$$150000 = 15000\left[\frac{1-(1+0.06)^{-n}}{0.06}\right]$$

$$= 1-(1.06)^{-n} = \frac{150000 \times 0.06}{15000}$$

$$1-(1.06)^{-n} = 0.6$$

$$(1.06)^{-n} = 1 - 0.6 = 0.4$$

Taking log of both sides

$$-n \log (1.06) = \log 0.4$$

$$-n = \frac{\log 0.4}{\log 1.06} = \frac{-0.39794000}{0.025305865}$$

$$-n = 16 \text{ approx.} = 16 \text{ approx.}$$

By Table:

$$P = R.\,{}^{a}\overline{n}|i$$

$$150000 = 15000\ {}^{a}\overline{n}|6\%$$

$${}^{a}\overline{n}|6\% = \frac{150000}{15000} = 10$$

In table look down the column 6% for an entry close to 10. The nearest is 10.10589527 which corresponds to n = 16.

-:4.28:-

Mr. Usman wants to deposit his savings of Rs. 48000 in a bank. The bank offers 8% interest compounded semi annually. Find the number of withdrawals, if he draw Rs. 2400 at the end of each six months.

SOLUTION

By Formula:

$$P = R\left[\frac{1-(1+i)^{-n}}{i}\right]$$

We have P = Rs. 48000, R = Rs. 2400, $i = {}^{8\%}/_{2} = 4\%$

$$48000 = 2400\left[\frac{1-(1+0.04)^{-n}}{0.04}\right]$$

EXERCISE NO. 6

SET – A

-:6.1:-

Solve for x, $5x + 4 = 19$

SOLUTION

$$5x + 4 = 19$$

Add (-4) to both sides, we get

$$5x + 4(-4) = 19 + (-4)$$

$$5x = 15$$

Dividing both sides by 5

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

$$x = 3$$

-:6.2:-

Solve for x, $2x + 8 = 24$

SOLUTION

$$2x + 8 = 24$$

Add (-4) to both sides, we get

$$2x + 8 + (-8) = 24 + (-8)$$

$$2x = 16$$

Dividing both sides by 2

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

$$x = 8$$

-:6.3:-

Solve for x, $7x - 3 = 4x + 21$

SOLUTION

$$7x - 3 = 4x + 21$$

Subtract 4x from both sides to remove 4x from the right side

$$7x - 3 - 4x = 4x + 21 - 4x$$

$$7x - 4x - 3 = 21$$

Combine the like terms

$$3x - 3 = 21$$

Add 3 to both sides, we get

$$3x - 3 + 3 = 21 + 3$$

$$3x = 24$$

Dividing both sides by 3

$$\frac{32x}{3} = \frac{24}{3}$$

$$x = 8$$

-:6.4:-

Solve for y, 4(y-1)+5(y+2)=3(y-8)

SOLUTION

$$4(y-1) + 5(y+2) = 3(y-8)$$

$$4y - 4 + 5y + 10 = 3y - 24$$

Combine the like items

$$9y + 6 = 3y - 24$$

Subtract 3y from both sides,

$$9y + 6 - 3y = 3y - 24 - 3y$$

$$6y + 6 = -24$$

$$6y = -24 - 6$$

$$6y = -30$$

Dividing both sides by 6

$$\frac{6y}{6} = -\frac{30}{6}$$

$$y = -5$$

-:6.5:-

Solve for x, x + 3(x – 2) = 2x – 4

SOLUTION

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

$$x + 3x - 6 = 2x - 4$$

$$x + 3x - 2x = -4 + 6$$

$$4x - 2x = 2 \Rightarrow 2x = 2$$

$$x = 1$$

-:6.6:-

Solve for x, $4(2x - 5) = 3(2x + 18)$

SOLUTION

$$4(2x - 5) = 3(2x + 18)$$
$$8x - 20 = 6x + 54$$
$$8x - 6x = 54 + 20$$
$$2x = 74$$
$$x = 37$$

-:6.7:-

Solve for x, $3x - 2(x + 4) = 5x - 28$

SOLUTION

$$3x - 2(x + 4) = 5x - 28$$
$$3x - 2x - 8 = 5x - 28$$
$$3x - 2x - 5x = -28 + 8$$
$$3x - 7x = -28 + 8$$
$$-4x = -20$$
$$4x = 20 \Rightarrow x = 5$$

-:6.8:-

Solve for x, $2(x + 5) - 8(x - 6) = 10$

SOLUTION

$$2(x+5) - 8(x - 6) = 10$$
$$2x + 10 - 8x + 48 = 10$$
$$2x - 8x = 10 - 10 - 48$$
$$-6x = -48$$
$$x = 8$$

-:6.9:-

Solve for x, $-3(2x - 5) = 2(4x + 7)$

SOLUTION

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

$$6x + 15 = 8x + 14$$

$$-6x - 8x = 14 - 15$$

$$-14x = -1$$

$$14x = 1$$

$$x = \frac{1}{14}$$

-:6.10:-

Solve for x, $4(x - 2) - 3(x - 1) = 2(x + 6)$

SOLUTION

$$4(x - 2) - 3(x - 1) = 2(x + 6)$$

$$4x - 8 - 3x + 3 = 2x + 12$$

Combine the like terms

$$4x - 3x - 8 + 3 = 2x + 12$$

$$x - 5 = 2x + 12$$

$$x - 2x = 12 + 5$$

$$-x = 17$$

$$x = -17$$

-:6.11:-

Solve for x, $-(a - 1) - (3a - 2) = 6 + 2(a - 1)$

SOLUTION

$$-(a - 1) - (3a - 2) = 6 + 2(a - 1)$$

$$-a + 1 - 3a + 2 = 6 + 2a - 2$$

$$-a - 3a + 1 + 2 = 6 - 2 + 2a$$

$$-4a + 3 = 4 + 2a$$

$$-4a - 2a = 4 - 3$$

$$-6a = 1$$

$$a = -\frac{1}{6}$$

-:6.12:-

Solve for x, $3(x + 1) + x^2 = x^2 + 12$

SOLUTION

$$3(x+1)+x^2=x^2+12$$
$$3x+3+x^2=x^2+12$$
$$3x+x^2-x^2=12-3$$
$$3x=9$$
$$x=3$$

-:6.13:-

Solve for x, $8(6 + 4x) + 24 = -16 + 2(x + 7)$

SOLUTION

$$8(6+4x)+24=-16+2(x+7)$$
$$48+32x+24=-16+2x+14$$
$$32x-2x=-16+14-48-24$$
$$30x=-74$$
$$x=-\frac{74}{30}=-\frac{37}{15}$$

-:6.14:-

Solve for x, $x - (x + 1) = 2x - (2x + 3)$

SOLUTION

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

There is no value of x which satisfies the equation. Therefore the equation is inconsistent.

-:6.15:-

Solve for x, $2.5x + 50 = 80$

SOLUTION

$$2.5x + 50 = 80$$

Multiplying both sides by 10

$$10(2.5x) + 10(50) = 10(80)$$
$$25x + 500 = 800$$
$$25x = 800 - 500$$
$$25x = 300$$
$$x = 12$$

Note:- It is often easier to first clear the equation of all decimals by multiplying both sides by an appropriate power of 10.

-:6.16:-

Solve for x, $0.07x + 0.11x = 3.6$

SOLUTION

$$0.07x + 0.11x = 3.6$$

Multiplying both sides by 100

$$100(0.07x + 0.11x) = 100(3.6)$$
$$7x + 11x = 360$$
$$18x = 360$$
$$x = 20$$

-:6.17:-

Solve for x, $0.21x + 0.11(700 - x) = 790$

SOLUTION

$$0.21x + 0.11(700 - x) = 790$$

Multiplying both sides by 100

$$100[0.21x + 0.11(700 - x)] = 100(790)$$
$$21x + 11(700 - x) = 79000$$
$$21x + 7700 - 11x = 79000$$
$$21x - 11x = 79000 - 7700$$
$$10x = 71300$$
$$x = 7130$$

-:6.18:-

Solve for x, $0.09(x + 100) = 0.08x + 11$

SOLUTION

$$0.09(x + 100) = 0.08x + 11$$

Multiplying both sides by 100

$$100[0.09(x + 100)] = 100(0.08x + 11)$$
$$9(x + 100) = 8x + 1100$$
$$9x + 900 = 8x + 1100$$
$$9x - 8x = 1100 - 900$$
$$x = 200$$

-:6.19:-

Solve for x, $0.8x + 0.9(850 - x) = 715$

SOLUTION

$$0.8x + 0.9(850 - x) = 715$$

Multiplying both sides by 10

$$10[0.8x + 0.9(850 - x)] = 10(715$$
$$8x + 9(850 - x) = 7150$$
$$8x + 7650 - 9x = 7150$$
$$8x - 9x = 7150 - 7650$$
$$-x = -500$$
$$x = 500$$

-:6.20:-

Solve for x, $0.2(x + 0.2) + 0.5(x - 0.4) = 5.44$

SOLUTION

$$0.2(x + 0.2) + 0.5(x - 0.4) = 5.44$$

$$0.2x + 0.04 + 0.5x - 0.20 = 5.44$$

Multiplying both sides by 100

$$100(0.2x + 0.04 + 0.5x - 0.20) = 100(5.44)$$

$$100(0.7x + 0.16) = 544$$

$$70x + 16 = 544$$

$$70x = 544 - 16$$

$$70x = 528$$

$$x = \frac{528}{70} = \frac{264}{35}$$

-:6.21:-

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

SOLUTION

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

By cross multiplication, we get

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

$$5x - 15 = 4x + 8$$

$$5x - 4x = 8 + 15$$

$$x = 23$$

-:6.22:-

Solve for x, $\frac{x-2}{3} + \frac{x+1}{8} = \frac{5}{6}$

SOLUTION

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

Combine the left side's terms

$$\frac{8(x-2)+3(x+1)}{24}=\frac{5}{6}$$

$$\frac{8x-16+3x+3}{24}=\frac{5}{6}$$

$$\frac{11x-13}{24}=\frac{5}{6}$$

By cross multiplication, we get

$$6(11x-13)=5(24)$$

$$66x-78=120$$

$$66x=120+78$$

$$66x=198$$

$$x=\frac{198}{66}=3$$

-:6.23:-

Solve for y, $\frac{2y-3}{3}+\frac{y+1}{2}=3$

SOLUTION

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

Combine the left side's terms

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

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

$$\frac{7y-3}{6}=\frac{3}{1}$$

By cross multiplication, we get

$$7y - 3 = 18$$
$$7y = 18 + 3$$
$$7y = 21$$
$$y = 3$$

-:6.24:-

Solve for x, $\frac{2x+7}{9} - 4 = \frac{x-7}{12}$

SOLUTION

$$\frac{2x+7}{9} - 4 = \frac{x-7}{12}$$
$$\frac{2x+7}{9} - \frac{x-7}{12} = 4$$
$$\frac{4(2x+7) - 3(x-7)}{36} = 4$$
$$\frac{8x + 28 - 3x + 21}{36} = 4$$
$$\frac{5x + 49}{36} = \frac{4}{1}$$

By cross multiplication

$$5x + 49 = 144$$
$$5x = 144 - 49$$
$$5x = 95$$
$$x = 19$$

-:6.25:-

Solve for x, $\frac{x-1}{4} - \frac{x-2}{6} = \frac{2}{3}$

SOLUTION

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

$$\frac{6(x-1)-4(x-2)}{24}=\frac{2}{3}$$

$$\frac{6x-6-4x+8}{24}=\frac{2}{3}$$

$$\frac{2x+2}{24}=\frac{2}{3}$$

By cross multiplication, we get

$$3(2x+2)=48$$

$$6x+6=48$$

$$6x=48-6$$

$$6x=42$$

$$x=7$$

-:6.26:-

Solve for x, $\frac{5}{6}(x+1)-\frac{2}{5}(x-1)=\frac{1}{2}$

SOLUTION

$$\frac{5}{6}(x+1)-\frac{2}{5}(x-1)=\frac{1}{2}$$

Combine the left side's terms

$$\frac{5(5x+5)-6(2x-2)}{30}=\frac{1}{2}$$

$$\frac{25x+25-12x+12}{30}=\frac{1}{2}$$

$$\frac{13x+37}{30}=\frac{1}{2}$$

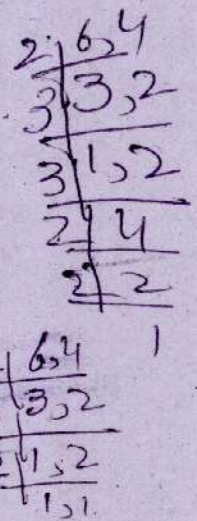
By cross multiplication, we get

$$26x+74=30$$

$$26x=30-74$$

$$26x=-44$$

$$x=-\frac{44}{26}=-\frac{22}{13}$$



-:6.27:-

Solve for x, $\frac{1}{2}(3x+6)-\frac{1}{3}(2x-4)=20$

SOLUTION

$$\frac{1}{2}(3x+6)-\frac{1}{3}(2x-4)=20$$

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

Combine the left side's terms

$$\frac{3(3x+6)-2(2x-4)}{6}=20$$

$$\frac{9x+18-4x+8}{6}=20$$

By cross multiplication, we get

$$5x+26=6(20)$$

$$5x+26=120$$

$$5x=120-26$$

$$5x=94$$

$$x=\frac{94}{5}=18.8$$

-:6.28:-

Solve for x, $\frac{7x+8}{3x+1}=\frac{5}{3}$

SOLUTION

$$\frac{7x+8}{3x+1}=\frac{5}{3}$$

By cross multiplication, we get

$$3(7x+8)=5(3x+1)$$

$$21x+24=15x+5$$

$$21x-15x=5-24$$

$$6x=-19 \Rightarrow x=-\frac{19}{6}$$

-:6.29:-

Solve for x, $\frac{12x-6}{3}=\frac{4x+8}{4}$

SOLUTION

$$\frac{12x-6}{3}=\frac{4x+8}{4}$$

By cross multiplication, we get

$$4(12x - 6) = 3(4x + 8)$$

$$48x - 24 = 12x + 24$$

$$48x - 12x = 24 + 24$$

$$36x = 48$$

$$x=\frac{48}{36}=\frac{4}{3}$$

-:6.30:-

Solve for x, $\frac{3x}{2}-\frac{x}{2}=\frac{5(x-4)}{6}$

SOLUTION

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

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

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

By cross multiplication, we get

$$6x = 5x - 20$$

$$6x - 5x = -20$$

$$x = -20$$

-:6.31:-

Solve for x, $\frac{2x-5}{3}-\frac{3x-1}{4}=\frac{2}{3}$

SOLUTION

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

$$\frac{4(2x-5)-3(3x-1)}{12}=\frac{2}{3}$$

$$\frac{8x-20-9x+3}{12}=\frac{2}{3}$$

$$\frac{-x-17}{12}=\frac{2}{3}$$

By cross multiplication, we get

$$3(-x-17)=24$$

$$-3x-51=24$$

$$-3x=24+51$$

$$-3x=75$$

$$x=25$$

-:6.32:-

Solve for x, $\frac{1}{2}(x+3)-\frac{2}{5}(x-9)=x+9$

SOLUTION

$$\frac{1}{2}(x+3)-\frac{2}{5}(x-9)=x+9$$

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

$$\frac{x+3}{2}-\frac{2x-18}{5}=x+9$$

$$\frac{5(x+3)-2(2x-18)}{10}=x+9$$

$$\frac{5x+15-4x+36}{10}=x+9$$

$$\frac{x+51}{10}=\frac{x+9}{1}$$

By cross multiplication, we get

$$x + 51 = 10(x + 9)$$
$$x + 51 = 10x + 90$$
$$x - 10x = 90 - 51$$
$$-9x = 39 \Rightarrow x = \frac{-39}{9} = \frac{-13}{3}$$

-:6.33:-

Solve for x, $\frac{x}{7} - \frac{1-x}{5} = 2 - \frac{3x}{5}$

SOLUTION

$$\frac{x}{7} - \frac{1-x}{5} = 2 - \frac{3x}{5}$$
$$\frac{5x + 7x - 7}{35} = \frac{10 - 3x}{5}$$
$$\frac{5x + 7x - 7}{35} = \frac{10 - 3x}{5}$$
$$\frac{12x - 7}{35} = \frac{10 - 3x}{5}$$

By cross multiplication, we get

$$5(12x - 7) = 35(10 - 3x)$$
$$60x - 35 = 350 - 105x$$
$$60x + 105x = 350 + 35$$
$$165x = 385 \Rightarrow x = \frac{385}{165} = \frac{7}{3}$$

-:6.34:-

Solve for x, $2x + \frac{4-x}{2} = 3x - \frac{8(x-2)}{6}$

SOLUTION

$$2x + \frac{4-x}{2} = 3x - \frac{8(x-2)}{6}$$
$$\frac{4x + 4 - x}{2} = \frac{18x - 8x + 16}{6} \Rightarrow \frac{3x + 4}{2} = \frac{10x + 16}{6}$$

By cross multiplication, we get

$$6(3x + 4) = 2(10x + 16)$$

$$18x + 24 = 20x + 32$$

$$18x - 20x = 32 - 24$$

$$-2x = 8 \Rightarrow x = -4$$

-:6.35:-

Solve for x, $\dfrac{1-8x}{4+3x} = \dfrac{2+16x}{3-6x}$

SOLUTION

$$\frac{1-8x}{4+3x} = \frac{2+16x}{3-6x}$$

By cross multiplication, we get

$$(3-6x)(1-8x) = (4+3x)(2+16x)$$

$$3(1-8x) - 6x(1-8x) = 4(2+16x) + 3x(2+16x)$$

$$3 - 24x - 6x + 48x^2 = 8 + 64x + 6x + 48x^2$$

$$48x^2 - 48x^2 - 24x - 6x - 64x - 6x = 8 - 3$$

$$-100x = 5 \Rightarrow x = \frac{-5}{100} = \frac{-1}{20}$$

-:6.36:-

Solve for x, $\dfrac{9x-7}{6x+5} = \dfrac{6x-3}{4x+2}$

SOLUTION

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

By cross multiplication, we get

$$(4x+2)(9x-7) = (6x+5)(6x-3)$$

$$4x(9x-7) + 2(9x-7) = 6x(6x-3) + 5(6x-3)$$

$$36x^2 - 28x + 18x - 14 - 36x^2 + 18x - 30x = -15$$

$$36x^2 - 36x^2 - 28x + 18x + 18x - 30x = -15 + 14$$

$$36x - 58x = -1$$

$$-22x = -1 \Rightarrow 22x = 1 \Rightarrow x = \frac{1}{22}$$

-:6.37:-

Solve for x, $\frac{4}{1-x} = \frac{92}{6+2x}$

SOLUTION

$$\frac{4}{1-x} = \frac{92}{6+2x}$$

By cross multiplication, we get

$$4(6 + 2x) = 92(1 - x)$$

$$24 + 8x = 92 - 92x$$

$$8x + 92x = 92 - 24$$

$$100x = 68$$

$$x = \frac{68}{100} = 0.68$$

-:6.38:-

Solve for x, $\frac{x+1}{3x} = \frac{1}{x} - \frac{1}{3}$

SOLUTION

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

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

By cross multiplication, we get

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

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

$$3x^2 + 3x^2 + 3x - 9x = 0$$

$$6x^2 - 6x = 0$$

$$6x(x - 1) = 0 \Rightarrow x - 1 = 0$$

$$x = 1$$

-:6.39:-

Solve for N, $\frac{N}{2} + \frac{N}{7} = N - 5$

SOLUTION

$$\frac{N}{2}+\frac{N}{7}=N-5$$

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

$$\frac{9N}{14}=\frac{N-5}{1}$$

By cross multiplication, we get

$$9N = 14(N - 5)$$

$$9N = 14N - 70$$

$$9N - 14N = -70$$

$$-5N = -70$$

$$5N = 70$$

$$N = 14$$

-:6.40:-

Solve for x, $\frac{3}{x+1}-\frac{4}{3x-4}=\frac{24}{3x^2-x-4}$

SOLUTION

$$\frac{3}{x+1}-\frac{4}{3x-4}=\frac{24}{3x^2-x-4}$$

$$\frac{3(3x-4)-4(x+1)}{(x+1)(3x-4)}=\frac{24}{3x^2-x-4}$$

$$\frac{9x-12-4x-4}{3x^2-x-4}=\frac{24}{3x^2-x-4}$$

$$\frac{5x-16}{3x^2-x-4}=\frac{24}{3x^2-x-4}$$

Multiplying both sides by $3x^2 - x - 4$, We get

$$5x - 16 = 24$$

$$5x = 24 + 16$$

$$5x = 40$$

$$x = 8$$

SET – B

-:6.1:-

If 54 is subtracted from three times a certain number, result is 36. Find the number

SOLUTION

Let x represent the number to be found. The sentence "if 54 is subtracted from three times a certain number, the result is 36" translates into the equation $3x - 54 = 36$. Solving this equation, we obtain

$$3x - 54 = 36$$

$$3x = 36 + 54$$

$$3x = 90$$

$$x = 30$$

-:6.2:-

If two is added to five times a certain number the result is the same as if 16 is subtracted from twice the number. Find the number.

SOLUTION

Let x represent the number to be found.

$$5x + 2 = 2x - 16$$

$$5x - 2x = -16 - 2$$

$$3x = -18$$

$$x = -6$$

-:6.3:-

The sum of three consecutive integers is 54, what are the numbers.

SOLUTION

Let x be the first number, then
$x + 1$ is the second number and
$x + 2$ is the third number

$$x + (x + 1) + (x + 2) = 54$$

$$3x + 3 = 54 \Rightarrow 3x = 54 - 3$$

$$3x = 51 \Rightarrow x = 17$$

Hence three consecutive integers are 17, 18 and 19

-:6.4:-

The sum of the three consecutive integers is 13 greater than twice the smallest of the three integers. Find the integers.

SOLUTION

Let the smallest integer is = x

Then the second integer = x + 1

and the third integer = x + 2

$$x + (x + 1) + (x + 2) = 2x + 13$$

$$3x + 3 = 2x + 13$$

$$3x - 2x = 13 - 3$$

$$x = 10$$

Three consecutive integers are 10, 11 and 12

To check our answer, we must determine whether or not they satisfy the condition. Since 10, 11 and 12 are consecutive integers whose sum is 33 and since twice the smallest plus 13 is also 33 as 2(10)+13=33 so our answer are correct.

-:6.5:-

Find three consecutive integers such that twice the sum of the fist two integers is 11 more than three times the largest.

SOLUTION

Let first integer = x

the second integer = x + 1

and the third integer = x + 2

The equation is as follows:

$$2[x + (x + 1)] = 3(x + 2) + 11$$

$$2[2x + 1) = 3x + 6 + 11$$

$$4x + 2 = 3x + 17$$

$$4x - 3x = 17 - 2$$

$$x = 15$$

Hence First integer = 15

Second integer = 16

Third integer = 17

-:6.6:-

Verify that for any three consecutive integers, the sum of the smallest and largest is equal to twice the middle integer.

SOLUTION

Let the smallest integer = x
the middle integer = x + 1
and the largest integer = x + 2
Sum of smallest and largest = Twice the middle

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

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

Hence verified

-:6.7:-

Find four consecutive integers whose sum is 106.

SOLUTION

Let first integer = x
the second integer = x + 1
the third integer = x + 2
and the fourth integer = x + 3

$$x + (x + 1) + (x + 2) + (x + 3) = 106$$

$$4x + 6 = 106$$

$$4x = 106 - 6$$

$$4x = 100$$

$$x = 25$$

Hence four consecutive integers are 25, 26, 27 and 28

-:6.8:-

Find a number such that three-eights of the number minus one half of it is 14 less than three-fourths of the number.

SOLUTION

Let x represent the number to be founded, then according to condition

$$\frac{3}{8}x - \frac{1}{2}x = \frac{3}{4}x - 14 \Rightarrow \frac{3x}{8} - \frac{x}{2} = \frac{3x}{4} - 14$$

$$\frac{3x-4x}{8}=\frac{3x-56}{4}$$

$$-\frac{x}{8}=\frac{3x-56}{4}$$

By cross multiplication, we get

$$-4x=8(3x-56)$$

$$-4x=24x-448$$

$$-4x-24x=-448$$

$$-28x=-448$$

$$28x=448$$

$$x=\frac{448}{28}=16$$

The required number is 16.

-:6.9:-

Find the number such that five sixths of the number is 4 more than two-thirds of the number

SOLUTION

Let x represent the number to be founded, then

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

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

$$\frac{15x-12x}{18}=4\Rightarrow\frac{3x}{18}=4$$

$$\frac{x}{6}=4$$

By cross multiplication

$$x=24$$

Hence required number is 24

-:6.10:-

Three-fourths of a number plus tow-fifths of the number is 13 less than one-half of the number. Find the number.

SOLUTION

Let x represent the number to be founded, then

$$\frac{3}{4}x + \frac{2}{5}x = \frac{1}{2}x - 13$$

$$\frac{3x}{4} + \frac{2x}{5} = \frac{x}{2} - \frac{13}{1}$$

$$\frac{15x + 8x}{20} = \frac{x - 26}{2}$$

$$\frac{23x}{20} = \frac{x - 26}{2}$$

By cross multiplication, we get

$$46x = 20x - 520$$

$$46x - 20x = -520$$

$$26x = -520$$

$$x = -20$$

Hence required number is -20

-:6.11:-

The sum of two numbers is 148. The larger number is two less than five times the smaller number. Find the two numbers.

SOLUTION

Let the smaller number is = x

Then the larger number = 5x -2

Sum of smaller and larger number = 148

$$x + 5x - 2 = 148$$

$$6x = 148 + 2$$

$$6x = 150$$

$$x = 25$$

Hence smaller number = 25

And larger number = $5x - 2 = 5(25) - 2 = 125 - 2 = 123$

-:6.12:-

The difference of two numbers is 33. The larger number is one more than three times the smaller number. Find the numbers.

SOLUTION

Let the smaller number = x

then the larger number = 3x + 1

Larger number minus smaller number = 33

$$(3x + 1) - x = 33$$

$$3x + 1 - x = 33$$

$$2x + 1 = 33 \Rightarrow 2x = 33 - 1$$

$$2x = 32 \Rightarrow x = 16$$

Hence smaller number = 16

Larger number = 48 + 1 = 49

-:6.13:-

Danial received a motercyle repair bill of Rs. 106. This include Rs. 23 for parts, Rs 22 per hour for labour and Rs. 6 for taxes. Find the number of hours of labour.

SOLUTION

Let x represent the number of hours of labour. The 22x represents the total charge for labour. Charge for parts plus charge for labour plus tax equal to the total bill as follows:

Parts + Labour + Tax = Total Bill

$$23 + 22x + 6 = 106$$

Solving this equation, we get

$$22x + 29 = 106$$

$$22x = 106 - 29$$

$$22x = 77$$

$$x = \frac{77}{22}$$

$$x = \frac{7}{2} = 3\frac{1}{2} \text{ hours}$$

-:6.14:-

In a class of 92 students, the number of females is one less than twice the number of males. How many females and how many males are there in the class?

SOLUTION

Total number of students = 92

Let the number of males = x

then the number of females = 2x – 1

$$x + (2x - 1) = 92$$

$$x + 2x - 1 = 92$$

$$3x = 92 + 1$$

$$3x = 93$$

$$x = 31$$

Hence Number of males = 31 and
Number of females = 61

-:6.15:-

A board 20 feet long is cut into two pieces such that the length of one piece is the two-thirds of the length of the other piece. Find

(a) The length of shorter piece

(b) The length of larger piece

SOLUTION

Let x length of one piece = x

then the length of the other piece = $\frac{2}{3}x$

Sum of shorter piece and larger piece is 20 feet, that is;

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

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

$$\frac{5x}{3} = \frac{20}{1}$$

By cross multiplication, we get

$$5x = 60$$

$$x = 12$$

Length of larger piece = x = 12 feet

Length of shorter piece = 2/3 x 12 = 8 feet

-:6.16:-

The average of the salaries of Ali, Asghar and Arshid is Rs. 24000. if Asghar earns Rs. 10000 more than Ali and Arshid's salary is Rs. 2000 more than twice of Ali's salary, find the salary of each person.

SOLUTION

If average salary of three persons = Rs. 24000
Then total salary of three persons = 3 x 24000 = Rs. 72000
Let the Ali's Salary = Rs. X
then Asghar's Salary = Rs. (x + 10000)
and Arshid's Salary = Rs. (2x + 2000)
Ali's Salary + Asghar's Salary + Arshid's Salary = Rs. 72000

$$x + (x + 10000) + (2x + 2000) = 72000$$
$$4x + 12000 = 72000$$
$$4x = 72000 - 12000$$
$$4x = 60000$$
$$x = \text{Rs. } 15000$$

Hence Ali's Salary = Rs. 15000
Asghar's Salary = Rs. 25000
Arshid's Salary = Rs. 32000

-:6.17:-

The sum of the present ages of Noor and his father is 64 years. After eight years Noor will be three-fifths as old as his father at that time. Find the present ages of Noor and his father.

SOLUTION

Sum of ages of Noor and his Father = 64 years
Let the present age of Noor = x
Then the present age of Father = 64 – x
After 8 years the age of Noor = x + 8
After 8 years the age of his Father = (64 – x) + 8
After 8 years Noor will be three-fifth as old as his father, that is

$$x + 8 = \frac{3}{5}[(64 - x) + 8] \Rightarrow x + 8 = \frac{3}{5}(72 - x)$$

$$\frac{x + 8}{1} = \frac{216 - 3x}{5}$$

By cross multiplication

$$5x + 40 = 216 - 3x$$
$$5x + 3x = 216 - 40$$
$$8x = 176$$
$$x = 22$$

Hence Present age of Noor = x = 22 years
and present age of his Father = 64–x = 64–22 = 42 years

-:6.18:-

Ahmed took three mathematics exams and had an average score of 88. his second exam was 10 points better than his first exam and his third exam was 4 points better than his second exam. What were his three exam scores?

SOLUTION

Average scores of three exams = 88 score
Total scores of three exams = 3 x 88 = 264
Let the scores of first exam = x scores
then the scores of second exam = x + 10
and the scores of third exam = (x + 10) + 4 = x + 14
Sum of three exams scores are

$$x + (x + 10) + (x + 14) = 264$$
$$3x + 24 = 264$$
$$3x = 264 - 24$$
$$3x = 240$$
$$x = 80$$

Hence First exam scores = 80
Second exam score = 90
Third exam score = 94

-:6.19:-

A bus is carrying 32 passengers, some with Rs. 3 tickets and the remainder with Rs. 5 tickets. If the total receipts from these passengers are Rs. 114. Find the number of Rs. 3 fares.

SOLUTION

Let x = Rs. 3 tickets passengers, then Rs. 5 tickets passengers are 32-x

$$3x + 5(32 - x) = 114$$
$$3x + 160 - 5x = 114$$
$$3x - 5x = 114 - 160$$
$$-2x = -46$$
$$2x = 46$$
$$x = 23$$

So No. of passengers of Rs. 3 are 23.

-:6.20:-

Going from one town to another, a man drives his car at 35 miles an hour, and returning he drives at 25 miles an hour. The round trip takes 6 hours. Find the distance between the towns.

SOLUTION

Let x be the distance between two towns

Total time consumed = 6 hours

Distance = (Speed Rate) (Time)

$$\text{Time} = \frac{\text{Distance}}{\text{Speed Rate}}$$

The time used to drive from one town to other $= \frac{x}{35}$

The time used to drive back $= \frac{x}{25}$

Total time used to go and come back $= \frac{x}{35} + \frac{x}{25}$

$$\frac{x}{35} + \frac{x}{25} = 6$$
$$\frac{7x + 5x}{175} = 6$$
$$\frac{12x}{175} = 6$$

By cross multiplication, we get

$$12x = 10.50$$
$$x = 87.5 \text{ miles}$$

The distance from between town is 87.5 miles.

-:6.21:-

A man who regularly drives between two cities, finds that if he drives at an average speed of 120 km/h, he arrives 2 hours before his usual time, and if he drives at an average speed of 60 km/h, he arrives 3 hours later than his usual time. What is the usual time.

SOLUTION

Let usual time to drive between two cities be x.

Average speed is 120 km/h, he arrive two hours before.

The consumed time at 120 km/h is (x-2) hours. The distance covered is

$$\text{Average Speed} \times \text{Time} = 120\,(x-2)$$

Again

The average speed is 60 km/h, he arrive three hours late.

The time consumed at 60 km/h is (x+3)

The distance covered is 60 (x+3)

The distance between two cities will remain same.

$$120(x-2) = 60(x+3)$$

$$120x - 240 = 60x + 180$$

$$120x - 60x = 180 + 240$$

$$60x = 420$$

$$x = 7$$

-:6.22:-

A car covers 635 km by going for 4 hours at a certain speed, then for 3 hours at 5 km/h faster, and then for 2 hours at 5 km/h slower. Find the first speed.

SOLUTION

Total distance = 635 km

Let the first speed = x km/h

The time consumed with first speed is 4 hours.

Distance covered by first speed is

$$\text{Time} \times \text{Speed} = 4x$$

The second time is 3 hours and second speed is 5 km/h faster, so second speed is (x+5) km/h

The distance covered is

$$\text{Time} \times \text{Speed} = 3(x+5)$$

The third time is 2 hours and third speed is 5 km/h slower than the first speed, so third speed is $(x - 5)$ km/h

The distance covered is

$$\text{Time} \times \text{Speed} = 2(x - 5)$$

Hence total distance covered is

$$4x + 3(x + 5) + 2(x - 5) = 635$$

$$4x + 3x + 15 + 2x - 10 = 635$$

$$4x + 3x + 2x + 15 - 10 = 635$$

$$9x + 5 = 635 \Rightarrow 9x = 635 - 5$$

$$9x = 630$$

$$x = \frac{630}{9} = 70$$

The first speed is 70 km/h

-:6.23:-

A sum of Rs. 17000 is invested, part at 3% simple interest and the remainder at 4% simple interest. If the annual interest is Rs. 600, how much was invested at each rate?

SOLUTION

Let x = The amount invested at 3%

$17000-x$ = The amount invested at 5%

The income from the 3% investment = $0.03x$ and

The income from the 4% investment = $0.04(17000-x)$

$$0.03x + 0.04(17000 - x) = \text{Rs. } 600$$

$$0.03x + 680 - 0.04x = \text{Rs. } 600$$

$$-0.01x + 680 = 600$$

$$-0.01x = 600 - 680 \Rightarrow -0.01x = -80$$

$$x = \text{Rs. } 8000$$

Amount of investment at 3% = Rs. 8000

Amount of investment at 4% = Rs. 9000

-:6.24:-

Mrs. B invested Rs. 30,000; a part at 5% and part at 8%. The total interest on the investment was Rs. 2100. How much did she invested at each rate?

SOLUTION

Let x = The amount of investment at 5%, then
30,000 – x = The amount of investment at 8%
The income from the 5% investment = 0.05x and
The income from the 8% investment = 0.08(30000 – x)

$$0.05x + 0.08(30000 - x) = 2100$$
$$0.05x + 2400 - 0.08x = 2100$$
$$0.05x - 0.08x = 2100 - 2400$$
$$-0.03x = -300$$
$$0.03x = 300$$
$$x = \frac{30000}{3} = \text{Rs.}10000$$

Amount invested at 5% = Rs. 10000
Amount invested at 8% = Rs. 20000

-:6.25:-

A sum of Rs. 2000 is split between two investments, one paying 7% interest and the other 8%. If return on the 8% investment exceeds that on the 7% investment by Rs. 40, how much is invested at each rate?

SOLUTION

Let the x = The amount of investment at 7%, and
2000 – x = The amount of investment at 8%
The income from the 7% investment = 0.07x, and
The income from the 8% investment = 0.08(2000 – x)
Since the return or income of 8% exceed Rs. 40, than income of 7%, so the equation is as follows:

$$0.07x + 40 = 0.08(2000 - x)$$
$$0.07x + 40 = 160 - 0.08x$$
$$0.07x + 0.08x = 160 - 40$$
$$0.15x = 120$$
$$x = \frac{120}{0.15} = \frac{12000}{15} = \text{Rs.}800$$

Hence Amount of investment at 7% = Rs. 800
Amount of investment at 8% = Rs. (2000 = 800) = Rs. 1200

-:6.26:-

One machine plows a field in 4 days, another does it in 6 days. How long does it take using both machines?

SOLUTION

Let x be the required number of days in which both machines plow the field.

$\frac{x}{4}$ = The part plow by first machine

and $\frac{x}{6}$ = The part plow by second machine

$$\frac{x}{4}+\frac{x}{6}=1$$

$$\frac{3x+2x}{12}=1=\frac{5x}{12}=1$$

$$5x=12=$$

$$x=\frac{12}{5}=2.4 \text{ days}$$

-:6.27:-

If a class room has a length that is 5 feet less than 2 times of its width and its perimeter is 80 feet, find width and length of the class room.

SOLUTION

Let x = The width of class room, then 2x-5 = The length of class room.

Sum of four sides of the class room is the perimeter of classroom.

$$2x+2(2x-5)=80$$

$$2x+4x-10=80$$

$$6x-10=80$$

$$6x=8+10$$

$$6x=90=x=\frac{90}{6}=15$$

Thus, the width of the class room is 15 feet and length of the class room in 2x-5 = 30 - 5 = 25 feet.