $\frac{8}{15}$ $\frac{19}{30}$ $\frac{9}{10}$

13. (a) $\frac{1}{2}$ and $\frac{3}{4}$

To find the rational numbers between these two numbers, we make this denominators equal

$\frac{1}{2}$ $\frac{1}{2}$ $\frac{40}{40}$ $\frac{40}{80}$ and $\frac{3}{4}$ $\frac{3}{4}$ $\frac{20}{40}$ $\frac{60}{80}$

Now, we can find any two rational numbers between $\frac{40}{80}$ and $\frac{60}{80}$

The number can be $\frac{41}{80}, \frac{42}{80}, \frac{43}{80}, \frac{44}{80}$........

The above numbers are the required number

(b) We have $\frac{1}{2}$ and $\frac{1}{2}$

Middle rational number between $\frac{1}{2}$ and $\frac{1}{2}$

$$\frac{1}{2} \quad \frac{1}{2} \quad \frac{1}{2} \quad \frac{1}{2} \quad \frac{1 \quad 1}{2} \quad \frac{1}{2} \quad 0 \quad 0$$

Ist Middle radcional number between $\frac{1}{2}$ and 0.

$$\frac{1}{2} \quad \frac{1}{2} \quad 0 \quad \frac{1}{2} \quad \frac{1}{2} \quad \frac{1}{4}$$

IInd Middle rational number between 0 and $\frac{1}{2}$.

$$\frac{1}{2} \quad 0 \quad \frac{1}{2} \quad \frac{1}{2} \quad \frac{1}{2} \quad \frac{1}{4}$$

Three Rational between $\frac{1}{2}$ and $\frac{1}{2}$ are $\frac{1}{4}$, 0, $\frac{1}{4}$

14. (a) 2 and 1

2 and 1 may be written as rational numbers $\frac{2}{1}$ and $\frac{1}{1}$

To find the rational numbers between these two numbers, we make their denominators equal.

$$\frac{2}{1} \quad \frac{2 \quad 10}{1 \quad 10} \quad \frac{20}{10} \text{ and } \frac{1}{1} \quad \frac{1 \quad 10}{1 \quad 10} \quad \frac{10}{10}$$

Now, we can find any rational numbers between $\frac{20}{10}$ and $\frac{10}{10}$

The numbers can be $\frac{19}{10}, \frac{18}{10}, \frac{17}{10}, \frac{16}{10}, \frac{11}{10}$

The above numbers are the required numbers.

(b) $\frac{4}{5}$ and $\frac{3}{4}$

To find the rational numbers between these two numbers, we make these denominators equal.

$$\frac{4}{5} \quad \frac{4 \quad 40}{5 \quad 40} \quad \frac{160}{200} \text{ and } \frac{3}{4} \quad \frac{3 \quad 50}{4 \quad 50} \quad \frac{150}{200}$$

Now, we can find any rational numbers between $\frac{160}{200}$ and $\frac{150}{200}$

The numbers can be $\frac{159}{200}, \frac{158}{200}, \frac{157}{200}, \frac{156}{200} \ldots\ldots\ldots \frac{151}{200}$

The above numbers are the required numbers

15. (a) $\frac{5}{11}$ and $\frac{1}{11}$

$\frac{4}{11}, \frac{3}{11}, \frac{2}{11}, \frac{1}{11}, \frac{0}{11}$ these 5 rational numbers $\frac{5}{11}$ and $\frac{1}{11}$

we want 10 rational numbers between $\frac{5}{11}$ and $\frac{1}{11}$

So, $\frac{5}{11} \quad \frac{10}{10} \quad \frac{50}{110}$ and $\frac{1}{11} \quad \frac{10}{10} \quad \frac{10}{110}$

Now we can find 10 rational number between $\frac{5}{11}$ and $\frac{1}{11}$.

The numbers can be $\frac{49}{110}, \frac{48}{110}, \frac{47}{110}, \frac{46}{110}, \frac{45}{110}, \frac{44}{110}, \frac{43}{110}, \frac{42}{110}, \frac{41}{110}, \frac{40}{110}, \frac{39}{110}$

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

To find the rational numbers between these two numbers.

To make the denominators equal

$\frac{1}{3} \quad \frac{1}{3} \quad \frac{40}{40} \quad \frac{40}{120}$ and $\frac{1}{4} \quad \frac{1}{4} \quad \frac{30}{30} \quad \frac{30}{120}$

Now, we can find 10 rational numbers between $\frac{40}{120}$ and $\frac{30}{120}$

The number can be $\frac{39}{120}, \frac{39}{120}, \frac{37}{120}, \frac{36}{120}, \frac{35}{120}, \frac{34}{120}, \frac{33}{120}, \frac{32}{120}, \frac{31}{120}$

Exercise 2.3

1. (a) $\frac{3}{8}$ and $\frac{5}{8}$ added $\quad \frac{3}{8} \quad \frac{5}{8} \quad \frac{3 \quad 5}{8} \quad \frac{8}{8} \quad 1$

(b) $\frac{3}{8}$ and $\frac{5}{8}$ added $\quad \frac{3}{8} \quad \frac{5}{8} \quad \frac{3 \quad 5}{8} \quad \frac{2}{8} \quad \frac{1}{4}$

(c) $\frac{3}{8}$ and $\frac{5}{8}$ added $\quad \frac{3}{8} \quad \frac{5}{8} \quad \frac{3 \quad 5}{8} \quad \frac{2}{8} \quad \frac{1}{4}$

(d) $\frac{3}{8}$ and $\frac{5}{8}$ added $\quad \frac{3}{8} \quad \frac{5}{8} \quad \frac{3 \quad 5}{8} \quad \frac{8}{8} \quad 1$

2. (a) $\frac{11}{12} \quad \frac{1}{4} \quad \frac{11 \quad 3}{12} \quad \frac{8}{12} \quad \frac{2}{3}$

(b) $\frac{3}{10} \quad \frac{9}{5} \quad \frac{3 \quad 18}{10} \quad \frac{15}{10} \quad \frac{3}{2} \quad 1\frac{1}{2}$

(c) $\frac{5}{12} \quad \frac{1}{4} \quad \frac{5 \quad 3}{12} \quad \frac{8}{12} \quad \frac{2}{3}$

(d) $\frac{7}{25} \quad \frac{3}{5} \quad \frac{7 \quad 15}{25} \quad \frac{22}{25}$

3. (a) $\frac{3}{4} \quad \frac{2}{3} \quad \frac{4}{5}$

LCM of 4, 3 and 5 is 60

$\frac{3}{4} \quad \frac{3}{4} \quad \frac{15}{15} \quad \frac{45}{60}$

$\frac{2}{3} \quad \frac{2}{3} \quad \frac{20}{20} \quad \frac{40}{60}$

$\frac{4}{5} \quad \frac{4}{5} \quad \frac{12}{12} \quad \frac{48}{60}$

$\frac{45}{60} \quad \frac{40}{60} \quad \frac{48}{60}$

$\frac{85 \quad 48}{60}$

$\frac{45 \quad 40 \quad 48}{60} \quad \frac{37}{60}$

(b) $\frac{7}{2} \quad \frac{5}{6} \quad \frac{5}{6}$

LCM of 2, 6 and 8 24

$\frac{7}{2} \quad \frac{7}{2} \quad \frac{12}{12} \quad \frac{84}{24}$

$\frac{5}{6} \quad \frac{5}{6} \quad \frac{4}{4} \quad \frac{20}{24}$

$\frac{5}{8} \quad \frac{5}{8} \quad \frac{3}{3} \quad \frac{15}{24}$

$\frac{84}{24} \quad \frac{20}{24} \quad \frac{15}{24}$

$\frac{20}{24} \quad \frac{15}{24} \quad \frac{84}{24}$

$\frac{20 \quad 15 \quad 84}{24} \quad \frac{20 \quad 39}{24} \quad \frac{79}{24}$

(c) $\frac{5}{7} \quad \frac{11}{14} \quad \frac{16}{21}$

LCM of 7, 14 and 21 42

(d) $\frac{4}{5} \quad \frac{7}{10} \quad \frac{8}{15}$

LCM of 5, 10 and 15 30

$\frac{5}{7} \quad \frac{5}{7} \quad \frac{6}{6} \quad \frac{30}{42}$

$\frac{11}{14} \quad \frac{11}{14} \quad \frac{3}{3} \quad \frac{33}{42}$

$\frac{16}{21} \quad \frac{16}{21} \quad \frac{2}{2} \quad \frac{32}{42}$

$\frac{30}{42} \quad \frac{33}{42} \quad \frac{32}{42}$

$\frac{30}{42} \quad \frac{32}{42} \quad \frac{33}{42} \quad \frac{30 \quad 32 \quad 33}{42}$

$\frac{62 \quad 33}{42} \quad \frac{29}{42}$

$\frac{4}{5} \quad \frac{4}{5} \quad \frac{6}{6} \quad \frac{24}{30}$

$\frac{7}{10} \quad \frac{7}{10} \quad \frac{3}{3} \quad \frac{21}{30}$

$\frac{8}{15} \quad \frac{8}{15} \quad \frac{2}{2} \quad \frac{16}{30}$

$\frac{24}{30} \quad \frac{21}{30} \quad \frac{16}{30}$

$\frac{24 \quad 21 \quad 16}{30}$

$\frac{61}{30}$

4. (a) $\frac{2}{5} \quad \frac{8}{6} \quad \frac{4}{5} \quad \frac{5}{6}$

$\frac{2}{5} \quad \frac{4}{5} \quad \frac{5}{6} \quad \frac{8}{6}$

LCM of 5, 5, 6 and 6 30

$\frac{2}{5} \quad \frac{2}{5} \quad \frac{6}{5} \quad \frac{12}{30}; \frac{4}{5} \quad \frac{4}{5} \quad \frac{6}{6} \quad \frac{24}{30}$

$\frac{5}{6} \quad \frac{5}{6} \quad \frac{5}{5} \quad \frac{25}{30};$

$\frac{8}{6} \quad \frac{8}{6} \quad \frac{5}{5} \quad \frac{40}{30}$

$\frac{12}{30} \quad \frac{24}{30} \quad \frac{25}{30} \quad \frac{40}{30}$

$\frac{12 \quad 24 \quad 25 \quad 40}{30}$

$\frac{60 \quad 40}{30} \quad \frac{21}{20} \quad \frac{7}{10}$

(b) $\frac{11}{3} \quad \frac{3}{4} \quad \frac{11}{6} \quad \frac{3}{8}$

LCM of 3, 4, 6 and 8 24

$\frac{11}{3} \quad \frac{11}{3} \quad \frac{80}{8} \quad \frac{88}{24}; \frac{3}{4} \quad \frac{6}{6} \quad \frac{18}{24};$

$\frac{11}{6} \quad \frac{11}{6} \quad \frac{4}{4} \quad \frac{44}{24}; \frac{3}{8} \quad \frac{3}{8} \quad \frac{3}{3} \quad \frac{9}{24}$

$\frac{88}{24} \quad \frac{18}{24} \quad \frac{44}{24} \quad \frac{9}{24}$

$\frac{88 \quad 18 \quad 44 \quad 20}{24}$

$\frac{150 \quad 90}{24}$

$\frac{144}{24}$

$\frac{47}{8}$

(c) $\frac{13}{2} \quad \frac{14}{3} \quad \frac{21}{2} \quad \frac{7}{12}$

$\frac{13}{2} \quad \frac{7}{12} \quad \frac{14}{3} \quad \frac{21}{2}$

LCM of 2, 12, 3 and 2 12

$\frac{13}{2} \quad \frac{13}{2} \quad \frac{6}{6} \quad \frac{78}{12}; \frac{7}{12} \quad \frac{7}{12} \quad \frac{1}{1} \quad \frac{7}{12}$

$\frac{14}{3} \quad \frac{14}{3} \quad \frac{4}{4} \quad \frac{56}{12}; \frac{21}{2} \quad \frac{21}{2} \quad \frac{6}{6} \quad \frac{126}{12}$

$\frac{78}{12}, \frac{7}{12}, \frac{56}{12}$ and $\frac{126}{12}$ added

$\frac{78}{12} \quad \frac{7}{12} \quad \frac{56}{12} \quad \frac{126}{12}$

$\frac{78 \quad 7 \quad 56 \quad 126}{12} \quad \frac{85 \quad 182}{12} \quad \frac{97}{12}$

(d) $\frac{8}{7} \quad \frac{4}{9} \quad \frac{11}{7} \quad \frac{5}{6}$

LCM of 7, 9, 7 and 6 126

$\frac{8}{7} \quad \frac{8}{7} \quad \frac{18}{18} \quad \frac{144}{126};\ \frac{4}{9} \quad \frac{4}{9} \quad \frac{14}{14} \quad \frac{56}{126};$

$\frac{11}{7} \quad \frac{11}{7} \quad \frac{18}{18} \quad \frac{198}{126};\ \frac{5}{6} \quad \frac{5}{6} \quad \frac{21}{21} \quad \frac{105}{126}$

$\frac{144}{126}, \frac{56}{126}, \frac{198}{126}$ and $\frac{105}{126}$ added

$$\frac{144}{126} \quad \frac{56}{126} \quad \frac{198}{126} \quad \frac{105}{126}$$

$$\frac{144 \quad 56 \quad 198 \quad 105}{126}$$

$$\frac{398 \quad 105}{126} \quad \frac{293}{126}$$

5. (a) $\frac{7}{4}$ (b) $\frac{39}{8}$ (c) $\frac{5}{9}$ (d) $\frac{13}{14}$ (e) $\frac{5}{9}$ (f) $\frac{4}{7}$

6. (a) $\frac{5}{8} \quad \frac{1}{8} \quad \frac{5 \quad 1}{8} \quad \frac{4}{8} \quad \frac{1}{2}$ (b) $\frac{3}{7} \quad \frac{5}{7} \quad \frac{3 \quad 5}{7} \quad \frac{8}{7}$

(c) $\frac{1}{3} \quad \frac{5}{3} \quad \frac{1 \quad 5}{3} \quad \frac{6}{3} \quad 2$ (d) $\frac{5}{11} \quad \frac{3}{11} \quad \frac{5 \quad 3}{11} \quad \frac{2}{11}$

7. (a) Subtract $\frac{8}{9}$ from $\frac{5}{6}$ $\quad \frac{5}{6} \quad \frac{8}{9} \quad \frac{15 \quad 16}{18} \quad \frac{31}{18}$

(b) Subtract $\frac{10}{9}$ from 1 $\quad 1 \quad \frac{10}{9} \quad 1 \quad \frac{10}{9} \quad \frac{9 \quad 10}{9} \quad \frac{1}{9}$

(c) Subtract $\frac{18}{15}$ from 0 $\quad 0 \quad \frac{18}{15} \quad 0 \quad \frac{18}{15} \quad \frac{18}{15}$

(d) Subtract $\frac{13}{15}$ from $\frac{9}{20}$ $\quad \frac{9}{20} \quad \frac{13}{15} \quad \frac{27 \quad 52}{60} \quad \frac{79}{60}$

8. Sum of two rational number 4

One of the number $\frac{11}{5}$

The other number $\frac{4}{1} \quad \frac{11}{5}$

$$4 \quad \frac{11}{5} \quad \frac{20 \quad 11}{5} \quad \frac{9}{5}$$

9. Sum of two rational number $\frac{13}{21}$

One of the number $\frac{5}{7}$

The other number $\frac{13}{21} \quad \frac{5}{7}$

$$\frac{13 \quad 15}{21} \quad \frac{2}{21}$$

10. Let required number x

Then, other number x 3

According to question

$$x \quad 3 \quad \frac{8}{9}$$

$$x \quad \frac{8}{9} \quad 3$$

Thus required number $\frac{19}{9} \quad \frac{8 \quad 27}{9} \quad \frac{19}{9}$

11. $\frac{9}{28} \quad \frac{5}{7} \quad \frac{15}{14} \quad \frac{9}{28} \quad \frac{10 \quad 15}{14} \quad \frac{9}{28} \quad \frac{5}{14} \quad \frac{9 \quad 10}{28} \quad \frac{1}{28}$

12. $\frac{4}{5} \quad \frac{11}{20} \quad \frac{9}{10} \quad \frac{4}{5} \quad \frac{11}{20} \quad \frac{9}{10} \quad \frac{16 \quad 11}{20} \quad \frac{9}{10}$

$$\frac{27}{10} \quad \frac{9}{10} \quad \frac{27 \quad 18}{20} \quad \frac{45}{20} \quad \frac{9}{4}$$

13. (a) The additive inverse of $\frac{3}{7} \quad \frac{3}{7}$ (b) The additive inverse of $\frac{5}{12} \quad \frac{5}{12}$

(c) The additive inverse of $\frac{8}{9}$ or $\frac{8}{9} \quad \frac{8}{9}$ (d) $\frac{3}{11}$ can be written as $\frac{3}{11}$.

(e) $\frac{6}{13}$ can be written as $\frac{6}{13}$. The additive inverse of $\frac{6}{13}$ is $\frac{6}{13}$.

14. Total number of fruits 240

apples $\frac{1}{3}$, oranges $\frac{1}{4}$, bananas $\frac{1}{5}$

Remaining mangoes are $1 \quad \frac{1}{3} \quad \frac{1}{4} \quad \frac{1}{5}$

$$1 \quad \frac{20 \quad 15 \quad 12}{60}$$ [∵ The LCM of 3, 4, 5 = 60]

$$1 \quad \frac{47}{60} \quad \frac{13}{60}$$

Thus, apples $\frac{1}{3}$ Total fruits $\frac{1}{3}$ 240 80

oranges $\frac{1}{4}$ Total fruits $\frac{1}{4}$ 240 60

bananas $\frac{1}{5}$ Total fruits $\frac{1}{5}$ 240 48

and mangoes $\frac{13}{60}$ Total fruits $\frac{13}{60}$ 240 52

15. Difference of number $\frac{6}{26}$. The greater number $\frac{4}{9}$

The smaller number ?

The smaller number $\frac{4}{9} \quad \frac{6}{26}$

$$\frac{4}{9} \quad \frac{6}{26} \quad \frac{104 \quad 54}{234} \quad \frac{50}{234} \quad \frac{25}{117}$$

16. Let the required rational number be $\frac{a}{b}$

$$\frac{a}{b} \quad \frac{3}{4} \quad \frac{4}{7}$$

$$\frac{a}{b} \quad \frac{4}{7} \quad \frac{3}{11} \quad \frac{4}{7} \quad \frac{3}{11} \quad \frac{44 \quad 21}{77} \quad \frac{65}{77}$$ [∵ The LCM of 7, 11 = 77]

Exercise 2.4

1. (a) $\frac{5}{11}$ (b) $\frac{2}{7}$ (c) $\frac{7}{8}$ (d) 1 (e) $\frac{5}{9}$

2. (a) $\frac{1}{2}^{1} \quad \frac{1}{\frac{1}{2}} \quad 2$ (b) $\frac{3}{2}^{1} \quad \frac{1}{\frac{3}{2}} \quad \frac{2}{3}$

(c) $\frac{5}{6}^{1} \quad \frac{1}{\frac{5}{6}} \quad \frac{6}{5}$

(d) $\frac{3}{2} \quad \frac{2}{3}^{1} \quad \frac{3 \quad 2}{2 \quad 3}^{1} \quad \frac{6}{6}^{1} \quad \frac{1}{1}^{1} \quad (\ 1)^{1} \quad \frac{1}{(\ 1)} \quad \frac{1}{1} \quad 1$

(e) $(\ 11)^{1} \quad \frac{1}{(\ 1)} \quad \frac{1}{1} \quad 1$

3. (a) $\frac{5}{3} \quad \frac{7}{15} \quad \frac{5 \quad 7}{3 \quad 15} \quad \frac{1 \quad 7}{3 \quad 3} \quad \frac{7}{9}$

(b) $\frac{2}{3} \quad \frac{4}{5} \quad \frac{2 \quad 4}{3 \quad 5} \quad \frac{8}{15}$

(c) $\frac{15}{2} \quad \frac{17}{5} \quad \frac{15}{2} \quad \frac{17}{5} \quad \frac{3}{2} \quad \frac{17}{1} \quad \frac{51}{2}$ or $\frac{51}{2}$

(d) $\frac{10}{19} \quad 57 \quad 10 \quad 3 \quad 30$

4. (a) $\frac{1}{2} \quad \frac{1}{4} \quad \frac{1}{2} \quad 6 \quad \frac{1 \quad 1}{2 \quad 4} \quad (1 \quad 3) \quad \frac{1}{8} \quad 3 \quad \frac{1 \quad 24}{8} \quad \frac{25}{8}$

(b) $5 \quad \frac{2}{15} \quad 6 \quad \frac{2}{9}$

$$1 \quad \frac{2}{3} \quad 2 \quad \frac{2}{3} \quad \frac{2}{3} \quad \frac{4}{3} \quad \frac{2}{3} \quad \frac{4}{3} \quad \frac{2 \quad 4}{3} \quad \frac{2}{3}$$

(c) $\frac{5}{18} \quad \frac{15}{7} \quad 1 \quad \frac{1}{4} \quad \frac{1}{2} \quad \frac{1}{4}$

$$\frac{5}{6} \quad \frac{5}{7} \quad \frac{1}{4} \quad \frac{1}{8} \quad \frac{25}{42} \quad \frac{1}{4} \quad \frac{1}{8} \quad \frac{25}{42} \quad \frac{1}{4} \quad \frac{1}{8}$$

LCM of 42, 4 and 8 168

$$\frac{100 \quad 42 \quad 21}{168} \quad \frac{121 \quad 42}{168} \quad \frac{79}{168}$$

5. (a) 2 divide by $\frac{1}{2}$ 2 $\frac{1}{2}$ 2 2 4 (b) 1 divide by $\frac{1}{3}$ 1 $\frac{1}{3}$ 1 3 3

(c) 5 divides by $\frac{5}{7}$ 5 $\frac{5}{7}$ 5 $\frac{7}{5}$ 1 7 7

(d) $\frac{7}{4}$ divide by 1 $\frac{7}{4}$ 1 $\frac{7}{4}$ 1 $\frac{7}{4}$ (e) 0 divide by $\frac{2}{3}$ 0 $\frac{2}{3}$ 0 $\frac{3}{2}$ 0

(f) $\frac{8}{7}$ divide by 4 $\frac{8}{7}$ 4 $\frac{8}{7}$ $\frac{1}{4}$ $\frac{2}{7}$

6. (a) $\frac{2}{9}$ $\frac{1}{9}$ $\frac{2}{9}$ $\frac{9}{1}$ 2 (b) $\frac{3}{13}$ $\frac{5}{39}$ $\frac{3}{13}$ $\frac{39}{5}$ $\frac{9}{5}$ $\frac{9}{5}$

(c) $\frac{56}{7}$ $\frac{8}{14}$ $\frac{56}{7}$ $\frac{14}{8}$ 2 (d) $\frac{105}{11}$ $\frac{15}{121}$ $\frac{105}{11}$ $\frac{121}{15}$ 7 11 77

7. (a) The multiplicative inverse of $\frac{6}{11}$ $\frac{11}{6}$ (b) The multiplicative inverse of $\frac{9}{5}$ $\frac{5}{9}$

(c) The multiplicative inverse of $\frac{1}{10}$ 10 (d) The multiplicative inverse of 5 $\frac{1}{5}$

8. Product of two rational number 5

One rational number 9

Other number (5) (9) 5 $\frac{1}{9}$ $\frac{5}{9}$ $\frac{5}{9}$

9. The Required number 13 $\frac{91}{5}$ 13 $\frac{5}{91}$ $\frac{13 \quad 5}{91}$ $\frac{5}{7}$

10. Sum of $\frac{7}{8}$ and $\frac{3}{5}$ $\frac{7}{8}$ $\frac{3}{5}$ LCM of 8 and 5 40 $\frac{35 \quad 24}{40}$ $\frac{11}{40}$

11. Length of rope 20 m Pieces of equal size are cut $\frac{5}{4}$ m

Number of pieces are cut off 20 $\frac{5}{4}$ 20 $\frac{4}{5}$ 16

16 pieces are cut off in 20 m rope
So, No rope is left.

12. (i) $\frac{13}{15}$ $\frac{3}{5}$ $\frac{3}{5}$ $\frac{13}{5}$ $\frac{3 \quad 9}{15}$ $\frac{13 \quad 9}{15}$ $\frac{44}{15}$ $\frac{20}{15}$ $\frac{4}{15}$ $\frac{5}{22}$ $\frac{2}{11}$

(ii) $\frac{3}{7}$ $\frac{5}{9}$ $\frac{5}{12}$ $\frac{12}{49}$ $\frac{\overset{1}{3} \quad (5)}{7 \quad \underset{3}{9}}$ $\frac{5 \quad \overset{1}{12}}{\underset{1}{12} \quad 49}$

$\frac{5}{21}$ $\frac{5}{49}$ $\frac{\overset{1}{5}}{\underset{3}{21}}$ $\frac{\overset{7}{49}}{\underset{1}{5}}$ $\frac{7}{3}$

13. (a) F (since division by 0 is not defined.)
(b) F (c) T (d) F (e) T (f) F (g) T

Exercise 2.5

1. If a rational number is in its lowest term and its denominator has no factor other than 2 or 5 on both.

Then that rational number has a terminating decimal representation. Other wise, it has a non-terminating repeating decimal representing.

In the given rational numbers $\frac{1}{12}, \frac{13}{27}, \frac{19}{45}$ and $\frac{71}{75}$ have factors other than 2 or 5. Hence these are non-terminating decimals.

On the other hand, rational number $\frac{5}{10}, \frac{18}{30}, \frac{33}{20}$ and $\frac{26}{25}$ have factor of either 2 or 5 or both. Hence, these are terminating decimals.

2. (a) $\frac{2}{11}$ 2   11

```
11) 2.000000 (0.1818
   -11
    90
   -88
    20
   -11
   -90
    88
     2
```

$\frac{2}{11}$ 0.1818

(b) $\frac{11}{8}$ 11   8

```
8)  11   (1.375
   -8
    30
   -24
     60
    -56
      40
     -40
       0
```

$\frac{11}{8}$ 1.375

(c) $\frac{16}{32}$ 16   32

```
32) 160 (0.5
   -160
     0
```

$\frac{16}{32}$ 0.5

(d) $\frac{26}{25}$ 26   25

```
25) 26  (0.5
   -25
    100
   -100
      0
```

$\frac{26}{25}$ 1.04

(e) $\frac{49}{15}$ 49   15

```
15)  49   (3.2666
    -45
      40
     -30
      100
      -90
       100
       -90
        10
```

$\frac{49}{15}$ 3.2666

(f) $\frac{85}{12}$ 85   12

```
12) 85    (7.0833
   -84
    100
    -96
      40
     -36
       4
```

$\frac{85}{12}$ 7.0833

(g) $\frac{26}{500}$ 26   500

```
500)  2600  (0.052
     -2500
      1000
     -1000
         0
```

$\frac{26}{500}$ 0.052

(h) $\frac{303}{125}$ 303   125

```
125) 303    (4.424
    -250
     530
     500
      300
      250
       500
       300
       100
```

$\frac{303}{125}$ 2.424

3. (a) $3.125 \quad \frac{3125}{1000} \quad \frac{25}{8} \quad 3\frac{1}{8}$ (b) $5005 \quad \frac{5005}{1000} \quad \frac{1001}{200} \quad 5\frac{1}{200}$

(c) Let, $x \quad 2.\overline{3}$

Here, only one digit in decimal part is repeating so we multiply it by 10.

$$10x \quad 2.\overline{3}$$

Subtracting (1) from (2) we get

$$10x \quad x \quad 23.\overline{3} \quad 2.\overline{3}$$
$$9x \quad 21$$
$$x \quad \frac{21}{9} \quad \frac{7}{3} \quad 2\frac{1}{3}$$
$$x \quad 2.\overline{3} \quad 2\frac{1}{3}$$

(d) Let $x \quad 1.4\overline{7}$

Here, we have two digits in the decimal part out of which only one digit is repeating. First, we multiply it by 10 so that only repotting decimal is left on the right side of decimal point.

$$10x \quad 14.\overline{7} \qquad \ldots(1)$$

Now, only one digit is repeating, so again we multiply it by 10.

$$100x \quad 14.\overline{7} \qquad \ldots(2)$$

Subtracting (2) from (1), we get

$$100x \quad 10x \quad 147.\overline{7} \quad 14.\overline{7}$$
$$90x \quad 133$$
$$x \quad \frac{133}{90} \quad 1\frac{43}{90}$$

(e) Let $x \quad 0.1\overline{3}$

Here, we have two digits in the decimal part out of which only one digit is repeating. First we multiply it by 10 so that only repating decimal is left on the right side of decimal point.

$10x \quad 1.\overline{3}\ldots(1)$

Now, only one digit is repeating, so again we multiply it by 10.

$$100x \quad 13.\overline{3} \quad \ldots(2)$$

Subtracting (2) from (1) we get.

$$100x \quad 10x \quad 13.\overline{3} \quad 1.\overline{3}$$
$$90x \quad 12$$
$$x \quad \frac{12}{90} \quad \frac{4}{30} \quad \frac{2}{15}$$

(f) Let $x \quad 3.\overline{185}$

Here, three digit in decimal part is repeating, so we multiply it by 1000.

$$1000x \quad 3185.\overline{185} \quad \ldots(2)$$

Subtracting (1) from (2), we get

$$1000x \quad x \quad 3185.\overline{185} \quad 3.\overline{185}$$
$$999x \quad 3182$$
$$x \quad \frac{3182}{999} \quad 3\frac{185}{999}$$

(g) Here, we have two digits in the decimal part out of which only one digit in repeating. First we multiply it by 10 so that only.
repeating decimal is left on the right side of decimal point

$$10x \quad 8.\overline{3} \qquad \ldots(1)$$

Now, only one digit is repeating so again we multiply it by 10.

$$100x \quad 83.\overline{3} \qquad \ldots(2)$$

Subtracting (1) from (2) we get

$$100x \quad 10x \quad 83.\overline{3} \quad 8.\overline{3}$$

$$90x \quad 75 \qquad x \quad \frac{75}{90} \quad \frac{25}{30}$$

(h) $12.68 \quad \frac{1268}{100} \quad \frac{317}{25} \quad 12\frac{17}{25}$

4. (a) Let $x \quad 0.\overline{6} \qquad ...(1)$

Here, only one digit in decimal part is repeating, so we multiply it by 10.

$$10x \quad 6.\overline{6} \qquad ...(2)$$

Subtracting (1) from (2), we get

$$10x - x \quad 6.\overline{6} - 0.\overline{6}$$

$$9x \quad 6$$

$$x \quad \frac{6}{9} \quad \frac{2}{3}$$

$$x \quad \frac{2}{3}$$

Thus this number can bge expressed as rational number.

(b) Let $x \quad 0.217217217 \quad ...(1)$

or $x \quad 0.\overline{217}$

Here, Three digits in decimal part are repeating, so we multiply it by 1000.

$$1000x \quad 217.\overline{217} \qquad ...(2)$$

Subtracting (1) from (2), we get

$$1000x - 217.\overline{217} - 0.\overline{217}$$

$$999x \quad 217$$

$$x \quad \frac{217}{999} \quad \frac{p}{q}$$

Thus, this number can be expressed as rational number.

(c) Let $x \quad 7.405055005...$

Since no digit or group of digits in decimal part is repeating, so it can't expressed as rational lnumber.

(d) These also can't be expressed as rational number.

(e) These also can't be expressed as rational number.

(f) These also can't be expressed as rational number.

5. (a) $3.\overline{5} \quad 4.\overline{7}$

First we convert decimals number into rational numbers.

Let $x \quad 3.\overline{5} \qquad \ldots(1)$

Here, we have one digits in decimal part is repeating, so we multiply by 10

$$10x \quad 35.\overline{5} \qquad \ldots(2)$$

Subtracting (1) from (2), we get

$$10x \quad x \quad 35.\overline{5} \quad 3.\overline{5}$$

$$9x \quad 32$$

$$x \quad \frac{32}{9}$$

again, Let $y \quad 4.\overline{7}$

Here, we have one digits in decimal part is repeating, so we multiply by 10

$$10y \quad 47.\overline{7}$$

Subtracting (3) from (4), we get

$$10y \quad y \quad 47.\overline{7} \quad 4.\overline{7}$$

$$9y \quad 43$$

$$y \quad \frac{43}{9}$$

$$4.\overline{7} \quad \frac{43}{9}$$

Than, $x \quad y$

$$3.\overline{5} \quad 4.\overline{7} \quad \frac{32}{3} \quad \frac{43}{9} \quad \frac{32 \quad 43}{9} \quad \frac{75}{9}$$

$$\frac{25}{3} \quad 8\frac{1}{3}$$

(b) $0.\overline{2} \quad 0.\overline{3} \quad 0.\overline{4}$

First we convert decimals number into rational numbers

Let $x \quad 0.\overline{2}$ …(1)

Here, we have one digits in decimal part is repeating, so we multiply by 10

$$10x \quad 2.\overline{2} \qquad \ldots(2)$$

subtracting (1) from (2) we get

$$10x \quad x \quad 2.\overline{2} \quad 0.\overline{2}$$

$$9x \quad 2$$

$$x \quad \frac{2}{9}$$

And $y \quad 0.\overline{3}$ …(3)

Here, we have one digits in decimal part is repeating, so we multiply by

$$10y \quad 3.\overline{3} \qquad \ldots(4)$$

Subtracting (3) from (4) we get

$$10y \quad y \quad 3.\overline{3} \quad 0.\overline{3} \quad 3$$

$$9y \quad 3$$

$$y \quad \frac{3}{9}$$

Again, $z \quad 0.\overline{4}$ …(5)

Here, we have one digits in decimal part is repeating, so, we multiply by

$$10x \quad 4.\overline{4} \ldots(6)$$

Subtracting (5) from (6) we get

$$10z \quad z \quad 4.\overline{4} \quad 0.4$$

$$9z \quad 4 \qquad\qquad z \quad \frac{4}{9}$$

than, $x \quad y \quad z$

$$0.\overline{2} \quad 0.\overline{3} \quad 0.\overline{4} \quad \frac{2}{9} \quad \frac{3}{9} \quad \frac{4}{9} \quad \frac{2 \quad 3 \quad 4}{9} \quad \frac{9}{9} \quad 1$$

MCQ's

1.	(b)	**2.**	(c)	**3.**	(b)	**4.**	(c)	**5.**	(b)	**6.**	(b)
7.	(b)	**8.**	(d)	**9.**	(d)	**10.**	(d)				