

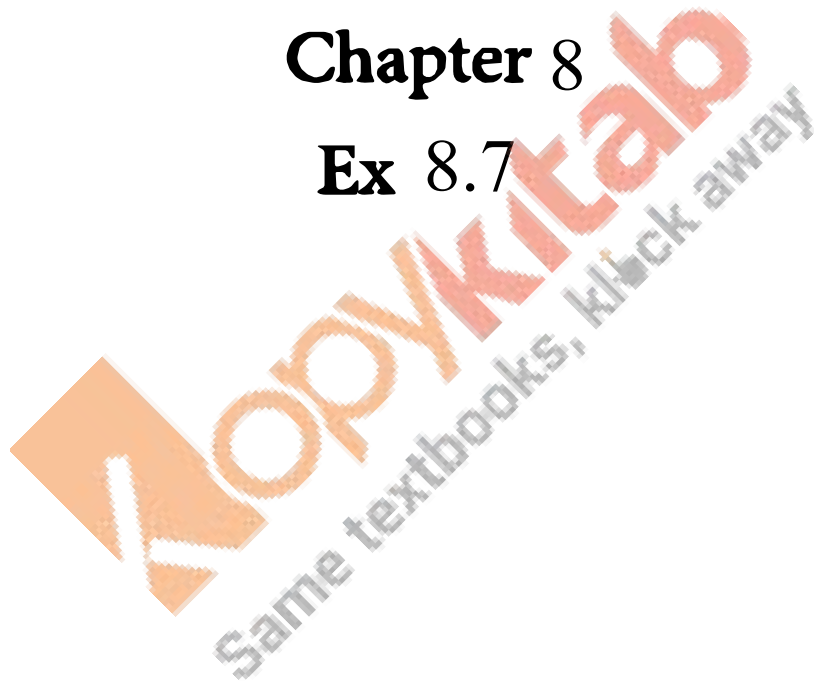
**RD SHARMA**

**Solutions**

**Class 10 Maths**

**Chapter 8**

**Ex 8.7**



**Question 1: Find the consecutive numbers whose squares have the same sum of 85.**

**Solution:**

Let the two consecutive two natural numbers be (x) and ( x+1) respectively.

Given,

That the sum of their squares is 85.

Then, by hypothesis, we get,

$$= x^2 +(x+1)^2 =85$$

$$= x^2+x^2+2x+1 =85$$

$$= 2x^2+ 2x+1 -85 =0$$

$$= 2x^2+ 2x+ -84 =0$$

$$= 2(x^2+ x+ -42) =0$$

Now applying factorization method, we get,

$$= x^2+ 7x-6x -42 =0$$

$$= x(x+7) -6(x+7) =0$$

$$= (x-6)(x+7) =0$$

Either,

$$x-6 =0 \text{ therefore , } x=6$$

$$x+7 =0 \text{ therefore } x= -7$$

Hence the consecutive numbers whose sum of squares is 85 are 6 and -7 respectively.

**Question 2: Divide 29 into two parts so that the sum of the squares of the parts is 425.**

**Solution:**

Let the two parts be (x) and (29-x) respectively.

According to the question, the sum of the two parts is 425.

Then by hypothesis,

$$= x^2 +(29-x)^2 = 425$$

$$= x^2 + x^2 + 841 - 58x = 425$$

$$= 2x^2 - 58x + 841 - 425 = 0$$

$$= 2x^2 - 58x + 416 = 0$$

$$= x^2 - 29x + 208 = 0$$

Now, applying the factorization method

$$= x^2 - 13x - 16x + 208 = 0$$

$$= x(x-13) - 16(x-13) = 0$$

$$= (x-13)(x-16) = 0$$

Either  $x-13=0$  therefore  $x=13$

Or,  $x-16=0$  therefore  $x=16$

The two parts whose sum of the squares is 425 are 13 and 16 respectively.

**Question 3: Two squares have sides  $x$  cm and  $(x+4)$  cm. The sum of their areas is  $656 \text{ cm}^2$ . Find the sides of the squares.**

**Solution:**

Given,

The sum of the sides of the squares are  $x$  cm and  $(x+4)$  cm respectively.

The sum of the areas =  $656 \text{ cm}^2$

We know that,

Area of the square = side \* side

Area of the square =  $x(x+4) \text{ cm}^2$

Given that the sum of the areas is  $656 \text{ cm}^2$

Hence by hypothesis,

$$= x(x+4) + x(x+4) = 656$$

$$= 2x(x+4) = 656$$

$$= x^2 + 4x = 328$$

Now by applying factorization method,

$$= x^2 + 20x - 16x - 328 = 0$$

$$= x(x+20) - 16(x+20) = 0$$

$$= (x+20)(x-16) = 0$$

Either  $x+20 = 0$  therefore  $x = -20$

Or,  $x-16 = 0$  therefore  $x = 16$

No negative value is considered as the value of the side of the square can never be negative.

Therefore, the side of the square is 16.

Therefore,  $x+4 = 16+4 = 20$  cm

Hence, the side of the square is 20cm.

**Question 4: The sum of two numbers is 48 and their product is 432. Find the numbers.**

**Solution:**

Given the sum of two numbers is 48.

Let the two numbers be  $x$  and  $48-x$  also the sum of their product is 432.

According to the question

$$= x(48-x) = 432$$

$$= 48x - x^2 = 432$$

$$= x^2 - 48x + 432 = 0$$

$$= x^2 - 36x - 12x + 432 = 0$$

$$= x(x-36) - 12(x-36) = 0$$

$$= (x-36)(x-12) = 0$$

Either  $x-36=0$  therefore  $x = 36$

Or,  $x-12=0$  therefore  $x = 12$

The two numbers are 12 and 36 respectively.

**Question 5: If an integer is added to its square, the sum is 90. Find the integer with the help of quadratic equation.**

**Solution:**

Let the integer be  $x$

Given that if an integer is added to its square, the sum is 90

$$= x + x^2 = 90$$

$$= x^2 + x - 90 = 0$$

$$= x^2 + 10x - 9x - 90 = 0$$

$$= x(x+10) - 9(x+10) = 0$$

$$= (x+10)(x-9) = 0$$

Either  $x+10 = 0$

Therefore  $x = -10$

Or,  $x-9 = 0$

Therefore  $x = 9$

The values of the integer are 9 and -10 respectively.

**Question 6: Find the whole numbers which when decreased by 20 is equal to 69 times the reciprocal of the numbers.**

**Solution:**

Let the whole number be  $x$  cm

As it is decreased by 20  $= (x-20) = 69x \frac{69}{x}$

$$x-20 = 69x \frac{69}{x}$$

$$x(x-20) = 69$$

$$x^2 - 20x - 69 = 0$$

Now by applying factorization method,

$$x^2 - 23x + 3x - 69 = 0$$

$$x(x-23) + 3(x-23) = 0$$

$$(x-23)(x+3) = 0$$

Either,  $x = 23$

Or,  $x = -3$

As the whole numbers are always positive  $x = -3$  is not considered.

The whole number is 23.

**Question 7: Find the consecutive natural numbers whose product is 20**

**Solution:**

Let the two consecutive natural number be  $x$  and  $x+1$  respectively.

Given that the product of natural numbers is 20

$$= x(x+1) = 20$$

$$= x^2 + x - 20 = 0$$

$$= x^2 + 5x - 4x - 20 = 0$$

$$= x(x+5) - 4(x+5) = 0$$

$$= (x+5)(x-4) = 0$$

Either  $x+5 = 0$

Therefore  $x = -5$

Considering the positive value of  $x$ .

Or,  $x-4 = 0$

Therefore  $x = 4$

The two consecutive natural numbers are 4 and 5 respectively.

**Question 8: The sum of the squares of two consecutive odd positive integers is 394. Find the two numbers?**

**Solution:**

Let the consecutive odd positive integer are  $2x-1$  and  $2x+1$  respectively.

Given, that the sum of the squares is 394.

According to the question,

$$(2x-1)^2 + (2x+1)^2 = 394$$

$$4x^2 + 1 - 4x + 4x^2 + 1 + 4x = 394$$

Now cancelling out the equal and opposite terms ,

$$8x^2 + 2 = 394$$

$$8x^2 = 392$$

$$x^2 = 49$$

$$x = 7 \text{ and } -7$$

Since the value of the edge of the square cannot be negative so considering only the positive value.

That is 7

$$\text{Now, } 2x - 1 = 14 - 1 = 13$$

$$2x + 1 = 14 + 1 = 15$$

The consecutive odd positive numbers are 13 and 15 respectively.

**Question 9: The sum of two numbers is 8 and 15 times the sum of the reciprocal is also 8 . Find the numbers.**

**Solution:**

Let the numbers be  $x$  and  $8-x$  respectively.

Given that the sum of the numbers is 8 and 15 times the sum of their reciprocals.

According to the question,

$$= 15\left(\frac{1}{x} + \frac{1}{8-x}\right) = 8$$

$$= 15 \frac{8-x+x}{x(8-x)} = 8$$

$$= 15 \times \frac{8}{8x-x^2} = 8$$

$$= 120 = 8(8x-x^2)$$

$$= 120 = 64x - 8x^2$$

$$= 8x^2 - 64x + 120 = 0$$

$$= 8(x^2 - 8x + 15) = 0$$

$$= x^2 - 8x + 15 = 0$$

$$= x^2 - 5x - 3x + 15 = 0$$

$$= x(x-5) - 3(x-5) = 0$$

$$= (x-5)(x-3) = 0$$

Either  $x-5 = 0$  therefore  $x = 5$

Or,  $x-3 = 0$  therefore  $x = 3$

The two numbers are 5 and 3 respectively.

**Question 10:** The sum of a number and its positive square root is  $625\frac{6}{25}$ . Find the numbers.

**Solution:**

Let the number be  $x$

By the hypothesis, we have

$$x + \sqrt{x} = 625x + \sqrt{x} = \frac{6}{25}$$

Let us assume that  $x = y^2$ , we get

$$y + y^2 = 625y + y^2 = \frac{6}{25}$$

$$= 25y^2 + 25y - 6 = 0$$

The value of  $y$  can be determined by:

$$y = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Where  $a = 25$ ,  $b = 25$ ,  $c = -6$

$$y = \frac{-25 \pm \sqrt{625 + 600}}{50} \quad y = \frac{-25 \pm 35}{50} \quad y = 15 \text{ and } y = -11$$

$$y = \frac{1}{5} \text{ and } y = \frac{-11}{10}$$

$$= x = y^2 = 15^2 = 225 \quad \frac{1}{5}^2 = \frac{1}{25}$$

The number  $x$  is  $225$  and  $\frac{1}{25}$

**Question 11:** There are three consecutive integers such that the square of the first increased by the product of the other two integers gives 154. What are the integers?



**Solution:**

Let the three consecutive numbers be  $x$ ,  $x+1$ ,  $x+2$  respectively.

$$x^2+(x+1)(x+2) = 154$$

$$= x^2+x^2+3x+2 = 154$$

$$= 3x^2+3x-152=0$$

The value of  $x$  can be obtained by the formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Here  $a = 3$ ,  $b = 3$ ,  $c = 152$

$$x = \frac{-3 \pm \sqrt{9 - 1216}}{6}$$

$$x = 8 \text{ and } x = -192 \text{ and } x = 8 \text{ and } x = \frac{-19}{2}$$

Considering the value of  $x$

If  $x = 8$

$$x+1 = 9$$

$$x+2 = 10$$

The three consecutive numbers are 8, 9, 10 respectively.

**Question 12:** The product of two successive integral multiples of 5 is 300. Determine the multiples.

**Solution:**

Given that the product of two successive integral multiples of 5 is 300

Let the integers be  $5x$  and  $5(x+1)$

According to the question,

$$5x[5(x+1)] = 300$$

$$= 25x(x+1) = 300$$

$$= x^2+x = 12$$

$$= x^2+x - 12 = 0$$

$$= x^2 + 4x - 3x - 12 = 0$$

$$= x(x+4) - 3(x+4) = 0$$

$$= (x+4)(x-3) = 0$$

Either  $x+4 = 0$

Therefore  $x = -4$

Or,  $x-3 = 0$

Therefore  $x = 3$

$$x = -4$$

$$5x = -20$$

$$5(x+1) = -15$$

$$x = 3$$

$$5x = 15$$

$$5(x+1) = 20$$

The two successive integral multiples are 15, 20 and -15 and -20 respectively.

**Question 13:** The sum of the squares of two numbers is 233 and one of the numbers is 3 less than the other number. Find the numbers.

**Solution:**

Let the number is  $x$

Then the other number is  $2x-3$

According to the question:

$$x^2 + (2x-3)^2 = 233$$

$$= x^2 + 4x^2 + 9 - 12x = 233$$

$$= 5x^2 - 12x - 224 = 0$$

The value of  $x$  can be obtained by  $X = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$   $X = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Here  $a = 5$ ,  $b = -12$ ,  $c = -224$

$$x = X = \frac{12 \pm \sqrt{144 + 20(224)}}{2(5)} \quad X = \frac{12 \pm \sqrt{144 + 20(224)}}{2(5)}$$

$$x=8 \text{ and } x=-28 \text{ and } x=8 \text{ and } x=\frac{-28}{5}$$

Considering the value of  $x=8$

$$2x-3=15$$

The two numbers are 8 and 15 respectively.

**Question 14:** The difference of two number is 4 . If the difference of the reciprocal is  $421\frac{4}{21}$  . find the numbers.

**Solution:**

Let the two numbers be  $x$  and  $x-4$  respectively.

Given, that the difference of two numbers is 4 .

By the given hypothesis we have,

$$= \frac{1}{x-4} - \frac{1}{x} = 421\frac{4}{21}$$

$$= \frac{x-x+4}{x(x-4)} = 421\frac{4}{21}$$

$$= 84 = 4x(x-4)$$

$$= x^2 - 4x - 21 = 0$$

Applying factorization theorem,

$$= x^2 - 7x + 3x - 21 = 0$$

$$= (x-7)(x+3) = 0$$

Either  $x-7=0$  therefore  $x=7$

Or,  $x+3=0$  therefore  $x=-3$

Hence the required numbers are -3 and 7 respectively.

**Question 15:** Let us find two natural numbers which differ by 3 and whose squares have the sum 117.

**Solution:**

Let the numbers be  $x$  and  $x-3$

According to the question

$$x^2+(x-3)^2=117$$

$$= x^2+x^2+9-6x-117 =0$$

$$= 2x^2-6x-108 =0$$

$$= x^2-3x-54 =0$$

$$= x^2-9x+6x-54 =0$$

$$= x(x-9)+6(x-9) =0$$

$$=(x-9)(x+6) =0$$

Either  $x-9 =0$  therefore  $x=9$

Or  $x+6 =0$  therefore  $x=-6$

Considering the positive value of  $x$  that is 9

$$x=9$$

$$x-3 = 6$$

The two numbers are 6 and 9 respectively.

**Question 16:** The sum of the squares of these consecutive natural numbers is 149. Find the numbers.

**Solution:**

Let the numbers be  $x$ ,  $x+1$ , and  $x+2$  respectively.

According to given hypothesis

$$x^2 + (x+1)^2 + (x+2)^2 = 149$$

$$x^2 + x^2 + x^2 + 1 + 2x + 4 + 4x = 149$$

$$3x^2 + 6x - 144 = 0$$

$$x^2 + 2x - 48 = 0$$

Now applying factorization method,

$$x^2 + 8x - 6x - 48 = 0$$

$$x(x+8) - 6(x+8) = 0$$

$$(x+8)(x-6) = 0$$

Either  $x+8 = 0$  therefore  $x = -8$

Or,  $x-6 = 0$  therefore  $x = 6$

Considering only the positive value of  $x$  that is 6 and discarding the negative value.

$$x = 6$$

$$x+1 = 7$$

$$x+2 = 8$$

The three consecutive numbers are 6, 7, and 8 respectively.

**Question 17: Sum of two numbers is 16. The sum of their reciprocal is  $13\frac{1}{3}$ . Find the numbers.**

**Solution:**

Given that the sum of the two natural numbers is 16

Let the two natural numbers be  $x$  and  $16-x$  respectively

According to the question

$$= \frac{1}{x} + \frac{1}{16-x} = 13\frac{1}{3}$$

$$= \frac{16-x+x}{x(16-x)} = 13\frac{1}{3}$$

$$= \frac{16}{x(16-x)} = 13\frac{1}{3}$$

$$= 16x - x^2 = 48$$

$$= -16x + x^2 + 48 = 0$$

$$= x^2 - 16x + 48 = 0$$

$$= x^2 - 12x - 4x + 48 = 0$$

$$= x(x-12) - 4(x-12) = 0$$

$$= (x-12)(x-4) = 0$$

Either  $x-12 = 0$  therefore  $x = 12$

Or,  $x-4 = 0$  therefore  $x = 4$

The two numbers are 4 and 12 respectively.

**Question 18: Determine the two consecutive multiples of 3 whose product is 270**

**Solution:**

Let the consecutive multiples of 3 are  $3x$  and  $3x+3$

According to the question

$$3x(3x+3) = 270$$

$$= x(3x+3) = 90$$

$$= 3x^2+3x = 90$$

$$= 3x^2+3x -90=0$$

$$= x^2+x -30=0$$

$$= x^2+6x-5x -30=0$$

$$= x(x+6)-5(x+6) = 0$$

$$= (x+6)(x-5) = 0$$

Either  $x+6 = 0$  therefore  $x=-6$

Or ,  $x-5 = 0$  therefore  $x=5$

Considering the positive value of  $x$

$$x=5$$

$$3x = 15$$

$$3x+3 = 18$$

The two consecutive multiples of 3 are 15 and 18 respectively.

**Question 19: The sum of a number and its reciprocal is  $174 \frac{17}{4}$  . find the numbers.**

**Solution:**

Let the number be  $x$

According to the question

$$x^2+1x = 174 \frac{x^2+1}{x} = \frac{17}{4}$$

$$= 4(x^2+1)=17x$$

$$= 4x^2+4-17x=0$$

$$= 4x^2+4-16x-x=0$$

$$= 4x(x-4)-1(x-4) =0$$

$$=(4x-1)(x-4) =0$$

Either  $x-4 =0$  therefore  $x=4$

Or,  $4x-1 =0$  therefore  $x = \frac{1}{4}$

The value of  $x$  is 4

**Question 20: A two digit is such that the products of its digits is 8 when 18 is subtracted from the number, the digits interchange their places. Find the number?**

**Solution:**

Let the digits be  $x$  and  $x-2$  respectively.

The product of the digits is 8

According to the question

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

$$= x^2-2x-8 =0$$

$$= x^2-4x+2x-8 =0$$

$$= x(x-4)+2(x-4) =0$$

Either  $x-4 =0$  therefore  $x=4$

Or ,  $x+2 =0$  therefore  $x= -2$

Considering the positive value of  $x = 4$

$$x-2 = 2$$

The two digit number is 42.

**Question 21: A two digit number is such that the product of the digits is 12, when 36 is added to the number, the digits interchange their places .find the number.**

**Solution:**

Let the tens digit be x

Then, the unit digit =  $12 \times \frac{12}{x}$

Therefore the number =  $10x + 12 \times 10 \times \frac{12}{x}$

And, the number obtained by interchanging the digits =  $x + 120 \times \frac{12}{x}$

=  $10x + 12 \times 36 = x + 120 \times 10 \times \frac{12}{x} + 36 = x + \frac{120}{x}$

=  $9x + 12 - 120 \times 36 = 0 \Rightarrow 9x + \frac{12 - 120}{x} + 36 = 0$

=  $9x^2 + 12 - 120x + 36x = 0 \Rightarrow \frac{9x^2 + 12 - 120x + 36x}{x} = 0$

=  $9x^2 - 108x + 36x = 0 \Rightarrow \frac{9x^2 - 108x + 36x}{x} = 0$

=  $9(x^2 - 12x + 4) = 0$

=  $(x^2 - 12x + 4) = 0$

=  $x^2 - 6x - 2x + 12 = 0$

=  $x(x - 6) - 2(x - 6) = 0$

=  $(x - 2)(x - 6) = 0$

Either  $x - 2 = 0$  therefore  $x = 2$

Or,  $x - 6 = 0$  therefore  $x = -6$

Since a digit can never be negative. So  $x = 2$

The number is 26.



**Question 22:** A two digit number is such that the product of the digits is 16 when 54 is subtracted from the number, the digits are interchanged. Find the number.

**Solution:**

Let the two digits be:

Tens digit be x

Units digit be  $16 \times \frac{16}{x}$

Numbers =  $10x + 16 \times 10 \times \frac{16}{x} \dots\dots\dots(i)$



Number obtained by interchanging =  $10(10x+16x)10(10x + \frac{16}{x})$

$$10x+16x \cdot 10x + \frac{16}{x} - 10(10x+16x)10(10x + \frac{16}{x}) = 54$$

$$= 10x^2+16-160+x^2 = 54$$

$$= 9x^2-54x-144= 0$$

$$= x^2-6x-16 = 0$$

$$= x^2-8x+2x-16 = 0$$

$$= x(x-8)+2(x-8) = 0$$

$$=(x-8)(x+2)=0$$

Either  $x-8 = 0$  therefore  $x=8$

Or,  $x+2 = 0$  therefore  $x = -2$

A digit can never be negative so  $x = 8$

Hence by putting the value of  $x$  in the above equation (i) the number is 82.

**Question 23: Two numbers differ by 3 and their product is 504. Find the numbers.**

**Solution:**

Let the numbers be  $x$  and  $x-3$  respectively.

According to the question

$$= x(x-3) = 504$$

$$= x^2-3x-504 = 0$$

$$= x^2-24x+21x-504 = 0$$

$$= x(x-24)+21(x-24) = 0$$

$$=(x-24)(x+21) = 0$$

Either  $x-24 = 0$  therefore  $x = 24$

Or,  $x+21 = 0$ , therefore  $x = -21$

$$x = 24 \text{ and } x = -21$$

$$x-3 = 21 \text{ and } x-3 = -24$$

The two numbers are 21 and 24 and -21 and -24 respectively.

**Question 24: Two numbers differ by 4 and their product is 192. Find the numbers.**

**Solution:**

Let the two numbers be  $x$  and  $x-4$  respectively

Given that the product of the numbers is 192

According to the question

$$= x(x-4) = 192$$

$$= x^2 - 4x - 192 = 0$$

$$= x^2 - 16x + 12x - 192 = 0$$

$$= x(x-16) + 12(x-16) = 0$$

$$= (x-16)(x+12) = 0$$

Either  $x-16=0$  therefore  $x=16$

Or,  $x+12=0$  therefore  $x=-12$

Considering only the positive value of  $x$

$$x=16$$

$$x-4=12$$

The two numbers are 12 and 16 respectively.

**Question 25: A two digit number is 4 times the sum of its digits and twice the product of its digits. Find the numbers.**

**Solution:**

Let the digit in the tens and the units place be  $x$  and  $y$  respectively.

Then it is represented by  $10x+y$

According to the question,

$$10x+y = 4(\text{sum of the digits}) \text{ and } 2xy$$

$$10x+y = 4(x+y) \text{ and } 10x+y = 2xy$$

$$10x+y = 4x+4y \text{ and } 10x+y = 2xy$$

$$6x-3y = 0 \text{ and } 10x+y-2xy = 0$$

$$y = 2x \text{ and } 10x + 2x - 2x(2x) = 0$$

$$12x = 4x^2$$

$$4x(x-3) = 0$$

Either  $4x=0$  therefore  $x=0$

Or,  $x-3=0$  therefore  $x=3$

We have  $y = 2x$

When  $x=3$ ,  $y=6$

**Question 26:** The sum of the squares of two positive integers is 208. If the square of the large number is 18 times the smaller. Find the numbers.

**Solution:**

Let the smaller number be  $x$

Then, square of the large number be  $= 18x$

Also, square of the smaller number be  $= x^2$

It is given that the sum of the square of the integer is 208.

Therefore,

$$= x^2 + 18x = 208$$

$$= x^2 + 18x - 208 = 0$$

Applying factorization theorem,

$$= x^2 + 26x - 8x - 208 = 0$$

$$= x(x+26) - 8(x+26) = 0$$

$$= (x+26)(x-8) = 0$$

Either  $x+26=0$  therefore  $x=-26$

Or,  $x-8=0$  therefore  $x=8$

Considering the positive number, therefore  $x=8$ .

Square of the largest number  $= 18x = 18 \cdot 8 = 144$

$$\text{Largest number} = \sqrt{144} = 12$$

Hence the numbers are 8 and 12 respectively.

**Question 27:** The sum of two numbers is 18. The sum of their reciprocal is  $14\frac{1}{4}$ . Find the numbers.

**Solution:**

Let the numbers be  $x$  and  $(18-x)$  respectively.

According to the given hypothesis,

$$x + 18 - x = 18 \quad \frac{1}{x} + \frac{1}{18-x} = 14\frac{1}{4} \quad 18 - x + x(18-x) = 14 \frac{18-x+x}{x(18-x)} = \frac{1}{4} \quad 18-x^2+18x = 14 \frac{18}{-x^2+18x} = \frac{1}{4}$$

$$= 72 = 18x - x^2$$

$$= x^2 - 18x + 72 = 0$$

Applying factorization theorem, we get,

$$= x^2 - 6x - 12x + 72 = 0$$

$$= x(x-6) - 12(x-6) = 0$$

$$= (x-6)(x-12) = 0$$

Either,  $x = 6$

Or,  $x = 12$

The two numbers are 6 and 12 respectively.

**Question 28:** The sum of two numbers  $a$  and  $b$  is 15 and the sum of their reciprocals  $\frac{1}{a}$  and  $\frac{1}{b}$  is  $310\frac{3}{10}$ . Find the numbers  $a$  and  $b$ .

**Solution:**

Let us assume a number  $x$  such that

$$x + 15 - x = 15 \quad \frac{1}{x} + \frac{1}{15-x} = 310\frac{3}{10} \quad 15 - x + x(15-x) = 310 \frac{15-x+x}{x(15-x)} = \frac{3}{10} \quad 1515x - x^2 = 310 \frac{15}{15x - x^2} = \frac{3}{10}$$

$$= 3x^2 - 45x + 150 = 0$$

$$= x^2 - 15x + 50 = 0$$

Applying factorization theorem,

$$= x^2 - 10x - 5x + 50 = 0$$

$$= x(x-10) - 5(x-10) = 0$$

$$= (x-10)(x-5) = 0$$

Either,  $x-10=0$  therefore  $x=10$

Or,  $x-5=0$  therefore  $x=5$

Case (i)

If  $x = a$ ,  $a=5$  and  $b=15-x$ ,  $b=10$

Case (ii)

If  $x = 15-a = 15-10 = 5$ ,

$x=a=10$ ,  $b=15-10=5$

Hence when  $a=5$ ,  $b=10$

$a=10$ ,  $b=5$

**Question 29:** The sum of two numbers is 9. The sum of their reciprocal is  $12\frac{1}{2}$ . Find the numbers.

**Solution:**

Given that the sum of the two numbers is 9

Let the two numbers be  $x$  and  $9-x$  respectively

According to the question

$$1/x + 1/(9-x) = 12\frac{1}{2}$$

$$= \frac{9-x+x}{x(9-x)} = 12\frac{1}{2}$$

$$= \frac{9}{9x-x^2} = 12\frac{1}{2}$$

$$= 9x-x^2 = 18$$

$$= x^2-9x+18 = 0$$

$$= x^2-6x-3x+18 = 0$$

$$= x(x-6)-3(x-6) = 0$$

$$= (x-6)(x-3) = 0$$

Either  $x-6=0$  therefore  $x=6$

Or  $x-3=0$  therefore  $x=3$

The two numbers are 3 and 6 respectively

**Question 30: Three consecutive positive integers are such that the sum of the squares of the first and the product of the other two is 46. Find the integers.**

**Solution:**

Let the consecutive positive integers be  $x$ ,  $x+1$ ,  $x+2$  respectively

According to the question

$$x^2+(x+1)(x+2) = 46$$

$$= x^2+x^2+3x+2 = 46$$

$$= 2x^2+3x+2 = 46$$

$$= 2x^2+3x+2-46=0$$

$$= 2x^2-8x+11x-44=0$$

$$= 2x(x-4)+11(x-4) = 0$$

$$= (x-4)(2x+11) = 0$$

Either  $x-4=0$  therefore  $x=4$

Or,  $2x+11=0$  therefore  $x = -\frac{11}{2}$

Considering the positive value of  $x$  that is  $x=4$

The three consecutive numbers are 4, 5 and 6 respectively

**Question 31: The difference of squares of two numbers is 88. If the large number is 5 less than the twice of the smaller, then find the two numbers**

**Solution:**

Let the smaller number be  $x$  and larger number is  $2x-5$

It is given that the difference of the squares of the number is 88

According to the question

$$(2x-5)^2 - x^2 = 88$$

$$= 4x^2 + 25 - 20x - x^2 = 88$$

$$= 3x^2 - 20x - 63 = 0$$

$$= 3x^2 - 27x + 7x - 63 = 0$$

$$= 3x(x-9) + 7(x-9) = 0$$

$$= (x-9)(3x+7) = 0$$

Either  $x-9 = 0$  therefore  $x=9$

$$\text{Or, } 3x+7 = 0 \text{ therefore } x = -\frac{7}{3}$$

Since a digit can never be negative so  $x=9$

Hence the number is  $2x-5 = 13$

The required numbers are 9 and 13 respectively

**Question 32: The difference of squares of two numbers is 180. The square of the smaller number is 8 times the larger number. Find the two numbers**

**Solution:**

Let the number be  $x$

According to the question

$$x^2 - 8x = 180$$

$$x^2 - 8x - 180 = 0$$

$$= x^2 + 10x - 18x - 180 = 0$$

$$= x(x+10) - 18(x-10) = 0$$

$$= (x-18)(x+10) = 0$$

Either  $x-18 = 0$  therefore  $x=18$

Or,  $x+10 = 0$  therefore  $x=-10$

Case (i)

$$x=18$$

$$8x=144$$

Larger number =  $\sqrt{144} = 12$   $\sqrt{144} = 12$

Case (ii)

$X = -10$

Square of the larger number  $8x = -80$

Here in this case no perfect square exist

Hence the numbers are 18 and 12 respectively .

