$\Rightarrow$ $3x^2 - 24x + 3840 = 0$

$\Rightarrow$ $x^2 - 8x + 1280 = 0$

Speed x time = distance.

EXERCISE - 4.2

(1) (i) $x^2 - 3x - 10$

$\Rightarrow$ $x^2 - 5x + 2x - 10$

$\Rightarrow$ $x(x-5) + 2(x-5)$

$\Rightarrow$ $(x-5)(x+2)$

(ii) Roots of this equation are the values for $(x-5)(x+2) = 0$

$\therefore$, $x - 5 = 0$ or $x + 2 = 0$

(ii) $2x^2 + x - 6 = 0$

$\Rightarrow$ $2x^2 + 4x - 3x - 6$

$\Rightarrow$ $2x(x+2) - 3(x+2)$

$\Rightarrow$ $(2x-3)(x+2) = 0$

$\therefore$, $x = \frac{3}{2}$ or $x = (-2)$

~~2x-3~~

2×1
2×3
6 2
4 -3

$\sqrt{2}$
$5 \times \sqrt{2}$

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

$\Rightarrow$ $\sqrt{2}x^2 + 5x + 2x + 5\sqrt{2}$

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

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

$x = -\frac{5}{\sqrt{2}}$; $x = (-\sqrt{2})$

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

$\Rightarrow \frac{1}{8}(16x^2 - 8x + 1)$

$= \frac{1}{8}(16x^2 - 4x - 4x + 1)$

$= \frac{1}{8}[4x(4x-1) - 1(4x-1)]$

$= \frac{1}{8}(4x-1)^2$

Therefore, $(4x-1) = 0$ or $(4x-1) = 0$

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

(v) $100x^2 - 20x + 1$

$\Rightarrow 100x^2 - 10x - 10x + 1$

$\Rightarrow 10x(10x-1) - 1(10x-1)$

$= (10x-1)^2$

Therefore, $(10x-1) = 0$ or $(10x-1) = 0$

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

2 (i) Let the no. of John's marbles be 'x'.

Therefore, no. of Jivanti's marble $= 45 - x$

After losing 5 marbles

No. of John's marble $= x - 5$

No. of Jivanti's marbles $= 45 - x - 5 = 40 - x$

It is given that the product of their marbles is 124.

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

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

$\Rightarrow x^2 - 36x - 9x + 324 = 0$

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

If the no. of John's marbles = 36,
Then, no. of Jivanti's marbles = 45 − 36
= 9

(ii) Let the no. of toys produced be x.

∴, cost of production of each toy = ₹ $(55 - x)$

It is given that, total production of the toys = ₹ 750

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

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

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

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

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

$x = 25$ or $x = 30$

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

(3) $x(27 - x) = 182$

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

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

1st no. = 13, then
Other no. = 14, Other no. = 27 − 14 = 13

Therefore, the no.s are 13 & 14.

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

~~$x^2 + x$~~ $\Rightarrow x^2 + x^2 + 1 + 2x = 365 \Rightarrow x^2 + x - 182 = 0$

$\Rightarrow (x + 14)(x - 13) = 0$

~~Therefore two cases~~

Either $x + 14 = 0$ or $x - 13 = 0$,

$x = (-14)$ or $x = 13$

Since, the integers are positive, x can only be 13.

∴, $x + 1 = 13 + 1 = 14$

Therefore, two consecutive integers will be ~~are~~ 13 and 14.

(5) Let the base be x ~~on~~ So, altitude of the $\Delta = (x-7)$
By pythagoras theorem.
$x^2 + (x-7)^2 = 13$
$\Rightarrow x^2 + x^2 + 49 - 14x = 169 \Rightarrow 2x^2 - 14x - 120 = 0$
$\Rightarrow x^2 - 7x - 60 = 0 \quad \Rightarrow x^2 - 12x + 5x - 60 = 0$
$\Rightarrow x(x-12) + 5(x-12) = 0$
$\Rightarrow (x-12)(x+5) = 0$
Therefore, the base of the given Δ is 12 cm
triangle will be $(12-7)$ cm
$= 5$ cm.

(6) Let the number of articles be x
Price of the article $= 2x+3$

~~no. of articles~~
price of article.

A/Q $\quad x \times (2x+3) = 90$
$\Rightarrow 2x^2 + 3x = 90$
$\Rightarrow 2x^2 + 3x - 90 = 0$
$\Rightarrow 2x^2 - 12x + 15x - 90 = 0$
$\Rightarrow 2x(x-6) + 15(x-6) = 0$
$(2x+15)(x-6) = 0$
$x = \frac{15}{2}, x = 6$

$\therefore$ No. of articles produced is 6.
The cost of each article $= 2x+3$
$= 2 \times 6 + 3$
$= 12 + 3$
$= ₹ 15.$