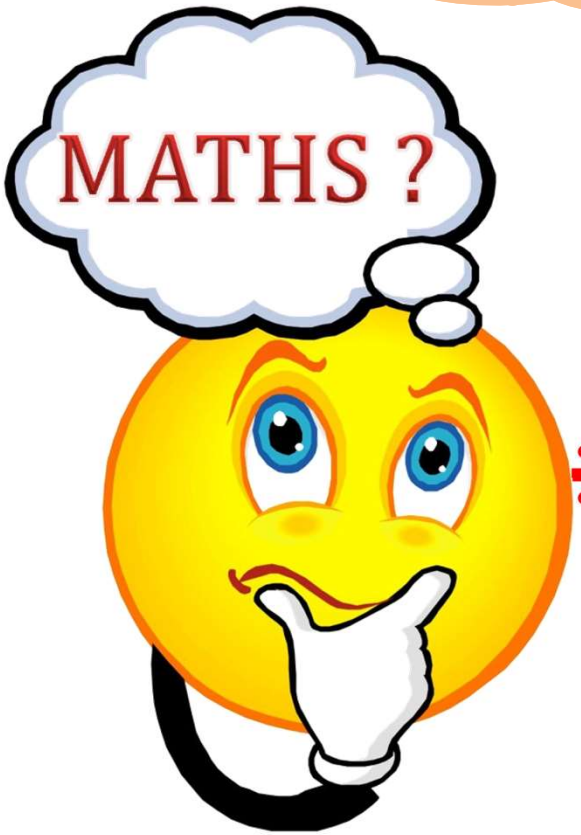
Lecture 01

Module 01

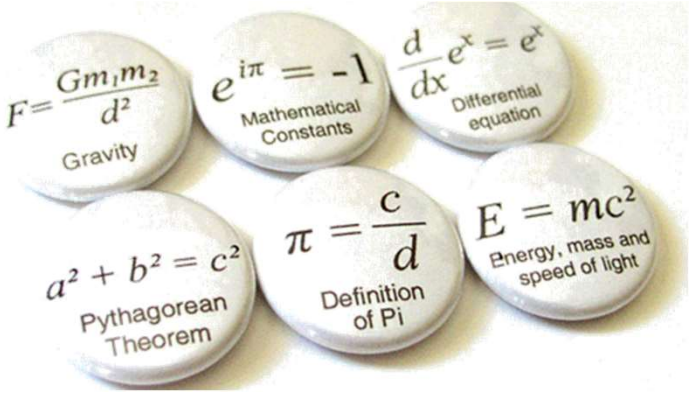

RATIONAL NUMBERS

Maths is the study of ?

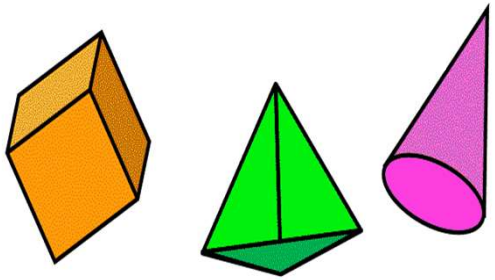


ers

Formulae

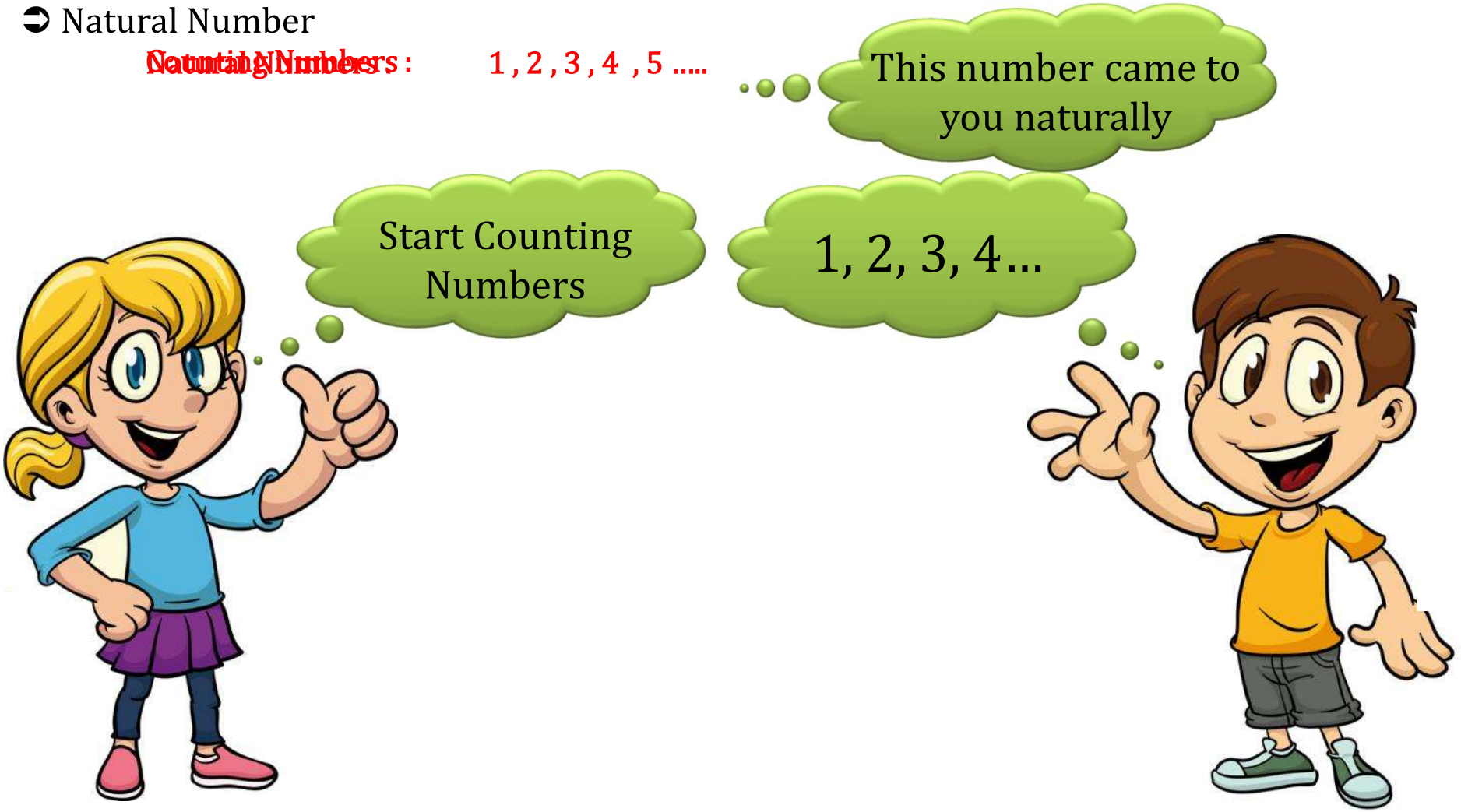


Geometric Shapes



➲ Natural Number

Natural Numbers : 1 , 2 , 3 , 4 , 5 .....



➲ Whole Number

Natural Numbers : 1 , 2 , 3 , 4 , 5 .....

Whole Numbers : 0 , 1 , 2 , 3 , 4 , 5 .....

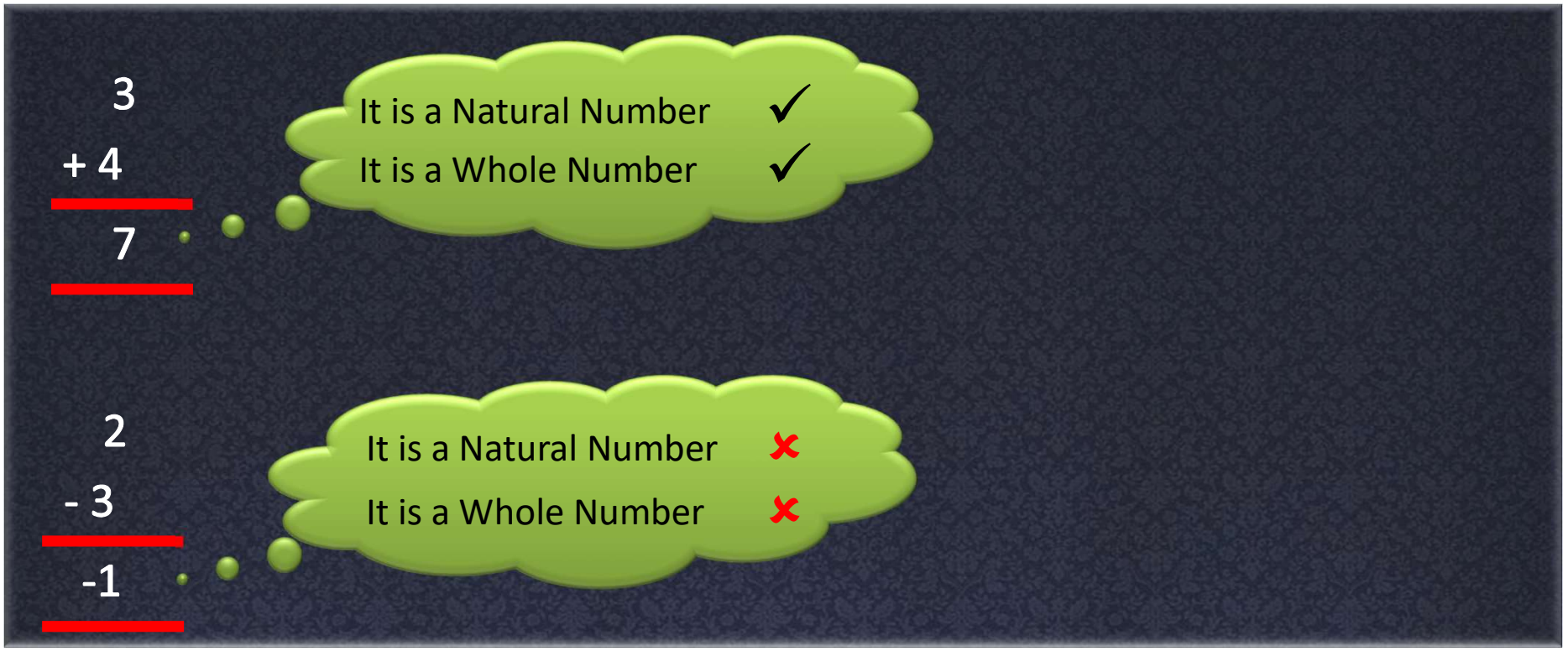
The collection of number which includes all the natural number and zero

➲ Integers Number

Natural Numbers : 1 , 2 , 3 , 4 , 5 .....

Whole Numbers : 0 , 1 , 2 , 3 , 4 , 5 .....

Integers : ... - 3 , - 2 , - 1 , 0 , 1 , 2 , 3 , 4 , 5 .....



COMMUTATIVITY

Two rational numbers can be added in any order

Operation	Numbers	Remarks
Add	What do you observe ? And $7 = 7$; $7 + 0 = 7$ $0 + 7 = 7 + 0$ Lets take an example ble numbers nd b, $a + b = b + a$	Addition is commutative

COMMUTATIVITY

Operation	Numbers	Remarks
Subt	And $0 - 7 = -7$; $0 - 7 = -7$ What do you observe ? $7 - 0 \neq 0 - 7$ I an example	Subtraction is not commutative

COMMUTATIVITY Two rational numbers can be multiplied in any order

Operation	Numbers	Remarks
Multi	What do you observe ? And $7 = 0$; $7 \times 0 = 0$ $0 \times 7 = 7 \times 0$ Lets take an example ble numbers nd b, $a \times b = b \times a$	Multiplication is commutative

COMMUTATIVITY

Operation	Numbers	Remarks
Divi	What do you observe ? And $0 = $ N.d ; $0 \div 7 = 0$ $7 \div 0 \neq 0 \div 7$ I an example	Division is not commutative

Module 02

ASSOCIATIVITY

Three rational numbers can be grouped in any order

Operation	Numbers	Remarks
Add	What do you observe ? (2+5) = 14 ; And (7+2)+5 = 14 i.e (7+2)+5 Lets take an example... ble numbers and c a + (b + c) = (a + b) + c	Addition is associative

ASSOCIATIVITY

Operation	Numbers	Remarks
Subt	What do you observe ? And $(2-5) = 10$; $(7-2)-5 = 0$ $7-(2-5) \neq (7-2)-5$ an example	Subtraction is not associative

ASSOCIATIVITY

Three rational numbers can be grouped in any order

Operation	Numbers	Remarks
Multi	What do you observe ? And $(2\times5) = 70$; $(7\times2)\times5 = 70$ i.e. $7\times(2\times5) = (7\times2)\times5$ Lets take For any two whole numbers a, b and c $a\times(b\times c) = (a\times b)\times c$	Multiplication is associative

ASSOCIATIVITY

Operation	Numbers	Remarks
Di	What do you observe ? And (2÷5) = 17.5; (7÷2)÷5 = 0.7 $7 \div (2 \div 5) \neq (7 \div 2) \div 5$ an example	Subtraction is not associative

Additive Inverse

Q.1) Write the additive inverse of each of the following.

Negative of Integers

Examples:

(i) $\frac{2}{8}$

Sol. $\frac{2}{8} \times -1 = \frac{-2}{8}$

(ii) $\frac{-5}{9}$

Sol. $\frac{-5}{9} \times -1 = \frac{5}{9}$

Additive Inverse

Q.1) Write the additive inverse of each of the following.

Negative of Integers

Examples:

(iii) $\frac{-6}{-5}$

Sol.

$$\frac{\not -6}{\not -5} = \frac{6}{5} \times -1 = \boxed{\frac{6}{-5}}$$

Multiplicative Inverse

Q.2) Write the multiplicative inverse of each of the following.

Reciprocal of Integers

Examples:

(i) -13

Sol. $-13 = \frac{1}{-13}$

(ii) $\frac{-13}{19}$

Sol. $\frac{-13}{19} = \frac{19}{-13}$

Module 03

Find using distributivity

Q. $\left\{\frac{7}{5}\times\left(\frac{-3}{12}\right)\right\}+\left\{\frac{7}{5}\times\frac{5}{12}\right\}$

Since denominator is same

Sol. $\left\{\frac{7}{5}\times\left(\frac{-3}{12}\right)\right\}+\left\{\frac{7}{5}\times\frac{5}{12}\right\}=\frac{7}{5}\times\left\{\frac{-3}{12}+\frac{5}{12}\right\}$

$=\frac{7}{5}\times\left(\frac{-3+5}{12}\right)$

$=\frac{7}{5}\times\frac{1}{6}\frac{\cancel{2}}{\cancel{12}}$

$=\frac{7}{30}$

Using appropriate properties find:

Q. $\frac{2}{5} \times \left(-\frac{3}{7}\right) - \frac{1}{6} \times \frac{3}{2} + \frac{1}{14} \times \frac{2}{5}$

What are the uncommon factors?

Sol. $= \frac{2}{5} \times \frac{-3}{7} + \frac{1}{14} \times \frac{2}{5} - \frac{1}{4}$ (Using commutativity)

$= \frac{2}{5}\left(\frac{-3}{7} + \frac{1}{14}\right) - \frac{1}{4}$ (Using distributivity)

$= \frac{2}{5}\left(\frac{-42 + 7}{98}\right) - \frac{1}{4}$ $\quad = \frac{-4 - 7}{28}$

$= \frac{2}{5} \times \frac{-35}{98} - \frac{1}{4}$ $\quad = \frac{-11}{28}$

$= \frac{-1}{7} \times \frac{1}{4}$

Module 04

Q. Using appropriate properties find

$$-\frac{2}{3}\times\frac{3}{5}+\frac{5}{2}-\frac{3}{5}\times\frac{1}{6}$$

Sol. $-\frac{2}{3}\times\frac{3}{5}+\frac{5}{2}-\frac{3}{5}\times\frac{1}{6}$

What are the uncommon factors?

$=\left(-\frac{2}{3}\times\frac{3}{5}\right)-\left(\frac{3}{5}\times\frac{1}{6}\right)+\frac{5}{2}$ (Using associativity)

$=\frac{3}{5}\left(\frac{-2}{3}-\frac{1}{6}\right)+\frac{5}{2}$ (Using distributivity)

$=\frac{3}{5}\left(\frac{-4-1}{6}\right)+\frac{5}{2}$

$=\frac{\cancel{3}^{1}}{\cancel{5}}\times\frac{-\cancel{5}}{\cancel{6}_{2}}+\frac{5}{2}$

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

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

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

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

$=2$

Q. Name the property under multiplication used in each of the following:

Sr. No.	Rational number	Multi
(i)	$\underbrace{\frac{-4}{5}}_{a} \times \underbrace{1}_{1} = \underbrace{1}_{1} \times \underbrace{\frac{-4}{5}}_{a} = -\frac{4}{5}$	1 is the mu

Is this in the form of $a \times 1 = 1 \times a = a$ Yes!

When we multiply rational number with 1, we get that rational number as the product

Lecture 02

Module 05

Q. Write five rational numbers which are smaller than 2.

Sol.

$\frac{1}{3}, \frac{1}{4}, \frac{1}{2}, \frac{-1}{2}, \frac{-1}{5}$, and so on.

Q. **Find ten rational numbers between:**

Q. $\frac{-2}{5}$ and $\frac{1}{2}$

Converting $\frac{-2}{5}$ and $\frac{1}{2}$ having same denominators such that difference between the numerators is more than 10

The difference between the numerators is not more than 10

Sol.

$$\frac{-2}{5} = \frac{-2 \times 2}{5 \times 2} = \frac{-4}{10} \times \frac{2}{2} = \frac{-8}{20}$$

$$\frac{1}{2} = \frac{1 \times 5}{2 \times 5} = \frac{5}{10} \times \frac{2}{2} = \frac{10}{20}$$

Ten rational numbers between $\frac{-2}{5}$ and $\frac{1}{2}$ are

$$\frac{-7}{20}, \frac{-6}{20}, \frac{-5}{20}, \frac{-4}{20}, \frac{-3}{20}, \frac{-2}{20}, \frac{-1}{20}, 0, \frac{1}{20}, \frac{2}{20}$$

Q. Find five rational numbers between:

Q. $\frac{1}{4}$ and $\frac{1}{2}$

Sol.

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

$$\frac{1}{2} = \frac{1 \times 2}{2 \times 2} = \frac{2}{4} \times \frac{8}{8} = \frac{16}{32}$$

Converting $\frac{1}{4}$ and $\frac{1}{2}$ having same denominators such that difference between the numerators is more than 5.

difference between the numerators is not

Converting $\frac{1}{4}$ and $\frac{2}{4}$ having same denominators such that difference between the numerators is more than 5.

Five rational numbers between $\frac{1}{4}$ a

$$\frac{9}{32}, \frac{10}{32}, \frac{11}{32}, \frac{12}{32}, \frac{13}{32}$$

Module 06

Q. Verify that $-(-x) = x$ for :

$$x = \left(-\frac{13}{17}\right)$$

Sol.

$$x = \frac{-13}{17} \quad ...(i)$$

Multiplying -1 on both the side

$-1 \times x = -1 \times \left(-\frac{13}{17}\right)$

$- - = +$

$$-x = +\frac{13}{17}$$

Multiplying -1 on both the side

$-1 \times (-x) = -1 \times \left(+\frac{13}{17}\right)$

$- + = -$

$-(-x) = -\frac{13}{17} \quad ...(ii)$

[From (i) and (ii)]

$-(-x) = x$ proved

we need to prove

In order to find $-x$

But $\frac{-13}{17}$ is the value of x

In order to find $-(-x)$

Q. Find five rational numbers between:

Q. $\frac{2}{3}$ and $\frac{4}{5}$

Sol.

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

$$\frac{4}{5} = \frac{4 \times 12}{5 \times 12} = \frac{48}{60}$$

Same denominators

What are next number between 40 to 48?

$\frac{41}{60}$ $\frac{42}{60}$ $\frac{43}{60}$ $\frac{44}{60}$ $\frac{45}{60}$

Converting $\frac{2}{3}$ and $\frac{4}{5}$ having same denominators such that difference between the numerators is more than 5.

Now, any five rational numbers are $\frac{41}{60}$ $\frac{42}{60}$ $\frac{43}{60}$ $\frac{44}{60}$ $\frac{45}{60}$

Q. Find five rational numbers between:

Q. $\frac{-3}{2}$ and $\frac{5}{3}$

Sol.

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

$$\frac{5}{3} = \frac{5 \times 2}{3 \times 2} = \frac{10}{6}$$

What are next number between –9 to –10 ?

$\frac{-8}{6}$ $\frac{-7}{6}$ $\frac{-6}{6}$ ... $\frac{1}{6}$ $\frac{2}{6}$

denominators. we have

Same denominators

$\therefore$ Five rational numbers are $\frac{-8}{6}$ $\frac{-7}{6}$ $\frac{-6}{6}$ $\frac{1}{6}$ $\frac{2}{6}$

Q. Find five rational numbers between $\frac{3}{5}$ and

Q. $\frac{3}{5}$ and $\frac{3}{4}$

Sol.

$$\frac{3}{5} = \frac{3 \times 20}{5 \times 20} = \frac{60}{100}$$

$$\frac{3}{4} = \frac{3 \times 25}{4 \times 25} = \frac{75}{100}$$

What are numbers between 60 to 75 ?

$\frac{61}{100}$ $\frac{62}{100}$ $\frac{63}{100}$ $\frac{64}{100}$ $\frac{65}{100}$

$\frac{66}{100}$ $\frac{67}{100}$ $\frac{68}{100}$ $\frac{69}{100}$ $\frac{70}{100}$ ...

∴ Ten rational numbers are $\frac{61}{100}$ $\frac{62}{100}$ $\frac{63}{100}$ $\frac{64}{100}$ $\frac{65}{100}$ $\frac{66}{100}$ $\frac{67}{100}$ $\frac{68}{100}$ $\frac{69}{100}$ $\frac{70}{100}$

Module 07

Q. Find the multiplicative inverse of the following

Sr. No.	Rational number	Mu
(i)	$-1 \times \frac{-2}{5} = \frac{2}{5}$	$\frac{5}{2}$
(ii)	– 1	– 1

What is the reciprocal of $\frac{2}{5}$ $\frac{}{1}$

$\frac{5}{2}$

$\frac{-1}{1} = -1$

Q. Verify that $-(-x) = x$ for :

$$x = \frac{11}{15}$$

Sol.

$$x = \frac{11}{15} \quad ...(i)$$

Multiplying -1 on both the side

$$-1 \times x = -1 \times \frac{11}{15}$$

$$-x = -\frac{11}{15}$$

Multiplying -1 on both the side

$- \times - = +$

$$-1 \times (-x) = -1 \times \left(-\frac{11}{15}\right)$$

We need to prove ...d $-x$

$$-(-x) = \frac{11}{15} \quad ...(ii)$$

But $\frac{11}{15}$ is the value of x

In order to find $-(-x)$

...oved

[From (i) and (ii)]

Module 08

Q. Find the multiplicative inverse of the following

Sr. No.	Rational number	Multipli
(i)	-13	
(ii)	$\frac{-13}{19}$	
(iii)	$\frac{1}{5}$	
(iv)	$\frac{-5}{8} \times \frac{-3}{7} = \frac{15}{56}$	$\frac{56}{15}$

What is the reciprocal of $\frac{-13}{1}$

What is the reciprocal of $\frac{-13}{19}$

What is the reciprocal of $\frac{1}{5}$

What is the reciprocal of $\frac{15}{56}$

$\frac{56}{15}$

$\frac{(-5) \times (-3)}{8 \times 7} = \frac{15}{56}$

Q. Name the property under multiplicatio

Sr. No.	Multiplicative	Property
(i)	$-\frac{13}{17}\times\frac{-2}{7}=\frac{-2}{7}\times\frac{-13}{17}$ a b	Commutativity
(ii)	$\frac{-19}{29}\times\frac{29}{-19}$	Multiplicative inverse

What is the reciprocal of $\frac{-19}{29}$

$a \times b = b \times a$

Yes!

Whenever a number multiplied by its reciprocal then which property is used?

Com

Multiplicative inverse

Q. Multiply $\frac{6}{13}$ by the reciprocal of $\frac{-7}{16}$

What is the reciprocal of $\frac{-7}{16}$

$\frac{-16}{7}$

$\therefore \frac{6}{13} \times$ Reciprocal of $\frac{-7}{16}$

$\therefore \frac{6}{13} \times \left(\frac{-16}{7}\right)$

$= \frac{6 \times (-16)}{13 \times 7}$

$= \frac{-96}{91}$

Lecture 03

Module 09

Q. Tell what property allows you to compute

$\underbrace{\frac{1}{3}}_{a} \times \underbrace{\left(6 \times \frac{4}{3}\right)}_{b\ \ c}$ as $\underbrace{\left(\frac{1}{3} \times 6\right)}_{a\ \ b} \times \frac{4}{3}$

Is this in the form of $a \times (b \times c) = (a \times b) \times c$ Yes!

So what is the property called as ?

In computing $\frac{1}{3} \times \left(6 \times \frac{4}{3}\right)$ as $\left(\frac{1}{3} \times 6\right) \times \frac{4}{3}$

we use the **associativity property.**

Associativity

Q. Is $\frac{8}{9}$ the multiplicative inverse of $-1\frac{1}{8}$ why or why not ?

Sol.

$$\frac{8}{9} \times \left(-1\frac{1}{8}\right)$$

$$= \frac{\cancel{8}}{\cancel{9}} \times \frac{-\cancel{9}^{\,-1}}{\cancel{8}}$$

$$= -1$$

$$\neq 1$$

$\therefore \frac{8}{9}$ is not the multiplicative inverse of $-1\frac{1}{8}$ because the product is not 1.

The product of a rational number and its multiplicative inverse is equal to 1.

Q. Is 0.3 the multiplicative inverse of $3\frac{1}{3}$ why or why not ?

Sol.

$$0.3 \times 3\frac{1}{3}$$

$$= \frac{\cancel{3}}{\cancel{10}} \times \frac{\cancel{10}}{\cancel{3}}$$

$$= 1$$

$\therefore$ 0.3 is the multiplicative inverse of $3\frac{1}{3}$ as the product is 1.

The product of a rational number and its multiplicative inverse is equal to 1.

Module 10

Q. Write.

1. The rational number that does not have a reciprocal

Sol. 0

2. The rational numbers that are equal to their reciprocals.

Sol. 1 and – 1

3. The rational number that is equal to its negative.

Sol. 0

Q. Fill in the blanks:

(i) Zero has __**No**__ reciprocal.

(ii) The numbers __**1**__ and __**– 1**__ are their own reciprocals.

(iii) The reciprocal of – 5 is $\frac{\textbf{– 1}}{\textbf{5}}$.

(iv) Reciprocal of $\frac{1}{x}$, where $x \neq 0$ is __***x***__.

(v) The product of two rational numbers is always a **Rational Number**

(vi) The reciprocal of a positive rational number is __**Positive**__.

Module 11

Q. Simplify $\frac{8}{-15} + \frac{4}{-3}$

Sol.

$$\frac{8}{-15} + \frac{4}{-3}$$

$$= \frac{8 \times -1}{-15 \times -1} + \frac{4 \times -1}{-3 \times -1}$$

$$= \frac{-8}{15} + \frac{-4}{3}$$

$$= \frac{-8}{15} + \frac{-4 \times 5}{3 \times 5}$$

$$= \frac{-8}{15} + \frac{-20}{15}$$

$$= \frac{-8 + (-20)}{15}$$

$$= \frac{-8 - 20}{15}$$

$$= \frac{-28}{15}$$

Denominators of both rational numbers are not positive

$3 \times ? = 15$

Denominators are equal

Q. Add $\frac{5}{12}$ and $\frac{3}{8}$

$12 \times ? = 24$

$8 \times ? = 24$

Denominators of both rational numbers ar positive

Denominators of both rational numbers are not equal

Lets add the numerators

ake them equal by taking L.C.M

Sol.

$$\frac{5}{12} + \frac{3}{8}$$

$$= \frac{5 \times 2}{12 \times 2} + \frac{3 \times }{8}$$

$$= \frac{10}{24} + \frac{9}{24}$$

$$= \frac{10 + 9}{24}$$

$$= \frac{19}{24}$$

2	12, 8
2	6, 4
2	3, 2
3	3, 1
	1, 1

LCM of 12 and 8

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

$= 24$

Q. Simplify $\frac{7}{-26} + \frac{16}{39}$

Sol.

$$\frac{7}{-26} + \frac{16}{39}$$

$$= \frac{7 \times -1}{-26 \times -1} + \frac{16}{39}$$

$$= \frac{-7}{26} + \frac{16}{39}$$

$$= \frac{-7 \times 3}{26 \times 3} + \frac{16 \times \ldots}{39 \times \ldots}$$

$$= \frac{-21}{78} + \frac{32}{78}$$

$$= \frac{-21 + 32}{78}$$

$$= \frac{11}{78}$$

Multiply & divide by –1

$39 \times ? = 78$

$26 \times ? = \ldots$

Den… are …

Lets add the numerators

Lets make … taki…

13	26, 39
2	2, 3
3	1, 3
	1, 1

LCM of 26 and 39
= 13 × 2 × 3
= 78

Module 12

Q. Fin

4 × ? = 12

3 × ? = 12

6 × ? = 12

3 × ? = 12

2 × ? = 12

Denominators of ea

Lets find L.C.M of 4, 3, 6 & 2

2	2, 3, 3, 1
3	1, 3, 3, 1
	1, 1, 1, 1

LCM of 4,3,6,2

= 2 × 2 × 3

= 12

Sol.

$$\frac{-7}{4} + \frac{5}{3} + \frac{-5}{6} + \frac{1}{3} + \frac{-1}{2}$$

$$= \frac{-7 \times 3}{4 \times 3} + \frac{5 \times 4}{3 \times 4} + \frac{-5 \times 2}{6 \times 2} + \frac{1 \times 4}{3 \times 4} + \frac{-1 \times 6}{2 \times 6}$$

$$= \frac{-21}{12} + \frac{20}{12} + \frac{-10}{12} + \frac{4}{12} + \frac{-6}{12}$$

$$= \frac{-21 + 20 + (-10) + 4 + (-6)}{12}$$

$$= \frac{-37 + 24}{12}$$

$$= \frac{-13}{12}$$

Q. Eva

$5 \times 28 = 1$? $20 \times$ $14 \times$ $7 \times 20 = 140$? $10 \times 14 = 140$

Denominators of ea

ets n

Sol. $\frac{-12}{5} + \frac{-7}{20} + \frac{3}{14} + \frac{1}{7} + \frac{-1}{10}$

$= \frac{-12 \times 28}{5 \times 28} + \frac{-7 \times 7}{20 \times 7} + \frac{3 \times 10}{14 \times 10} + \frac{1 \times 20}{7 \times 20} + \frac{-1 \times 14}{10 \times 14}$

$= \frac{-336}{140} + \frac{-49}{140} + \frac{30}{140} + \frac{20}{140} + \frac{-14}{140}$

$= \frac{-336 + (-49) + 30 + 20 + (-14)}{140}$

$= \frac{-399 + 50}{140}$

$= \frac{-349}{140}$

2	5, 20, 14, 7, 10
5	5, 10, 7, 7, 5
7	1, 2, 7, 7, 1
2	1, 2, 1, 1, 1
	1, 1, 1, 1, 1

LCM of 5, 20, 14, 7, 10

$= 2 \times 5 \times 7 \times 2$

$= 140$

Module 13

Prove that :

Q. $\left(\frac{-3}{16} \times \frac{8}{15}\right) = \left(\frac{8}{15} \times \frac{-3}{16}\right)$

Now open the Bracket

Sol.

$$\text{LHS} = \left(\frac{-3}{16} \times \frac{8}{15}\right) = \frac{(-3) \times 8}{16 \times 15} = \frac{-24}{240} = \frac{-1}{10}$$

$$\text{RHS} = \left(\frac{8}{15} \times \frac{-3}{16}\right) = \frac{8 \times (-3)}{15 \times 16} = \frac{-24}{240} = \frac{-1}{10}$$

$\therefore$ LHS = RHS

Hence, $\left(\frac{-3}{16} \times \frac{8}{15}\right) = \left(\frac{8}{15} \times \frac{-3}{16}\right)$

Solve :

Q. $\frac{3}{5} + \frac{7}{3} + \frac{-11}{5} + \frac{-2}{3}$

Let us group the term with same denominator

Since there are equal denominator

Sol.

$$\frac{3}{5} + \frac{7}{3} + \frac{-11}{5} + \frac{-2}{3} = \left(\frac{3}{5} + \frac{-11}{5}\right) + \left(\frac{7}{3} + \frac{-2}{3}\right)$$

$$= \frac{\{3 + (-11)\}}{5} + \frac{\{7 + (-2)\}}{3}$$

$$= \frac{-8}{5} + \frac{5}{3}$$

$$= \frac{(-24 + 25)}{15}$$

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

Lecture 04

Module 14

Q. Solve $\left(\frac{-3}{2} \times \frac{4}{5}\right) + \left(\frac{9}{5} \times \frac{-10}{3}\right) - \left(\frac{1}{2} \times \frac{3}{4}\right)$

Sol. $\left(\frac{-3}{2} \times \frac{4}{5}\right) + \left(\frac{9}{5} \times \frac{-10}{3}\right) - \left(\frac{1}{2} \times \frac{3}{4}\right)$

$= \frac{-3 \times \cancel{4}^{2}}{\cancel{2}^{1} \times 5} + \frac{\cancel{9}^{3} \times \cancel{-10}^{2}}{5 \times \cancel{3}^{1}} - \frac{1 \times 3}{2 \times 4}$

$= \frac{-3 \times 2}{1 \times$ 5 × 1 ·

L.C.M of 5, 1 ,8 is 40

8 × 5 = 40

$= \frac{-6}{5} - \frac{-6}{1} + \frac{3}{8}$

$= \frac{-6 \times 8}{5 \times 8} + \frac{-6 \times 40}{1 \times 40} - \frac{3 \times 5}{8 \times 5}$

$= \frac{-48}{40} - \frac{240}{40} - \frac{15}{40}$

$= \frac{-48 - 240 - 15}{40}$

$= \frac{-303}{40}$

Q. $\left(\frac{-7}{18} \times \frac{15}{-7}\right) - \left(1 \times \frac{1}{4}\right) + \left(\frac{1}{2} \times \frac{1}{4}\right)$

Sol. $\left(\frac{-7}{18} \times \frac{15}{-7}\right) - \left(\frac{1}{1} \times \frac{1}{4}\right) + \left(\frac{1}{2} \times \frac{1}{4}\right)$

$= \frac{\overset{1}{\cancel{-7}} \times \overset{5}{\cancel{15}}}{\underset{6}{\cancel{18}} \times \underset{1}{\cancel{-7}}} - \frac{1 \times 1}{1 \times 4} + \frac{1 \times 1}{2 \times 4}$

$= \frac{1 \times 5}{6 \times 1} - \frac{1 \times 1}{1 \times 4} + \frac{1 \times 1}{2 \times 4}$

$= \frac{5}{6} - \frac{1}{4} + \frac{1}{8}$

$= \frac{5 \times 4}{6 \times 4} - \frac{1 \times 6}{4 \times 6} + \frac{1 \times 3}{8 \times 3}$

$= \frac{20}{24} - \frac{6}{24} + \frac{3}{24}$

$= \frac{20 - 6 + 3}{24}$

$= \frac{23 - 6}{24}$

$= \frac{17}{24}$

6 × ? = 24

4 × ? = 24

8 × ? = 24

2	6, 4, 8
2	3, 2, 4
2	3, 1, 2
3	3, 1, 1
	1, 1, 1

L.C.M of 6, 4, 8

= 2 × 2 × 2 × 3

= 24

Module 15

Q. Fill in the blanks : $\frac{27}{16} \div (....) = \frac{-15}{8}$

Let us assume $\frac{a}{b}$

Sol.

$\frac{27}{16} \div \left[\frac{a}{b}\right] = \frac{-15}{8}$

What is the reciprocal of $\frac{a}{b}$?

$= \frac{b}{a}$

$\frac{27}{16} \times \frac{b}{a} = \frac{-15}{8}$

To convert ÷ to ×

$\therefore \quad \frac{b}{a} = \frac{-15}{8} \times \frac{16}{27}$ (5, 2, 1, 9)

But, we have to find the value of $\frac{a}{b}$

$\therefore \quad \frac{b}{a} = \frac{-10}{9}$

What is the reciprocal of $\frac{-10}{9}$?

$= \frac{-9}{10}$

$\therefore \quad \frac{a}{b} = \frac{-9}{10}$

Hence, the missing number is $\frac{-9}{10}$

Q. What number should be added to $\frac{-7}{8}$ to get $\frac{4}{9}$?

Sol. Let the other number to be added be x

$$x + \frac{-7}{8} = \frac{4}{9}$$

$$\therefore \quad x = \frac{4}{9} - \left(\frac{-7}{8}\right)$$

$$\therefore \quad x = \frac{4}{9} + \frac{7}{8}$$

$$\therefore \quad x = \frac{(32+63)}{72}$$

$$\therefore \quad x = \frac{95}{72}$$

Hence, the required number is $\frac{95}{72}$

Q. What number should be subtracted from $\frac{-5}{7}$ to get -1

Since x is subtracted from $\frac{-7}{16}$

Sol.

Let the other number to be subtracted be x

$$\frac{-5}{7} - x = -1$$

We have to find the value of x

$$\therefore \quad -x = -1 - \left(\frac{-5}{7}\right)$$

$$\therefore \quad -x = \frac{-1}{1} + \frac{5}{7}$$

$$\therefore \quad -x = \frac{(-7+5)}{7}$$

$$\therefore \quad -x = \frac{-2}{7}$$

$$\therefore \quad x = \frac{2}{7}$$

Hence, the required number is $\frac{2}{7}$

Q . The sum of two rational numbers is -5. If one of them is $\frac{-13}{6}$. Find the other

Sol.

Let the other number be x.

$$x + \frac{-13}{6} = -5$$

$$\therefore \quad x = -5 - \left(\frac{-13}{6}\right)$$

$$\therefore \quad x = \left(\frac{-5}{1} + \frac{13}{6}\right)$$

$$\therefore \quad x = \frac{(-30 + 13)}{6}$$

$$\therefore \quad x = \frac{-17}{6}$$

Hence, the required number is $\frac{-17}{6}$

Module 16

Q. Tell what property allows you to compute

$\underbrace{\frac{1}{3}}_{a} \times \underbrace{\left(6 \times \frac{4}{3}\right)}_{b\ c}$ as $\underbrace{\left(\frac{1}{3} \times 6\right)}_{a\ b} \times \underbrace{\frac{4}{3}}_{c}$

Is this in the form of $a \times (b \times c) = (a \times b) \times c$ Yes!

So what is the property called as ?

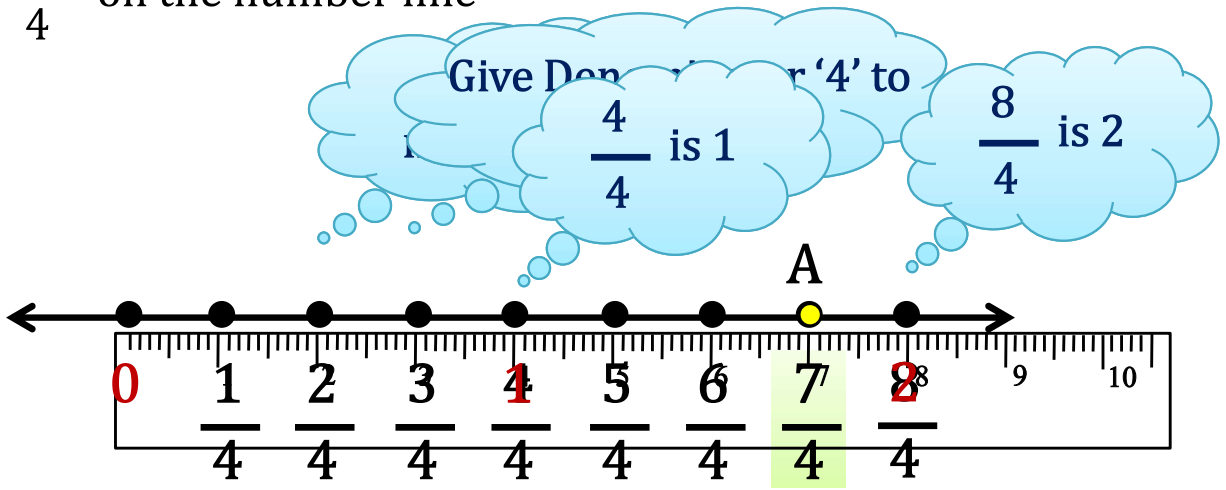
In computing $\frac{1}{3} \times \left(6 \times \frac{4}{3}\right)$ as $\left(\frac{1}{3} \times 6\right) \times \frac{4}{3}$

we use the **associativity**

Associativity

Q. Represent $\frac{7}{4}$ on the number line

Q. $\frac{7}{4}$

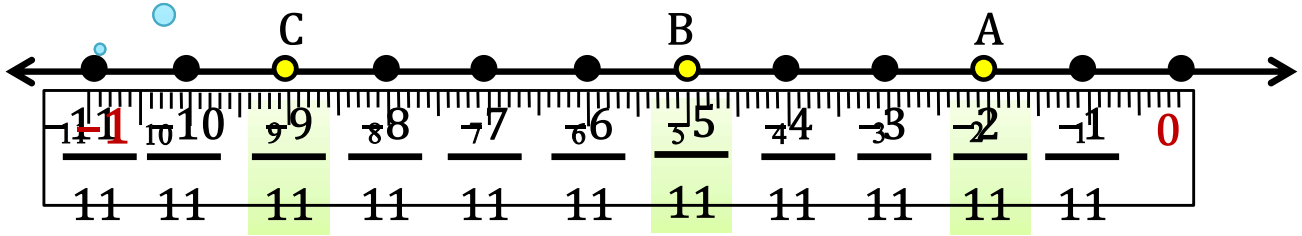


Q. Represent $\frac{-2}{11}, \frac{-5}{11}, \frac{-9}{11}$ on the number line

Q. $\frac{-2}{11}, \frac{-5}{11}, \frac{-9}{11}$

$\frac{-11}{11}$ is -1

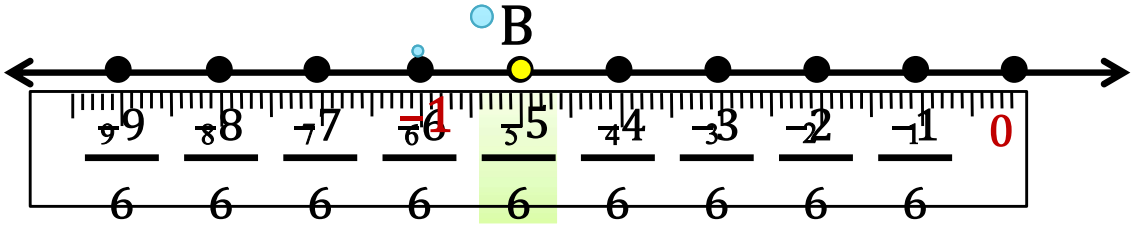
Give Denominator '11' to each number



Q. Represent $\frac{-5}{6}$ on the number line

Q. $\frac{-5}{6}$

Give Der... ...o ...e... $\frac{-6}{6}$ is -1



Module 17

Example 1 Which of the numbers $\frac{3}{-4}$ and $\frac{-5}{6}$ is greater ?

Sol.

One number $= \frac{3}{-4} = \frac{3 \times (-1)}{-4 \times (-1)} = \frac{-3}{}$ number $\frac{-5}{6}$

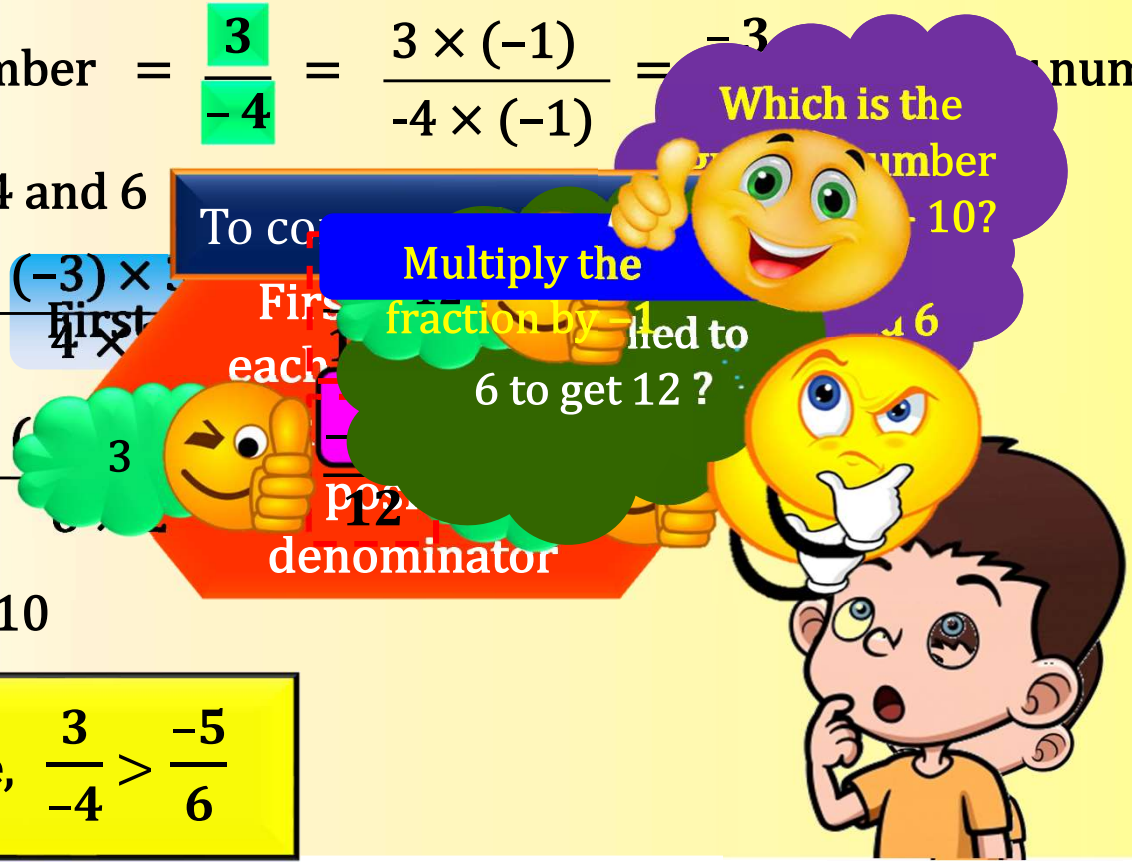
LCM of 4 and 6

$\therefore \quad \frac{-3}{4} = \frac{(-3) \times}{4 \times}$ First

$\therefore \quad \frac{-5}{6} = \frac{(}{3}$ $\frac{-}{12}$

$\because \quad -9 > -10$

$\therefore$ Hence, $\frac{3}{-4} > \frac{-5}{6}$



Example 2 Arrange the numbers $\frac{-3}{5}$, $\frac{7}{-10}$ and $\frac{-5}{8}$ in ascending order.

Sol. We have $\frac{7}{-10} = \frac{7 \times (-1)}{(-10) \times (-1)} = \frac{-7}{}$

Thus, the given numbers are $\frac{-3}{}$

LCM of 5,10

$\therefore \quad \frac{-3}{5} = \frac{(-3)}{}$

$\therefore \quad \frac{-7}{10} = \frac{(-7)}{10 \times}$

$\therefore \quad \frac{-5}{8} = \frac{(-5) \times 5}{8 \times 5} = \frac{}{40}$

$\because \quad \frac{-28}{40} < \frac{-25}{40} < \frac{-24}{40}$

Hence $\frac{-7}{10} < \frac{-5}{8} < \frac{-3}{5}$ i.e., $\frac{7}{-10} <$

Let us compare three of the numerators

–25 &

– 24?

nd 8?

Multiply the fraction by –1

To arrange th

be n

What s

be multiplied

8 to get 40 ?

First we make the

Take LCM

8

5

Working

5	5 ,8 ,10
2	1 ,8 ,2
2	1 ,4 ,1
2	1 ,2 ,1
	1 ,1 ,1

Module 18

Q.) **Which of the following is greater:**

(i) $\frac{4}{-5}, \frac{-7}{10}$

Sol. We have, $= \frac{4}{-5} = \frac{4 \times (-1)}{-5 \times (-1)} = \frac{-4}{}$

LCM of 5 ar

To

Multiply the fraction by –1

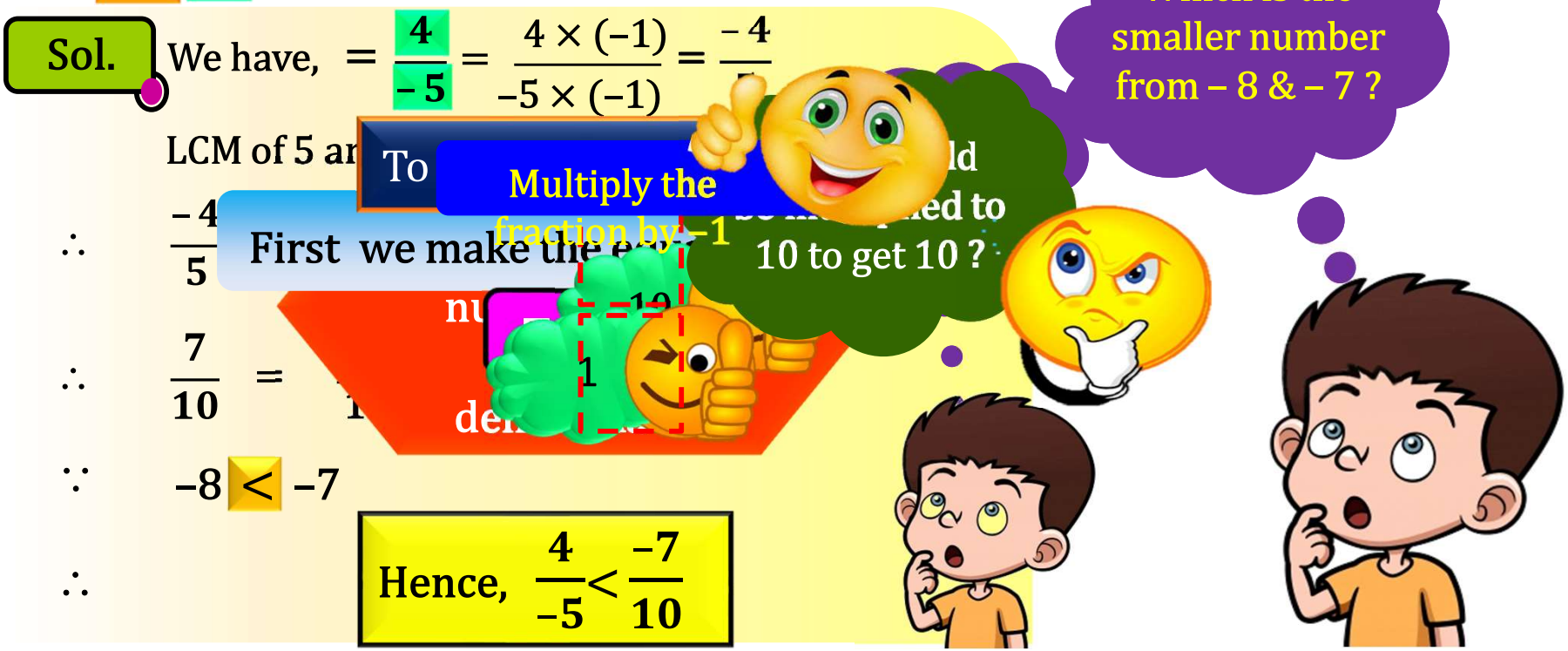
First we make the

$\therefore \quad \frac{-4}{5}$

$\therefore \quad \frac{7}{10} =$

$\because \quad -8 < -7$

$\therefore$ **Hence,** $\frac{4}{-5} < \frac{-7}{10}$



Q.) Arrange the following rational numbers in descending order :

(ii) $\frac{-5}{6}, \frac{-7}{12}, \frac{-13}{18}, \frac{23}{-24}$

Sol. We have $\frac{23}{-24} = \frac{23 \times (-1)}{-24 \times (-1)} =$

What should be multiplied to 18 to get 144?

What should be multiplied to 144?

Which is the greater number from – 120, – 84, –104 & –138 ?

Multiply the fraction by –1

6 to get 144?

$\therefore$ $\frac{-13}{18} =$

Take LCM

positive denominator

$\frac{}{24 \times 6} =$

$\because$ $-84 > -104 > -120 > -138$

$\therefore$ Hence, $\frac{-7}{12} > \frac{-13}{18} > \frac{-5}{6} > \frac{23}{-24}$


Thank
You