Chapter 8: Linear equations
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Exercise 8A

Question 1.
Solution:

$8x+3=27+2x$

$\Rightarrow 8x-2x=27-3$

$\Rightarrow 6x=24$

$\Rightarrow x=4$

Question 2.
Solution:

$5x+7=2x-8$

$\Rightarrow 5x-2x=-8-7$

$\Rightarrow 3x=-15$

$\Rightarrow x=-5$

Question 3.
Solution:

$2z-1=14-z$

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

$\Rightarrow 3z=15$

$\Rightarrow z=5$

Question 4.
Solution:

$9x+5=4(x-2)+8$

$\Rightarrow 9x+5=4x-8+8$

$\Rightarrow 9x-4x=-5$

$\Rightarrow 5x=-5$

$\Rightarrow x=-1$

Question 5.

Solution:

$$\frac{7y}{5} = y - 4$$

$$\Rightarrow 7y = 5(y-4)$$

$$\Rightarrow 7y = 5y - 20$$

$$\Rightarrow 7y - 5y = -20$$

$$\Rightarrow 2y = -20$$

$$\Rightarrow y = -10$$

Question 6.

Solution:

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

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

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

$$\Rightarrow x = \frac{1}{3}$$

Question 7.

Solution:

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

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

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

$$\Rightarrow 18y - 12 = 0$$

$$\Rightarrow 18y = 12$$

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

Question 8.

Solution:

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

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

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

$$\Rightarrow 35x = 70$$

$$\Rightarrow x = 2$$

Question 9.

Solution:

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

$$\Rightarrow \frac{5(x-5)-2(x-3)}{10}=\frac{1}{2}$$

$$\Rightarrow 5x-25-2x+6=5$$

$$\Rightarrow 3x=5+25-6$$

$$\Rightarrow 3x=24$$

$$\Rightarrow x=8$$

Question 10.

Solution:

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

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

$$\Rightarrow 9t-6-8t-12=8-12t$$

$$\Rightarrow t-18=8-12t$$

$$\Rightarrow 13t=26$$

$$\Rightarrow t=2$$

Question 11.

Solution:

$$\frac{2x+7}{5}-\frac{3x+11}{2}=\frac{2x+8}{3}-5$$

$$\Rightarrow \frac{2(2x+7)-5(3x+11)}{10}=\frac{2x+8-15}{3}$$

$$\Rightarrow \frac{4x+14-15x-55}{10}=\frac{2x-7}{3}$$

$$\Rightarrow 3\left(4x+14-15x-55\right)=10\left(2x-7\right)$$

$$\Rightarrow 12x+42-45x-165=20x-70$$

$$\Rightarrow -33x-123=20x-70$$

$$\Rightarrow -33x-20x=-70+123$$

$$\Rightarrow -53x=53$$

$$\Rightarrow x=-1$$

Question 12.

Solution:

$$\frac{5x-4}{6}=4x+1-\frac{3x+10}{2}$$

$$\Rightarrow \frac{5x-4}{6}=\frac{8x+2-3x-10}{2}$$

$$\Rightarrow 2(5x-4)=6(8x+2-3x-10)$$

$$\Rightarrow 10x-8=48x+12-18x-60$$

$$\Rightarrow -8+60-12=48x-18x-10$$

$$\Rightarrow 40=20x$$

$$\Rightarrow x=2$$

Question 13.

Solution:

$$5x-\frac{1}{3}(x+1)=6\left(x+\frac{1}{30}\right)$$

$$\Rightarrow 5x-\frac{x-1}{3}=6x+\frac{1}{5}$$

$$\Rightarrow \frac{15x-x-1}{3}=\frac{30x+1}{5}$$

$$\Rightarrow 5(15x-x-1)=3(30x+1)$$

$$\Rightarrow 75x-5x-5=90x+3$$

$$\Rightarrow 70x-90x=3+5$$

$$\Rightarrow -20x=8$$

$$\Rightarrow x=\frac{8}{-20}$$

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

Question 14.

Solution:

$$4-\frac{2(z-4)}{3}=\frac{1}{2}(2z+5)$$

$$\Rightarrow 4-\frac{2z-8}{3}=z+\frac{5}{2}$$

$$\Rightarrow \frac{12-2z+8}{3}=\frac{2z+5}{2}$$

$$\Rightarrow 2(12-2z+8)=3(2z+5)$$

$$\Rightarrow 24-4z+16=6z+15$$

$$\Rightarrow 24+16-15=6z+4z$$

$$\Rightarrow 25=10z$$

$$\Rightarrow z=\frac{5}{2}$$

Question 15.

Solution:

$$\frac{3(y-5)}{4}-4y=3-\frac{(y-3)}{2}$$

$$\frac{3y-15-16y}{4}=\frac{6-y+3}{2}$$

Question 16.

Solution:

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

$$8x-3=2(3x)$$

$$8x-3=6x$$

$$8x-6x=3$$

$$2x=3$$

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

Question 17.

Solution:

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

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

$$9x=105-90x$$

$$9x+90x=105$$

$$99x=105$$

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

Question 18.

Solution:

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

$$3x=-4(5x+2)$$

$$3x=-20x-8$$

$$3x+20x=-8$$

$$23x=-8$$

$$x=\frac{-8}{23}$$

Question 19.

Solution:

$$\frac{6y-5}{2y}=\frac{7}{9}$$

$$9(6y-5)=7(2y)$$

$$54y-45=14y$$

$$54y-14y=45$$

$$40y=45$$

$$y=\frac{9}{8}$$

Question 20.

Solution:

$$\frac{2-9z}{17-4z}=\frac{4}{5}$$

$$5(2-9z)=4(17-4z)$$

$$10-45z=68-16z$$

$$10-68=45z-16z$$

$$-58=29z$$

$$29z=-58$$

$$z=\frac{-58}{29}=-2$$

Question 21.

Solution:

$$\frac{4x+7}{9-3x}=\frac{1}{4}$$

$$4(4x+7)=9-3x$$

$$16x+28=9-3x$$

$$16x+3x=9-28$$

$$19x=-19$$

$$x=-1$$

Question 22.

Solution:

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

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

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

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

$$25y=-20$$

$$y=\frac{-20}{25}=\frac{-4}{5}$$

Question 23.

Solution:

$$\frac{15(2-y)-5(y+6)}{1-3y}=10$$

$$\frac{30-15y-5y-30}{1-3y}=10$$

$$\frac{-20y}{1-3y}=10$$

$$-20y=10(1-3y)$$

$$-20y=10-30y$$

$$-20y+30y=10$$

$$10y=10$$

$$y=1$$

Question 24.

Solution:

$$\frac{2x-(7-5x)}{9x-(3+4x)}=\frac{7}{6}$$

$$\frac{2x-7-5x}{9x-3+4x}=\frac{7}{6}$$

$$\frac{7x-7}{5x-3}=\frac{7}{6}$$

$$6(7x-7)=7(5x-3)$$

$$42x-42=35x-21$$

$$42x-35x=42-21$$

$$7x=21$$

$$x=3$$

Question 25.

Solution:

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

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

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

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

$$3m+3=10-2m$$

$$3m+2m=10-3$$

$$5m=7$$

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

Question 26.

Solution:

$$\frac{3x+5}{4x+2}=\frac{3x+4}{4x+7}$$

$$(4x+7)(3x+5)=(4x+2)(3x+4)$$

$$12x^2+20x+21x+35=12x^2+16x+6x+8$$

$$12x^2+41x+35=12x^2+22x+8$$

$$12x^2-12x^2+41x-22x=8-35$$

$$19x=-27$$

$$x=\frac{-27}{19}$$

Question 27.

Solution:

$$\frac{9x-7}{3x+5}=\frac{3x-4}{x+6}$$

$$(x+6)(9x-7)=(3x+5)(3x-4)$$

$$9x^2-7x+54x-42=9x^2-12x+15x-20$$

$$9x^2+47x-42=9x^2+3x-20$$

$$9x^2-9x^2+47x-3x=-20+42$$

$$44x=22$$

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

Question 28.

Solution:

$$\frac{2-7x}{1-5x}=\frac{3+7x}{4+5x}$$

$$(4+5x)(2-7x)=(1-5x)(3+7x)$$

$$8-28x+10x-35x2=3+7x-15x-35x2$$

$$-35x2-18x+8=-35x2-8x+3$$

$$-35x2+35x2-18x+8x=-8+3$$

$$-10x=-5$$

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

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Exercise 8B

Question 1.

Solution:

Let the numbers be 8x and 3x.

$$8x+3x=143$$

$$11x=143$$

$$x=13$$

So, one number = 8x = $8\times13=104$

Other number = 3x = $3\times13=39$

Question 2.

Solution:

Let the original number be x.

$\frac{2}{3}$ of original number is 20 less than the original number.

$$\frac{2}{3}x = x - 20$$

$$2x = 3(x - 20)$$

$$2x = 3x - 60$$

$$x = 60$$

Therefore original number is 60.

Question 3.

Solution:

Let the number be x.

Four- fifths of the number is 10 more than two-thirds of the number.

$$\frac{4}{5}x = 10 + \frac{2}{3}x$$

$$\frac{4x}{5} = \frac{30 + 2x}{3}$$

$$3(4x) = 5(30 + 2x)$$

$$12x = 150 + 10x$$

$$2x = 150$$

$$x = 75$$

Therefore, the number is 75.

Question 4.

Solution:

Let one part be x.

7 times the first part = 7x

Let the other part be (24-x)

5 times the second part = 5(24-x)

$$7x + 5(24 - x) = 146$$

$$7x + 120 - 5x = 146$$

$$7x - 5x = 146 - 120$$

$$2x = 26$$

$$x = 13$$

Therefore one part = 13

Other part = (24-x) = (24-13) = 11.

Question 5.

Solution:

Let the number be x.

Fifth part increased by 5 = $\frac{x}{5}+5$

Fourth part diminished by 5 = $\frac{x}{4}-5$

$$\frac{x}{5}+5=\frac{x}{4}-5$$

$$5+5=\frac{x}{4}-\frac{x}{5}$$

$$10=\frac{5x-4x}{20}$$

$$200=x$$

$$x=200$$

Therefore the number is 200.

Question 6.

Solution:

Let the common multiple for the given three numbers be x.

Then, the three numbers would be 4x, 5x and 6x.

$$4x+6x=5x+55$$

$$10x=5x+55$$

$$10x-5x=55$$

$$5x=55$$

$$x=11$$

Smallest number = 4x = 4×11 = 44

largest number = 6x = 6×11 = 66

third number = 5x = 5×11 = 55.

Therefore, three numbers are 44, 55 and 66.

Question 7.

Solution:

Let the number be x.

$$10+4x=5x-5$$

$$10+5=5x-4x$$

$$15=x$$

$$x=15$$

Therefore, the number is 15.

Question 8.

Solution:

Let the common multiple of both the numbers be x.

Then first number = 3x

Second number = 5x.

$$\frac{3x+10}{5x+10}=\frac{5}{7}$$

$$7(3x+10)=5(5x+10)$$

$$21x+70=25x+50$$

$$21x-25x=50-70$$

$$-4x=-20$$

$$x=5$$

Therefore, first number = 3x = 3×5 = 15

Second number = 5x = 5×5 = 25.

Question 9.

Solution:

Let the first odd number be x.

Second odd number = (x+2)

Third odd number = (x+4)

$$x+(x+2)+(x+4)=147$$

$$x+x+2+x+4=147$$

$$3x+6=147$$

$$3x=141$$

$$x=47$$

Therefore, first odd number is 47.

Second odd number = (x+2) = 47+2 =49

Third odd number = (x+4) = 47+4 =51

Question 10.

Solution:

Let the first even number be x.

Second even number = x+2

Third even number = x+4

$$x+x+2+x+4=234$$

$$3x+6=234$$

$$3x=228$$

$$x=76$$

First even number = 76

Second even number = x+2 = 76+2 =78

Third even number = x+4 =76+4 =80.

Question 11.

Solution:

Let the digit in the units place be x.

Digit in the tens place = (12-x)

Original number = $10(12-x)+x=120-9x$

On reversing the digits we have x at tens place and (12-x) at units place.

New number = $10x+12-x=9x+12$

New number – old number = 54

$9x+12-(120-9x)=54$

$9x+12-120+9x=54$

$18x-108=54$

$18x=54+108$

$18x=162$

$x=9$

Therefore, the digits in the units place is 9.

Digits in the tens place = (12-x) = (12-9) =3

Therefore, original number is 39.

Question 12.

Solution:

Let the digit in the units place be x.

Digit in the tens place = 3x

Original number = $10(3x)+x=30x-x$

On reversing the digits we have x at tens place and 3x at units place.

New number = $10x+3x=13x$

New number = old number -36

$13x=30x+x-36$

$13x=31x-36$

$36=18x$

$x=2$

Therefore, the digits in the units place is 2.

Digits in the tens place = 3x = 3×2 = 6

Therefore, original number is 62.

Question 13.

Solution:

Let the numerator be x.

The denominator is greater than numerator by 7 = (x+7).

$$\frac{x+17}{(x+7)-6}=2$$

$$\frac{x+17}{x+1}=2$$

$$x+17=2(x+1)$$

$$x+17=2x+2$$

$$17-2=2x-x$$

$$x=15$$

Therefore numerator is 15.

Denominator = x+7 = 15+7 = 22

So, original fraction = $\frac{15}{22}$.

Question 14.

Solution:

Denominator, d=x

Twice of numerator, $2n=x+2$

Numerator, $n=\frac{x+2}{2}$

$$\frac{n+3}{d+3}=\frac{2}{3}$$

$$3(n+3)=2(d+3)$$

$$3n+9=2d+6$$

$$3n-2d=6-9$$

$$3n-2d=-3$$

On replacing d by x and n by $\frac{x+2}{2}$

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

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

$$6-x=-6$$

$$-x=-6-6$$

$$x=12$$

So, denominator is 12.

Numerator = $\frac{x+2}{2}=\frac{12+2}{2}=7$

So, original fraction = $\frac{7}{12}$.

Question 15.

Solution:

Let the breadth of the original rectangle be x cm.

Then, its length will be (x+7) cm.

The area of rectangle will be $(x)(x+7)cm^2$.

$\therefore (x+3)(x+7-4)=(x)(x+7)$

$(x+3)(x+3)=x^2+7x$

$x^2+3x+3x+9=x^2+7x$

$x^2+6x+9=x^2+7x$

$9=x^2-x^2+7x-6x$

$9=x$

$x=9$

Breadth = 9 cm.

Length = (x+7) = (9+7) = 16 cm.

Question 16.

Solution:

Let the width of the rectangle be x cm.

Length of rectangle will be $\frac{3}{2}x$.

Perimeter = $2(x)+2\left(\frac{3}{2}\right)x=180m.$

$2(x)+2\left(\frac{3}{2}\right)x=180$

$2x+\frac{6x}{2}=180$

$\frac{4x+6x}{2}=180$

$10x=360$

$x=36$

Therefore, width of the rectangle is 36 m.

Length of the rectangle will be = $\frac{3}{2}x=\frac{3}{2}\times 36=54m.$

Question 17.

Solution:

Let the length of the base of the triangle be x cm.

Then, its altitude will be $\frac{5}{3}x$ cm.

Area of triangle = $\frac{1}{2}x\left(\frac{5}{3}x\right)=\frac{5}{6}x^2$

$\therefore \frac{1}{2}(x-2)\left(\frac{5}{3}x+4\right)=\frac{5}{6}x^2$

$\left(\frac{x-2}{2}\right)\left(\frac{5x+12}{3}\right)=\frac{5x^2}{6}$

$\frac{(x-2)(5x+12)}{6}=\frac{5x^2}{6}$

$\frac{5x^2+12x-10x-24}{6}=\frac{5x^2}{6}$

$5x^2+12x-10x-24=5x^2$

$5x^2-5x^2+2x=24$

$2x=24$

$x=12m$

Therefore, the base of the triangle is 12 m.

Altitude of triangle = $\frac{5}{3}x=\frac{5}{3}\times 12=20m.$

Question 18.

Solution:

Let the common multiple of all the three angles be x.

Then, the first angle will be 4x.

And the second angle will be 5x.

In a triangle, sum of all three angles is 180°.

So, third angle = $180-(4x+5x)=180-9x$

$\therefore 4x+5x=180-9x$

$9x=180-9x$

$9x+9x=180$

$18x=180$

$x=10$

First angle = 4x = 4×10 = 40°

second angle = 5x = 5×10 = 50°

third angle = 4x+5x = 9x = 9×10 = 90°.

Question 19.

Solution:

Let the speed of the steamer in the still water be x km/h.

Speed (downstream) = (x+1) km/h

Speed (upstream) = (x-1) km/h

Distance covered in 9 hours (downstream) = 9(x+1) km

Distance covered in 10 hours (upstream) = 10(x-1) km

But both of these distances will be the same.

$9(x+1)=10(x-1)$

$9x+9=10x-10$

$9+10=10x-9x$

$x=19$

Therefore, speed of the steamer in still water is 19 km/h.

Distance between the ports = $9(x+1)=9(19+1)=9\times 20=180km.$

Question 20.

Solution:

Let the speed of one motorcyclist be x km/hr.

So, speed of other motorcyclist will be (x+7) km/hr.

Distance travelled by the first motorcyclist in 2 hours = 2x km

Distance travelled by the first motorcyclist in 2 hours = 2(x+7) km

Therefore,

$300-\left[2x+(2x+14)\right]=34$

$300-(2x+2x+14)=34$

$300-4x-14=34$

$286-4x=34$

$286-34=4x$

$252=4x$

$x=63$

Therefore, the speed of motorcyclist is 63 km/h.

The speed of second motorcyclist is (x+7) = (63+7) = 70 km/h.

Question 21.

Solution:

Let the first number be x.

Then, the second number will be $\frac{5}{6}x.$

Third number = $\frac{4}{5}\left(\frac{5}{6}x\right)=\frac{2}{3}x.$

$\therefore x+\frac{5x}{6}+\frac{2x}{3}=150$

$\frac{6x+5x+4x}{6}=150$

$15x=150\times 6$

$15x=900$

$x=60$

Therefore, first number is 60.

Second number = $\frac{5}{6}x=\frac{5}{6}\times 60=50$

Third number = $\frac{2}{3}x=\frac{2}{3}\times 60=40.$

Question 22.

Solution:

Let the first part be x.

Let the second part be (4500-x).

5% of x = 10% of (4500-x)

$\frac{5}{100}x=\frac{10}{100}(4500-x)$

$\frac{5x}{100}=\frac{45000-10x}{100}$

$5x=45000-10x$

$15x=45000$

$x=3000$

Therefore, the first part is 3000.

Second part = (4500-x) = 4500-3000 = 1500.

Question 23.

Solution:

Let the present age of Rakhi be x.

Then, the present age of Rakhi's mother will be 4x.

After 5 years, Rakhi's age will be (x+5).

And her other's age will be (4x+5).

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

$4x+5=3x+15$

$4x-3x=15-5$

$x=10$

Present age of Rakhi = 10 years

Present age of her mother $4x = 4\times10 = 40$ years.

Question 24.

Solution:

Let the age of Monu's father be x.

The age of Monu's grandfather will be (x+26).

Then, age of Monu will be (x-29).

$x+(x+26)+(x-29)=135$

$x+x+26+x-29=135$

$3x-3=135$

$3x=138$

$x=46$

Therefore, age of Monu's father = 46 years.

Age of grandfather = (x+26) = 46+26 = 72 years

Age of Monu = (x-29) = 46-29 = 17 years.

Question 25.

Solution:

Let the age of the grandson be x.

Then his grandfather's age will be 10x.

Also, the grandfather is 54 years older than his grandson.

Therefore, age of grandson = x+54

$10x=x+54$

$10x-x=54$

$9x=54$

$x=6$

Therefore, grandson's age is 6 years.

Grandfather's age = $10x = 10\times6 = 60$ years.

Question 26.

Solution:

Let the age of the younger cousin be x.

Then, the age of elder cousin will be (x+10).

15 years ago:

Age of younger cousin = (x-15)
Age of elder cousin = (x+10-15) = (x-5)

$\therefore (x-5) = 2(x-15)$

$x-5 = 2x-30$

$x-2x = -30+5$

$x = 25$

Therefore, present age of younger cousin is 25 years.

Present age of elder cousin = $x+10 = 25+10 = 35$ years.

Question 27.

Solution:

Let the number of deer in the herd be x.

The number of deer grazing is $\frac{1}{2}x$.

Remaining deer = $x-\frac{x}{2} = \frac{x}{2}$

Number of deer playing = $\frac{3}{4}\left(\frac{x}{2}\right) = \frac{3}{8}x$.

The number of deer drinking water is 9.

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

$\frac{72+3x+4x}{8} = x$

$72+7x = 8x$

$x = 72$

Therefore, total number of deer in the herd = 72.

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Exercise 8C

OBJECTIVE QUESTIONS:

Tick (✓) the correct answer in each of the following:

Question 1.

Solution: (c) 5

$2x-3 = x+2$

$2x-x = 2+3$

$x = 5$

Question 2.

Solution: (b) -5

$$5x+\frac{7}{2}=\frac{3}{2}x-14$$

$$\frac{10x+7}{2}=\frac{3x-28}{2}$$

$$10x+7=3x-28$$

$$10x-3x=-28-7$$

$$7x=-35$$

$$x=-5$$

Question 3.

Solution: (a) 40

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

$$5z=4(z+10)$$

$$5z=4z+40$$

$$z=40$$

Question 4.

Solution: (c) $\frac{4}{5}$

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

$$3m=\frac{25m-8}{5}$$

$$15m=25m-8$$

$$-10m=-8$$

$$m=\frac{-8}{-10}=\frac{4}{5}$$

Question 5.

Solution: (b) -1

$$5t-3=3t-5$$

$$\therefore 5t-3=3t-5$$

$$2t=-2$$

$$t=-1$$

Question 6.

Solution: (d) $\frac{7}{3}$

$$2y+\frac{5}{3}=\frac{26}{3}-y$$
$$\frac{6y+5}{3}=\frac{26-3y}{3}$$
$$6y+5=26-3y$$
$$6y+3y=26-5$$
$$9y=21$$
$$y=\frac{7}{3}$$

Question 7.

Solution: (b) -1

$$\frac{6x+1}{3}+1=\frac{x-3}{6}$$
$$\frac{6x+1+3}{3}=\frac{x-3}{6}$$
$$6(6x+1+3)=6(x-3)$$
$$36x+24=3x-9$$
$$36x-3x=-24-9$$
$$33x=-33$$
$$x=-1$$

Question 8.

Solution: (c) 36

$$\frac{n}{2}-\frac{3n}{4}+\frac{5n}{6}=21$$
$$\frac{6n-9n+10n}{12}=21$$
$$7n=21\times12$$
$$n=\frac{252}{7}$$
$$n=36$$

Question 9.

Solution: (d) $\frac{1}{2}$

$$\frac{x+1}{2x+3}=\frac{3}{8}$$
$$8(x+1)=3(2x+3)$$
$$8x+8=6x+9$$
$$8x-6x=9-8$$
$$2x=1$$
$$x=\frac{1}{2}$$

Question 10.

Solution: (c) 8

$$\frac{4x+8}{5x+8}=\frac{5}{6}$$
$$6(4x+8)=5(5x+8)$$
$$24x+48=25x+40$$
$$24x-25x=-48+40$$
$$-x=-8$$
$$x=8$$

Question 11.

Solution: (d) 12

$$\frac{n}{n+15}=\frac{4}{9}$$
$$9n=4(n+15)$$
$$9n=4n+60$$
$$9n-4n=60$$
$$5n=60$$
$$n=12$$

Question 12.

Solution: (a) -2

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

$3t-9=10t+5$

$3t-10t=9+5$

$-7t=14$

$-t=2$

$t=-2$

Question 13.

Solution: (c) 80

Let the number be x.

$\frac{4}{5}x=\frac{3}{4}x+4$

$\frac{4x}{5}=\frac{3x+16}{4}$

$16x+15x+80$

$16x-15x=80$

$x=80$

Question 14.

Solution: (b) 28 years

Let x be the common multiple of the ages of A and B.

Then, the ages of A and B would be 5x and 7x respectively.

$\frac{5x+4}{7x+4}=\frac{3}{4}$

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

$20x+16=21x+12$

$16-12=21x-20x$

$x=4$

Age of B = 7x = 7×4 = 28 years.

Question 15.

Solution: (b) 5 cm

Let the equal sides of triangle be x.

Then, perimeter would be $(x+x+6)$

$2x+6=16$

$2x=10$

$x=5$

Length of each equal side = 5 cm.

Question 16.

Solution: (d) 17

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

$x+x+1+x+2=51$

$3x+3=51$

$3x=48$

$x=16$

Middle integer = x+1 = 16+1 = 17.

Question 17.

Solution: (a) 40

Let the number be x and x+15

$x+x+15=95$

$2x+15=95$

$2x=80$

$x=40$

The smaller number is 40.

Question 18.

Solution: (c) 48

`Let the number of boys in the classroom be x.

Then, the number of girls will be (x-8)

The equation becomes:

$\frac{x}{x-8}=\frac{7}{5}$

$5x=7x-56$

$-2x=-56$

$x=28$

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TEST PAPER 8

A. Question 1.
Solution:

$$2a^2-3b^2-4c^2-5-(4a^2+5b^2-6c^2+8)$$
$$=2a^2-3b^2-4c^2-5-4a^2-5b^2+6c^2-8$$
$$=2a^2-4a^2-3b^2-5b^2-4c^2+6c^2-5-8$$
$$=-2a^2-8b^2+2c^2-13$$

Question 2.
Solution:
(i)

$$(4a+5b)\times(5a-6b)$$
$$=4a(5a-6b)+5b(5a-6b)$$
$$=20a^2-24ab+25ab-30b^2$$
$$=20a^2+ab-30b^2$$

(ii)

$$(6x^2-x+8)\times(x^2-3)$$
$$=x^2(6x^2-x+8)-3(6x^2-x+8)$$
$$=6x^4-x^3+8x^2-18x^2+3x-24$$
$$=6x^4-x^3-10x^2+3x-24$$

Question 3.
Solution:

$$a^2-2a+3)5a^3-4a^2+3a+18(5a+6$$
$$\underline{-5a3-10a^2+15a}$$
$$6a^2-12a+18$$
$$\underline{-6a^2-12a+18}$$
$$0$$

Question 4.

Solution:

(i)

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

$$\left(x-\frac{1}{x}\right)^2=(4)^2$$

$$x^2-2\times x\times\frac{1}{x}+\frac{1}{x^2}=16$$

$$x^2+\frac{1}{x^2}=16+2=18$$

(ii)

$$\left(x^2+\frac{1}{x^2}\right)^2=(18)^2$$

$$x^4+2\times x^2\times\frac{1}{x^2}+\frac{1}{x^4}=324$$

$$x^4+\frac{1}{x^4}=324-2=322$$

Question 5.

Solution:

$$\left\{(83)^2-(17)^2\right\}$$

$$=(83+17)(83-17)$$

$$=100\times66$$

$$=6600$$

Question 6.

Solution:

(i)

$$x^3-3x^2+x-3$$

$$=x^2(x-3)+1(x-3)$$

$$=(x^2+1)(x-3)$$

(ii)

$$63x^2y^2-7$$

$$=7(9x^2y^2-1)$$

$$=7\left[(3xy)^2-(1)^2\right]$$

$$=7(3xy+1)(3xy-1)$$

(iii)

$1-6x+9x^2$

$=9x^2-6x+1$

$=9x^2-3x-3x+1$

$=3x(3x-1)-1(3x-1)$

$=(3x-1)(3x-1)$

$=(3x-1)^2$

(iv)

$7x^2-19x-6$

$=7x^2-21x+2x-6$

$=7x(x-3)+2(x-3)$

$=(7x+2)(x-3)$

Question 7.

Solution:

$\frac{2x+7}{3x+5}=\frac{15}{17}$

$\Rightarrow 17(2x+7)=15(3x+5)$

$\Rightarrow 34x+119=45x+75$

$\Rightarrow 119-75=45x-34x$

$\Rightarrow 44=11x$

$\Rightarrow x=4$

Question 8.

Solution:

Let the present age of the son be x years and that of the father be f years.

5 years back, the father was 7 times as old as his son.

$\therefore (f-5)=7(x-5)$

$f=7x-35+5$

$f=7x+30$

After 5 years, ages of the father and son will be $(f+5) and (x+5)$, respectively.

After 5years, the father will be three times older than his son.

$(f+5)=3(x+5)$

$7x-30+5=3x+15$

$7x-25=3x+15$

$7x-3x=25+15$

$4x=40$

$x=10$

Therefore, the present age of the son is 10 years.

Father's present age = $(7x-30)=7\times10-30=40\,years$.

B.

Question 9.

Solution: (c) $(a-1)(b-1)$

$ab-a-b+1$

$=a(b-1)-1(b-1)$

$=(a-1)(b-1)$

Question 10.

Solution: (b) $(1+8x)(3-x)$

$3+23x-8x^2$

$3+23x-8x^2$

$=3+24x-x-8x^2$

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

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

Question 11.

Solution: (a) $(x-3)(7x+2)$

$7x^2-19x-6$

$=7x^2-21x+2x-6$

$=7x(x-3)+2(x-3)$

$=(x-3)(7x+2)$

Question 12.

Solution: (c) $3(2x+5)^2$

$12x^2 + 60x + 75$

$= 3(4x^2 + 20x + 25)$

$= 3\left[(2x)^2 + 2 \times 2x \times 5 + 5^2 \right]$

$= 3(2x + 5)^2$

Question 13.

Solution: (b) $(5p + 3)(2p + 1)$

$10p^2 + 11p + 3$

$= 10p^2 + 11p + 3$

$= 5p(2p + 1) + 3(2p + 1)$

$= (5p + 3)(2p + 1)$

Question 14.

Solution: (c) $2x(2x - 1)(2x + 1)$

$8x^3 - 2x$

$= 2x(4x^2 - 1)$

$= 2x\left[(2x)^2 - (1)^2 \right]$

$= 2x(2x - 1)(2x + 1)$

Question 15.

Solution: (b) $x = 4$

$\frac{x+5}{2} + \frac{x-5}{3} = \frac{25}{6}$

$\frac{3(x+5) + 2(x-5)}{6} = \frac{25}{6}$

$3x + 15 + 2x - 10 = 25$

$5x + 5 = 25$

$5x = 20$

$x = 4$

C. Question 16.

Solution:

(i) $x2 - 18x + 81 = (x - 9)^2$.

(ii) $4 - 36x2 = 4(1 - 3x)(1 + 3x)$.

(iii) $x^2 - 14x + 13 = (x - 13)(x - 1)$.

(iv) $9x2 - x2 - 4y2 + 4xy = (3z + x - 2y)(3z - x + 2y)$.

(v) $abc - ab - c + 1 = (c - 1)(ab - 1)$.

D. Question 17.

Solution:

(i) $(5 - 3x^2)$ is a binomial. - T

(ii) -8 is a monomial. - T

(iii) $(5a - 9b) - (-6a + 2b) = (-a - 7b)$. - F

(iv) When $x = 2$ and $y = 1$ the value of $\frac{-8}{7} x^3 y^4 is \frac{-64}{7}$. - T

(v) $\frac{x}{4} + \frac{x}{6} - \frac{x}{2} = \frac{3}{4} \Rightarrow x = -9$.. - T

(vi) $2x - 5 = 0 \Rightarrow x = \frac{2}{5}$.. - F