2. Solve the problems given in Example 1.

22.i) The no. of Marbles left with Jivanti, when she lost 5 Marbles $= 4x - x - 5 = 40 - x$.

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

$\Rightarrow 40x - x^2 - 200 + 5x = 124$.

$\Rightarrow x^2 - 45x + 324 = 0$.

$\Rightarrow x^2 - 3x - 9x + 324 = 0$

$\Rightarrow x(x-36) - 9(x-36) = 0$.

$\Rightarrow (x-9)(x-36) = 0$.

$\Rightarrow x - 9 = 0 \;/\; x - 36 = 0$.

$\Rightarrow x = 9$ or $x = 36$.

no. of marbles they had to start with 9 & 36.

ii) Let the no. of toys produced in a day be x.

Then, Cost of production of each toy on day $= ₹(55-x)$.

Total cost of production on that day $= x(55-x)$.

$x(55-x) = 750$.

$\Rightarrow 55x - x^2 = 750$.

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

$\Rightarrow x^2 - 25x - 30x + 750 = 0$

$\Rightarrow x(x-25) - 30(x-25) = 0$.

$\Rightarrow (x-30)(x-25) = 0$.

$\Rightarrow x - 30 = 0$ or $x - 25 = 0$.

$\Rightarrow x = 30$ or $x = 25$.

$\therefore$ no. of toys produced on that day was 25 / 30.

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

Q3. Let the first no. be x, then another no. will be $27-x$.

$x(27-x) = 182$.

$\rightarrow 27x - x^2 = 182$.

$\rightarrow 27x - x^2 = 182$.

$\rightarrow x^2 - 14x - 13x + 182 = 0$.

$\rightarrow (x-14)(x-13) = 0$.

$\rightarrow x = 14$ or $x = 13$.

$\therefore$ the required no. are 13 & 14.

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

Q no. 4 ÷

Let the 2 consecutive Integers be x and $x+1$.

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

$\Rightarrow x^2 + x^2 + 2x + 1 = 365$.

$\Rightarrow 2x^2 + 2x - 364 = 0$.

$\Rightarrow x^2 + x - 182 = 0$.

Q no. 4 ⇒ $x^2 + 14x - 13x - 182 = 0$. ⇒ $x(x+14) - 13(x+14) = 0$

⇒ $(x-13)(x+14) = 0$.

⇒ $x = 13, -14$.

(-14 is rejected because it's a negative Integer).

Hence, the 2 consecutive positive Integers are 13 & $13+1 = 14$.

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

Q no. 5 → Let the base of right triangle be x cm.

Then, altitude of right triangle will be $(x-7)$ cm.

Hypotenuse = 13 cm.

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

$$\Rightarrow 169 = x^2 + x^2 - 14x + 49.$$

$$\Rightarrow 2x^2 - 14x - 120 = 0.$$

$$\Rightarrow x^2 - 7x - 60 = 0$$

$$\Rightarrow x^2 - 12x + 5x - 60 = 0.$$

$$\Rightarrow (x-12)(x+5) = 0.$$

$$\Rightarrow x = 12. \quad \text{or } x = -5.$$

∴ Hence, the base of right triangle is 12 cm. & Its altitude is $12 - 7 = 5$ cm.

6. A cottage industry produces a certain number of pottery articles in a day. It was observed on a particular day that the cost of production of each article (in rupees) was 3 more than twice the number of articles produced on that day. If the total cost of production on that day was ₹ 90, find the number of articles produced and the cost of each article.

Q no. 6 ⇒ Let the no. of pottery article produced in a day = x.

Cost of production of each article = $₹\frac{90}{x}$.

$$2x + 3 = \frac{90}{x}.$$

$\Rightarrow 2x(2x+3) = 30.$

$\Rightarrow 2x^2 + 3x - 90 = 0.$

$\Rightarrow 2x(2x+15) - 6(2x+15) = 0.$

$\Rightarrow 2x^2 + 3x = 90.$

$\Rightarrow 2x^2 + 15x - 12x - 90 = 0.$

$\Rightarrow (2x+15)(x-6) = 0.$

$\Rightarrow 2x = -15$ or $x - 6 = 0.$

$\Rightarrow x = -\frac{15}{2}$ or $x = 6.$

∴ No. of articles produced per day = 6.

Cost of production of each article = $\frac{90}{6} = ₹15.$