Exercise 4.4

1.

(i) $2x^2 - 3x + 5 = 0$

$a = 2 \quad b = -3 \quad c = 5$

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

$= \frac{-(-3) \pm \sqrt{(3)^2 - 4(2)(5)}}{2(2)}$

$= \frac{3 \pm \sqrt{9 - 40}}{4}$

$= \frac{3 \pm \sqrt{-31}}{4}$

$a = \frac{3 + \sqrt{31}}{4} \qquad b = \frac{3 - \sqrt{31}}{4}$

No real roots

(ii) $3x^2 - 4\sqrt{3}x + 4 = 0$

$a = 3 \quad b = -4\sqrt{3} \quad c = 4$

$D = b^2 - 4ac$

$= (-4\sqrt{3})^2 - (4)(3)(4)$

$= 48 - 48$

$= 0$

two equal roots

$= \frac{-b \pm \sqrt{D}}{2a}$

$= \frac{-b \pm 0}{2} =$

$= \frac{-(-4\sqrt{3}) \pm 0}{2(3)} \qquad \frac{\pm 4\sqrt{3}}{6} =$

$= \frac{4\sqrt{3} \pm 0}{2} \qquad a = \frac{24}{2} = 24 \qquad b = \frac{24}{-24}$

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

$a = 2 \quad b = -6 \quad c = 3$

$D = b^2 - 4ac$

$= (-6)^2 - (4)(2)(3)$

$= 36 - 24$

$= 12$

$$\frac{-b^2 \pm \sqrt{12}}{2(2)}$$

$$\frac{-(-6) \pm \sqrt{12}}{4}$$

$$= \frac{6 \pm \sqrt{12}}{4}$$

$$= a = \frac{6 + \sqrt{12}}{4} \qquad b = \frac{3 - \sqrt{3}}{}$$

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

3. $2x^2 + kx + 3 = 0$

$a = 2 \quad b = k \quad c = 3$

$D = b^2 - 4ac$

$= k^2 - 4(2)(3)$

$= k^2 - 24$

For equal

$D = 0$

$\Rightarrow k^2 - 24 = 0$

$\Rightarrow k^2 = 24$

$\Rightarrow k = \pm\sqrt{24}$

$\Rightarrow k = \pm\sqrt{24}$

$\Rightarrow k = \pm 2\sqrt{6}$

$\Rightarrow k = \pm 2\sqrt{6}$

(4) $kx(x-2) + 6 = 0$

$kx^2 - 2kx + 6 = 0$

$a = k \quad b = -2k \quad c = 6$

$D = b^2 - 4ac$

$= (-2k)^2 - (4)(k)(6)$

$= 4k^2 - 24k$

For equal:

$D = 0$

$\Rightarrow 4k^2 - 24k = 0$

$\Rightarrow k(4k - 24) = 0$

$\Rightarrow k = 0$ or $4k - 24 = 0$

$\Rightarrow 4k = 24$

$\Rightarrow k = \frac{24}{4}$

$\Rightarrow k = 6$

So k cannot be 0 $k = 6$

3 Let the length = 2x
Let the breadth = x

area = 800 m²

l × b = area

For
x × 2x = 800
2x² = 800
x² = 400
x = √400
x = 20

breadth x = 20 cm
length = 2 × 20 = 40 cm

4 Let the present age of one is = x
Let the present age of other = (x - 20)

Four years ago = x - 4
other = x - 20 - 4
= x - 24

(x - 4)(x - 24) = 48
⇒ x(x - 24) - 4(x - 24) = 48
⇒ x² - 24x - 4x - 96 = 48
⇒ x² - 20x - 96 = 49
⇒ x² - 20x - 96 - 49 = 0
⇒ x² - 20x - 145 = 0

a = 1 b = −20 c = −145

$D = b^2 - 4ac$

$= (-20)^2 - (4)(1)(-145)$

$= 400 + 580$

$= 980$

$x = \frac{-b \pm \sqrt{980}}{2a}$

$= \frac{-(-20) \pm \sqrt{980}}{2a}$

$= \frac{20 \pm \sqrt{980}}{2}$

$= \frac{20 \pm 14\sqrt{5}}{2}$

No it is not possible

5) Perimeter = 80cm

~~dot~~ area = 400m.

let ~~one~~ length = x

breadth = 80 − x

area = (x)(80 − x) = 400

$= -x^2 + 80x = 400$

$= -x^2 + 80x - 400 = 0$

$= -(x^2 - 80x + 400) = 0$

$x^2 - 80x + 400 = 0$

$x^2 - 80x + 400$

$a = 1 \quad b = -80 \quad c = 400$

$D = b^2 - 4ac$

$= (-80)^2 - (4)(1)(400)$

$= 6400 - 1600$

$= 4800$

$$x = \frac{-b \pm \sqrt{4800}}{2(1)}$$

$$x = \frac{-(-80) \pm 40\sqrt{3}}{2}$$

$$= \frac{80 \pm 40\sqrt{3}}{2}$$

$$= \frac{40(2 + \sqrt{3})}{2}$$

$$x = 20(2 + \sqrt{3})$$

Yes $a = 20 \quad b = 20$