7th class

MATHEMATICS

IIT FOUNDATION

STUDY MATERIAL

2. FUNDAMENTALS OF FRACTIONS

TEACHING TASK

JEE MAINS LEVEL QUESTIONS:

① If $a > c$ in mixed number $a\frac{b}{c}$ it implies that the fractional part $\frac{b}{c}$ is improper.

Ans: A

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② Let's consider the structure of a mixed number. A mixed number is typically represented as $a + \frac{b}{c}$

where a is the whole number part, (b) is the numerator of the fractional part, and c is the denominator of the fractional part.

Given that 6 is a prime number, we want to understand its impact on the reducibility of the mixed number.

Ans: A

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③ If n is multiple of p in the mixed number $m\frac{n}{p}$ then $\frac{n}{p}$ Simplifies to an integer because n being a multiple of p means $n = kp$ for some integer k.

∴ The mixed number

$m \times \frac{n}{p}$ can be expressed as $m \times k$

which is an integer.

Ans: A

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④ The mixed number can be expressed as

$\Rightarrow x + y$

Here, x is the whole number part of the mixed number.

y is the fractional part, typically expressed as a fractional $\frac{a}{b}$, where a is the numerator and b is the denominator.

Ans: B

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⑤ Let's first interpret the mixed number provided. $2\frac{3}{7}$

→ The whole part x is 2

→ The fractional part y is $3/7$, where 3 is the numerator and 7 is the denominator.

⇒ Square the whole part x : $x^2 = 2^2 = 4$.

⇒ Add this result to the numerator of the fractional part $y = 4+3 = 7$

∴ The result is 7. Ans: ☆

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⑥ Through options

A: This is a proper fraction because the numerator 3 is less than the denominator 4.

B: This is a proper fraction because the numerator 5 is greater than the denominator 2.

C: This is a proper fraction because the numerator 2 is less than the denominator 3.

D: This is a proper fraction because the numerator 4 is less than the denominator 5.

Ans: B

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(7) If the whole part x is multiplied by 2, the new whole part becomes $2x$.

→ If the fractional part $\frac{y}{z}$ is multiplied by 3, the new fractional part becomes $\frac{3y}{z}$.

Ans: D

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(8) Let's first understand the mixed number

$3\frac{4}{5}$

we need to increase the numerator of the fractional part y by 2, while keeping the denominator constant which is 5.

1. Increase the numerator 4 by 2 : $4+2=6$.
2. The new fractional part becomes $6/5$.

∴ The new mixed number is $3\ 6/5$.

Ans: A

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(9) Let

$$4\frac{2}{5} = 4+\frac{2}{5}$$

Here, $4=\frac{20}{5}$ adding both $\frac{20}{5}$ and $\frac{2}{5}$

$$4\frac{2}{5} = \frac{20}{5}+\frac{2}{5} = \frac{22}{5}.$$

Ans: A

(10) $a \times \frac{b}{1} = \frac{ab}{1} = ab$

$\therefore$ Improper fraction.

Ans: A

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(11) ★

To convert the mixed fraction $2\frac{4}{5}$ into an improper fraction,

$\Rightarrow 2\frac{4}{5}$

$\Rightarrow (2 \times 5) + 4 = 10 + 4 = 14.$

$\therefore \frac{14}{5}.$ Ans: ★

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(12)

Given $\frac{45}{60} = \frac{3}{x}$

$\Rightarrow \frac{60}{45} = \frac{x}{3}$

$\Rightarrow \frac{\cancel{60}^{4}}{\cancel{45}_{3}} \times \cancel{3}^{1} = x$

$= x = 4.$ Ans: D

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(13) Given numbers

$\frac{11}{17} = 0.64$, $\frac{9}{13} = 0.69$, $\frac{5}{8} = 0.62$

Decreasing order = $\frac{9}{13}, \frac{11}{17}, \frac{5}{8}$.

Ans: B

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(14) Given fraction $\frac{24}{168}$

$$\Rightarrow \frac{\cancel{24}^{12}}{\cancel{168}_{84}} = \frac{\cancel{126}}{\cancel{84}_{42}} = \frac{6}{42}$$

Ans: A

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(15) Given that, 48 students are in a class out of them $\frac{1}{4}$ are watch cartoons.

$$\Rightarrow \cancel{48}^{12} \times \frac{1}{\cancel{4}} = 12$$

$\Rightarrow$ Student do not watch cartoon = $48 - 12 = 36$.

Ans: C

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(16) Through options

$\frac{1}{2} = \frac{8}{x}$

$\frac{8}{x} = \frac{1}{2}$

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

$x = 16$

$\therefore \frac{1}{2} = \frac{8}{16}$ //

Ans: B

(17) $\frac{2}{3} = \frac{x}{12}$

$x = \frac{2 \times 12^{4}}{3_{1}}$

$x = 8$

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

Ans: A

(18) Through options

$\Rightarrow \frac{9}{20} =$

This fraction is not equivalent to $\frac{2}{5}$.

Ans: C

(19) Fractions are; $\frac{1}{4}, \frac{3}{8}, \frac{2}{5}$

$\frac{1}{4} = 0.25, \frac{3}{8} = 0.375, \frac{2}{5} = 0.4$

Ans: D

JEE ADVANCED LEVEL QUESTIONS.

Multicorrect answer type:

(20)

A: The whole part is less than the fractional part.

→ whole part: 3 and fractional part = 5/6

⇒ $3\frac{5}{6} \Rightarrow \frac{18}{6}$ and $\frac{5}{6}$:

B: The numerator of the fractional part is greater than 2. The numerator of the fractional part is 5.

C: If the whole part is multiplied by 2, the result is greater than the mixed number.

Ans: B and C.

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(21) A: If a and c have a common factor greater than 1, then $\frac{a}{c}$ than 1. the can be reduced This fraction $a\frac{b}{c}$ is not irreducible.

B: If b is a prime number, then $\frac{b}{c}$ is already in its simplest form with respect to b and c.

C: If a and b are co prime, then $\frac{a}{c}$ and $\frac{b}{c}$ are also co prime since b and c are integers.

D: If c is a multiple of a, say $c = ka$ where k is an integer greater than 1, then $\frac{a}{c} = \frac{1}{k}$.

Ans: C.

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(22) $4\frac{3}{5} = 4 + \frac{3}{5} = \frac{4\times5+3}{5} = \frac{20+3}{5} = \frac{23}{5}$

A: $4 \times 3 = 12$, $\frac{23}{5}$ is which is approximately 4.6 12 is Greater than 4.6, so Statement A is true.

B: $4\frac{3}{5}$ is $3/5$, $\frac{3}{5}$ is equal to 0.6. It is a true statement.

C: $4\frac{3}{5} = \frac{23}{5}$ not $\frac{22}{5}$, It a false. Ans: A, B

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(23) $\frac{a}{b} = \frac{5}{6}$, through options

A) $a=10, b=12 \Rightarrow \frac{a}{b} = \frac{10^5}{12_6} = \frac{5}{6}$

B) $a=15, b=18 \Rightarrow \frac{a}{b} = \frac{15^5}{18_6} = \frac{5}{6}$

C) $a=25, b=30 \Rightarrow \frac{a}{b} = \frac{25^5}{30_6} = \frac{5}{6}$

D) $a=20, b=24 \Rightarrow \frac{a}{b} = \frac{20^5}{24_6} = \frac{5}{6}$.

Ans: A, B, C, D

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(24) through options

A: $\frac{1}{2}$ and $\frac{2}{4} \Rightarrow \frac{2^1}{4_2} = \frac{1}{2}$ equivalent.

B: $\frac{1}{3}$ and $\frac{3}{9} \Rightarrow \frac{3^1}{9_3} = \frac{1}{3}$ equivalent.

C: $\frac{2}{4}$ and $\frac{5}{9} \Rightarrow \frac{2^1}{4_2} = \frac{1}{2}$ not equivalent

D: $\frac{4}{8}$ and $\frac{7}{13} \Rightarrow \frac{4^1}{8_2} = \frac{1}{2}$ not equivalent.

Ans: A and B

Statement Type:

(25) Assertion : This statement appears to describe a mixed number, but it is written in a confusing way. Typically, a mixed number is written as a whole number + a fraction.

Reason : This statement accurately describes the function of the whole part in a mixed number. the whole part indeed represents the total number of unit wholes.

Ans: A

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(26) Assertion : This statement is true because the fraction part of a mixed number is always a proper fraction, which is by definition less than one.

Reason: This statement is also true. A mixed numbers is indeed a combination of a whole number and a proper fraction.

Ans: A

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(27) Assertion: $2 \times 7 = 14$

$14 + 4 = 18$

∴ The result improper fraction is $\frac{18}{7}$.

Reason: This statement correctly describes the method for converting a mixed number to an improper fraction.

- Multiply the whole part by the denominator.
- Add the numerator.

Ans: A

(28) Statement I: A proper fraction is defined as a fraction where the numerator is less than the denominator. $\frac{9}{2}$,

Statement II: Proper fractions are the fractions in which the numerator is less than its denominator.

Ans: D

(29) Statement I: $\frac{3}{4}$ and $\frac{2}{4}$ are like fractions. This is true because they have the same denomina-tor.

Statement II: Dinominators are the same in like fractions. This is true because it defines like fractions.

Ans: A

Comprehension Type:

(30) Through options

A: convert $\frac{1}{4}$ to compare with $\frac{7}{8}$ and $1/3$

$\Rightarrow \frac{1}{4} = \frac{6}{24}$

clearly, $\frac{6}{24} < \frac{8}{24}$

So, $\frac{1}{4} < \frac{7}{8}$.

B: compare $\frac{23}{24}$ with $\frac{7}{8}$

$\Rightarrow$ convert $\frac{7}{8}$ to a denominator of 24.

$\rightarrow \frac{7}{8} = \frac{21}{24}$.

clearly, $\frac{23}{24} > \frac{21}{24}$

So, $\frac{23}{24} > \frac{7}{8}$

C: convert $\frac{11}{12}$ with $\frac{1}{3}$

$\Rightarrow \frac{11}{12} = \frac{22}{24}$

$\Rightarrow \frac{22}{24} > \frac{8}{24}$

So, $\frac{11}{12}$ is $> 1/3$

D: Compare $\frac{17}{14}$ with $\frac{7}{8}, 1/3$

$\Rightarrow \frac{17}{24} < \frac{21}{24} \left(< \frac{7}{8}\right)$

$\Rightarrow \frac{17}{24} > \frac{8}{24} \left(> 1/3\right)$

$\therefore$ Fraction $\frac{7}{8} > 1/3$ is $\frac{17}{24}$.

Ans: D

INTEGERS TYPE

(31)

$P+\frac{q}{r}$ is integer, $\frac{q}{r}$ itself must be an integer.

∴ The smallest integer value for $\frac{q}{r}$ is 1

It means $q=r$.

q and r is positive integer the minimum value for r is 1

$$\frac{q}{r}=\frac{1}{1}=1$$

$$r=1.$$

(32) Let analyze the mixed number given

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

$4+\frac{2}{k}=n$, where n is an integer.

$$\frac{2}{k}=n-4$$

$$k=\frac{2}{n-4}$$

case 1: $(n-4=1)$: $n=5 \Rightarrow k=\frac{2}{1} \Rightarrow k=2$

case 2: $(n-4=-1)$: $n=3 \Rightarrow k=\frac{2}{-1} \Rightarrow k=-2$

case 3: $(n-4=2)$: $n=6 \Rightarrow k=\frac{2}{2} \Rightarrow k=1$

case 4: $(n-4=-2)$: $n=2 \Rightarrow k=\frac{2}{-2} \Rightarrow k=-1$

(33) $m\frac{n}{p} \Rightarrow m \times \frac{p}{p} = m$. which is an integer

$\frac{n}{p} = 1$, $n = p$

The smallest possible positive integer for p is 1.

$p = 1$, $n = p = 1$

$m = 71$

The smallest integer greater than 1 is 2.

∴ The minimum possible value of m is

$m = 2$.

(34) $\frac{p}{q} = \frac{2}{3}$ and $q = 9$

Find p

$\frac{p}{q} = \frac{2}{3}$

cross- multipling

$3p = 2 \times q$

$3p = 2 \times 9$ (where $q = 9$)

$p = \frac{18}{3}$

$p = 6$.

(85) If $\frac{11}{4} = \frac{77}{x}$, $x = ?$

$\frac{11}{4} = \frac{77}{x}$ (cross multiply)

$\Rightarrow \quad 11x = 77 \times 4$

$x = \frac{\cancel{77} \times 4}{\cancel{11}_1}$

$x = 7 \times 4$

$x = 28.$

Matrix matching type.

(86)

(a) $\frac{2}{10}, \frac{3}{100}, \frac{4}{1000}, \frac{5}{10000}$ are decimal fractions

Ans: r

(b) $\frac{2010}{2024}, \frac{15}{9}, \frac{2}{3}$ are unlike fractions

Ans: q

(c) $\frac{1}{2010}, \frac{7}{2010}, \frac{78}{2010}, \frac{1729}{2010}$ are like fractions

Ans: p

(d) $\frac{3}{4}, \frac{5}{7}, \frac{6}{12}, \frac{21}{109}$ are vulgar fractions

Ans: s

LEARNERS TASK

Conceptual understanding questions (CUQ's)

(1) Through options

D: $5\frac{2}{5}$, Numerator = 2, Denominator = 5

2 is less than 5, so this is a proper fraction.

Ans: D

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(2) If a mixed number is written in the form $a\frac{b}{c}$, the a is called the whole part.

Ans: A

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(3) $\frac{p}{q} = \frac{2}{5}$

To find $\frac{3p}{q}$ we multiply both sides of

$\frac{p}{q} = \frac{2}{5}$ by 3

$\frac{3p}{q} = 3 \times \frac{2}{5}$

$\frac{3p}{q} = \frac{6}{5}$.

Ans: A

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(4) Through options checking 32 denominator and equivalent to $\frac{21}{8}$.

C) $\frac{\frac{21}{84}}{\frac{32}{8}} = \frac{21}{8}$

Ans: C

(5) Through options

B) $2\frac{3}{24}$

$\Rightarrow \frac{(2\times24)+3}{24} \Rightarrow \frac{48+3}{24} \Rightarrow \frac{51}{24} \neq \frac{17}{8}$.

Ans: B

(6) Marks are writing in fractions

$= \frac{\cancel{15}^{3}}{\cancel{25}_{5}} = \frac{3}{5}$.

Ans: D

(7) $2\frac{3}{4}$

here, This represents a mixed fraction. 2 as the whole number and $\frac{3}{4}$ as a the proper fraction.

Ans: A

(8) $\frac{4}{9} = \frac{a}{18}$

Cross multiply each other

$\Rightarrow 4 \times 18 = a \times 9$

$\Rightarrow \frac{4 \times 18^{2}}{\cancel{9}_{1}} = a$ | $a = 8.$

$\Rightarrow a = 4 \times 2$

Ans: B

(9) $\frac{\cancel{10}^{3}}{\cancel{3}_{1}}^{1}$

$\Rightarrow 3\frac{1}{3}$ Ans: A

(10) convert $3\frac{2}{5}$ to an improper

$\Rightarrow \frac{(3 \times 5) + 2}{5} \Rightarrow \frac{15+2}{5} = \frac{17}{5}$ Ans: C

(11) For 30 minutes in fraction

For 1 hour = 1

For 30 minutes = $\frac{1}{2}$ hours. Ans: B

(12) through options

A) $\frac{7}{9}$ and $\frac{14}{18}$ $\Rightarrow$ $\frac{14^{7}}{18_{9}} = \frac{7}{9}$.

so. $\frac{7}{9}$ and $\frac{14}{18}$ are like fractions.

Ans: A

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(13) ★ Greatest to Smallest

Option B: $\frac{7}{8} = 0.87$, $\frac{2}{3} = 0.66$, $\frac{4}{7} = 0.57$.

Ans: B

JEE MAINS LEVEL QUESTIONS:

(1) $6\frac{4}{9}$

$\Rightarrow$ Increase the numerator of the fraction part by 1 where $4+1=5$.

$\Rightarrow$ Increase the denominator of the fraction part by 2 $9+2=11$

$\therefore \frac{5}{11}$

$\therefore$ The new mixed fraction is $6\frac{5}{11}$.

Ans: B

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(2) A: Convert into improper fraction

$3\frac{7}{6} \Rightarrow \frac{(3\times6)+7}{6} = \frac{18+7}{6} = \frac{25}{6}$.

B: Given that dividing 7 by 7 gives $=1\ \frac{7}{7}=1$

C: The whole part is 3 and the fractional part is $\frac{7}{6}$

$3 > \frac{7}{6}$, This is correct. Ans: ABC

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(3) Through options

A: $3\frac{4}{14} \Rightarrow \frac{(3\times14)+4}{14} = \frac{42+4}{14} = \frac{46}{14}^{23}_{7}$

$\Rightarrow \frac{23}{7} \Rightarrow 3\frac{2}{7}$.

Ans: A

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

To increase the numerator of the fractional part by 2, while keeping the denominator constant.

The original fractional part is $\frac{4}{5}$.

$\Rightarrow$ Increase the numerator by $2 \Rightarrow 4+2=6$

$\Rightarrow$ fraction is $6/5$

mixed number is $3\frac{6}{5}$ Ans: A

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⑤ $\frac{9}{5} = 1\frac{4}{5} \Rightarrow 1 + \frac{4}{5}$

⇒ To combine these into a single fraction:

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

Ans: ☆

⑥ $\frac{7}{3} = 2$ with remainder of 1.

So, $\frac{7}{3} = 2\frac{1}{3}$ Ans: A

⑦ $\frac{4}{9} = 0.444$

The $\frac{4}{9}$ is 0.44 as comparing these decimall is the smallest Ans: B

⑧ $\frac{13}{20} = 0.433$

as comparing all equation $\frac{13}{20}$ is greatest.

Ans: D

(9) $\frac{315}{405}$

The prime factorization of 315 is

$315 = 3 \times 3 \times 5 \times 7 = 3^2 \times 5 \times 7$

The prime factorization of 405 is

$405 = 3 \times 3 \times 3 \times 5 = 3^4 \times 5$

The common factors are

$3^2 \times 5 \Rightarrow 9 \times 5 = 45$

Now, divide both the numerator and the denominator by 45

$\frac{315 \div 45}{405 \div 45} = \frac{7}{9}$ Ans: C

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(10) Option C: $\frac{4}{11} = 0.364$, $\frac{7}{13} = 0.538$, $\frac{5}{9} = 0.556$, $\frac{2}{3} = 0.667$

Ans: C

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(11) $\frac{7}{20}$ can not be simplified to $\frac{1}{3}$

Ans: D

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(12) $4\frac{2}{2} \Rightarrow \frac{(4 \times 2) + 3}{2} = \frac{8+3}{2} = \frac{11}{2} = 5.5$

Ans: ✱

JEE ADVANCED LEVEL QUESTIONS

Multi correct Answer type:

(13) In a mixed number $n\frac{m}{p}$, where n is whole number part m is the numerator and p is the denominator, the condition to ensure that the fractional part $\frac{m}{p}$ is a proper fractional part. If m be less than the p.

This ensures that the fraction is less than 1.

$\frac{m}{p}$, m is less than p

Ans: C

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(14) $2\frac{4}{3} = 2 - \frac{4}{3} \Rightarrow \frac{6}{3} - \frac{4}{3} = \frac{2}{3}$. Ans: A

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(15) $\frac{3}{5} = 0.6$, Greater than $\frac{3}{5}$ are

A) $\frac{5}{7} = 0.7$ B) $\frac{2}{3} = 0.6$ C) $\frac{4}{5} = 0.8$ D) $\frac{7}{9} = 0.7$

Ans: A, C and D.

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(16) $\frac{2}{5} = 0.4$, equivalent to $\frac{2}{5}$ is

$\frac{4}{10} = 0.4$

Ans: A

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(17) option A:

$\frac{1}{5}, \frac{4}{5}$.

both fractions have a denominator of 5.

$\therefore$ 1/5, 4/5 are like fractions.

C: $\frac{1}{6}, \frac{5}{6}$

both fractions have denominator of 6

$\therefore \frac{1}{6}, \frac{5}{6}$ are like fractions.

Ans: A and C.

Statement type:

(18) Assertion: states that $5\frac{3}{4}$ consists of 5 whole units and an additional $\frac{3}{4}$. This is correct because the mixed number $5\frac{3}{4}$ means 5 whole units & $\frac{3}{4}$.

Reason: Explains that in a mixed number, the whole part 5 in this case indicates the number of complete units. and the fractional part 3/4 represents the remaining parts. This is also correct.

Ans: A.

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(19) This assertion is false. In the mixed number $3\frac{2}{5}$, the numerator 2 actually represents two parts out of the five parts that make up one whole unit.

+ This reason is true. The numerator in the fractional part of a mixed number $a\frac{b}{c}$ represents b parts out of c parts of of c.

Ans: D

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(20) Statement 1: Assending order of $\frac{2}{3}, \frac{2}{7}, \frac{2}{11}, \frac{2}{5}$ and $\frac{2}{3}, \frac{2}{5}, \frac{2}{7}, \frac{2}{9}, \frac{2}{11}$

ascending order: $\frac{2}{11}, \frac{2}{7}, \frac{2}{5}, \frac{2}{3}$.

For the second set = $\frac{2}{3}, \frac{2}{5}, \frac{2}{7}, \frac{2}{9}, \frac{2}{11}$.

ascending order: $\frac{2}{11}, \frac{2}{9}, \frac{2}{7}, 2/5, 2/3$.

Ans: A.

Comprehension type:

(21) Number of Pages of a book = 100

Rani typed pages = 50 $\Rightarrow \frac{50}{100} = \frac{1}{2}$

Meena typed $\frac{1}{4}$ th pages = $\frac{100}{4}$ = 25 pages.

$\therefore$ Rani typed more pages compared to meena.

Ans: A

Integer type:

(22) $3\frac{4}{7}$ is the whole part 3 is multiplied by numerator of the fractional part 4.

$\therefore$ 3x4 = 12.

(23) Let $6\frac{p}{q} = \frac{6q+p}{q}$, p = 2 and q = 3

$\Rightarrow \frac{6\times3+2}{3} = \frac{18+2}{3} = \frac{20}{3}$, fraction not integer

Let p = 3 q = 5.

$\Rightarrow \frac{6*5+3}{5} = \frac{30+3}{5} = \frac{33}{5}$, fraction not integer.

let p = 5, q = 1

$\Rightarrow \frac{6\times1+5}{1} = \frac{6+5}{1} = 11$, it a integer.

(24) $\frac{2x}{3} = 8$

$\Rightarrow x = \frac{8 \times 3}{2_1}$

$x = 4 \times 3 \Rightarrow x = 12.$

(25) $\frac{5}{10} = \frac{x-2}{30}$

Cross multiply the above equation

$5 \times 30 = (x-2)10$

$\Rightarrow 5 = x-2$

$x = 5+2$

$x = 7.$

Matrix matching type:

(26)

(a) Simplest form of $\frac{24}{78} = \frac{4}{13}$ Ans: q

(b) equivalent to $\frac{3}{5}$ is $\frac{12}{20} = \frac{3}{5}$ Ans: r

(c) $\frac{3}{5} < \frac{8}{5}$ Ans: P

$\frac{3}{5} = 0.6$

$\frac{8}{5} = 1.6$

(d) $\frac{5}{3} > \frac{7}{10}$ Ans: S

$\frac{5}{3} = 1.66$

$\frac{7}{10} = 0.7$