Fractions and decimals

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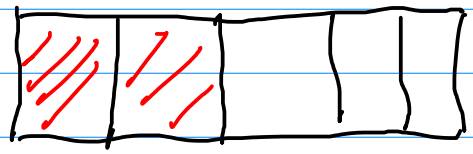
Fractions :- → part of whole number

The number of the $\frac{a}{b}$, where $b \neq 0$

because $b = 0$ then $\frac{1}{b}$ is undefined.

$\frac{a}{b}$ → a: numerator, b: denominator

Geometric meaning of fractions :-



→ $\frac{2}{5}$

Types of Fractions :-

- proper fraction :- if the numeration of the fraction of a fraction is smaller than the denominator

$\frac{1}{3}, \frac{4}{5}, \frac{7}{9}$ < 1

- Improper fraction :- The numerator > denominator

$7/5, 5/2, 7/2, 5/3$ > 1

is $\frac{2}{2}$ => it is a whole number = 1

we perform addition and subtractions only with like fractions

- like fractions :- Fractions with same denominator

$\frac{1}{2}, \frac{3}{2}, \frac{4}{2}, \ldots$

- unlike fractions :- denominator is diff

$3/5, 7/6, \ldots$

- Unit fractions :- Numerator is 1.

$\frac{1}{6}, \frac{1}{8}, \frac{1}{7}, \frac{1}{1000}$

- Mixed fraction :- Fractions having a whole number along with proper fractions

$7\frac{3}{4}$ (3/4 → proportion, 7 → whole number)

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

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

$= \frac{7 \times 4 + 3 \times 1}{\text{Lcm}(1,4) = 4}$

$= \frac{28 + 3}{4} = \frac{31}{4}$

Improper fractions to mixed fractions :-

$$\frac{77}{4} = 19\ \frac{1}{4}$$

19 ← quotient

1 → remainder

4 ← divisor

$$\begin{array}{r|l} & 19 \\ 4 & 77 \\ & -4 \\ \hline & 37 \\ & -36 \\ \hline & 1 \end{array}$$

Equivalent fractions :-

A given fraction obtained by multiplying or dividing both it's numerator and denominator by some non-zero integer

$$\frac{3}{5} = \frac{3\times2}{5\times2} = \frac{6}{10}, \quad \frac{3}{5} = \frac{3}{5}\times\frac{3}{3} = \frac{9}{15}$$

$$\frac{1}{2} = \frac{2}{4} = \frac{3}{6}, \ldots$$

$$\frac{17}{15} = \frac{34}{30}, \frac{51}{45}, \ldots$$

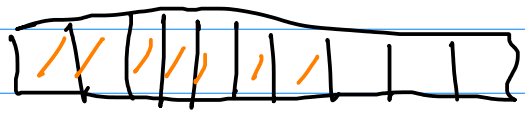
$$\frac{9}{12} = \frac{9\div3}{12\div3} = \frac{3}{4}, \ldots$$

Comparision of fractions

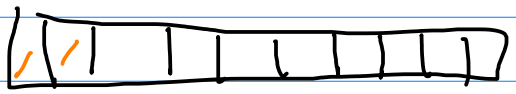
case 1: Fractions with same denominator

↳ simply compare the numerator

$$\frac{7}{10} > \frac{2}{10}$$



7/10



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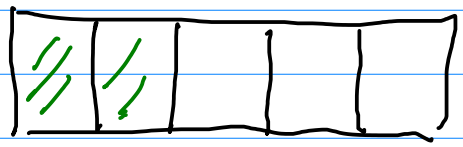
Case 2:- Fractions with same numerator:

When fraction have same numerator, then the fraction with large denominator is smaller

① 

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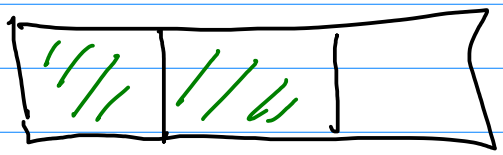
② 

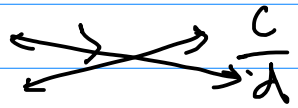
2/3

$2/3 > 2/5$ | $3/4 < 3/5$, $4/8 > \frac{4}{9}$

Case 3 : when fraction have diff denominator and numerator

→ convert fraction into like fraction and then compare

CROSS-MULTIPLICATION :-

If $\frac{a}{b}$  $\frac{c}{d}$

$\Leftrightarrow$ $ad > bc$

If $\frac{a}{b} = \frac{c}{d}$

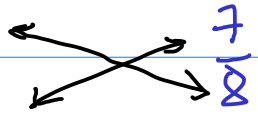
$\Leftrightarrow$ $ad = bc$

If $\frac{a}{b} < \frac{c}{d}$

$\Leftrightarrow$ $ad < bc$

Examples :-

24 35

$\frac{3}{5}$  $\frac{7}{8}$

As $8 \times 3 < 7 \times 5$

Hence $\frac{3}{5} < \frac{7}{8}$

Examples :-

Arrange $\frac{2}{9}, \frac{3}{4}, \frac{8}{21}$ in descending order.

→ bigger to smaller

Ans. Lcm (9, 4, 21) = 252

$\frac{2}{9} = \frac{2 \times 28}{252} = \frac{56}{252}$ → (I)

$\frac{3}{4} = \frac{3 \times 63}{252} = \frac{189}{252}$ → (II)

$\frac{8}{21} = \frac{8 \times 12}{252} = \frac{96}{252}$ → (III)

$\frac{56}{252} < \frac{96}{252} < \frac{189}{252}$

$\frac{2}{9} < \frac{8}{21} < \frac{3}{4}$

$\frac{3}{4} > \frac{8}{21} > \frac{2}{9}$

Addition and subtractions

case 1 :- Addition of like fractions

$$\frac{4}{15} + \frac{3}{15} = \frac{7}{15}$$

$$\frac{7}{15} - \frac{20}{15} = \frac{7-20}{15} = \frac{-13}{15}$$

case 2 :- Addition of unlike fractions

Take the lcm :- $\frac{2}{9}, \frac{3}{4}, \frac{8}{2}$

add them

LCM (9, 4, 2) = 36 ✓

$$\frac{2}{9} = \frac{2 \times 4}{36} = \frac{8}{36}$$ ✓

$$\frac{3}{4} = \frac{3 \times 9}{36} = \frac{27}{36}$$ ✓

$$\frac{8}{2} = \frac{8 \times 18}{36} = \frac{144}{36}$$ ✓

4
36 | 179
−144
35

Sum up $\frac{179}{36} = 4\frac{35}{36}$ (4 → quotient, 35 → remainder)

Multiplication

① Multiplication of a fraction by a whole number :-

$$\frac{36}{52} \times 5 = \frac{36}{52} \times \frac{5}{1} = \frac{36 \times 5}{52 \times 1} = \frac{180}{52}$$

$$= \frac{45}{13}$$

$$= 3\frac{6}{10}$$

② Multiplication of a fraction with fraction

$$\frac{a}{b} \times \frac{c}{d} = \frac{ac}{bd}$$

$$\frac{1}{2} \times \frac{4}{7} = \frac{4}{14} = \frac{2}{7}$$

$$\frac{1}{\cancel{2}} \times \frac{\cancel{4}^{2}}{7} = \frac{2}{7}$$

$$\frac{1}{\cancel{2}} \times \frac{\cancel{2}}{\cancel{2}} \times \frac{3}{4} = \frac{1}{4}$$

$$\frac{\cancel{2}}{52} \times \frac{\cancel{12}}{\cancel{40}_{20}^{10}} \times \frac{\cancel{\cancel{66}}^{\cancel{6}}}{\cancel{39}_{3}} \times \frac{1}{\cancel{11}} = \frac{1}{520}$$

Reciprocal of Fraction

- Reciprocal of fraction $\frac{a}{b}$ is $\frac{b}{a}$

- $\frac{a}{b} \times \frac{b}{a} = \frac{ab}{ba} = 1$

Division of Fractions :-

- Division of a whole number by fraction:

$$3 \div \frac{1}{4} = 3 \times \frac{4}{1} = \frac{12}{1} = 12$$

Tanishka

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

Kanvika

$$4 \div \frac{16}{2} = 4 \times \frac{2}{16_4} = \frac{2}{4} = \frac{1}{2}$$

Vihaan

$$5 \div \frac{25}{30} = 5 \times \frac{\overset{6}{30}}{\underset{5}{25}} = 6$$

Swapnika

$$6 \div \frac{18}{30} = 6 \times \frac{30}{18_3} = 10$$

Juhan

$$7 \div \frac{17}{34} = 7 \times \frac{\overset{2}{34}}{17} = 14$$

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

G

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