quadratic equation is the equation of the form , where $a \neq 0$.

Therefore, in equation $kx^2 - 2kx + 6 = 0$, we cannot have k = 0.

Therefore, we discard k = 0.

Hence the answer is k = 6.

Q3. Is it possible to design a rectangular mango grove whose length is twice its breadth, and the area is $\mathbf{800}\,m^2$. If so, find its length and breadth.

Ans. Let breadth of rectangular mango grove = x metres

Let length of rectangular mango grove = $2x$ metres

Area of rectangle = $length \times breadth$ = $x \times 2x = 2x^2\ m^2$

According to given condition:

$2x^2 = 800$

$\Rightarrow 2x^2 - 800 = 0 \Rightarrow x^2 - 400 = 0$

Comparing equation $x^2 - 400 = 0$ with general form of quadratic equation $ax^2 + bx + c = 0$, we get $a = 1$, $b = 0$ and $c = -400$

Discriminant $= b^2 - 4ac = (0)^2 - 4\ (1)\ (-400) = 1600$

Discriminant is greater than 0 means that equation has two disctinct real roots.

Therefore, it is possible to design a rectangular grove.

Applying quadratic formula, $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ to solve equation,

$$x = \frac{0 \pm \sqrt{1600}}{2 \times 1} = \frac{\pm 40}{2} = \pm 20$$

$\Rightarrow x = 20, -20$

We discard negative value of x because breadth of rectangle cannot be in negative.

Therefore, x = breadth of rectangle = 20 metres

Length of rectangle = $2x = 2 \times 20 = 40$ metres

Q4. Is the following situation possible? If so, determine their present ages.

The sum of the ages of two friends is 20 years. Four years ago, the product of their ages in years was 48.

Ans. Let age of first friend = x years and let age of second friend = $(20 - x)$ years

Four years ago, age of first friend = $(x - 4)$ years

Four years ago, age of second friend = $(20 - x) - 4 = (16 - x)$ years

According to given condition,

$(x - 4)(16 - x) = 48$

$\Rightarrow 16x - x^2 - 64 + 4x = 48$

$\Rightarrow 20x - x^2 - 112 = 0$

$\Rightarrow x^2 - 20x + 112 = 0$

Comparing equation, $x^2 - 20x + 112 = 0$ with general quadratic equation $ax^2 + bx + c = 0$, we get $a = 1$, $b = -20$ and $c = 112$

Discriminant $= b^2 - 4ac = (-20)^2 - 4(1)(112) = 400 - 448 = -48 < 0$

Discriminant is less than zero which means we have no real roots for this equation.

Therefore, the give situation is not possible.

Q5. Is it possible to design a rectangular park of perimeter 80 metres and area 400 m^2. If so, find its length and breadth.

Ans. Let length of park = x metres

We are given area of rectangular park = $400 m^2$

Therefore, breadth of park = $\frac{400}{x}$ metres {Area of rectangle = length × *breadth*}

Perimeter of rectangular park = 2 (*length* + *breath*) = $2\left(x+\frac{400}{x}\right)$ metres

We are given perimeter of rectangle = 80 metres

According to condition:

$$2\left(x+\frac{400}{x}\right)=80$$

$$\Rightarrow 2\left(\frac{x^2+400}{x}\right)=80$$

$$\Rightarrow 2x^2+800=80x$$

$$\Rightarrow 2x^2-80x+800=0$$

$$\Rightarrow x^2-40x+400=0$$

Comparing equation, $x^2-40x+400=0$ with general quadratic equation $ax^2+bx+c=0$, we get $a = 1$, $b = -40$ and $c = 400$

Discriminant $= b^2 - 4ac = (-40)^2 - 4\ (1)\ (400) =$ $1600 - 1600 = 0$

Discriminant is equal to 0.

Therefore, two roots of equation are real and equal which means that it is possible to design a rectangular park of perimeter 80 metres and area $400m^2$.

Using quadratic formula $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ to solve equation,

$$x = \frac{40 \pm \sqrt{0}}{2} = \frac{40}{2} = 20$$

Here, both the roots are equal to 20.

Therefore, length of rectangular park = 20 metres

Breadth of rectangular park = $\frac{400}{x} = \frac{400}{20} = 20\ m$

*********** END **********