$5x = 7\sqrt{2}$

Date 12-6-21

1) Find the roots of the following quadratic equations by factorization:

i) $\sqrt{2}x^2 + 7x + 5\sqrt{2} = 0$

$\sqrt{2}x^2 + 2x + 5x + 5\sqrt{2} = 0$

$\sqrt{2}x(x + \sqrt{2}) + 5(x + \sqrt{2}) = 0$

$(\sqrt{2}x + 5)(x + \sqrt{2})$

$\sqrt{2}x = -5 \quad x = -\sqrt{2}$

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

ii) $2x^2 - x + \frac{1}{8} = 0$

$\frac{16x^2 - 8x + 1}{8} = 0$

$16x^2 - 8x + 1 = 0 \times 8$

$16x^2 - 8x + 1 = 0$

$16x^2 - 4x - 4x + 1 = 0$

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

$(4x - 1)(4x - 1)$

$4x = 1 \quad 4x = 1$

$x = \frac{1}{4} \quad x = \frac{1}{4}$

iv) $100x^2 - 20x + 1 = 0$

$10x^2 - 10x - 10x + 1$

$10x(10x-1) - 1(10x-1)$

$(10x-1)(10x-1)$

$10x = 1 \quad 10x = 1$

$x = \frac{1}{10} \quad x = \frac{1}{10}$

2) John and Jivanti together have 45 marbles. Both of them lost 5 marbles each and the product of the number of marbles they now have is 124, we would like to find out how many marbles they had to start with.

Ans: Total no of marbles with John = x

After losing 5 marbles John is having $x-5$

After losing 5 marbles Frank is having $45-x-5$

$= 40-x$

$(x-5)(40-x) = 124$

$x(40-x) - 5(40-x) = 124$

$40x - x^2 - 200 + 5x = 124$

$40x + 5x - x^2 - 200 - 124$

$45x - x^2 - 324$

$-x^2 + 45x - 324$

$-x^2 + 9x + 36x - 324$

$-x(x-9) + 36(x-9)$

$(-x+36)(x-9)$

3 | 324
3 | 108
2 | 54
3 | 27
3 | 9
3 | 3

John having $x-5 = 9-5 = 4$ (if $x=9$)

Q) A toy industry produces certain number of toys in a day. The cost of production of each toy (in rupees) was found to be 55 minus the number of toys produced in a day. On a particular day, the total cost of production was 750. We would like to find out the number of toys produced on that day.

Ans) Let the total no of toys produced on that day be x

The cost of production of each toy on that day is $55-x$

$$x(55-x) = 750$$

$$55x - x^2 = 750$$

$$-x^2 + 55x - 750 = 0$$

$$x^2 - 55x + 750 = 0$$

3) Find two numbers whose sum is 27 and product is 182.

Ans) If one no is x

Then the other no = $27-x$

Product = 182

$x(27-x) = 182$

$27x - x^2 = 182$

$-x^2 + 27x - 182 = 0$

$x^2 - 27x + 182 = 0$

$x^2 - 14x - 13x + 182 = 0$

$x(x-14) - 13(x-14)$

$(x-13)(x-14)$

$x = 13 \quad x = 14$

If x is 13 then the other no is 14

If x is 14 then the other no is 13

$$\begin{array}{r|l} 2 & 182 \\ \hline 7 & 91 \\ \hline & 13 \end{array}$$

4) Find two consecutive positive integers, sum of whose squares is 365.

Ans) Let one no be x

The other consecutive positive integer be $x+1$

$$x^2 + (x+1)^2 = 365$$

$$x^2 + x^2 + 1 + 2x = 365$$

$$2x^2 + 1 + 2x = 365$$

$$2x^2 + 2x - 364 = 0$$

$$2x^2 + 28x - 26x - 364 = 0$$

$$2x(x+14) - 26(x+14) = 0$$

$$(2x-26)(x+14)$$

$$x = 14, \quad x = -14$$

$2 \mid 728$
$2 \mid 364$
$2 \mid 182$
$7 \mid 91$
13

The consecutive positive integers are 14 and 15

5) The altitude of a right triangle is 7cm less than its base. If the hypotenuse is 13cm, find the other two sides.

Ans) Let base = x height = $x-7$cm

hypotenous side = 13cm

By Pythagoras Theorem

$h^2 = (base)^2 + (height)^2$

$(base)^2 + (height)^2 = h^2$

$x^2 + (x-7)^2 = 13^2$

$x^2 + (x^2 - 14x + 49) = 169$

$2x^2 - 14x - 120 = 0$

$2x^2 - 24x + 10x - 120 = 0$

$2x(x-12) + 10(x-12)$

$(2x+10)(x-12)$

$x = 12$

base = 12cm

height = $12-7 = 5$cm

2 | 250
2 | 125
5 | 25
5 | 5
1

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6) A cottage industry produces a certain number of toys in a day. The cost of production of each toy (in rupees) was found to be 55 minus the number of toys produced in a day. On a particular day the total cost of production was 750. We would like to find out the no of toys produced in a day. Let x no of toys produced in a day be x toys produced on that day.

Ans)

Cost of 1 toy = 55 - x

ATQ total cost = 750

$x(55-x) = 750$

$\Rightarrow -x^2 + 55x - 750 = 0$

$\Rightarrow x^2 - 55x + 750 = 0$

The number of toys produced that day satisfies the quadratic equation $x^2 - 55x + 750 = 0$ which is the required representation of the problem mathematically.