पुना International School

Shree Swaminarayan Gurukul, Zundal

Class -VIII

Mathmatics

Specimen Copy

Year- 2020-21

CHAPTER – 1 RATIONAL NUMBER

- **Summary**
- **Introduction**
- **Properties of rational number**
- **Rational number between two rational number**
- **Addition and subtraction of rational number**
- **Activity**

- **Introduction:**

Rational Number Definition

A rational number can be defined as any number which can be represented in the form of p/q where q is greater than 0. Also, we can say that any fraction fit under the category of rational numbers, where denominator and numerator are integers and the denominator is not equal to zero.

- It is represented in the form of a/b, where b≠0.
- The ratio p/q can be further simplified and represented in decimal form.

The set of rational numerals are:

1. Involve positive and negative numbers, and zero.
2. Can be expressed as a fraction.

Rational Numbers Properties

- The result of two rationals is always a rational number is we multiply, add or subtract them.
- A rational number remains the same is we divide or multiply both numerator and denominator with the same number.
- Sum of zero and a rational number revert the same number itself.

EXERCISE 1.1

Questions

1. Using appropriate properties find:

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

Ans. (i) $-\frac{2}{3}\times\frac{3}{5}+\frac{5}{2}-\frac{3}{5}\times\frac{1}{6}$

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

[Using associative property]

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

[Using distributive property]

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

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

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

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

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

[Using associative property]

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

[Using distributive property]

$= \frac{2}{5}\times\left(\frac{-6+1}{14}\right)-\frac{1}{4} = \frac{2}{5}\times\frac{-5}{14}-\frac{1}{4}$

$= \frac{-1}{7} - \frac{1}{4} = \frac{-4-7}{28} = \frac{-11}{28}$

2. Write the additive inverse of each of the following:

(i) $\frac{2}{8}$ (ii) $\frac{-5}{9}$ (iii) $\frac{-6}{-5}$ (iv) $\frac{2}{-9}$ (v) $\frac{19}{-6}$

Ans 2. We know that additive inverse of a rational number $\frac{a}{b}$ is $\left(\frac{-a}{b}\right)$, such that $\frac{a}{b}+\left(\frac{-a}{b}\right)=0.$

(i) Additive inverse of $\frac{2}{8}$ is $\frac{-2}{8}$.

(ii) Additive inverse of $\frac{-5}{9}$ is $\frac{5}{9}$.

(iii) Additive inverse of $\frac{-6}{-5}$ is $\frac{-6}{5}$.

(iv) Additive inverse of $\frac{2}{-9}$ is $\frac{2}{9}$.

(v) Additive inverse of $\frac{19}{-6}$ is $\frac{19}{6}$.

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

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

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

Ans 3.(i) Putting $x=\frac{11}{15}$ in $-(-x)=x$,

$$-\left(-\frac{11}{15}\right)=\frac{11}{15} \Rightarrow \frac{11}{15}=\frac{11}{15}$$

$\Rightarrow$L.H.S. = R.H.S.

(ii)Putting $x=\frac{-13}{17}$ in $-(-x)=x,$

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

$\Rightarrow$ L.H.S. = R.H.S.

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4. Find the multiplicative inverse of the following:

(i) -13 (ii) $\frac{-13}{19}$ (iii) $\frac{1}{5}$

(iv) $\frac{-5}{8}\times\frac{-3}{7}$ (v) $-1\times\frac{-2}{5}$ (vi) -1

Ans 4. We know that multiplicative inverse of a rational number a is $\left(\frac{1}{a}\right)$, such that $a\times\frac{1}{a}=1.$

(i) Multiplicative inverse of -13 is $\frac{-1}{13}.$

(ii) Multiplicative inverse of $\frac{-13}{19}$ is $\frac{-19}{13}.$

(iii) Multiplicative inverse of $\frac{1}{5}$ is $5.$

(iv) Multiplicative inverse of $\frac{-5}{8}\times\frac{-3}{7}=\frac{15}{56}$ is $\frac{56}{15}.$

(v) Multiplicative inverse of $-1 \times \frac{-2}{5} = \frac{2}{5}$ is $\frac{5}{2}$.

(vi) Multiplicative inverse of -1 is $\frac{1}{-1}$.

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

(i) $\frac{-4}{5} \times 1 = 1 \times \frac{-4}{5}$ (ii) $-\frac{13}{17} \times \frac{-2}{7} = \frac{-2}{7} \times \frac{-13}{17}$

(iii) $\frac{-19}{29} \times \frac{29}{-19} = 1$

Ans 5.(i) 1 is the multiplicative identity.
(ii) Commutative property.

(iii) Multiplicative Inverse property.

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

Ans 6.The reciprocal of $\frac{-7}{16}$ is $\frac{-16}{7}$.

According to the question,

$\frac{6}{13} \times \left(\frac{-16}{7}\right) = \frac{-96}{91}$

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7. Tell what property allows you to compute

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

Ans 7. By using associative property of multiplication, we will compute as $a\times(b\times c)=(a\times b)\times c$.

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8. Is $\frac{8}{9}$ the multiplicative inverse of $-1\frac{1}{8}$?

Why or why not?

Ans 8. Since multiplicative inverse of a rational number a is $\left(\frac{1}{a}\right)$, if $a\times\frac{1}{a}=1.$

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

But its product must be positive 1.

Therefore, $\frac{8}{9}$ is not the multiplicative inverse of $\left(-1\frac{1}{8}\right)$.

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

Ans. 9. Since multiplicative inverse of a rational number a is $\left(\frac{1}{a}\right)$, if $a\times\frac{1}{a}=1.$

Therefore, $0.3\times3\frac{1}{3} = \frac{3}{10}\times\frac{10}{3} = 1$

Therefore, Yes 0.3 is the multiplicative inverse of $3\frac{1}{3}$.

10.Write:

(i) The rational number that does not have a reciprocal.

(ii) The rational numbers that are equal to their reciprocals.

(iii) The rational number that is equal to its negative.

Ans. 10.(i) 0 (ii) 1 and -1 (iii) 0

11. 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 ___-1/5_____.

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

(v) The product of two rational numbers is always a ___ RATIONAL NUMBER_____.

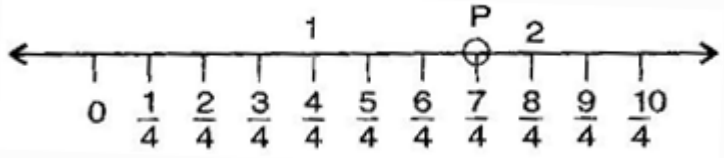
(vi) The reciprocal of a positive rational number is POSITIVE_____

EXERCISE 1.2

1. Represent these numbers on the number line:

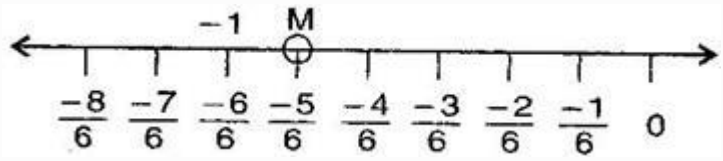
(i) $\frac{7}{4}$ (ii) $\frac{-5}{6}$

Ans 1. (i) $\frac{7}{4} = 1\frac{3}{4}$



Here, P $1\frac{3}{4} = \frac{7}{4}$

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



Here, M = $\frac{-5}{6}$

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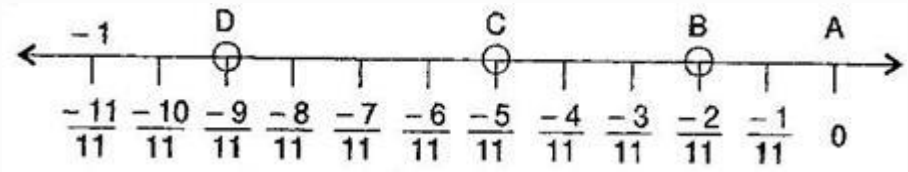
2. Represent $\frac{-2}{11}, \frac{-5}{11}, \frac{-9}{11}$ on the number line.

Ans 2. Here, B = $\frac{-2}{11}$, C = $\frac{-5}{11}$ and D = $\frac{-9}{11}$



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

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

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4. Find ten rational numbers between $\frac{-2}{5}$ and $\frac{1}{2}$.

Ans 4. $\frac{-2}{5}$ and $\frac{1}{2}$

Here, L.C.M. of 5 and 2 is 10.

$\therefore \frac{-2}{5} \times \frac{2}{2} = \frac{-4}{10}$ and $\frac{1}{2} \times \frac{5}{5} = \frac{5}{10}$

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

$\therefore$ Ten rational number between $\frac{-2}{5}$ and $\frac{1}{2}$ are $\frac{-7}{20}, \frac{-6}{20}, \frac{-5}{20}, \frac{-4}{20}, \frac{-3}{20}, \frac{-2}{20}, \frac{-1}{20}, 0, \frac{1}{20}, \frac{2}{20}$.

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5. Find five rational numbers between:

(i) $\frac{2}{3}$ and $\frac{4}{5}$ (ii) $\frac{-3}{2}$ and $\frac{5}{3}$ (iii) $\frac{1}{4}$ and $\frac{1}{2}$

Ans 5. (i) $\frac{2}{3}$ and $\frac{4}{5}$

L.C.M. of 3 and 5 is 15.

$\therefore \frac{2}{3}\times\frac{5}{5}=\frac{10}{15}$ and $\frac{4}{5}\times\frac{3}{3}=\frac{12}{15}$

Again $\frac{10}{15}\times\frac{4}{4}=\frac{40}{60}$ and $\frac{12}{15}\times\frac{4}{4}=\frac{48}{60}$

$\therefore$ Five rational numbers between $\frac{2}{3}$ and $\frac{4}{5}$ are $\frac{41}{60}, \frac{42}{60}, \frac{43}{60}, \frac{44}{60}, \frac{45}{60}$.

(ii) $\frac{-3}{2}$ and $\frac{5}{3}$

L.C.M. of 2 and 3 is 6.

$\therefore \frac{-3}{2}\times\frac{3}{3}=\frac{-9}{6}$ and $\frac{5}{3}\times\frac{2}{2}=\frac{10}{6}$

$\therefore$ $\therefore$ Five rational numbers between $\frac{-3}{2}$ and $\frac{5}{3}$ are $\frac{-8}{6}, \frac{-7}{6}, 0, \frac{1}{6}, \frac{2}{6}$.

(iii) $\frac{1}{4}$ and $\frac{1}{2}$

L.C.M. of 4 and 2 is 4.

$\therefore \frac{1}{4}\times\frac{1}{1}=\frac{1}{4}$ and $\frac{1}{2}\times\frac{2}{2}=\frac{2}{4}$

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

$\therefore$ Five rational numbers between $\frac{1}{4}$ and $\frac{1}{2}$ are $\frac{9}{32}, \frac{10}{32}, \frac{11}{32}, \frac{12}{32}, \frac{13}{32}$.

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6. Write 5 rational numbers greater than -2.

Ans 6. Five rational numbers greater than -2 are:

$\frac{-3}{2}, -1, \frac{-1}{2}, 0, \frac{1}{2}$

[Other rational numbers may also be possible]

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7. Find ten rational numbers between $\frac{3}{5}$ and $\frac{3}{4}$.

Ans 7. $\frac{3}{5}$ and $\frac{3}{4}$

L.C.M. of 5 and 4 is 20.

$\therefore \frac{3}{5} \times \frac{4}{4} = \frac{12}{20}$ and $\frac{3}{4} \times \frac{5}{5} = \frac{15}{20}$

Again $\frac{12}{20} \times \frac{8}{8} = \frac{96}{160}$ and $\frac{15}{20} \times \frac{8}{8} = \frac{120}{160}$

$\therefore$ Five rational numbers between $\frac{3}{5}$ and $\frac{3}{4}$ are:

$\frac{97}{160}, \frac{98}{160}, \frac{99}{160}, \frac{100}{160}, \frac{101}{160}, \frac{102}{160}, \frac{103}{160}, \frac{104}{160}, \frac{105}{160}, \frac{106}{160}$.

Chapter – 2 Linear equations in one variable

- **Summary**
- **Introduction**
- **Solving equations which have Linear expressions on one side and numbers on the other side**
- **Solving equations having the variable on both sides**
- **Reducing equations to simpler form**
- **Equations reducible to the linear form**
- **Activity**

EXERCISE 2.1

Solve the following questions.

1. $x-2=7$

Ans. $x-2=7$

$\Rightarrow x-2+2 = 7+2$

[Adding 2 both sides]

$\Rightarrow x = 9$

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2. $y+3=10$

Ans. $y+3=10$

$\Rightarrow y+3-3 = 10-3$

[Subtracting 3 both sides]

$\Rightarrow y = 7$

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3. $6=z+2$

Ans. $6=z+2$

$\Rightarrow 6-2=z+2-2$

[Subtracting 2 both sides]

$\Rightarrow 4=z \Rightarrow z=4$

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4. $\frac{3}{7}+x=\frac{17}{7}$

Ans. $\frac{3}{7}+x=\frac{17}{7}$

$\Rightarrow x+\frac{3}{7}-\frac{3}{7}=\frac{17}{7}-\frac{3}{7}$

[Subtracting $\frac{3}{7}$ both sides]

$\Rightarrow x=\frac{17-3}{7}$

$\Rightarrow x = \frac{14}{7}$

$\Rightarrow x = 2$

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5. $6x = 12$

Ans. $6x = 12$

$\Rightarrow \frac{x}{6} = \frac{12}{6}$

[Dividing both sides by 6]

$\Rightarrow x = 2$

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6. $\frac{t}{5} = 10$

Ans. $\frac{t}{5} = 10$

$\Rightarrow \frac{t}{5} \times 5 = 10 \times 5$

[Multiplying both sides by 5]

$\Rightarrow t = 50$

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7. $\frac{2x}{3} = 18$

Ans. $\frac{2x}{3} = 18$

$\Rightarrow \frac{2x}{3} \times 3 = 18 \times 3$

[Multiplying both sides by 3]

$\Rightarrow 2x = 18 \times 3$

$\Rightarrow \frac{2x}{2} = \frac{18 \times 3}{2}$

[Dividing both sides by 2]

$\Rightarrow x = 27$

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8. $1.6 = \frac{y}{1.5}$

Ans. $1.6 = \frac{y}{1.5}$

$\Rightarrow 1.6 \times 1.5 = \frac{y}{1.5} \times 1.5$

[Multiplying both sides by 1.5]

$\Rightarrow 2.40 = y \Rightarrow y = 2.40$

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9. $7x - 9 = 16$

Ans. $7x - 9 = 16$

$\Rightarrow 7x - 9 + 9 = 16 + 9$

[Adding 9 both sides]

$\Rightarrow 7x = 25 \Rightarrow \frac{7x}{7} = \frac{25}{7}$

[Dividing both sides by 7]

$\Rightarrow x = \frac{25}{7}$

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10. $14y - 8 = 13$

Ans. $14y - 8 = 13$

$\Rightarrow 14y - 8 + 8 = 13 + 8$

[Adding 8 both sides]

$\Rightarrow 14y = 21 \Rightarrow \frac{14y}{14} = \frac{21}{14}$

[Dividing both sides by 14]

$\Rightarrow y = \frac{3}{2}$

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11. $17 + 6p = 9$

Ans. $17 + 6p = 9$

$\Rightarrow 17 + 6p - 17 = 9 - 17$

[Subtracting 17 from both sides]

$\Rightarrow 6p = -8 \Rightarrow \frac{6p}{6} = \frac{-8}{6}$

[Dividing both sides by 6]

$\Rightarrow p = \frac{-4}{3}$

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12. $\frac{x}{3} + 1 = \frac{7}{15}$

Ans. $\frac{x}{3} + 1 = \frac{7}{15}$

$\Rightarrow \frac{x}{3} + 1 - 1 = \frac{7}{15} - 1$

[Subtracting 1 from both sides]

$\Rightarrow \frac{x}{3} = \frac{7-15}{15} \Rightarrow \frac{x}{3} = \frac{-8}{15}$

$\Rightarrow \frac{x}{3} \times 3 = \frac{-8}{15} \times 3$

[Multiplying both sides by 3]

$\Rightarrow x = \frac{-8}{5}$

Exercise- 2.2

1. If you subtract $\frac{1}{2}$ from a number and multiply the result by $\frac{1}{2}$, you get $\frac{1}{8}$. What is the number?

Ans. Let the number be x.
According to the question,

$\frac{1}{2}\left(x - \frac{1}{2}\right) = \frac{1}{8}$

$\Rightarrow 2 \times \frac{1}{2}\left(x - \frac{1}{2}\right) = \frac{1}{8} \times 2$

[Multiplying both sides by 2]

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

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

[Adding both sides $\frac{1}{2}$]

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

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

Hence, the required number is $\frac{3}{4}$.

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2. The perimeter of a rectangular swimming pool is 154 m. Its length is 2 m more than twice its breadth. What are the length and breadth?

Ans. Let the breadth of the pool be x m.

Then, the length of the pool = $(2x+2)$ m

Perimeter = $2(l+b)$

$\Rightarrow$ 154 = $2(2x+2+x)$

$\Rightarrow \frac{154}{2}=\frac{2(2x+2+x)}{2}$

[Dividing both sides by 2]

$\Rightarrow 77=3x+2$

$\Rightarrow 77-2=3x+2-2$

[Subtracting 2 from both sides]

$\Rightarrow 75=3x$

$\Rightarrow \frac{75}{3}=\frac{3x}{3}$

[Dividing both sides by 3]

$\Rightarrow 25=x$

$\Rightarrow \ x = 25$ m

Hence, length of the pool = $2x + 2$

$2 \times 25 + 2$ = 50 + 2 = 52 m

And, breadth of the pool = 25 m.

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3. The base of an isosceles triangle is $\frac{4}{3}$ cm. The perimeter of the triangle is $4\frac{2}{15}$ cm. What is the length of either of the remaining equal sides?

Ans. Let each of equal sides of an isosceles triangle be x cm.
Perimeter of a triangle = Sum of all three sides

$$\Rightarrow \ 4\frac{2}{15} = \frac{4}{3} + x + x$$

$$\Rightarrow \ \frac{62}{15} = \frac{4}{3} + 2x$$

$$\Rightarrow \ \frac{62}{15} - \frac{4}{3} = \frac{4}{3} - \frac{4}{3} + 2x$$

[Subtracting $\frac{4}{3}$ from both the sides]

$$\Rightarrow \ \frac{62 - 20}{15} = 2x$$

$$\Rightarrow \ \frac{42}{15} = 2x$$

$$\Rightarrow \ \frac{42}{15 \times 2} = \frac{2x}{2}$$

[Dividing both sides by 2]

$$\Rightarrow \ \frac{7}{5} = x$$

$$\Rightarrow \ x = 1\frac{2}{5} \text{ cm}$$

Hence, each equal side of an isosceles triangle is $1\frac{2}{5}$ cm.

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4. Sum of two numbers is 95. If one exceeds the other by 15, find the numbers.

Ans. Sum of two number = 95
Let the first number be x, then another number be $x+15$.

According to the question, $x+x+15=95$

$\Rightarrow 2x+15=95$

$\Rightarrow 2x+15-15=95-15$

[Subtracting 15 from both sides]

$\Rightarrow 2x=80$

$\Rightarrow \frac{2x}{2}=\frac{80}{2}$

[Dividing both sides by 2]

$\Rightarrow x=40$

Hence, the first number = 40

And another number = 40 + 15 = 55.

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5. Two numbers are in the ratio 5 : 3. If they differ by 18, what are the numbers?

Ans. Let the two numbers be $5x$ and $3x$
According to question, $5x-3x=18$

$\Rightarrow 2x=18$

$\Rightarrow \frac{2x}{2}=\frac{18}{2}$

[Dividing both sides by 2]

$\Rightarrow x=9$

Hence, first number = 5×9 = 45 and second number = 3×9 = 27.

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6. Three consecutive integers add up to 51. What are these integers?

Ans. Let the three consecutive integers be $x, x+1$ and $x+2$.
According to the question, $x+x+1+x+2=51$

$\Rightarrow 3x+3=51$

$\Rightarrow 3x+3-3=51-3$

[Subtracting 3 from both sides]

$\Rightarrow 3x=48$

$\Rightarrow \frac{3x}{3}=\frac{48}{3}$

[Dividing both sides by 3]

$\Rightarrow x=16$

Hence, first integer = 16,

second integer = 16 + 1 = 17 and

third integer = 16 + 2 = 18.

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7. The sum of three consecutive multiples of 8 is 888. Find the multiples.

Ans. Let the three consecutive multiples of 8 be $x, x+8$ and $x+16$.
According to question, $x+x+8+x+16=888$

$\Rightarrow 3x+24=888$

$\Rightarrow 3x+24-24=888-24$

[Subtracting 24 from both sides]

$\Rightarrow 3x=864$

$\Rightarrow \frac{3x}{3}=\frac{864}{3}$

[Dividing both sides by 3]

$\Rightarrow x=288$

Hence, first multiple of 8 = 288,

second multiple of 8 = 288 + 8 = 296 and third multiple of 8 = 288 + 16 = 304.

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8. Three consecutive integers are such that when they are taken in increasing order and multiplied by 2, 3 and 4 respectively, they add up to 74. Find these numbers.

Ans. Let the three consecutive integers be $x, x+1$ and $x+2$.

According to the question, $2x+3(x+1)+4(x+2)=74$

$\Rightarrow 2x+3x+3+4x+8=74$

$\Rightarrow 9x+11=74$

$\Rightarrow 9x+11-11=74-11$

[Subtracting 11 from both sides]

$\Rightarrow 9x=63$

$\Rightarrow \frac{9x}{9}=\frac{63}{9}$

[Dividing both sides by 9]

$\Rightarrow x=7$

Hence first integer = 7, second integer

= 7 + 1 = 8 and third integer = 7 + 2 = 9.

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9. The ages of Rahul and Haroon are in the ratio 5 : 7. Four years later the sum of their ages will be 56 years. What are their present ages?

Ans. Let the present ages of Rahul and Haroon be $5x$ years and $7x$ years respectively.

According to condition, $(5x+4)+(7x+4)=56$

$\Rightarrow 12x+8=56$

$\Rightarrow 12x+8-8=56-8$

[Subtracting 8 from both sides]

$\Rightarrow 12x=48$

$\Rightarrow \frac{12x}{12}=\frac{48}{12}$

[Dividing both sides by 12]

$\Rightarrow \ x = 4$

Hence, present age of Rahul = 5×4 = 20 years and present age of Haroon

= 7×4 = 28 years.

10. The number of boys and girls in a class are in the ratio 7 : 5. The number of boys is 8 more than the number of girls. What is the total class strength?

Ans. Let the number of girls be x.
Then, the number of boys = $x + 8$.

According to the question, $\frac{x+8}{x} = \frac{7}{5}$

$\Rightarrow \ 5(x+8) = 7x$

$\Rightarrow \ 5x + 40 = 7x$

$\Rightarrow \ 5x - 7x = -40$

[Transposing $7x$ to L.H.S. and 40 to R.H.S.]

$\Rightarrow \ -2x = -40 \ \Rightarrow \ \frac{-2x}{-2} = \frac{-40}{-2}$

[Dividing both sides by -2]

$\Rightarrow \ x = 20$

Hence the number of girls = 20 and number of boys = 20 + 8 = 28.

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11. Baichung's father is 26 years younger than Baichung's grandfather and 29 years older than Baichung. The sum of the ages of all the three is 135 years. What is the age of each one of them?

Ans. Let Baichung's age be x years, then Baichung's father's age = $(x+29)$ years and Baichung's granddaughter's age = $(x+29+26) = (x+55)$ years.
According to condition, $x + x + 29 + x + 55 = 135$

$\Rightarrow \ 3x + 84 = 135 \ \Rightarrow \ 3x + 84 - 84 = 135 - 84$

[Subtracting 84 from both sides]

$\Rightarrow 3x = 51 \Rightarrow \frac{3x}{3} = \frac{51}{3}$

[Dividing both sides by 3]

$\Rightarrow x = 17$ years

Hence, Baichung's age = 17 years, Baichung's father's age = 17 + 29

= 46 years

And Baichung's granddaughter's age

= 17 + 29 + 26 = 72 years.

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12. Fifteen years from now Ravi's age will be four times his present age. What is Ravi's present age?

Ans. Let Ravi's present age be x years.
After fifteen years, Ravi's age = $4x$ years.

Fifteen years from now, Ravi's age = $(x+15)$ years.

According to question, $4x = x+15$

$\Rightarrow 4x - x = 15$

[Transposing x to L.H.S.]

$\Rightarrow 3x = 15$

$\Rightarrow \frac{3x}{3} = \frac{15}{3}$

[Dividing both sides by 3]

$\Rightarrow x = 5$ years

Hence, Ravi's present age be 5 years.

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13. A rational number is such that when you multiply it by $\frac{5}{2}$ and add $\frac{2}{3}$ to the product, you get $\frac{-7}{12}$. What is the number?

Ans. Let the rational number be x.

According to the question, $\frac{5}{2}x+\frac{2}{3}=\frac{-7}{12}$

$\Rightarrow \frac{5}{2}x+\frac{2}{3}-\frac{2}{3}=\frac{-7}{12}-\frac{2}{3}$

[Subtracting $\frac{2}{3}$ from both sides]

$\Rightarrow \frac{5x}{2}=\frac{-7-8}{12}$

$\Rightarrow \frac{5x}{2}=\frac{-15}{12}$

$\Rightarrow 5x\times 12=-15\times 2$

$\Rightarrow 60x=-30$

$\Rightarrow \frac{60x}{60}=\frac{-30}{60}$

[Dividing both sides by 60]

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

Hence, the rational number is $\frac{-1}{2}$.

---

14. Lakshmi is a cashier in a bank. She has currency notes of denominations ` 100, `50 an`10 respectively. The ratio of the number of these notes is 2 : 3 : 5. The total cash with Lakshmi is `4,00,000. How many notes of each denomination does she have?

Ans. Let number of notes be $2x, 3x$ and $5x$.

According to question, $100\times 2x+50\times 3x+10\times 5x=4,00,000$

$\Rightarrow 200x+150x+50x=4,00,000$

$\Rightarrow 400x=4,00,000$

$\Rightarrow \frac{400x}{400}=\frac{4,00,000}{400}$

[Dividing both sides by 400]

$\Rightarrow x = 1000$

Hence, number of denominations of ` 100 notes = 2×1000 = 2000

Number of denominations of ` 50 notes = 3×1000 = 3000

Number of denominations of ` 10 notes = 5×1000 = 5000

Therefore, required denominations of notes of ` 100, ` 50 and ` 10 are 2000, 3000 and 5000 respectively.

---

15. I have a total of `300 in coins of denomination `1, `2 and `5. The number of `2 coins is 3 times the number of `5 coins. The total number of coins is 160. How many coins of each denomination are with me?

Ans. Total sum of money = ` 300
Let the number of ` 5 coins be $x$, number of ` 2 coins be $3x$ and number of ` 1 coins be $160-(x+3x)=160-4x$.

According to question, $5 \times x + 2 \times (3x) + 1 \times (160 - 4x) = 300$

$\Rightarrow 5x + 6x + 160 - 4x = 300$

$\Rightarrow 7x + 160 = 300$

$\Rightarrow 7x + 160 - 160 = 300 - 160$

[Subtracting 160 from both sides]

$\Rightarrow 7x = 140$

$\Rightarrow \frac{7x}{7} = \frac{140}{7}$

[Dividing both sides by 7]

$\Rightarrow x = 20$

Hence, the number of coins of ` 5 denomination = 20

Number of coins of ` 2 denomination = 3×20 = 60

Number of coins of ` 1 denomination = $160 - 4 \times 20$ = 160 – 80 = 80

---

16. The organizers of an essay competition decide that a winner in the competition gets a prize of `100 and a participant who does not win, gets a prize of `25. The total prize money distributed is `3,000. Find the number of participants is 63.

Ans. Total sum of money = ` 3000
Let the number of winners of ` 100 be x.

And those who are not winners = $63-x$

According to the question, $100\times x+25\times(63-x)=3000$

$\Rightarrow\ 100x+1575-25x=3000$

$\Rightarrow\ 75x+1575=3000$

$\Rightarrow\ 7x+1575-1575=3000-1575$

[Subtracting 1575 from both sides]

$\Rightarrow\ 7x=1425$

$\Rightarrow\ \frac{7x}{7}=\frac{1425}{7}$

[Dividing both sides by 7]

$\Rightarrow\ x=19$

Hence the number of winner is 19.

Exercise- 2.3

Solve the following equations and check your results.

1. $3x=2x+18$

Ans. $3x=2x+18$

$\Rightarrow\ 3x-2x=18$

$\Rightarrow\ x=18$

To check:

$3x=2x+18$

$\Rightarrow\ 3\times18=2\times18+18$

$\Rightarrow\ 54=36+18$

$\Rightarrow$ 54 = 54

$\Rightarrow$ L.H.S. = R.H.S.

Hence, it is correct.

---

2. $5t-3=3t-5$

Ans. $5t-3=3t-5$

$\Rightarrow\ 5t-3t=-5+3$

$\Rightarrow\ 2t=-2$

$\Rightarrow\ t=\frac{-2}{2}=-1$

To check:

$5t-3=3t-5$

$\Rightarrow\ 5\times(-1)-3=3\times(-1)-5$

$\Rightarrow\ -5-3=-3-5$

$\Rightarrow\ -8=-8$

$\Rightarrow$ L.H.S. = R.H.S.

Hence, it is correct.

---

3. $5x+9=5+3x$

Ans. $5x+9=5+3x$

$\Rightarrow\ 5x-3x=5-9$

$\Rightarrow\ 2x=-4$

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

To check:

$5x+9=5+3x$

$\Rightarrow 5\times(-2)+9=5+3\times(-2)$

$\Rightarrow -10+9=5-6$

$\Rightarrow -1=-1$

$\Rightarrow$ L.H.S. = R.H.S.

Hence, it is correct.

---

4. $4z+3=6+2z$

Ans. $4z+3=6+2z$

$\Rightarrow 4z-2z=6-3$

$\Rightarrow 2z=3$

$\Rightarrow z=\frac{3}{2}$

To check:

$4z+3=6+2z$

$\Rightarrow 4\times\frac{3}{2}+3=6+2\times\frac{3}{2}$

$\Rightarrow 2\times3+3=6+3$

$\Rightarrow 6+3=9$

$\Rightarrow 9=9$

$\Rightarrow$ L.H.S. = R.H.S.

Hence, it is correct.

---

5. $2x-1=14-x$

Ans. $2x-1=14-x$

$\Rightarrow 2x+x=14+1$

$\Rightarrow 3x=15$

$\Rightarrow x=\frac{15}{3}=5$

To check:

$2x-1=14-x$

$\Rightarrow\ 2\times5-1=14-5$

$\Rightarrow$ 10 – 1 = 9

$\Rightarrow$ 9 = 9

$\Rightarrow$ L.H.S. = R.H.S.

Hence, it is correct.

---

6. $8x+4=3(x-1)+7$

Ans. $8x+4=3(x-1)+7$

$\Rightarrow\ 8x+4=3x-3+7$

$\Rightarrow\ 8x-3x=-3+7-4$

$\Rightarrow\ 5x=0$

$\Rightarrow\ x=\frac{0}{5}=0$

To check:

$8x+4=3(x-1)+7$

$\Rightarrow\ 8\times0+4=3(0-1)+7$

$\Rightarrow\ 0+4=3\times(-1)+7$

$\Rightarrow\ 4=-3+7$

$\Rightarrow\ 4=4$

$\Rightarrow$ L.H.S. = R.H.S.

Hence, it is correct.

---

7. $x=\frac{4}{5}(x+10)$

Ans. $x=\frac{4}{5}(x+10)$

$\Rightarrow 5x=4(x+10)$

$\Rightarrow 5x=4x+40$

$\Rightarrow 5x-4x=40$

$\Rightarrow x=40$

To check:

$x=\frac{4}{5}(x+10)$

$\Rightarrow 40=\frac{4}{5}(40+10)$

$\Rightarrow 40=\frac{4}{5}\times 50$

$\Rightarrow 40=4\times 10$

$\Rightarrow$ 40 = 40

$\Rightarrow$ L.H.S. = R.H.S.

Hence, it is correct.

---

8. $\frac{2x}{3}+1=\frac{7x}{15}+3$

Ans. $\frac{2x}{3}+1=\frac{7x}{15}+3$

$\Rightarrow \frac{2x}{3}-\frac{7x}{15}=3-1$

$\Rightarrow \frac{10x-7x}{15}=2$

$\Rightarrow 3x=30$

$\Rightarrow x=\frac{30}{3}=10$

To check:

$$\frac{2x}{3}+1=\frac{7x}{15}+3$$

$$\Rightarrow \frac{2\times10}{3}+1=\frac{7\times10}{15}+3$$

$$\Rightarrow \frac{20}{3}+1=\frac{14}{3}+3$$

$$\Rightarrow \frac{20+3}{3}=\frac{14+9}{3}$$

$$\Rightarrow \frac{23}{3}=\frac{23}{3}$$

$\Rightarrow$ L.H.S. = R.H.S.

Hence, it is correct.

---

9. $2y+\frac{5}{3}=\frac{26}{3}-y$

Ans. $2y+\frac{5}{3}=\frac{26}{3}-y$

$$\Rightarrow 2y+y=\frac{26}{3}-\frac{5}{3}$$

$$\Rightarrow 3y=\frac{26-5}{3}$$

$$\Rightarrow 3y=\frac{21}{3}$$

$$\Rightarrow y=\frac{21}{3\times3}=\frac{7}{3}$$

To check:

$$2y+\frac{5}{3}=\frac{26}{3}-y$$

$$\Rightarrow 2\times\frac{7}{3}+\frac{5}{3}=\frac{26}{3}-\frac{7}{3}$$

$$\Rightarrow \frac{14}{3}+\frac{5}{3}=\frac{26}{3}-\frac{7}{3}$$

$\Rightarrow \quad \frac{14+5}{3}=\frac{26-7}{3}$

$\Rightarrow \quad \frac{19}{3}=\frac{19}{3}$

$\Rightarrow$ L.H.S. = R.H.S.

Hence, it is correct.

---

10. $3m=5m-\frac{8}{5}$

Ans. $3m=5m-\frac{8}{5}$

$\Rightarrow \quad 3m-5m=\frac{-8}{5}$

$\Rightarrow \quad -2m=\frac{-8}{5}$

$\Rightarrow \quad m=\frac{-8}{5\times(-2)}$

$\Rightarrow \quad m=\frac{4}{5}$

To check:

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

$\Rightarrow \quad 3\times\frac{4}{5}=5\times\frac{4}{5}-\frac{8}{5}$

$\Rightarrow \quad \frac{12}{5}=4-\frac{8}{5}$

$\Rightarrow \quad \frac{12}{5}=\frac{20-8}{5}$

$\Rightarrow \quad \frac{12}{5}=\frac{12}{5}$

$\Rightarrow$ L.H.S. = R.H.S.

Hence, it is correct.

Exercise 2.4

1. Amina thinks of a number and subtracts $\frac{5}{2}$ from it. She multiplies the result by 8. The result now obtained is 3 times the same number she thought of. What is the number?

Ans. Let Amina think a number x.

According to the question, $8\left(x-\frac{5}{2}\right)=3x$

$\Rightarrow 8x-\frac{8\times 5}{2}=3x$

$\Rightarrow 8x-4\times 5=3x$

$\Rightarrow 8x-20=3x$

$\Rightarrow 8x-3x=20$

$\Rightarrow 5x=20$

$\Rightarrow x=\frac{20}{5}=4$

Hence, the number is 4.

---

2. A positive number is 5 times another number. If 21 is added to both the numbers, then one of the new numbers becomes twice the other new number. What are the numbers?

Ans. Let another number be x.

Then positive number = $5x$

According to the question, $5x+21=2(x+21)$

$\Rightarrow 5x+21=2x+42$

$\Rightarrow 5x-2x=42-21$

$\Rightarrow 3x=21$

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

Hence another number = 7 and positive number = 7×5 =35

---

3. Sum of the digits of a two-digit number is 9. When we interchange the digits, it is found that the resulting new number is greater than the original number by 27. What is the two-digit number?

Ans. Let the unit place digit of a two-digit number be x.

Therefore, the tens place digit = $9 - x$

$\because$ 2-digit number = 10 x tens place digit + unit place digit

$\therefore$ Original number = $10(9-x)+x$

According to the question, New number

= Original number + 27

$\Rightarrow 10x+(9-x)=10(9-x)+x+27$

$\Rightarrow 10+9-x=90-10x+x+27$

$\Rightarrow 9x+9=117-9x$

$\Rightarrow 9x+9x=117-9$

$\Rightarrow 18x=108$

$\Rightarrow x = \frac{108}{18} = 6$

Hence, the 2-digit number = $10(9-x)+x$ = 10 (9 – 6) + 6 = $10\times3+6$ = 30 + 6 = 36

4. One of the two digits of a two-digit number is three times the other digit. If you interchange the digits of this two-digit number and add the resulting number to the original number, you get 88. What is the original number?

Ans. Let the unit place digit of a two-digit number be x.

Therefore, the tens place digit = $3x$

$\because$ 2-digit number = 10 x tens place digit + unit place digit

$\therefore$ Original number = $10\times 3x+x=30x+x = 31x$

According to the question, New number + Original number = 88

$\Rightarrow 10x+3x+31x=88$

$\Rightarrow 44x=88$

$\Rightarrow x=\frac{88}{44}=2$

Hence, the 2-digit number = $31x=31\times 2=62$

---

5. Shobo's mother's present age is six times Shobo's present age. Shobo's age five years from now will be one third of his mother's present age. What are their present age?
Ans. Let Shobo's present age be x years.
And Shobo's mother's present age = $6x$ years

According to the question, $x+5=\frac{1}{3}\times 6x$

$\Rightarrow x+5=2x$

$\Rightarrow 2x=x+5$

$\Rightarrow 2x-x=5$

$\Rightarrow x=5$ years.

Hence, Shobo's present age = 5 years

And Shobo's mother's present age = 6×5 = 30 years.

---

6. There is a narrow rectangular plot, reserved for a school, in Mahuli village. The length and breadth of the plot are in the ratio 11 : 4. At the rate `100 per meter it will cost the village panchayat`75,000 to fence the plot. What are the dimensions of the plot?
Ans. Let the length and breadth of the rectangular plot be $11x$ and $4x$ respectively.

$\therefore$ Perimeter of the plot = $\frac{\text{Total Cost}}{\text{Cost of 1 meter}} = \frac{75000}{100}$ = 750 m

We know that Perimeter of rectangle = 2 (length + breadth)

Therefore, according to the question,

$750=2(11x+4x)$

$\Rightarrow 750 = 2 \times 15x$

$\Rightarrow 750 = 30x$

$\Rightarrow 30x = 750$

$\Rightarrow x = \frac{750}{30} = 25$

Hence, length of rectangular plot = 11×25 = 275 m

And breadth of rectangular plot = 4×25 = 100 m

---

7. Hasan buys two kinds of cloth materials for school uniforms, shirt material that costs him `50 per meter and trouser material that costs him `90 per meter.

Ans. Let ratio between shirt material and trouser material be $3x : 2x$.

The cost of shirt material = $50 \times 3x = 150x$

The selling price at 12% gain = $\frac{100 + P\%}{100} \times$ C.P.

$= \frac{100+12}{100} \times 150x$

$= \frac{112}{100} \times 150x = 168x$

The cost of trouser material = $90 \times 2x = 180x$

The selling price at 12% gain = $\frac{100 + P\%}{100} \times$ C.P.

$= \frac{100+10}{100} \times 180x$

$= \frac{110}{100} \times 180x = 198x$

According to the question,

$168x + 198x = 36,600$

$\Rightarrow 366x = 36600$

$\Rightarrow x = \frac{36600}{366}$ = 100 meters

Now, trouser material = $2x = 2 \times 100$

= 200 meters

Hence, Hasan bought 200 meters of the trouser material.

For every 2 meters of the trouser material he buys 3 meters of the shirt material. He sells the materials at 12% and 10% respectively. His total sale is `36,000. How much trouser material did he buy?

---

8. Half of a herd of deer are grazing in the field and three fourths of the remaining are playing nearby. The rest 9 are drinking water from the pond. Find the number of deer in the herd.

Ans. Let the total number of deer in the herd be x.

According to question, $x = \frac{x}{2} + \frac{3}{4} \times \left(x - \frac{x}{2} \right) + 9$

$\Rightarrow x = \frac{x}{2} + \frac{3}{4}\left(\frac{2x - x}{2} \right) + 9$

$\Rightarrow x = \frac{x}{2} + \frac{3}{4} \times \frac{x}{2} + 9$

$\Rightarrow x = \frac{x}{2} + \frac{3}{8}x + 9$

$\Rightarrow x - \frac{x}{2} - \frac{3x}{8} = 9$

$\Rightarrow \frac{8x - 4x - 3x}{8} = 9$

$\Rightarrow \frac{x}{8} = 9$

$\Rightarrow x = 9 \times 8 = 72$

Hence, the total number of deer in the herd is 72.

---

9. A grandfather is ten times older than his granddaughter. He is also 54 years older than her. Find their present ages.

Ans. Let present age of granddaughter be x years.

Therefore, Grandfather's age = $10x$ years

According to question, $10x = x + 54$

$\Rightarrow 10x - x = 54$

$\Rightarrow 9x = 54$

$\Rightarrow x = \frac{54}{9} = 6$ years

Hence, granddaughter's age = 6 years and grandfather's age = 10×6 = 60 years.

---

10. Aman's age is three times his son's age. Ten years ago he was five times his son's age. Find their present ages.

Ans. Let the present age of Amon's son be x years.

Therefore, Aman's age = $3x$ years

According to question,

$3x - 10 = 5(x - 10)$

$\Rightarrow 3x - 10 = 5x - 50$

$\Rightarrow 3x - 5x = -50 + 10$

$\Rightarrow -2x = -40$

$\Rightarrow x = \frac{-40}{-2}$ = 20 years

Hence, Aman's son's age = 20 years

And Aman's age = 3×2 = 60 years

Exercise- 2.5

Solve the following linear equations.

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

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

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

$\Rightarrow \frac{3x-2x}{6}=\frac{5+4}{20}$

$\Rightarrow \frac{x}{6}=\frac{9}{20}$

$\Rightarrow x=\frac{9\times 6}{20}=\frac{27}{10}$

To check:

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

$\Rightarrow \frac{27}{10\times 2}-\frac{1}{5}=\frac{27}{10\times 3}+\frac{1}{4}$

$\Rightarrow \frac{27}{20}-\frac{1}{5}=\frac{9}{10}+\frac{1}{4}$

$\Rightarrow \frac{27-4}{20}=\frac{18+5}{20}$

$\Rightarrow \frac{23}{20}=\frac{23}{20}$

$\Rightarrow$ L.H.S. = R. H. S.

Therefore, it is correct.

---

2. $\frac{n}{2}-\frac{3n}{4}+\frac{5n}{6}=21$

Ans. $\frac{n}{2}-\frac{3n}{4}+\frac{5n}{6}=21$

$\Rightarrow \frac{6n-9n+10n}{12}=21$

$\Rightarrow \frac{7n}{12}=21$

$\Rightarrow n=\frac{21\times12}{7}$

$\Rightarrow n=36$

To check:

$\frac{n}{2}-\frac{3n}{4}+\frac{5n}{6}=21$

$\Rightarrow \frac{36}{2}-\frac{3\times36}{4}+\frac{5\times36}{6}=21$

$\Rightarrow 18-27+30=21$

$\Rightarrow$ 21 = 21

$\Rightarrow$ L.H.S. = R. H. S.

Therefore, it is correct.

---

3. $x+7-\frac{8x}{3}=\frac{17}{6}-\frac{5x}{2}$

Ans. $x+7-\frac{8x}{3}=\frac{17}{6}-\frac{5x}{2}$

$\Rightarrow \frac{x}{1}-\frac{8x}{3}+\frac{5x}{2}=\frac{17}{6}-\frac{7}{1}$

$$\Rightarrow \frac{6x-16x+15x}{6}=\frac{17-42}{6}$$

$$\Rightarrow \frac{5x}{6}=\frac{-25}{6}$$

$$\Rightarrow x=\frac{-25\times 6}{6\times 5}$$

$$\Rightarrow x=-5$$

To check:

$$x+7-\frac{8x}{3}=\frac{17}{6}-\frac{5x}{2}$$

$$\Rightarrow -5+7-\frac{8\times(-5)}{3}=\frac{17}{6}-\frac{5\times(-5)}{2}$$

$$\Rightarrow 2+\frac{40}{3}=\frac{17}{6}+\frac{25}{2}$$

$$\Rightarrow \frac{6+40}{3}=\frac{17+75}{6}$$

$$\Rightarrow \frac{46}{3}=\frac{92}{6}$$

$$\Rightarrow \frac{46}{3}=\frac{46}{3}$$

$\Rightarrow$ L.H.S. = R. H. S.

Therefore, it is correct.

---

4. $\frac{x-5}{3}=\frac{x-3}{5}$

Ans. $\frac{x-5}{3}=\frac{x-3}{5}$

$$\Rightarrow 5\times(x-5)=3(x-3)$$

$$\Rightarrow 5x-25=3x-9$$

$$\Rightarrow 5x-3x=-9+25$$

$\Rightarrow 2x = 16$

$\Rightarrow x = \frac{16}{2} = 8$

To check:

$\frac{x-5}{3} = \frac{x-3}{5}$

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

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

$\Rightarrow 1 = 1$

$\Rightarrow$ L.H.S. = R. H. S.

Therefore, it is correct.

---

5. $\frac{3t-2}{4} - \frac{2t+3}{3} = \frac{2}{3} - t$

Ans. $\frac{3t-2}{4} - \frac{2t+3}{3} = \frac{2}{3} - t$

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

$\Rightarrow \frac{3(3t-2) - 4(2t+3) + 12t}{12} = \frac{2}{3}$

$\Rightarrow \frac{9t-6-8t-12+12t}{12} = \frac{2}{3}$

$\Rightarrow \frac{13t-18}{12} = \frac{2}{3}$

$\Rightarrow 3 \times (13t-18) = 2 \times 12$

$\Rightarrow 39t - 54 = 24$

$\Rightarrow 39t = 24 + 54$

$\Rightarrow 39t = 78$

$\Rightarrow \quad t = \frac{78}{39} = 2$

To check:

$$\frac{3t-2}{4} - \frac{2t+3}{3} = \frac{2}{3} - t$$

$$\Rightarrow \quad \frac{3\times 2-2}{4} - \frac{2\times 2+3}{3} = \frac{2}{3} - 2$$

$$\Rightarrow \quad \frac{6-2}{4} - \frac{4+3}{3} = \frac{2-6}{3}$$

$$\Rightarrow \quad \frac{4}{4} - \frac{7}{3} = \frac{-4}{3}$$

$$\Rightarrow \quad \frac{1}{1} - \frac{7}{3} = \frac{-4}{3}$$

$$\Rightarrow \quad \frac{3-7}{3} = \frac{-4}{3}$$

$$\Rightarrow \quad \frac{-4}{3} = \frac{-4}{3}$$

$\Rightarrow$ L.H.S. = R. H. S.

Therefore, it is correct.

---

6. $m - \frac{m-1}{2} = 1 - \frac{m-2}{3}$

Ans. $m - \frac{m-1}{2} = 1 - \frac{m-2}{3}$

$$\Rightarrow \quad \frac{m}{1} - \frac{m-1}{2} + \frac{m-2}{3} = 1$$

$$\Rightarrow \quad \frac{6m-3(m-1)+2(m-2)}{6} = 1$$

$$\Rightarrow \quad \frac{6m-3m+3+2m-4}{6} = 1$$

$$\Rightarrow \quad \frac{5m-1}{6} = 1$$

$\Rightarrow\ 5m-1=6$

$\Rightarrow\ 5m=6+1$

$\Rightarrow\ 5m=7$

$\Rightarrow\ m=\frac{7}{5}$

To check:

$m-\frac{m-1}{2}=1-\frac{m-2}{3}$

$\Rightarrow\ \frac{7}{5}-\frac{\frac{7}{5}-1}{2}=1-\frac{\frac{7}{5}-2}{3}$

$\Rightarrow\ \frac{7}{5}-\frac{\frac{7-5}{5}}{2}=1-\frac{\frac{7-10}{5}}{3}$

$\Rightarrow\ \frac{7}{5}-\frac{2}{5\times 2}=1-\frac{-3}{5\times 3}$

$\Rightarrow\ \frac{7}{5}-\frac{1}{5}=1+\frac{1}{5}$

$\Rightarrow\ \frac{7-1}{5}=\frac{5+1}{5}$

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

$\Rightarrow$ L.H.S. = R. H. S.

Therefore, it is correct.

Simplify and solve the following linear equation.

7. $3(t-3)=5(2t+1)$

Ans. $3(t-3)=5(2t+1)$

$\Rightarrow\ 3t-9=10t+5$

$\Rightarrow\ 3t-10t=5+9$

$\Rightarrow -7t = 14$

$\Rightarrow t = \frac{14}{-7}$

$\Rightarrow t = -2$

To check:

$3(t-3) = 5(2t+1)$

$\Rightarrow 3(-2-3) = 5\{2\times(-2)+1\}$

$\Rightarrow 3\times -5 = 5(-4+1)$

$\Rightarrow -15 = 5\times(-3)$

$\Rightarrow -15 = -15$

$\Rightarrow$ L.H.S. = R. H. S.

Therefore, it is correct.

---

8. $15(y-4)-2(y-9)+5(y+6)=0$

Ans. $15(y-4)-2(y-9)+5(y+6)=0$

$\Rightarrow 15y-60-2y+18+5y+30=0$

$\Rightarrow 18y-12=0$

$\Rightarrow 18y=12$

$\Rightarrow y = \frac{12}{18}$

$\Rightarrow y = \frac{2}{3}$

To check:

$15(y-4)-2(y-9)+5(y+6)=0$

$\Rightarrow 15\left(\frac{2}{3}-4\right)-2\left(\frac{2}{3}-9\right)+5\left(\frac{2}{3}+6\right)=0$

$\Rightarrow 15\left(\frac{2-12}{3}\right)-2\left(\frac{2-27}{3}\right)+5\left(\frac{2+18}{3}\right)=0$

$\Rightarrow 15\times\frac{-10}{3}-2\times\frac{-25}{3}+5\times\frac{20}{3}=0$

$\Rightarrow -50+\frac{50}{3}+\frac{100}{3}=0$

$\Rightarrow -50+\frac{50+100}{3}=0$

$\Rightarrow -50+\frac{150}{3}=0$

$\Rightarrow -50+50=0$

$\Rightarrow 0 = 0$

$\Rightarrow$ L.H.S. = R. H. S.

Therefore, it is correct.

---

9. $3(5z-7)-2(9z-11)=4(8z-13)-17$

Ans. $3(5z-7)-2(9z-11)=4(8z-13)-17$

$\Rightarrow 15z-21-18z+22=32z-52-17$

$\Rightarrow -3z+1=32z-69$

$\Rightarrow -3z-32z=-69-1$

$\Rightarrow -35z=-70$

$\Rightarrow z=\frac{-70}{-35}=2$

To check:

$3(5z-7)-2(9z-11)=4(8z-13)-17$

$\Rightarrow 3(5\times2-7)-2(9\times2-11)=4(8\times2-13)-17$

$\Rightarrow 3(10-7)-2(18-11)=4(16-13)-17$

$\Rightarrow\ 3\times3-2\times7=4\times3-17$

$\Rightarrow\ 9-14=12-17$

$\Rightarrow\ -5=-5$

$\Rightarrow$ L.H.S. = R. H. S.

Therefore, it is correct.

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10. $0.25(4f-3)=0.05(10f-9)$

Ans. $0.25(4f-3)=0.05(10f-9)$

$\Rightarrow\ 1.00f-0.75=0.50f-0.45$

$\Rightarrow\ 1.00f-0.50f=-0.45+0.75$

$\Rightarrow\ 0.50f=0.3$

$\Rightarrow\ f=\dfrac{0.3}{0.50}$

$\Rightarrow\ f=0.6$

To check:

$0.25(4f-3)=0.05(10f-9)$

$\Rightarrow\ 0.25(4\times0.6-3)=0.05(10\times0.6-9)$

$\Rightarrow\ 0.25(2.4-3)=0.05(6.0-9)$

$\Rightarrow\ 0.25\times(-0.6)=0.05\times(-3)$

$\Rightarrow\ -0.150=-0.150$

$\Rightarrow$ L.H.S. = R. H. S.

Therefore, it is correct.

EXERCISE- 2.6

Solve the following equations.

1. $\frac{8x-3}{3x}=2$

Ans. $\frac{8x-3}{3x}=2$

$\Rightarrow 8x-3=2\times 3x$

$\Rightarrow 8x-3=6x$

$\Rightarrow 8x-6x=3$

$\Rightarrow 2x=3 \Rightarrow x=\frac{3}{2}$

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2. $\frac{9x}{7-6x}=15$

Ans. $\frac{9x}{7-6x}=15$

$\Rightarrow 9x=15(7-6x)$

$\Rightarrow 9x=105-90x$

$\Rightarrow 9x+90x=105$

$\Rightarrow 99x=105$

$\Rightarrow x=\frac{105}{99}$

$\Rightarrow x=\frac{35}{33}$

---

3. $\frac{x}{x+15}=\frac{4}{9}$

Ans. $\frac{z}{z+15}=\frac{4}{9}$

$\Rightarrow z\times 9=4(z+15)$

$\Rightarrow 9z=4z+60$

$\Rightarrow\ 9z-4z=60$

$\Rightarrow\ 5z=60$

$\Rightarrow\ z=\dfrac{60}{5}$

$\Rightarrow\ z=12$

---

4. $\dfrac{3y+4}{2-6y}=\dfrac{-2}{5}$

Ans. $\dfrac{3y+4}{2-6y}=\dfrac{-2}{5}$

$\Rightarrow\ 5(3y+4)=-2(2-6y)$

$\Rightarrow\ 15y+20=-4+12y$

$\Rightarrow\ 15y-12y=-4-20$

$\Rightarrow\ 3y=-24$

$\Rightarrow\ y=\dfrac{-24}{3}$

$\Rightarrow\ y=-8$

---

5. $\dfrac{7y+4}{y+2}=\dfrac{-4}{3}$

Ans. $\dfrac{7y+4}{y+2}=\dfrac{-4}{3}$

$\Rightarrow\ 3(7y+4)=-4(y+2)$

$\Rightarrow\ 21y+12=-4y-8$

$\Rightarrow\ 21y+4y=-8-12$

$\Rightarrow\ 25y=-20$

$\Rightarrow y = \frac{-20}{25}$

$\Rightarrow y = \frac{-4}{5}$

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6. The ages of Hari and Harry are in the ratio 5 : 7. Four years from now the ratio of their ages will be 3 : 4. Find their present ages.

Ans. Let the Ages of Hari and Harry be $5x$ years and $7x$ years.

According to question, $\frac{5x+4}{7x+4} = \frac{3}{4}$

$\Rightarrow 4(5x+4) = 3(7x+4)$

$\Rightarrow 20x+16 = 21x+12$

$\Rightarrow 20x-21x = 12-16$

$\Rightarrow -x = -4$

$\Rightarrow x = 4$

Hence, the age of Hari = $5x = 4\times5$

= 20 years

And the age of Harry = $7x = 7\times4$

= 28 years.

---

7. The denominator of a rational number is greater than its numerator by 8. If the numerator is increased by 17 and the denominator is decreased by 1, the number obtained is $\frac{3}{2}$. Find the rational number.

Ans. Let the numerator of a rational number be x, then the denominator is $x+8$.

Therefore, Rational number = $\frac{x}{x+8}$

According to the question,

$$\frac{x+17}{x+8-1}=\frac{3}{2}$$

$$\Rightarrow \frac{x+17}{x+7}=\frac{3}{2}$$

$$\Rightarrow 2(x+17)=3(x+7)$$

$$\Rightarrow 2x+34=3x+21$$

$$\Rightarrow 2x-3x=21-34$$

$$\Rightarrow -x=-13$$

$$\Rightarrow x=13$$

Hence, the required rational number

$$= \frac{x}{x+8}=\frac{13}{13+8}=\frac{13}{21}.$$