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(Q) (i) Let the no. of marbles john have be x
No. of marbles jivanti have $= 45-x$

After losing 5 marbles each,

No. of marbles john have $= x-5$
No. of marbles jivanti have $= 45-x-5$
$= 40-x$

A/q
$(x-5)(40-x) = 124$
$\Rightarrow x^2 - 45x + 324 = 0$
$\Rightarrow x^2 - 36x - 9x + 324 = 0$
$\Rightarrow x(x-36) - 9(x-36) = 0$
$\Rightarrow (x-36)(x-9) = 0$

Therefore,
$x - 36 = 0$ $\quad$ $x-9 = 0$
$\Rightarrow x = 36$ $\quad$ $\Rightarrow x = 9$

Therefore,
If john have 36 marbles
jivanti will have $45-36 = 9$ marbles.

And if,

John will have 9 marbles
jivanti will have $45-9 = 36$ marbles.

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(ii) Let the no. of toys produced in a day be x
cost of production of each toy = ₹$(55-x)$

A/q

$$x(55-x) = 750$$
$$\Rightarrow x^2 - 55x + 750 = 0$$
$$\Rightarrow x^2 - 25x - 30x + 750 = 0$$
$$\Rightarrow x(x-25) - 30(x-25) = 0$$
$$\Rightarrow (x-25)(x-30) = 0.$$

Therefore,

$x - 25 = 0$ $\qquad$ $x - 30 = 0$

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

∴ Hence, the no. of toys produced will be either 25 or 30.

(3) Let the first no. be x and
second number be $27 - x$

A/q
$$x(27-x) = 182$$
$$\Rightarrow \cancel{x^2} - 27x - x^2 = 182$$
$$\Rightarrow x^2 - 27x + 182 = 0$$
$$\Rightarrow x^2 - 14x - 13x + 182 = 0$$
$$\Rightarrow x(x-14) - 13(x-14) = 0$$
$$\Rightarrow (x-14)(x-13) = 0$$

Therefore,

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$x - 14 = 0$ $\Rightarrow x = 14$

$x - 13 = 0$ $\Rightarrow x = 13$

So the required no. are 13 and 14.

(4) Let the two consecutive positive integers be x and $x+1$

A/q

$$x^2 + (x+1)^2 = 365$$
$$\Rightarrow x^2 + x^2 + 1 + 2x = 365$$
$$\Rightarrow 2x^2 + 2x - 364 = 0$$
$$\Rightarrow x^2 + x - 182 = 0$$
$$\Rightarrow x^2 + 14x - 13x - 182 = 0$$
$$\Rightarrow x(x+14) - 13(x+14) = 0$$
$$\Rightarrow (x+14)(x-13) = 0$$

Therefore.

$x + 14 = 0$ $\Rightarrow x = -14$

$x - 13 = 0$ $\Rightarrow x = 13$

i.e. The integer can be positive so ~~th~~ x will be 13 only.

i.e. $x + 1 = 13 + 1 = 14$.

i.e. The two consecutive positive numbers will be 13 and 14.

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5) Let the base of the right Δ be x cm
the altitude of the right Δ be $(x-7)$ cm

A/q

$$x^2 + \cancel{(x-7)} (x-7)^2 = 13^2$$
$$\Rightarrow x^2 + x^2 + 49 - 14x = 169$$
$$\Rightarrow 2x - 14x - 120 = 0$$
$$\Rightarrow x^2 - 7x - 60 = 0$$
$$\Rightarrow x^2 - 12x + 5x - 60 = 0$$
$$\Rightarrow x(x-12) + 5(x-12) = 0$$
$$\Rightarrow (x-12)(x+5) = 0$$

Therefore,

$x - 12 = 0$ $\Rightarrow x = 12$

$x + 5 = 0$ $\Rightarrow x = -5$

∵ Since sides cannot be (-ve), so x will be 12cm only.

∴ Therefore the base of the Δ is 12cm and altitude will be $(12-7)$ cm $= 5$ cm.

(6) Let the no. of articles produced be x
Cost of production of each article $= ₹(2x+3)$

A/q

$$x(2x+3) = 90$$
$$\Rightarrow 2x^2 + 3x - 90 = 0$$
$$\Rightarrow 2x^2 + 15x - 12x - 90 = 0$$
$$\Rightarrow x(2x+15) - 6(2x+15) = 0$$

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

Therefore,

$2x+15=0$

$\Rightarrow x = \frac{-15}{2}$

$x-6=0$

$\Rightarrow x=6.$

$\because$ As the no. of article produced cannot be in fraction so x can be 6 only.

$\therefore$ Hence, no. of articles produced $=6$

cost of each article $= ₹(2x+3)$

$= ₹(2\times 6+3)$

$= ₹15.$