Excercise 4.3.

(1). i) $2\left[x^2 - \frac{7}{2}x + \frac{3}{2}\right] = 0$

$= x^2 - \frac{7}{2}x + \frac{3}{2} = 0$

$= (x)^2 - \left[\frac{7}{2}\right]x + \left[\frac{7}{4}\right]^2 - \left[\frac{7}{4}\right]^2 + \frac{3}{2} = 0$

$= \left[x - \frac{7}{4}\right]^2 - \left[\frac{49}{16} - \frac{3}{2}\right] = 0$

$= \left[x - \frac{7}{4}\right]^2 - \left[\frac{49 - 24}{16}\right] = 0$

$= \left[x - \frac{7}{4}\right]^2 - \left[\frac{25}{16}\right] = 0$

$= \left[x - \frac{7}{4}\right]^2 - \left[\frac{5}{4}\right]^2 = 0$

$= \left[x - \frac{7}{4} + \frac{5}{4}\right]\left[x - \frac{7}{4} - \frac{5}{4}\right] = 0$

$= \left[x - \frac{12}{4}\right]\left[x - \frac{2}{4}\right] = 0$

$= (x - 3)\left[x - \frac{1}{2}\right] = 0$

$= x = 3 \quad , \quad x = \frac{1}{2}.$

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

$x^2 + \frac{x}{2} + \left[\frac{1}{4}\right]^2 - \left[\frac{1}{4}\right]^2 + 2 = 0$

$= \left[x + \frac{1}{4}\right]^2 - \left[\frac{1}{16} - 2\right] = 0$

$= \left[x + \frac{1}{4}\right]^2 - \left[\frac{\sqrt{(-31)}}{4}\right]^2 = 0$

= roots do not exist.

2. i) $a = 2, \quad b = -7, \quad c = 3.$

$D = b^2 - 4ac$

$= (-7)^2 - 4 \times 2 \times 3$

$= 49 - 24 = 25.$

$D > 0.$

$\alpha = \frac{-(-7) + \sqrt{25}}{2 \times 2} = \frac{7+5}{4} = \frac{12}{4} = 3.$

$\beta = \frac{-(-7) - \sqrt{25}}{2 \times 2} = \frac{7-5}{4} = \frac{2}{4} = \frac{1}{2}.$

Roots are 3 and 1/2.

ii) $a = 2, \quad b = 1, \quad c = -4.$

$D = b^2 - 4ac$

$= (1)^2 - 4 \times 2(-4)$

$= 1 + 32 = 33$

$D > 0.$

$\alpha = \frac{-1 + \sqrt{33}}{4}$

$\beta = \frac{-b - \sqrt{D}}{2a} = \frac{-1 - \sqrt{33}}{4}$

$\Rightarrow \frac{-1 + \sqrt{33}}{4}, \frac{-1 - \sqrt{33}}{4}.$

3. $x - \frac{1}{x} = 3$

$\Rightarrow x^2 - 1 = 3x$

$= x^2 - 3x - 1 = 0$

$= a = 1, b = -3, c = -1.$

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

$$= \frac{3 \pm \sqrt{9+4}}{2} = \frac{3 \pm \sqrt{13}}{2}$$

$$x = \frac{3 + \sqrt{13}}{2}$$

$$x = \frac{3 - \sqrt{13}}{2}$$

4. Let present age of rehman be x yrs.
3yr ago rehman age was $= (x-3)$ yr.
5yr from rehmans age $= (x+5)$ yr.
ATQ/

$$\frac{1}{x-3} + \frac{1}{x+5} = \frac{1}{3}$$

$$= \frac{x+5+x-3}{(x-3)(x-5)} = \frac{1}{3}$$

$$= \frac{2x+2}{x^2+2x-15} = \frac{1}{3}$$

$= 6x + 6 = x^2 + 2x - 15 \Rightarrow x^2 - 4x - 21 = 0.$

$= x^2 - 7x + 3x - 21 = 0 \Rightarrow x(x-7) + 3(x-7) = 0$

$= x + 3 = 0, \quad x - 7 = 0.$

$= x = 7 \text{ or } -3.$

Rehman's present age is 7 yrs.

°in maths

5. Let shefali's marks be x.
marks in english be 30 − x.

ATQ,

$(x+2)(30-x-3) = 210$

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

$-x^2 + 25x + 54 = 210$

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

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

$(x-12)(x-13) = 0$.

$x = 12, 13$.

Marks in maths = 30 − 12 = 18.
Marks in english = 30 − 13 = 17.

6. Shorter side be x m.
longer side = (x + 30)
Daigonal = (x + 60) m.

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

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

$= x^2 - 90x + 30x - 2700 = 0$

$= x(x-90) + 30(x-90) = 0$

$= (x+30)(x-90) = 0$.

$= x + 30 = 0 \quad | \quad x - 90 = 0$.

$= x = -30$. or $x = 90$.

= Shorter = 90 m

= longer = 90 + 30

= 120 m.