

7th CLASS
MATHEMATICS
IIT FOUNDATION
STUDY MATERIAL

3. OPERATIONS ON FRACTIONS.

TEACHING TASK

JEE MAINS LEVEL QUESTIONS

① The original tank is filled to $= \frac{3}{4}$.

The second tank hold twice as much as the original tank $= 2V$

Transferred by the second tanker $= \frac{3}{4 \times 2}$

$$= \frac{3}{8}$$

Ans: B

② $\frac{3}{x} + \frac{1}{2} = \frac{5}{4} \Rightarrow \frac{3}{x} = \frac{5}{4} - \frac{1}{2}$

$\frac{3}{x} = \frac{5-2}{4} \Rightarrow \frac{3}{x} = \frac{3}{4}$

$$\frac{x}{3} = \frac{4}{3}$$

$$x = \frac{4}{\cancel{3}} \times \cancel{3} \Rightarrow x = 4$$

Ans: No correct option

③ $\frac{2}{a} = \frac{5}{b} = \frac{10}{c}$

$\frac{2}{a} = \frac{5}{b} \Rightarrow \frac{b}{a} = \frac{5}{2}$

$\frac{5}{b} = \frac{10}{c} \Rightarrow \frac{c}{b} = \frac{10}{5}$

$a:b = 2:5$

$b:c = 5:10$

$a:b:c = 2:5:10$

$\therefore a:b:c = 2:5:10$

$\Rightarrow \frac{a+b+c}{a} = \frac{2+5+10}{2} = \frac{17}{2}$ Ans: No correct option

④ $\frac{a^2-b^2}{a^2+ab} \Rightarrow \frac{(a+b)(a-b)}{a^2+ab} \Rightarrow \frac{(a+b)(a-b)}{a(a+b)}$

$\Rightarrow \frac{a-b}{a}$ Ans:

⑤ Let other fraction be x.

$\frac{1}{3} + x = \frac{7}{12}$

$x = \frac{7}{12} - \frac{1}{3}$

$x = \frac{7-4}{12} \Rightarrow x = \frac{3}{12} = \frac{1}{4}$ Ans: A

⑥ $\frac{3}{4}$ cake is shared for 5 members

$\therefore \frac{\frac{3}{4}}{5} = \frac{3}{4 \times 5} = \frac{3}{20}$ Ans: C

⑦ The total cake can be represented as $\frac{16}{16} = 1$

Anu eat = $\frac{7}{16}$ of cake

$$\Rightarrow 1 - \frac{7}{16} = \frac{16-7}{16} = \frac{9}{16}$$

Teja eat = $\frac{1}{4}$ of cake

Ans: A

$$\Rightarrow \frac{9}{16} - \frac{1}{4} = \frac{9-4}{16} = \frac{5}{16}$$

⑧ $\left(\frac{10}{5} \times \frac{3}{6}\right) + \left(\frac{2}{3} \times \frac{6}{2}\right) - \frac{8}{4}$ of $\frac{14}{7}$

$$\Rightarrow \left(\frac{\cancel{10}^2}{\cancel{5}_1} \times \frac{\cancel{3}^1}{\cancel{6}_2}\right) + \left(\frac{\cancel{2}^1}{\cancel{3}_1} \times \frac{\cancel{6}^2}{\cancel{2}_1}\right) - \frac{\cancel{8}^4}{\cancel{4}_2} \times \frac{\cancel{14}^7}{\cancel{7}_1}$$

$$\Rightarrow (1 + 2) - 4$$

Ans: A

$$\Rightarrow 3 - 4 = -1$$

⑨ $\left[\frac{5}{4} + \left(\frac{6}{10} \times \frac{5}{4}\right) - \left(\frac{3}{4} \times \frac{4}{6}\right) + \frac{1}{2}\right]$ of $\frac{3}{4}$

$$\Rightarrow \left[\frac{5}{4} + \left(\frac{\cancel{6}^3}{\cancel{10}_2} \times \frac{\cancel{5}^1}{\cancel{4}_1}\right) - \left(\frac{\cancel{3}^1}{\cancel{4}_1} \times \frac{\cancel{4}^1}{\cancel{6}_2}\right) + \frac{1}{2}\right] \times \frac{3}{4}$$

$$\Rightarrow \left[\frac{5}{4} + \left(\frac{3}{4}\right) - \frac{1}{2} + \frac{1}{2}\right] \times \frac{3}{4}$$

Ans: D

$$= \left(\frac{5}{4} + \frac{3}{4}\right) \times \frac{3}{4} \Rightarrow \left(\frac{\cancel{8}^2}{\cancel{4}_1}\right) \times \frac{3}{\cancel{4}_2} \Rightarrow \frac{3}{2}$$

$$(10) \quad 12\frac{1}{2} + 12\frac{1}{3} + 12\frac{1}{6}$$

$$\Rightarrow \frac{25}{2} + \frac{37}{3} + \frac{73}{6}$$

Ans: B

$$\Rightarrow \frac{25 \times 3 + 37 \times 2 + 73}{6} \Rightarrow \frac{75 + 74 + 73}{6} = \frac{222}{6} = 37.$$

(11)

$$\frac{2x}{1 + \frac{1}{x}} = 1 \Rightarrow \frac{2x}{1 + \frac{1-x+x}{1-x}} \Rightarrow \frac{2x}{1 + \frac{1}{1-x}} \Rightarrow \frac{2x}{\frac{1-x+1}{1-x}} = 1$$

$$\Rightarrow \frac{2x}{2-x} = \frac{2x}{2-x} \times \frac{1-x}{1-x} \Rightarrow \frac{2x-2x^2}{2-x} = 1$$

$$\Rightarrow 2x-2x^2=2-x \Rightarrow 2x+x-2x^2-2=0$$

$$\Rightarrow -2x^2+3x-2=0 \Rightarrow 2x^2-3x+2=0$$

$$\Rightarrow 2x^2-2x-x+2=0 \Rightarrow 2x(x-1)-(x-1)=0$$

$$\Rightarrow (x-1)(2x-2)=0$$

$$\therefore x-1=0 \text{ (or) } 2x-2=0$$

$$x=1 \text{ (or) } 2x=2 \\ x=\frac{2}{2}=1$$

Ans: B

⑫ $\frac{1}{3} + \frac{2}{5} - \frac{1}{4} \Rightarrow \frac{5+2 \times 3}{15} - \frac{1}{4} \Rightarrow \frac{5+6}{15} - \frac{1}{4}$

$\Rightarrow \frac{11}{15} - \frac{1}{4} = \frac{44-15}{60} = \frac{29}{60}$ Ans: No correct option.

⑬ $\frac{2}{3} \div \left(\frac{4}{5} - \frac{1}{2} \right) \Rightarrow \frac{2}{3} \div \left(\frac{4 \times 2 - 1 \times 5}{10} \right)$

$\Rightarrow \frac{2}{3} \div \left(\frac{8-5}{10} \right) \Rightarrow \frac{2}{3} \div \left(\frac{3}{10} \right)$

$\Rightarrow \frac{2}{3} \times \frac{10}{3} = \frac{20}{9}$ Ans: No correct option

⑭ $3\frac{3}{5}, 2\frac{4}{7}, \frac{19}{6}, \frac{18}{8}$

$\Rightarrow 3\frac{3}{5} = \frac{15+3}{5} = \frac{18}{5} = 3.6$

$\Rightarrow 2\frac{4}{7} = \frac{14+4}{7} = \frac{18}{7} = 2.57$

$\Rightarrow \frac{19}{6} = 3.16$

$\Rightarrow \frac{18}{8} = 2.25$

$\Rightarrow \frac{18}{5} - \frac{18}{8} \Rightarrow \frac{18 \times 8 - 18 \times 5}{40} = \frac{144 - 90}{40}$

$= \frac{54}{40} = \frac{27}{20}$

Ans: A.

$$(15) \left(\frac{2}{5} + \frac{3}{5} \right) \div \left(\frac{7}{5} - \frac{4}{10} \right)$$

$$\left(\frac{5}{5} \right) \div \left(\frac{7 \times 2 - 4}{10} \right)$$

Ans: A

$$1 \div \left(\frac{14-4}{10} \right) \Rightarrow 1 \div \left(\frac{10}{10} \right) \Rightarrow 1 \div 1 \Rightarrow 1$$

$$(16) 3\frac{1}{4} + \frac{1}{2} \div \frac{3}{4} - \frac{1}{2} \times 3\frac{1}{2}$$

$$\Rightarrow \frac{12+1}{4} + \frac{1}{2} - \frac{1}{2} \times \frac{6+1}{2}$$

$$\Rightarrow \frac{13}{4} + \frac{1}{2} \times \frac{2}{3} - \frac{1}{2} \times \frac{7}{2}$$

$$= \frac{13}{4} + \frac{2}{3} - \frac{7}{4} \Rightarrow \frac{13}{4} - \frac{7}{4} + \frac{2}{3}$$

$$\Rightarrow \frac{13-7}{4} + \frac{2}{3} \Rightarrow \frac{6}{4} + \frac{2}{3} \Rightarrow \frac{6 \times 3 + 2 \times 4}{12} = \frac{18+8}{12} = \frac{26}{12}$$

$$\Rightarrow \frac{13}{6} = 2\frac{1}{6} \quad \text{Ans: A}$$

(17) Square area = side $\times$ side.

$$= 6\frac{2}{3} \times 6\frac{2}{3} \Rightarrow \frac{18+2}{3} \times \frac{18+2}{3} \quad \text{Ans: B}$$

$$\Rightarrow \frac{20}{3} \times \frac{20}{3} = \frac{400}{9} = 44.44 \approx 45 \text{ m}^2.$$

(18) Let x be the other number

$$\Rightarrow x \times \frac{20}{3} = \frac{145}{7} \quad \text{Ans: D}$$

$$\Rightarrow x = \frac{\cancel{145}^{29}}{7} \times \frac{3}{\cancel{20}_4} = \frac{29}{7} \times \frac{3}{4} = \frac{87}{28}$$

(19) $\frac{a}{b} = \frac{3}{4}, \frac{b}{c} = \frac{5}{6}$

$$a:b = 3:4$$

$$b:c = 5:6$$

$$a:b:c = 15:20:24$$

$$\therefore \frac{a}{c} = \frac{\cancel{15}^5}{\cancel{24}_8} = \frac{5}{8} \quad \text{Ans: A}$$

20 Through options:

A: A fraction is irreducible if the greatest common divisor of a and b is 1. here a is a prime number greater than 2, because a prime number has no divisors other than 1 and itself.
 $\therefore \frac{a}{b}$ is irreducible.

B: A proper fraction is one where the numerator a is less than the denominator b . Given $a > 2$ and $b > 1$, since b is the denominator and cannot be zero or negative, $\frac{a}{b}$ will always be less than 1.
 $\therefore \frac{a}{b}$ is a proper fraction.

C: Simplifying $\frac{2a}{2b} = \frac{a}{b}$. This is true because dividing both numerator and denominator by their gcd, yields the original fraction $\frac{a}{b}$.

D: A mixed number consists of an integer part and a proper fraction part. $\frac{a}{b}$ is already a proper fraction, it can indeed be expressed as a mixed number $0\frac{a}{b}$.

Ans: A, B, C and D.

JEE ADVANCED LEVEL QUESTIONS

Multi correct answer type:

21) Through options:

A: An proper fraction is one where the numerator is greater than or equal to the denominator.

B: The reciprocal of $\frac{2}{3}$ is $\frac{3}{2}$

C: $\frac{2}{3}$ is equivalent to $\frac{4}{6} \Rightarrow \frac{2 \times 2}{3 \times 2} = \frac{2}{3}$

D: This $\frac{2}{3}$ can be written as the mixed number $0\frac{2}{3}$.

Ans: B, C and D

22) Through options

A: $ad < bc$, This statement must be true. When $\frac{a}{b} < \frac{c}{d}$ multiplying both sides by bd , a and d are positive integers.

B: $ad > bc$, this statement not necessarily true. For example, $\frac{a}{b} = \frac{1}{2}$ and $\frac{c}{d} = \frac{2}{3}$, $ad = 1 \times 3 = 3$, $bc = 2 \times 2 = 4$. $ad < bc$

C: $a+b < c+d$, This statement is necessarily true. $a+b = 1+2=3$, $c+d = 2+3=5$.

D: $a-b < c-d$, It is not true, $a-b = 1-2 = -1$, $c-d = 2-3 = -1$
 $a-b \not< c-d$

Ans: A, C

23) $\text{poor} = 2\frac{3}{5} \text{ h, and } \frac{1}{4} \text{ hr}$

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

$$\Rightarrow \frac{10+3}{5} + \frac{1}{4} \Rightarrow \frac{13}{5} + \frac{1}{4} \Rightarrow \frac{13 \times 4 + 1 \times 5}{20}$$

$$\Rightarrow \frac{52+5}{20} = \frac{57}{20} \text{ hr. (or) } 2\frac{17}{20}$$

Ans: A, C

24) $\frac{2}{3}$ and $\frac{5}{6}$

LCM of 3, 6 is 6.

$$\frac{2 \times 2}{6} \text{ and } \frac{5 \times 1}{6} \Rightarrow \frac{4}{6} \text{ and } \frac{5}{6}$$

multiply and divide with 2

$$\frac{4 \times 2}{6 \times 2} \text{ and } \frac{5 \times 2}{6 \times 2} \Rightarrow \frac{8}{12} \text{ and } \frac{10}{12}$$

$$\therefore \text{Fraction between } \frac{2}{3} \text{ and } \frac{5}{6} \text{ is } \frac{\overset{3}{\cancel{9}}}{\underset{4}{\cancel{12}}} = \frac{3}{4}$$

Ans: A

Assertion and Reason Type:

- (25) Assertion: To examine this assertion, consider two fraction $\frac{a}{b}$ and $\frac{c}{d}$

$$\frac{a}{b} - \frac{c}{d} = \frac{ad - bc}{bd},$$

Reason: The difference between two fractions is positive when the numerator of the larger fraction is greater than the numerator of the smaller fraction.

Ans: A

- (26) Assertion: To compare $\frac{1}{3}$ and $\frac{2}{5}$

$\Rightarrow 5 \times 1 = 2 \times 3 \Rightarrow 5 < 6$, it follows that

$$\frac{1}{3} < \frac{2}{5}.$$

Reason: The value of a fraction depends on both its numerator and denominator. Comparing fractions solely based on the numerator is incorrect without considering the denominator.

Ans: D

(27) Assertion: This statement is false. It is not strictly necessary for the denominators to be the same when adding fractions. You can add fractions with different denominators by finding a common denominator and converting them.

Reason: This statement is true. The reason correctly explains why having common denominators allows for straight forward addition of fractions. When fractions have the same denominator, their parts represent the same-sized units, making addition straight forward by simply adding the numerators.

Ans: D

Statement Type

(28) Statement-1: $\frac{8}{25} + \frac{9}{25} + \frac{10}{25} = \frac{8+9+10}{25} = \frac{27}{25}$.

Statement-11: $\frac{x}{a} + \frac{y}{a} + \frac{z}{a} = \frac{x+y+z}{a}$

∴ Both statements are true.

Ans: A

(29) Statement-1: product of $\frac{24}{25}$ and Reciprocal of $\frac{8}{5}$ is $\Rightarrow \frac{24}{25} \times \frac{1}{8} = \frac{3}{5}$

$\rightarrow$ This Statement is false.

Statement-11: The Reciprocal of $\frac{a}{b}$ is $\frac{b}{a}$.

Ans: D

Comprehension Type:

(30) For dozen (12) chocolates needs $\frac{4}{6}$ of powder.

Cocoa powder is needed for 1 chocolate $= \frac{4}{6} \times \frac{1}{12}$

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

$$\Rightarrow \text{No. of chocolates we need} = \frac{1}{18}$$

Integer Type:

31

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

32

$$\frac{9}{2} + \frac{\frac{3}{2} \div \frac{6}{4}}{\frac{5}{3} \div \frac{5}{6}} - 1$$

$$\frac{9}{2} + \frac{\frac{3}{\cancel{2}} \times \frac{\cancel{4}}{6}}{\frac{5}{\cancel{3}} \times \frac{6}{\cancel{5}}} - 1 \Rightarrow \frac{9}{2} + \frac{1}{2} - 1 \Rightarrow \frac{9+1}{2} - 1$$

$$\Rightarrow \frac{\cancel{10}}{\cancel{2}} - 1 \Rightarrow 5 - 1 = 4.$$

Matrix matching type:

(33)

$$\begin{aligned} \text{(a)} \quad 9\frac{3}{4} + 7\frac{7}{6} + 3\frac{5}{12} &\Rightarrow \frac{36+3}{4} + \frac{42+7}{6} + \frac{36+5}{12} \\ &\Rightarrow \frac{39}{4} + \frac{49}{6} + \frac{41}{12} \Rightarrow \frac{39 \times 3 + 49 \times 2 + 41 \times 1}{12} \\ &\Rightarrow \frac{117 + 98 + 41}{12} = \frac{256}{12} = \frac{64}{3} = 21\frac{1}{3} \end{aligned}$$

Ans: q

$$\begin{aligned} \text{(b)} \quad 3\frac{1}{4} - 1\frac{5}{6} + 2\frac{3}{8} &\Rightarrow \frac{12+1}{4} - \frac{6+5}{6} + \frac{16+3}{8} \\ &\Rightarrow \frac{13}{4} - \frac{11}{6} + \frac{19}{8} \Rightarrow \frac{13 \times 6 - 11 \times 4 + 19 \times 3}{24} \Rightarrow \frac{78 - 44 + 57}{24} \\ &\Rightarrow \frac{91}{24} = 3\frac{19}{24} \end{aligned}$$

Ans: p

$$\begin{aligned} \text{(c)} \quad 9\frac{5}{14} - 6\frac{8}{21} + \frac{25}{42} &\Rightarrow \frac{126+5}{14} - \frac{126+8}{21} + \frac{25}{42} \\ &\Rightarrow \frac{131}{14} - \frac{134}{21} + \frac{25}{42} \Rightarrow \frac{131 \times 6 - 134 \times 4 + 25 \times 2}{84} \\ &\Rightarrow \frac{786 - 536 + 50}{84} = \frac{300}{84} = \frac{75}{21} = \frac{25}{7} = 3\frac{4}{7} \end{aligned}$$

Ans: r

$$(d) 2\frac{1}{8} - \frac{7}{12} - \frac{23}{24} \Rightarrow \frac{16+1}{8} - \frac{7}{12} - \frac{23}{24} \Rightarrow \frac{17}{8} - \frac{7}{12} - \frac{23}{24}$$

$$\Rightarrow \frac{17 \times 3 - 7 \times 2 - 23 \times 1}{24} = \frac{51 - 14 - 23}{24} = \frac{\overset{7}{\cancel{14}}}{\underset{12}{\cancel{24}}} = \frac{7}{12}$$

Ans: S

LEARNERS TASK

Conceptual Understanding Questions (CUP's)

$$\textcircled{1} \quad \frac{2}{3} + \frac{1}{4} = \frac{2 \times 4 + 1 \times 3}{12} = \frac{8+3}{12} = \frac{11}{12} \quad \text{Ans: B}$$

$$\textcircled{2} \quad \frac{3}{5} - \frac{1}{5} = x \Rightarrow x = \frac{3-1}{5} = \frac{2}{5} \quad \text{Ans: A}$$

$$\textcircled{3} \quad \frac{2}{3} \times \frac{5}{4} = \frac{5}{3 \times 2} = \frac{5}{6} \quad \text{Ans: A}$$

$$\textcircled{4} \quad \frac{15}{7} \times \frac{28}{45} = \frac{4}{3} \quad \text{Ans: B}$$

$$\textcircled{5} \quad \frac{80}{9} \div \frac{16}{7} = \frac{x}{9} \Rightarrow \frac{80}{9} \times \frac{7}{16} = \frac{x}{9} \quad \text{Ans: A}$$
$$\frac{5 \times 7}{9} = \frac{x}{9} \Rightarrow \frac{5 \times 7 \times 9}{9} = x \Rightarrow x = 5 \times 7 = 35$$

$$\textcircled{6} \quad \frac{9}{8} - x = \frac{39}{56} \Rightarrow \frac{9}{8} - \frac{39}{56} = x \quad \text{Ans: C}$$
$$\Rightarrow \frac{9 \times 7 - 39}{56} = \frac{63 - 39}{56} = \frac{24}{56} = \frac{3}{7}$$

⑦ Neelima runs for two hours = $\frac{30}{4}$ km
 for 4 hours running = $\frac{30}{4} + \frac{30}{4} \Rightarrow \frac{30+30}{4}$
 $\Rightarrow \frac{60}{4} = 15$ kms. Ans: B

⑧ Gouthami running = $\frac{2}{3}$ rd
 let consider the running part of Gauthami is 1.
 Remaining part of the ground = $1 - \frac{2}{3} \Rightarrow \frac{3-2}{3} = \frac{1}{3}$ part
 Ans: A

⑨ $\frac{x}{y} \times \frac{z}{y} \times \frac{y}{z} \times \frac{y}{z} = \frac{x}{z}$ Ans: C

⑩ reciprocal of $\frac{3}{5}$ is $\frac{5}{3}$ Ans: C

⑪ $\frac{16}{5} \div 2 = \frac{16}{5 \times 2} = \frac{16}{10} \Rightarrow \frac{8}{5} = 1\frac{3}{5}$ Ans: D

⑫ each day drinking Juice = $\frac{3}{8}$ Liters
 24 days = $\frac{3}{8} \times 24 = 3 \times 3 = 9$ liters
 Ans: B

$$(13) \frac{1}{2} + \frac{1}{x} = 2 \Rightarrow \frac{1}{x} = 2 - \frac{1}{2}$$

$$\frac{1}{x} = \frac{4-1}{2} = \frac{3}{2} \Rightarrow \therefore x = \frac{2}{3} \quad \text{Ans: A}$$

$$(14) \frac{4}{7} \div \frac{2}{3} = y \Rightarrow \frac{4}{7} \times \frac{3}{2} = y$$

$$y = \frac{2 \times 3}{7} = \frac{6}{7} \quad \text{Ans: A}$$

JEE MAINS LEVEL QUESTIONS

$$(1) \frac{2x-1}{3} > \frac{x+2}{2} \Rightarrow 2(2x-1) > 3(x+2)$$

$$\Rightarrow (4x-2) > (3x+6)$$

$$\Rightarrow (4x-3x) > (6+2) \Rightarrow x > 8 \quad \text{Ans: B}$$

$$(2) \frac{x}{y} = \frac{3}{5}, \frac{y}{z} = \frac{4}{7}$$

$$x:y = 3:5$$

$$y:z = 4:7$$

$$x:y:z = 12:20:35$$

$$= \frac{x+y}{2} \Rightarrow \frac{12+20}{35} = \frac{32}{35}$$

$$(3) \quad \frac{a}{b} = \frac{2}{3}, \quad \frac{b}{c} = \frac{3}{4}$$

$$a:b = 2:3$$

$$b:c = 3:4$$

$$a:b:c = \overset{2}{\cancel{6}}:\overset{3}{\cancel{9}}:\overset{4}{\cancel{12}} = 2:3:4$$

$$\therefore \frac{a}{c} = \frac{\cancel{2}}{\cancel{4}_2} = \frac{1}{2} \quad \text{Ans: A}$$

$$(4) \quad \frac{p}{q} = \frac{1}{2} \Rightarrow \frac{p+2}{p-2} \Rightarrow \frac{1+2}{1-2} = \frac{3}{-1} = -3$$

Ans: No correct option

(5) Seema's Room consider 1 part

$\therefore$ Seema's unpainted while she painting alone $= 1 - \frac{2}{3}$

$$\frac{3-2}{3} \Rightarrow \frac{1}{3}$$

$\Rightarrow$ Unpainted area after her brother helping $= \frac{1}{3} - \frac{1}{5}$

$$\Rightarrow \frac{5 \times 1 - 1 \times 3}{15} = \frac{5-3}{15} = \frac{2}{15} \quad \text{Ans: C}$$

⑥ Raju has $= \frac{1}{7}$, bobby has $= \frac{2}{7}$, Total $= \frac{1}{7} + \frac{2}{7}$
 $= \frac{3}{7}$

Ravi has remaining $= 1 - \frac{3}{7} = \frac{7-3}{7} = \frac{4}{7}$.

Ans: D

⑦ John $= \frac{1}{8}$, Kiran $= \frac{3}{4}$

Together they have $= \frac{1}{8} + \frac{3}{4} = \frac{1+3 \times 2}{8} = \frac{1+6}{8} = \frac{7}{8}$

Ans: A

⑧ Through options

A: $\frac{3}{4} + \frac{1}{5} = \frac{3 \times 5 + 1 \times 4}{20} = \frac{15+4}{20} = \frac{19}{20}$

B: $\frac{1}{4} + \frac{3}{5} = \frac{5+3 \times 4}{20} = \frac{5+12}{20} = \frac{17}{20}$

C: $\frac{5}{8} + \frac{3}{4} = \frac{5+3 \times 2}{8} = \frac{5+6}{8} = \frac{11}{8} = 1 \frac{3}{8}$

D: $\frac{1}{8} + \frac{3}{4} = \frac{1+3 \times 2}{8} = \frac{1+6}{8} = \frac{7}{8}$ Ans: C

⑨ $\frac{4}{10} + \frac{5}{100} + \frac{7}{1000} \Rightarrow \frac{4 \times 100 + 5 \times 10 + 7 \times 1}{1000}$

$= \frac{400+50+7}{1000} = \frac{457}{1000}$ Ans: C

$$(10) \quad 4\frac{1}{5} - \left[3\frac{1}{3} - \left(2\frac{1}{2} - \left(\frac{1}{3} + \frac{1}{6} - \frac{1}{12} \right) \right) \right]$$

$$\Rightarrow \frac{20+1}{5} - \left[\frac{9+1}{3} - \left(\frac{4+1}{2} - \left(\frac{4+2-1}{12} \right) \right) \right]$$

$$\Rightarrow \frac{21}{5} - \left[\frac{10}{3} - \left(\frac{5}{2} - \left(\frac{5}{12} \right) \right) \right]$$

$$\Rightarrow \frac{21}{5} - \left[\frac{10}{3} - \left(\frac{5-5}{12} \right) \right] \Rightarrow \frac{21}{5} - \left[\frac{10}{3} - \left(\frac{-1}{12} \right) \right]$$

$$\Rightarrow \frac{21}{5} - \left[\frac{10}{3} + \frac{1}{12} \right] \Rightarrow \frac{21}{5} - \left[\frac{10 \times 4 + 1}{12} \right]$$

$$\Rightarrow \frac{21}{5} - \left[\frac{40+1}{12} \right] \Rightarrow \frac{21}{5} - \frac{41}{12} \Rightarrow \frac{21 \times 12 - 41 \times 5}{60}$$

$$\Rightarrow \frac{252 - 205}{60} = \frac{47}{60}$$

Ans: No correct option

$$(11) \quad 5\frac{1}{6} - 3\frac{4}{9} + x = \frac{7}{3} \times 4\frac{1}{6}$$

$$\Rightarrow \frac{30+1}{6} - \frac{27+4}{9} + x = \frac{7}{3} \times \frac{24+1}{6} \Rightarrow \frac{31}{6} - \frac{31}{9} + x = \frac{7}{3} \times \frac{25}{6}$$

$$\Rightarrow \frac{31 \times 9 - 31 \times 6}{54} + x = \frac{175}{18} \Rightarrow \frac{279 - 186}{54} + x = \frac{175}{18}$$

$$\Rightarrow \frac{93}{54} + x = \frac{175}{18} \Rightarrow x = \frac{175}{18} - \frac{93}{54} \Rightarrow \frac{175 \times 3 - 93 \times 1}{54}$$

$$\Rightarrow \frac{525 - 93}{54} = \frac{432}{54} = 8. \quad \text{Ans: A}$$

- ⑫ To find out how much more of book monish read compared to preeti

$$\Rightarrow \text{Monish's portion} - \text{Preeti's portion} = \frac{5}{6} - \frac{1}{6} = \frac{5-1}{6} \\ = \frac{4}{6} = \frac{2}{3}$$

Ans: A

- ⑬ length of a Rectangular part = $41\frac{2}{3} \text{ m} = \frac{123+2}{3} = \frac{125}{3} \text{ m}$

$$\text{Breadth of a Rectangular part} = 18\frac{3}{5} \text{ m} = \frac{90+3}{5} = \frac{93}{5} \text{ m}$$

Area of a Rectangular part = length $\times$ Breadth

$$\Rightarrow \frac{125}{3} \times \frac{93}{5} = 25 \times 31 = 775 \text{ m}^2$$

Ans: D

- ⑭ For $5\frac{2}{5} \text{ kg}$ of sugar cost = $101\frac{1}{4}$ Rupees

$$\Rightarrow \frac{27}{5} \text{ kg} = \frac{405}{4} \text{ Rupee}$$

per 1 kg = ?

$$\frac{1}{\frac{27}{5}} \times \frac{405}{4} \Rightarrow \frac{5}{27} \times \frac{405}{4} = \frac{225}{4}$$

$$\Rightarrow \frac{225}{4} = \frac{75}{4} \Rightarrow 18\frac{3}{4} \text{ Rupees}$$

Ans: A

JEE ADVANCED LEVEL QUESTIONS

Multi correct answer type:

15) Through options

A: $ad < bc$, This is always true when $\frac{a}{b} < \frac{c}{d}$,
as we can cross-multiply to get $ad < bc$.

B: $ad > bc \Rightarrow ad$ cannot be greater than bc .

C: $a+b < c+d \Rightarrow$ its some times true, some times false.

D: $a+b > c+d \Rightarrow$ not necessarily true, but can be true in case.

Ans: A

16) Through options.

a). We can simplified it further $\frac{7}{10} = 0.7$

b) It is equivalent to $\frac{14}{20}$, yes $\frac{\cancel{14}^7}{\cancel{20}_{10}} = \frac{7}{10}$

c) It is decimal representation is $0.7 \Rightarrow \frac{7}{10} = 0.7$.

d) $\frac{7}{10} = 0.7$, $\frac{3}{5} = 0.6$ $\frac{7}{10} > \frac{3}{5}$.

Ans: A, B, C, D

(17)

$$\frac{p}{2} = \frac{2}{3}, \quad 3p+2q$$

We can express p and q in terms of a common variable, say x :

$$p = 2x, \quad q = 3x. \quad \text{Now, Substitute these expressions into } 3p+2q$$

$$\Rightarrow 3p+2q = 3(2x) + 2(3x) = 6x + 6x = 12x.$$

$$\text{Since } \frac{p}{2} = \frac{2}{3} \Rightarrow p = \frac{2q}{3} = \frac{2(3x)}{3} = 2x$$

Now, Substitute $p = 2x$ into $12x$:

$$12x = 6(p/2) = 6p$$

$$\text{Now, Substitute } \frac{p}{2} = \frac{2}{3} \quad 6p = 4q$$

$$\Rightarrow 3p+2q = 6p \Rightarrow 16 \times 3 \times \frac{p}{2} \Rightarrow \frac{16}{3} \times \frac{2}{3} = \frac{32}{9} = 10.67$$

$$\Rightarrow \frac{10}{3} \quad \text{and } 3p+2q = 6p = 4q$$

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

Ans: c and d

(18)

Through options

$$A) \frac{6}{5} \times \frac{1}{4} = \frac{3 \times 1}{5 \times 2} = \frac{3}{10}, \text{ it is true.}$$

$$B) \frac{6}{5} + \frac{1}{4} = \frac{6 \times 4 + 1 \times 5}{20} = \frac{24 + 5}{20} = \frac{29}{20}, \text{ it is false.}$$

$$C) \frac{6}{5} \div \frac{1}{4} \Rightarrow \frac{6}{5} \times \frac{4}{1} = \frac{24}{5}, \text{ it's not true}$$

$$D) \frac{6}{5} - \frac{1}{4} = \frac{6 \times 4 - 1 \times 5}{20} = \frac{24 - 5}{20} = \frac{19}{20}, \text{ it is true.}$$

Ans: A and D

Assertion and Reason Type:

- 19) Assertion: $\frac{3}{7} > \frac{4}{9}$, this is true because $\frac{3}{7} = 0.4286$ and $\frac{4}{9} = 0.444$, so $\frac{3}{7}$ is indeed greater than $\frac{4}{9}$.

Reason: When comparing fractions with different denominators, it is sufficient to compare their numerators" is false.

Ans: C

- 20) Assertion: $\frac{1}{2} + \frac{1}{3} + \frac{1}{4} > 1$, this is true, as calculated $\frac{1}{2} + \frac{1}{3} + \frac{1}{4} = \frac{13}{12} > 1$

Reason: This statement is incorrect because the sum of fractions can be less than, equal to, or greater than the individual fractions, depending on their values.

Ans: C

- 21) Assertion: $\frac{3}{5} = \frac{6}{10}$, this is true because both fractions can be simplified to the same decimal value: $\frac{3}{5} = 0.6$ and $\frac{6}{10} = 0.6$

Reason: This statement is incorrect because the fractions $\frac{3}{5}$ and $\frac{6}{10}$ do not have the same numerator and denominator. The correct explanation for the assertion is that the fractions have the same value or equal when simplified, not that they have the same numerator and denominator.

Ans: C

22) Assertion: This is true. For example, if we multiply the numerator and denominator of $\frac{3}{4}$ by 2, we get $\frac{6}{8}$, which is equal to $\frac{3}{4}$.

Reason: ~~At~~ This is also true and explains why the assertion is true. When we multiply the numerator and denominator by the same number, we are essentially multiplying the fraction by a form of 1. (ex. $\frac{2}{2}$, $\frac{3}{3}$, etc), which doesn't change the value of the fraction.

Ans: A

Statement type:

23) Statement-1: This is false because:

$$\frac{18}{15} - \frac{9}{7} = \frac{18 \times 7 - 9 \times 15}{15 \times 7} = \frac{126 - 135}{105} = \frac{-9}{105} = \frac{-3}{35}$$

$\frac{-3}{35}$ is not a whole number.

Statement II: This statement is true because to add or subtract fractions, you need a common denominator.

Ans: D

Comprehension Type:

(24) Fractions between $\frac{3}{4}$ and $\frac{5}{11}$ is

LCM of 4 and 11 = 44

$$\frac{3 \times 11}{44} \text{ and } \frac{5 \times 4}{44} \Rightarrow \frac{33}{44} \text{ and } \frac{20}{44}.$$

Through options $\frac{\cancel{26}^{13}}{\cancel{44}_{22}} = \frac{13}{22}$ Ans: D

Integer type:

(25) The equivalent fraction of $\frac{1}{2}$ with 3 as a numerator divided and product with 3.

$$\Rightarrow \frac{1}{2} \times \frac{3}{3} = \frac{1 \times 3}{2 \times 3} = \frac{3}{6}.$$

(26) $1\frac{3}{4} \Rightarrow \frac{4 \times 1 + 3}{4} = \frac{4 + 3}{4} = \frac{7}{4}$

$\frac{7}{4}$ is not possible to simplify into integers.

(27) Total no. of peoples = 24

Group of wearing blue shirts = $\frac{1}{4}$

$$\text{no. of people wearing blue shirts} = \frac{24}{4} = 6.$$

$$(28) \quad \frac{t}{2} \div \frac{5}{6} = \frac{9}{5}$$

$$\Rightarrow \frac{t}{2} \times \frac{6}{5} = \frac{9}{5} \Rightarrow t = \frac{9}{5} \times \frac{5}{3}$$

$$\therefore t = 3.$$

Matrix matching type:

(29)

$$(a) \quad 7\frac{1}{4} \times 3\frac{5}{6} \Rightarrow \frac{29}{4} \times \frac{23}{6} = \frac{667}{24} \quad \text{Ans: S}$$

$$(b) \quad (3\frac{3}{5}) \div \frac{9}{8} \Rightarrow \frac{18}{5} \times \frac{8}{9} = \frac{2 \times 8}{5 \times 1} = \frac{16}{5} \quad \text{Ans: r}$$

$$(c) \quad \frac{135}{60} \times \frac{190}{11} = \frac{135 \times 19}{6 \times 11} = \frac{2565}{66} = \frac{855}{22} \quad \text{Ans: q}$$

$$(d) \quad \frac{1}{5} \div \frac{1}{2} = \frac{1}{5} \times \frac{2}{1} = \frac{2}{5} \quad \text{Ans: p}$$