8. Linear Equations in One Variable

Exercise 8.1

1. Question

Solve the following:

(i) x + 3 = 11 (ii) y - 9 = 21

(iii) 10 = z + 3 (iv) $\frac{3}{11}+x=\frac{9}{11}$

(v) 10x = 30 (v) 10x = 30

(vi) $\left(\frac{s}{7}\right)=4$ (vii) $\left(\frac{3x}{6}\right)=10$

(viii) $1.6=\frac{x}{1.5}$ (ix) 8x – 8 = 48

(x) $\left(\frac{x}{3}\right)+1=\left(\frac{7}{15}\right)$ (xi) $\left(\frac{x}{5}\right)=12$

(xii) $\left(\frac{3x}{5}\right)=15$ (xiii) 3(x + 6) = 24

(xiv) $\left(\frac{x}{4}\right)-8=1$ (xv) 3(x + 2) – 2(x – 1) = 7

Answer

Note: - Our Main Motto is to bring variable to one side of the equation and find the value

(i) x + 3 = 11

Taking 3 to right side of equation,

⇒ x = 11 - 3 = 8

x = 8

(ii) y - 9 = 21

Taking 9 to the right side of equation,

$\Rightarrow y = 21 + 9 = 30$

$y = 30$

(iii) $10 = z + 3$

Bring 3 to left side of equation,

$\Rightarrow z = 10 - 3 = 7$

$z = 7$

(iv) $\frac{3}{11} + x = \frac{9}{11}$

$\Rightarrow x = \frac{9}{11} - \frac{3}{11} = \frac{6}{11}$

$x = \frac{6}{11}$

(v) $10x = 30$

Take 10 to right hand side of the equation,

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

$x = 3$

(vi) $\left(\frac{s}{7}\right) = 4$

Take 7 to right hand side of equation,

$\Rightarrow s = 7 \times 4$

$s = 28$

(vii) $\left(\frac{3x}{6}\right) = 10$

$\Rightarrow (\frac{x}{2}) = 10$

Taking 2 to right side of equation,

$\Rightarrow x = 10 \times 2$

$x = 20$

(viii) $1.6 = \frac{x}{1.5}$

Take 1.5 to left side of equation,

⇒ x = 1.6 × 1.5

x = 2.4

(ix) 8x – 8 = 48

⇒ 8x = 48 + 8

⇒8x = 56

⇒ x = (56/8) = 7

x = 7

(x) $\left(\frac{x}{3}\right)+1=\left(\frac{7}{15}\right)$

⇒ $(\frac{x}{3}) = (\frac{7}{15}) - 1$

⇒ $(\frac{x}{3}) = (-\frac{8}{15})$

⇒ x = - 8/5

(xi) $\left(\frac{x}{5}\right)=12$

⇒ x = 5 × 12 = 60

x = 60

(xii) $\left(\frac{3x}{5}\right)=15$

⇒ 3x = 15 × 5

⇒ x = (15 × 5)/3

⇒ x = 5 × 5 = 25

x = 25

(xiii) 3(x + 6) = 24

⇒ $(x + 6) = \frac{24}{3} = 8$

⇒ x + 6 = 8

⇒ x = 8 - 6 = 2

x = 2

(xiv) $\left(\frac{x}{4}\right) - 8 = 1$

⇒ $(\frac{x}{4}) = 8 + 1$

⇒ $(\frac{x}{4}) = 9$

⇒ x = 9 × 4 = 36

x = 36

(xv) 3(x + 2) – 2(x – 1) = 7

Expanding the expressing we get,

3x + 6 - 2x + 2 = 7

Place Variable in one side and numbers in the other side of equation,

⇒ 3x - 2x = 7 - 6 - 2

⇒ x = - 1

x = - 1

2. Question

Solve the Equations

(i) 5x = 3x + 24 (ii) 8t + 5 = 2t – 31

(iii) 7x – 10 = 4x + 11 (iv) 4z + 3 = 6 + 2z

(v) 2x – 1 = 14 – x (vi) 6x + 1 = 3(x – 1) + 7

(vii) $\frac{2x}{5} - \frac{3}{2} = \frac{x}{2} + 1$ (viii) $\frac{x-3}{5} - 2 = \frac{2x}{5}$

(ix)3(x + 1) = 12 + 4(x – 1) (x) 2x – 5 = 3(x – 5)

(xi) 6(1 – 4x) + 7(2 + 5x) = 53 (xii) 3(x + 6) + 2(x + 3) = 64

(xiii) $\frac{2m}{3} + 8 = \frac{m}{2} - 1$ (xiv) (3/4) (x - 1) = (x - 3)

Answer

Note: In This part, our main objective would be to bring variables to one side of the equation and numbers to another side.

(i) $5x = 3x + 24$

$\Rightarrow 5x - 3x = 24$

$\Rightarrow 2x = 24$

$\Rightarrow x = 12$

(ii) $8t + 5 = 2t - 31$

$\Rightarrow 8t - 2t = -31 - 5$

$\Rightarrow 6t = -36$

$\Rightarrow t = -6$

(iii) $7x - 10 = 4x + 11$

$\Rightarrow 7x - 4x = 10 + 11$

$\Rightarrow 3x = 21$

$\Rightarrow x = 7$

(iv) $4z + 3 = 6 + 2z$

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

$\Rightarrow 2z = 3$

$$\Rightarrow z = \left(\frac{3}{2}\right) = 1.5$$

(v) $2x - 1 = 14 - x$

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

$\Rightarrow 3x = 15$

$\Rightarrow x = 5$

(vi) $6x + 1 = 3(x - 1) + 7$

$\Rightarrow 6x + 1 = 3x - 3 + 7$

$\Rightarrow 6x - 3x = -1 - 3 + 7$

$\Rightarrow 3x = 3$

$\Rightarrow x = 1$

(vii) $\frac{2x}{5} - \frac{3}{2} = \frac{x}{2} + 1$

We can make it simple by eliminating fractions and making it as a equation of integers only

For this we should multiply all terms of the equation with an appropriate numbers

Our Purpose is to eliminate the denominators, so the number we choose to multiply has to be a multiple of the denominator, this has to satisfy all denominators. Hence, we choose that Number to be the L.C.M. of all numbers in denominator.

So. in this question, it has to be L.C.M. of 5 & 2 that is 10.

So, multiply all terms of equation with 10

⇒ 4x - 15 = 5x + 10

⇒ 4x - 5x = 15 + 10

⇒ - x = 25

⇒ x = - 25

(viii) $\frac{x-3}{5} - 2 = \frac{2x}{5}$

Multiply with L.C.M. of 5 & 1 that is 5

⇒ x - 3 - 10 = 2x

⇒ x - 2x = 13

⇒ - x = 13

⇒ x = - 13

(ix)3(x + 1) = 12 + 4(x – 1)

⇒ 3x + 3 = 12 + 4x - 4

⇒ 3x - 4x = 12 - 4 - 3

⇒ - x = 5

⇒ x = - 5

(x) 2x – 5 = 3(x – 5)

⇒ 2x - 5 = 3x - 15

⇒ 2x - 3x = 5 - 15

⇒ - x = - 10

⇒ x = 10

(xi) 6(1 − 4x) + 7(2 + 5x) = 53

⇒ 6 - 24x + 14 + 35x = 53

⇒ 35x - 24x = 53 - 6 - 14

⇒ 11x = 33

⇒ x = 3

(xii) 3(x + 6) + 2(x + 3) = 64

⇒ 3x + 18 + 2x + 6 = 64

⇒ 5x + 24 = 64

⇒ 5x = 64 - 24

⇒ 5x = 40

⇒ x = 8

(xiii) $\frac{2m}{3}+8=\frac{m}{2}-1$

Multiplying with L.C.M. of 3 & 2, that is 6

⇒ 4m + 48 = 3m - 6

⇒ 4m - 3m = - 48 - 6

⇒ m = - 54

(xiv) (3/4) (x - 1) = (x - 3)

⇒3 (x - 1) = 4 (x - 3)

⇒ 3x - 3 = 4x - 12

⇒ x = 9

Exercise 8.2

1. Question

If 4 is added to a number and the sum is multiplied by 3, the result is 30. Find the number.

Answer

Let the Number be x,

4 added to number, ⇒ x + 4

Summultiplied by 3, result is 30

⇒ 3(x + 4) = 30

⇒ x + 4 = 10

⇒ x = 6.

2. Question

Find three consecutive odd numbers whose sum is 219.

Answer

Sum of three consecutive odd numbers is 219

Odd number is of the form 2k - 1

Let the numbers be 2k - 3,2k - 1,2k + 1,

⇒ 6k - 3 = 219

⇒ 6k = 222

⇒ k = 37

⇒ numbers are 71,73,75.

3. Question

A number subtracted by 30 gives 14 subtracted by 3 times the number. Find the number.

Answer

Let the number be x,

Subtracted by 30, ⇒ x - 30

⇒ x - 30 = 14 - 3x

⇒ 4x = 44

⇒ x = 11

4. Question

If 5 is subtracted from 3 times a number, the result is 16. Find the number.

Answer

Let number be x

3x - 5 = 16

⇒ 3x = 21

⇒ x = 7

5. Question

find two numbers such as one of them exceed the other by 9 and their sum is 81.

Answer

One of them exceeds the other by 9, so let the numbers be x & x + 9

Sum of both the numbers is 81

⇒ 2x + 9 = 8 1 ⇒ 2x = 72

⇒ x = 36

They are 36 and 45

6. Question

Prakruthi's age is 6 times Sahil's age. After 15 years Prakruthi will be 3 times as old as Sahil. Find their age.

Answer

Let Age of Sahil be x. ⇒ Age of Prakruthi is 6x

After 15 years, x + 15 & 6x + 15 are their ages

⇒ 6x + 15 = 3 (x + 15)

⇒ 6x + 15 = 3x + 45

⇒ 3x = 30

⇒ x = 10

The Present ages of Sahil and Prakruthi are 10 and 60 respectively.

7. Question

Ahmed's father is thrice as old as Ahmed. After 12 years his age will be twice that of his son. Find their present age.

Answer

Let Present age of Ahmed be x. ⇒ Age of his father is 3x

After 12 years, their ages will be x + 12 & 3x + 12

3x + 12 = 2(x + 12)

⇒ x = 12

The Present Ages of Ahmed and his father are 12 and 36 respectively.

8. Question

Sanju is 6 years older than his brother Nishu. If the sum of their ages is 28 years. Find their present ages.

Answer

Let Age of Nishu be x. ⇒ Age of Sanju = x + 6

Given, Sum of their ages = 28

⇒ 2x + 6 = 28

⇒ 2x = 22

⇒ x = 11

The Present Ages of Nishu and Sanju are 11 and 17 respectively.

9. Question

Viji is twice as old as his brother Deepu. If the difference between their ages is 11 years, find their present age.

Answer

Let age of Deepu be x. ⇒ Age of Viji is 2x

Difference of their ages is 11

⇒ 2x - x = 11

⇒ x = 11

The Present ages of Viji and Deepu are 22 and 11 respectively.

10. Question

Mrs. Joseph is 27 years older than her daughter Bindu. After 8 years she will be twice as old as Bindu. Find their present age.

Answer

Let the Present age of Bindu be x. ⇒ Present age of Mrs. Joseph is x + 27

After 8 years, their ages are x + 8 & x + 35

x + 35 = 2 (x + 8)

⇒ x = 35 - 16 = 19

The Present ages of Bindu and Mrs. Joseph are 19 and 46 respectively.

11. Question

After 16 years, Leena will be 3 times as old as she is now. Find her present age.

Answer

Let Present age of Leena be x,

Given, x + 16 = 3x

⇒ 2x = 16

⇒ x = 8

12. Question

A rectangle has a length which is 5 cm less than twice its breadth. If the length is decreased by 5 cm and breadth is increased by 2 cm, the perimeter for the resulting rectangle will be 74 cm. Find the length and breadth of the original rectangle.

Answer

Let b be the breadth of the rectangle, ⇒ length = 2b - 5

Given, 2(2b - 5 - 5 + b + 2) = 74

⇒ 3b - 8 = 74/2 = 37

⇒ b = 15

The Length and Breadth of the rectangle are 15 cm and 25 cm respectively.

13. Question

The length of a rectangular field is twice its breadth. If the perimeter of the field is 288 m, find the dimensions of the field.

Answer

Let b be the breadth of the rectangle, ⇒ length = 2b

Given, Perimeter = 288

⇒ 2(Length + breadth) = 288

⇒ 2b + b = 288/2

⇒ 3b = 144

⇒ b = 48

The Length and breadth of the rectangle are 48 and 96 respectively.

14. Question

Sristi's salary is the same as 4 times Azar's salary. If together they earn Rs. 3750 a month. Find their individual salaries

Answer

Let Salary of Azar be x, ⇒ Salary of Sristi = 4x

Given, x + 4x = 3750

⇒ 5x = 3750

⇒ x = 750

The Salaries of Azar and Sristi are 750 and 3000 respectively.

Additional Problems 8

1 A. Question

The value of x in the equation 5x – 35 = 0 is:

A. 2

B. 7

C. 8

D. 11

Answer

⇒ 5x – 35 = 0

⇒ 5x = 35

⇒ x =35/5

⇒ x = 7

∴Value of x is 7

1 B. Question

If 14 is taken away from one fifth of a number, the result is 20. The equation expressing this statement is:

A. $\left(\frac{x}{5}\right)-14=20$

B. $x-\left(\frac{14}{5}\right)=\left(\frac{20}{5}\right)$

C. $x - 14 = \left(\frac{20}{5}\right)$

D. $x + \left(\frac{14}{5}\right) = 20$

Answer

Let the number is X

One fifth of the the number is X/5

According to the problem,

⇒ X/5 – 14 = 20

∴The equation expressing this statement is

(X/5) – 14 =20

1 C. Question

If five times a number increased by 8 is 53, the number is:

A. 12

B. 9

C. 11

D. 2

Answer

Let the number is X

According to problem,

⇒ 5x + 8 = 53

⇒ 5x = 53 - 8

⇒ 5x = 45

⇒ x =45 / 5

⇒ x = 9

1 D. Question

The value of x in the equation 5(x – 2) = 3(x – 3) is:

A. 2

B. $\frac{1}{2}$

C. $\frac{3}{4}$

D. 0

Answer

5(x - 2) = 3(x - 3)

⇒ 5x – 10 = 3x – 9

⇒ 5x – 3x = 10 – 9

⇒ 2x = 1

⇒ x = 1/2

1 E. Question

If the sum of two numbers is 84 and their difference is 30, the numbers are:

A. –57 and 27

B. 57 and 27

C. 57 and –27

D. –57 and –27

Answer

Let the numbers are X and Y

According to the problem,

X + Y = 84 …. (1)

X – Y = 30 …..(2)

Now minus 2^{nd} equation from 1^{st},

⇒ 2X =84 - 30

⇒ 2X = 54

⇒ X = 54/2

⇒ X = 27

Now put the value of X in the 1st equation,

⇒ X + Y = 84

⇒ 27 + Y = 84

⇒ Y = 84 – 27

⇒ Y = 57

∴ The value of X and Y are 27 and 57

1 F. Question

If the area of a rectangle whose length is twice its breadth is 800 m^2, then the length and breadth of the rectangle are:

A. 60m and 20m

B. 40m and 20m

C. 80m and 10m

D. 100m and 8m

Answer

Let, breadth = x m. and breadth = 2x

According to problem,

⇒ x × 2x = 800

⇒ $2x^2$ = 800

⇒ x^2 = 400

⇒ x = 20

∴ Breadth = x = 20 m and Length = 2x = 2 × 20 = 40 m

1 G. Question

If the sum of three consecutive odd numbers is 249, the numbers are

A. 81, 83, 85

B. 79, 81, 83

C. 103, 105, 107

D. 95, 97, 99

Answer

Let, the three odd numbers = x, x + 2, x + 4

According to problem,

⇒ x + x + 2 + x + 4 = 249

⇒ 3x + 6 = 249

⇒ 3x = 243

⇒ x = 81

∴ The numbers are 81, (81 + 2) = 83, (81 + 4) = 85

1 H. Question

If $\frac{(x+0.7x)}{2}$=0.85, the value of x is:

A. 2

B. 1

C. –1

D. 0

Answer

According to the problem,

⇒ $\frac{(x+0.7x)}{2}$=0.85

⇒ (x + 0.7x) = 0.85 × 2

⇒ 1.7x = 1.7

⇒ x = 1.7/1.7

⇒ x = 1

1 I. Question

If 2x – (3x – 4) = 3x – 5, then x equals:

A. $\frac{4}{9}$

B. $\frac{9}{4}$

C. $\frac{3}{2}$

D. $\frac{2}{3}$

Answer

⇒ 2x – (3x - 4) = 3x – 5

⇒ 4 – x = 3x – 5

⇒ 4 + 5 = 3x + x

⇒ 9 = 4x

⇒ x = 9/4

2 A. Question

Solve: (3x + 24) ÷ (2x + 7) = 2:

Answer

⇒ (3x + 24) ÷ (2x + 7) = 2:

⇒ (3x + 24) = 2 ×(2x + 7)

⇒ (3x + 24) = 4x + 14

⇒ 24 – 14 = 4x – 3x

⇒ 10 = x

∴The value of x is 10

2 B. Question

Solve: (1 – 9y) ÷ (11 – 3y) = $\left(\frac{5}{8}\right)$.

Answer

⇒ (1 – 9y) ÷ (11 – 3y) = $\left(\frac{5}{8}\right)$.

⇒ 8×(1 - 9y) = 5×(11 – 3y)

⇒ 8 – 72y = 55 - 15y

⇒ 8 – 55 = 72y -15y

⇒ 47 = 63y

⇒ y =47/63

∴ The value of y is 47/63

3. Question

The sum of two numbers is 45 and their ratio is 7:8. Find the numbers.

Answer

According to the problem the two numbers ratio is 7:8 and they are 7x and 8x

According to the problem,

7x + 8x = 45

15x = 45

X = 3

∴ The 1st number is 7x

⇒ 7x = 7 × 3 = 21

∴The 2nd number is 8x

⇒ 8 × 3 = 24

∴The two numbers are 21 and 24

4. Question

Shona's mother is four times as old as Shona. After five years, her mother will be three times as old as Shona (at that time). What are their present age?

Answer

Let, Shona's age = x

Shona's mother's age = 4x

According to problem,

⇒ 4x + 5 = 3(x + 5)

⇒ 4x + 5 = 3x + 15

⇒ x = 10

∴ Shona's age = x = 10 years

Shona's mother's age = 4x = 40 years

5. Question

The sum of three consecutive even numbers is 336. Find them

Answer

Let the consecutive numbers are x, x + 1,x + 2, x + 4

According to the questions,

Sum of the Consecutive numbers is 336,

⇒ (x + x + 2 + x + 4) = 336

⇒ 3x + 6 = 336

⇒ 3x =330

⇒ x = 110

∴ The Consecutive numbers are

X =110,

2^{nd} number =x + 2 =110 + 2 = 112

3^{rd} number = x + 4 =110 + 4 = 114

6. Question

Two friends A and B start a joint business with a capital 60,000. If A's share is twice that of B, how much have each invested?

Answer

Let,B share X and A share 2X.

According to the problem,

⇒ X + 2X =60,000

⇒ 3X = 60,000

⇒ X = 20000

∴ B share X = 20000

∴ A share 2X = 2 × 20000 =40000

7. Question

Which is the number when 40 is subtracted gives one-third of the original number?

Answer

Let the number is X

According to the problem,

⇒ X/3 - 40 = X

⇒ X/3 – X = 40

⇒ $\frac{X-3X}{3}$ = 40

⇒ -2X = 120

⇒ X = 60

∴ The Original number is 60.

8. Question

Find the number whose sixth part exceeds its eight part by 3.

Answer

Let, the number is = x

According to problem,

⇒ $\frac{x}{6} = \frac{x}{8} + 8$

⇒ $\frac{4x - 3x}{24} = 8$

⇒ x/24 = 8

⇒ x = 24 × 8

⇒ x = 192

9. Question

A house and a garden together cost Rs. 8,40,000. The price of the garden is $\frac{5}{7}$ times the price of the house. Find the price of the house and the garden.

Answer

Let price of the house is X and price of the garden is $\frac{5X}{7}$

According to the problem,

⇒ x + $\frac{5X}{7}$ = 8,40,000

⇒ $\frac{7X + 5X}{7}$ =8,40,000

⇒ $\frac{12X}{7}$ = 8,40,000

$\Rightarrow X = \frac{8,40,000 \times 7}{12}$

$\Rightarrow X = 70000 \times 7$

$\Rightarrow X = 49000$

$\therefore$ Price of the house is X = 490000

$\therefore$ Price of the garden is $\frac{5X}{7} = \frac{5 \times 490000}{7} = 350000$

10. Question

Two farmers A and B together own a stock of grocery. They agree to divide it by its value. Farmer A takes 72 bags while B takes 92 bags and gives Rs. 8,000 to A. What is the cost of each bag?

Answer

Let, value of each bag = Rs. x

According to problem,

$\Rightarrow 92x - 8000 = 72x + 8000$

$\Rightarrow 20x = 16000$

$\Rightarrow x = 800$

$\therefore$ Value of each bag = Rs. 800

11. Question

A father's age is four times that of his son. After 5 years, it will be three times that of his son. How many more years will take if father's age is to be twice that of his son?

Answer

Let, son's age = x

Father's age = 4x

According to problem,

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

$\Rightarrow 4x + 5 = 3x + 15$

$\Rightarrow x = 10$

$\therefore$ son's age = x = 10 years

$\therefore$ Father's age = 4x = 40 years

Let, it will take y more years to be the father's age twice than the son.

According to problem,

$\Rightarrow 4x + 5 + y = 2(x + 5 + y)$

$\Rightarrow 45 + y = 30 + 2y$

$\Rightarrow y = 15$

$\therefore$ 15 more years will take if father's age is to be twice that of his son.

12. Question

Find a number which when multiplied by 7 is as much above 132 as it was originally below it.

Answer

Let, the number is = x

According to problem,

$\Rightarrow 7x = x + 132$

$\Rightarrow 6x = 132$

$\Rightarrow x = 22$

$\therefore$ The number is = 22

13. Question

A person buys 25 pens worth 250, each of equal cost. He wants to keep 5 pens for himself and sell the remaining to recover his money. What should be the price of each pen?

Answer

He will sell = 25 – 5 = 20

According to problem,

Selling price of 20 pens = 250

$\therefore$ Selling price of each pen = 250/20 = 12.5

14. Question

The sum of the digits of a two-digit number is 12. If the new number formed by reversing the digits is greater than the original number by 18, find the original number. Check your solution.

Answer

Let, the unit's digit = x

The ten's digit = 12 – x

∴ The number = 10(12 – x) + x = 120 – 9x

After reversing,

Unit's digit = 12 – x

Ten's digit = x

∴The number after reversing = 10x + 12 – x = 9x + 12

According to problem,

⇒ 9x + 12 = 120 – 9x + 18

⇒ 18x = 126

⇒ x = 7

∴ The original number,

⇒ 120 – 9 × 7

⇒ 57

15. Question

The distance between two stations is 340 Km. Two trains start simultaneously from these stations on parallel tracks and cross each other. The speed of one of the them is greater than that of the other by 5 Km/hr. If the distance between two trains after 2 hours of their start is 30 Km., find the speed of each train.

Answer

Let, the speed of the slower train = x km/h

Speed of the faster train = (x + 5) km/h

∴ In 2 hours slower train moved = 2x km

∴ In 2 hours faster train moved = 2(x + 5) = (2x + 10) km

According to problem,

⇒ 2x + 2x + 10 = 340 + 30

⇒ 4x = 370 – 10

⇒ x = 360/9

⇒ x = 90

∴ Speed of the slower train = x = 90 km/h

∴ Speed of the faster train = x + 5 = 90 + 5 = 95 km/h

16. Question

A steamer goes down stream and covers the distance between two ports in 4 hours while it covers the same distance up stream in 5 hours. If the speed of the steamer upstream is 2 km/hour, find the speed of steamer in still water.

Answer

Let, the speed of the steamer in still water = x km/hr

Speed of the stream = y km/hr

Speed of the steamer in upstream = 2 km/hr

Time taken by the steamer to cover the distance in upstream = 5 hrs.

∴ Distance = 2 × 5 = 10 km

Time taken by the steamer to cover the distance in downstream = 4 hrs.

∴ Speed of the steamer in downstream = 10/4 = 2.5 km/hr

∴ x – y = 2 …… (1)

∴ x + y = 2.5 …… (2)

From (1) + (2) we get,

⇒ 2x = 2 + 2.5

⇒ x = 2.25

∴ Speed of the steamer in still water = 2.25 km/hr

17. Question

The numerator of the rational number is less than its denominator by 3. If the numerator becomes three times and the denominator is increased by 20, the new number becomes $\frac{1}{8}$. Find the original number.

Answer

Let, the denominator = x

The numerator = x – 3

According to problem,

$$\Rightarrow \frac{3(x-3)}{x+20} = \frac{1}{8}$$

⇒ 24x – 72 = x + 20

⇒ 23x = 92

⇒ x = 4

∴ the original number,

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

18. Question

The digit at the tens place of a two digit number is three times the digit at the units' place. If the sum of this number and the number formed by reversing its digit is 88, find the number.

Answer

Let, the digit at unit's place = x

∴ digit at ten's place = 3x

∴ The two digit number = 10 × 3x + x = 31x

After reversing the digits,

Digit at unit's place = 3x

Digit at ten's place = x

∴ Number formed after reversing the digits = 10 × x + 3x = 13x

According to problem,

⇒ 31x + 13x = 88

⇒ 44x = 88

⇒ x = 2

∴ The two digit number = 31 × 2 = 62

19. Question

The altitude of a triangle is five-thirds the length of its corresponding base. If the altitude is increased by 4 cm and the base decreased by 2 cm, the area of the triangle would remain the same. Find the base and altitude of the triangle.

Answer

Let, base of the triangle = x cm

∴ altitude of the triangle = 5x/3 cm

∴ area of the triangle = $1/2 \times x \times 5x/3 = 5x^2/6$

In 2nd case,

Base of the triangle = x – 2 cm

Altitude of the triangle = (5x/3) + 4

∴ area of the triangle = 1/2 × (x – 2) × (5x/3 + 4)

= $5x^2/6$ + 2x – 5x/3 – 4

According to problem,

⇒ $5x^2/6 = 5x^2/6$ + 2x – 5x/3 – 4

⇒ x/3 = 4

⇒ x = 12

∴ Base = 12 cm

∴ Altitude = 5 × 12/3 = 20 cm

20. Question

One of the angles of a triangle is equal to the sum of the other two angles. If the ratio of the other two angles of the triangle is 4 : 5, find the angles of the triangle.

Answer

Let, the other two angles = 4x and 5x

∴ The biggest angle = 4x + 5x = 9x

According to problem,

⇒ 4x + 5x + 9x = 180

⇒ 18x = 180

⇒ x = 10

∴The angles of the triangle,

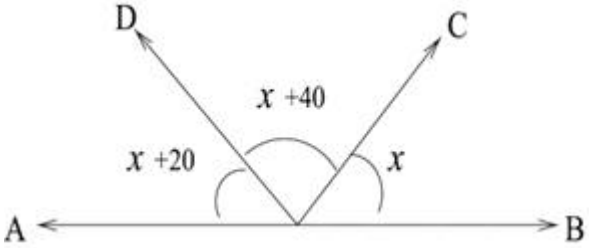
4x = 4 × 10° = 40°

5x = 5 × 10° = 50°

9x = 9 × 10° = 90°

21. Question

In the figure, AB is a straight line. Find x.



Answer

AB is a straight line.

$\therefore x + 20 + x + 40 + x = 180$

$\Rightarrow 3x + 60 = 180$

$\Rightarrow 3x = 120$

$\Rightarrow x = 40$

$\therefore x = 40°$