Quadratic Eqn

Max power = 2

$$ax^2 + bx + c = 0$$

Method to solve

- Factorisation Method
- Quadratic formula Method
- Completing square Method ✗

Factorisation Method   Ex - 4.2

① $2x^2 + x - 6 = 0$

$2x^2 + (4-3)x - 6 = 0$

$2x^2 + 4x - 3x - 6 = 0$

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

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

$$x+2=0 \qquad 2x-3=0$$

$$x=-2 \qquad x=\frac{3}{2}$$

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

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

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

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

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

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

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

$$4x-1=0 \qquad 4x-1=0$$

$$\boxed{x=\frac{1}{4}} \qquad \boxed{x=\frac{1}{4}}$$

Word problem - 4.2

(3)

Suppose no = x, y

$$x + y = 27 \quad -(i) \rightarrow \quad y = 27 - x$$

$$xy = 182 \quad +(ii)$$

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

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

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

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

$$\begin{array}{c|c} 2 & 182 \\ \hline 7 & 91 \\ \hline 13 & 13 \\ \hline & 1 \end{array}$$

Sol⁻

(4) Two Consecutive no = $x, x+1$

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

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

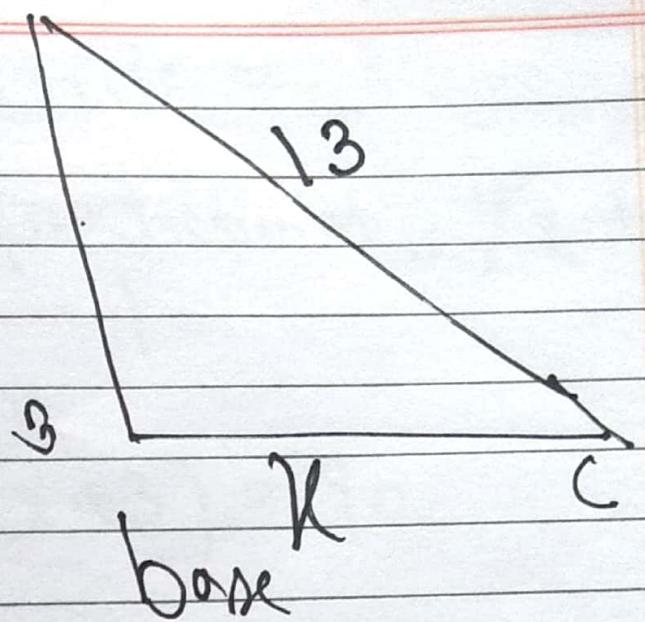$$2x^2 + 2x - 364 = 0 \quad \div \; by \; 2$$

$$x^2 + 1x - 182 = 0$$

$$x^2 + (14 - 13)x - 142 = 0$$

Suppose base = x

altitude $x-7$

by P.T

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

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

$$2x^2 - 14x - 120 = 0 \quad \div by$$

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

$$x^2 - (12-5)x - 6 = 0$$

(6)

No. of article $= X$

Cost of production of $= 2x + 3$

1

Total Cost

$$x(2x+3) = 90$$

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

factor

Quadratic formula- for $ax^2 + bx + c = 0$

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

Ex- $1\underset{a}{x^2} - \underset{b}{2x} + \underset{c}{3} = 0$

$$x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4 \times 1 \times 3}}{2 \times 1}$$

$$= \frac{2 \pm \sqrt{4 + 12}}{2} = \frac{2 \pm 4}{2}$$

$x = \frac{2+4}{2}$

$x = \frac{6}{2} = 3$ $\qquad$ $x = \frac{2-4}{2} = -\frac{2}{2} = -1$

Word problem - 4.3

4. Suppose present Rehman age $= x$

Age 3 yrs ago $= x-3$

" 5 yrs now $= x+5$

So $\dfrac{1}{x-3} + \dfrac{1}{x+5} = \dfrac{1}{3}$

$$\dfrac{x+5 + x-3}{(x-3)(x+5)} \rightarrow \dfrac{1}{3}$$

So $x^2 + 5x - 3x - 15 = (2x + 2) \times 3$

$x^2 + 2x - 15 = 6x + 6$

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

Now Simplify

5. Marks in maths $= x$

" " Eng $= 30 - x$

$(x+2)(27-x) = 210$

$27x - x^2 + 54 - 2x - 210 = 0$

$-x^2 + 25x - 156 = 0$

So $x^2 - 25x + 156 = 0$

$x^2 - (12 + 13)x + 156 = 0$

Simplify self
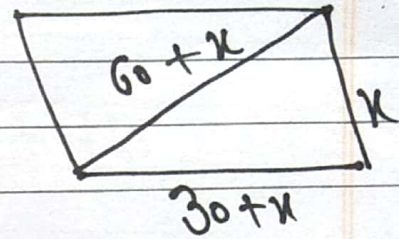
(6) Suppose

Shorter Side = x

diagonal = $60 + x$

$60 + x$

x

$30 + x$

longer Side = $30 + x$

by Pythagoras

$$(60 + x)^2 = x^2 + (30 + x)^2$$

$$3600 + x^2 + 120x = x^2 + 900 + x^2 + 60x$$

$$x^2 - 60x - 2700 = 0$$

Simplify

(7) Suppose Larger no = x

Smaller no = y

$$x^2 - y^2 = 180 \quad -(i)$$

And

$$y^2 = 8x$$

So

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

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

Simplify by any

Method

Suppose

⑧ Speed of train = x km/hr
new speed
$$= (x+5) \text{ km/hr}$$
distance = 360 km

time = distance/speed

$$\frac{360}{x} - \frac{360}{x+5} = 1$$

Now Simplify

⑨ Suppose smaller tank take = x hr
larger " " = $(x-10)$ hr

Total time = $9\frac{3}{8} = \frac{75}{8}$ hr

we take part for 1 hour

$$\frac{1}{x} + \frac{1}{x-10} = \frac{8}{75}$$

$$\frac{x-10+x}{x(x-10)} = \frac{8}{75}$$

$$8x^2 - 80x = 150x - 750$$

$$8x^2 - 230x + 750 = 0$$

$\div$ by 2

Simplify $\quad 4x^2 - 115x + 375 = 0$

(10)

Suppose Speed of Passenger = x

' Speed " Express = $(x+11)$ km/hr

distance = 132 km

$t = d/v$

$$\frac{132}{x} - \frac{132}{x+11} = 1$$

Simplify

(11) Suppose Side of Ist Squar = x

Perimeter " = $4x$

Side = $\frac{\text{Perimeter}}{4}$

" of IInd = $24 + 4x$

Side of IInd = $\frac{24 + 4x}{4}$

$= \frac{4(6+x)}{4}$ = $6+x$

Sum of area

$$x^2 + (6+x)^2 = 468$$

$$x^2 + 36 + x^2 + 12x - 468 = 0$$

$$2x^2 + 12x - 432 = 0 \qquad \div by\, 2$$

$$x^2 + 6x - 216 = 0$$

$x^2 \times (18 - 12)x$
$-216 = 0$

Simplify