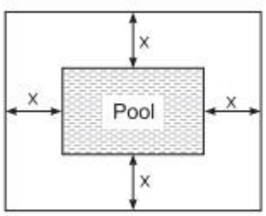
Quadratic Equations

Case Study Based Questions

Case Study 1

Noida authority decided to make a park for the people, so that the persons make them physically fit and take a fresh air.

A grassy park is in the form of rectangle having length 20 m and breadth 14 m. At the centre of the park, there is a rectangular pool, which is at a distance of equal width around it, there is a path having an area of 120 m^2.



Based on the given information, solve the following questions:

Q1. If the centre pool is at x metre distance from around the park, then length and breadth of the pool (in metre) will be:

a. (20-4x). (14-4x)

b. (20-x). (14-x)

c. (20-2x), (14-2x)

d. (20+2x), (14+2x)

Q2. If the area of path is 120 m^2, then the quadratic equation in terms of x is:

a. $x^2-17x+48=0$

b. $x^2-17x+30=0$

c. x^2-17x+36=0

d. x^2-16x+138=0

Q3. Find the nature of the roots of the equation formed in part 2.

a. Real and equal

b. Real and distinct

c. Imaginary

d. None of these

Q4. Width of the pool is:

a. 6 m

b. 2 m

c. 12 m

d. 7 m

Q5. The area of the rectangular pool is:

a. 30 m^2

b. 40 m^2

c. 46 m^2

d. 160 m^2

Solutions

1. Given, length and breadth of a park are l_1 = 20 m and b_1 = 14 m.
Then the length and breadth of the pool will be
(20-2x) m and (14-2x) m.
So, option (c) is correct.

2. Given, area of path = 120 m^2
.. Area of rectangular park
- Area of rectangular pool = 120
⇒ 20 x 14-(20-2x) (14-2x) = 120
⇒ 280 (280-40x-28x+4x2) = 120
⇒ 68x-4x^2 = 120
⇒4x^2-68x+120 = 0
⇒ x^2-17x+30=0
So, option (b) is correct.

3. Since, quadratic equation is x^2-17x+30=0.
On comparing with $ax^2 + bx + c = 0$, we get
a=1, b = 17 and c=30
.. Discriminant (D) = b^2-4ac
=(-17)2-4x1x (30)
=289-120 169 > 0
Here, discriminant is positive, so roots are real and distinct.
So, option (b) is correct.

4. Quadratic equation is x^2-17x+30= 0.
Here, a = 1, b = 17, c=30
Using quadratic formula.

$$x = \frac{-b \pm \sqrt{D}}{2a} = \frac{+17 \pm \sqrt{169}}{2 \times 1} = \frac{17 \pm 13}{2}$$

$$\Rightarrow \quad x = \frac{17+13}{2} \text{ or } x = \frac{17-13}{2}$$

$$\Rightarrow \quad x = \frac{30}{2} \text{ or } x = \frac{4}{2}$$

$$\Rightarrow \quad x = 15 \text{ or } x = 2$$

If we consider $x = 15$, then $l_2 = 20 - 2 \times 15$
$= 20 - 30 = -10,$

which is not possible.
.. We consider only x = 2 m.
Thus, width of the pool is 2 m.
So, option (b) is correct.

5. The area of the rectangular pool = l^2 x b_2
=(20-2x) (14-2x)
=(20-2 × 2) (14-2x2) (put x = 2)
= 16 x 10 = 160 m^2
So, option (d) is correct.

Case Study 2

In cricket match of world cup 2016, Ashwin took 2 wickets less than twice the number of wickets taken by Ishant. The product of the numbers of wickets taken by these two is 24.

Based on the above information, solve the following questions:

Q1. If Ishant took x wickets in the world cup, then wickets taken by Ashwin are:

a. (2x+2)

b. (2x-2)

c. (2x-1)

d. (2x-5)

Q2. The given statement represents in equation form as:

a. $x^2-3x+10=0$

b. $x^2+x+12=0$

c. $x^2-x-12=0$

d. $x^2-2x+12=0$ a. (2x+2)

Q2. The given statement represents in equation form as:

a. $x^2-3x+10=0$

b. $x^2+x+12=0$

c. $x^2-x-12=0$

d. $x^2-2x+12=0$

Q3. If quadratic equation has real and equal roots, then condition of discriminant D is:

a. $D<0$

b. $D=0$

c. $D\geq0$

d. $D>0$

Q4. The nature of roots of the equation formed by given statement is:

a. real and equal

b. real and distinct

c. imaginary
d. real and imaginary

Q5. The number of wickets taken by Ashwin is:
a. 3
b. 4
c. 6
d. 2

Solutions

1. As, Ishant took x wickets in the world cup, then Ashwin took 2 wickets less than twice the number
of wickets taken by Ishant i.e.. (2x-2) wickets.
So, option (b) is correct.

2. According to the given statement, the product of the number of wickets taken by these two players = 24
;- x(2x-2)=24
$\Rightarrow 2x^2-2x=24 \Rightarrow x^2-x-12=0$
So, option (c) is correct.

3. The condition for discriminant having real and equal
roots is D = 0.
So, option (b) is correct.

4. From part 2, quadratic equation is $x^2-x-12=0$.
On comparing with $ax^2 + bx + c = 0$, we get
a=1, b = -1 and c=-12
.. Discriminant, D=b2-4ac
=(-1)2-4x1x (-12)
=1+48=49>0
Here, discriminant is positive, so roots are real and distinct.
So, option (b) is correct.

5. As quadratic equation is
$x^2-x-12=0$

x^2-(4-3)x-12=0

x^2-4x+3x-12=0

x(x-4)+3(x-4)=0

(x-4)(x+3)=0

x-4=0 or x+3=0

x=4 or x=-3

.: x=4(x=-3, rejected because quantity of wicket cannot be negative)

Thus, Ashwin took the wickets=2x-2

=2(4)-2-8-2-6

So, option (c) is correct.

Case Study 3

Chenab railway bridge is the World's tallest railway bridge in Jammu and Kashmir Territory, which is constructed on Chenab river. Its shape is a parabolic arch, whose equation is in the form of

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

The nature of roots can be defined as:

(i) D=b^2-4ac > 0, roots are real and distinct.

(ii) D=b^2-4ac = 0, roots are real and equal.

(iii) D=b^2-4ac < 0, roots are imaginary.

Based on the above information, solve the following questions:

Q1. Find the nature of roots of the equation $5x^2$-4x-3=0.

Q2. Identify the type of the roots of quadratic equation x^2+3x+3=0.

Q3. Find the value of k in which the equation $3x^2$ - 2x + 4k = 0 has equal roots.

OR

Find the value of k for which the equation x^2+5kx+16=0 has no real root.

Solutions

1. Given equation is $5x^2-4x-3=0$.

On comparing with $ax^2 + bx + c = 0$, we get

a=5, b = -4 and c=-3

Now, discriminant D=b2-4ac

$=(-4)^2-4x5x\ (-3)$

= 16+6076 > 0

Hence, roots of given equation are real and distinct.

2. Given quadratic equation is $x^2+3x+3=0$.

On comparing with $ax^2 + bx + c = 0$, we get

a=1, b 3 and c=3

.. Discriminant, $D=b^2-4ac$

$= (3)^2 - 4x1x3$

=9-12=-3<0

Hence, roots of given equation are imaginary.

3. Given quadratic equation is $3x^2-2x+4k=0$.

On comparing with $ax^2 + bx + c = 0$, we get

a=3, b=-2 and c = 4k

As the roots of the given equation are equal.

Therefore, discriminant $D= b^2-4ac=0$

$= (-2)^2-4 \times 3 \times 4k = 0$

= 4-4 x 12k = 0

= 1-12k=0

$$k = \frac{1}{12}$$

OR

Given equation: $x^2 + 5kx+16=0$

Comparing this equation with general quadratic equation $ax^2 + bx + c=0$

a=1, b=5k and c = 16

.. Discriminant (D)= $b^2-4ac = (5k^2)-4(1)\ (16)$

$= 25k^2-64$

If the given equation has no real root, then

$$D < 0$$

$$\Rightarrow \quad 25k^2 - 64 < 0 \Rightarrow k^2 < \frac{64}{25}$$

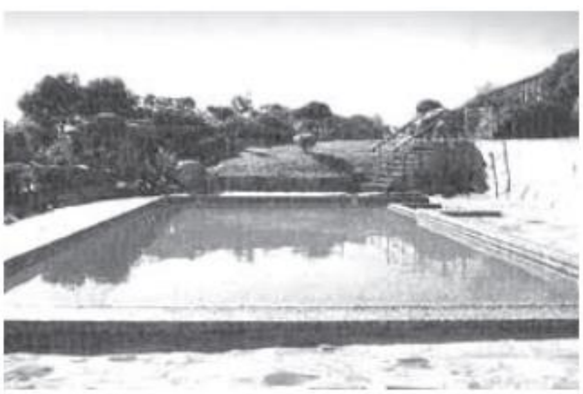
$$\Rightarrow \quad k^2 - \left(\frac{8}{2}\right)^2 < 0$$

$$\Rightarrow \quad -\frac{8}{5} < k < \frac{8}{5} \quad [\because x^2 - a^2 < 0 \Rightarrow -a < x < a]$$

Therefore, the roots of the given equation will not be real if $-\frac{8}{5} < k < \frac{8}{5}$.

Case Study 4

In the picture given below, one can see a rectangular in-ground swimming pool installed by a family in their backyard. There is a concrete sidewalk around the pool of width x m. The outside edges of the sidewalk measure 7 m and 12 m. The area of the pool is 36 sq. m. [CBSE 2022 Term-II]



Based on the given information, solve the following questions:

Q1. Write the representation of the length and breadth of the pool algebraically.

Q2. Form a quadratic equation in terms of x.

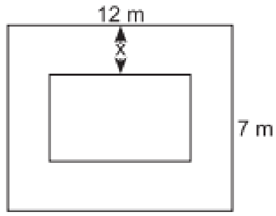
Q3. Find the length of the sidewalk around the pool.

OR

Find the width of the sidewalk around the pool.

Solutions

1. Given, width of the path be x metres.
Inside, length and breadth of a rectangular pool are
L= (12-2x) m and b = (7-2x)m.



2. .. Area of the pool = lx b
= (12-2x) x (7-2x)
$=84-24x-14x+4x^2$
$=4x^2-38x+84$
.. The required quadratic equation in terms of x is
$4x^2-38x+84-0$
or $2x^2-19x+42 = 0$

3. We have, area of the pool is 36 m^2.
:- $4x^2-38x+84 =36$
$= 2x^2-19x+4218$
$= 2x^2-19x+24=0$
$= 2x^2-(16+3)x +24=0$
$= 2x^2-16x-3x+24=0$
= 2x (x-8)-3(x-8)=0
= (2x-3) (x-8)=0

$\Rightarrow \quad x = \frac{3}{2}, \ x = 8$

When $x = 8$,
$b = 7 - 2 \times 8$
$= -9$ which is not possible

So, we neglect $x = 8$.

Consider, $x = \frac{3}{2}$,

$\therefore$ Length $l = 12 - 2 \times \frac{3}{2} = 9$ m

So, length of the sidewalk around the pool is 9m.

Or

$\therefore$ Width $b = 7 - 2 \times \frac{3}{2} = 4$ m.

So, width of the sidewalk around the pool is $\frac{3}{2}$m.

Solutions for Questions 5 to 9 are Given Below

Case Study 5

Nature of Roots

A quadratic equation can be defined as an equation of degree 2. This means that the highest exponent of the polynomial in it is 2. The standard form of a quadratic equation is $ax^2 + bx + c = 0$, where a, b, and c are real numbers and $a \neq 0$. Every quadratic equation has two roots depending on the nature of its discriminant, $D = b^2 - 4ac$.

Based on the above information, answer the following questions.

(i) Which of the following quadratic equation have no real roots?

(a) $-4x^2 + 7x - 4 = 0$ (b) $-4x^2 + 7x - 2 = 0$

(c) $-2x^2 + 5x - 2 = 0$ (d) $3x^2 + 6x + 2 = 0$

(ii) Which of the following quadratic equation have rational roots?

(a) $x^2 + x - 1 = 0$ (b) $x^2 - 5x + 6 = 0$

(c) $4x^2 - 3x - 2 = 0$ (d) $6x^2 - x + 11 = 0$

(iii) Which of the following quadratic equation have irrational roots?

(a) $3x^2 + 2x + 2 = 0$ (b) $4x^2 - 7x + 3 = 0$

(c) $6x^2 - 3x - 5 = 0$ (d) $2x^2 + 3x - 2 = 0$

(iv) Which of the following quadratic equations have equal roots?

(a) $x^2 - 3x + 4 = 0$ (b) $2x^2 - 2x + 1 = 0$

(c) $5x^2 - 10x + 1 = 0$ (d) $9x^2 + 6x + 1 = 0$

(v) Which of the following quadratic equations has two distinct real roots?

(a) $x^2 + 3x + 1 = 0$ (b) $-x^2 + 3x - 3 = 0$

(c) $4x^2 + 8x + 4 = 0$ (d) $3x^2 + 6x + 4 = 0$

Case Study 6

Quadratic in Day to Day Life

In our daily life we use quadratic formula as for calculating areas, determining a product's profit or formulating the speed of an object and many more.

Based on the above information, answer the following questions.

(i) If the roots of the quadratic equation are 2, –3, then its equation is

(a) $x^2 - 2x + 3 = 0$ (b) $x^2 + x - 6 = 0$ (c) $2x^2 - 3x + 1 = 0$ (d) $x^2 - 6x - 1 = 0$

(ii) If one root of the quadratic equation $2x^2 + kx + 1 = 0$ is $-1/2$, then $k =$

(a) 3 (b) –5 (c) –3 (d) 5

(iii) Which of the following quadratic equations, has equal and opposite roots?

(a) $x^2 - 4 = 0$ (b) $16x^2 - 9 = 0$ (c) $3x^2 + 5x - 5 = 0$ (d) Both (a) and (b)

(iv) Which of the following quadratic equations can be represented as $(x - 2)^2 + 19 = 0$?

(a) $x^2 + 4x + 15 = 0$ (b) $x^2 - 4x + 15 = 0$ (c) $x^2 - 4x + 23 = 0$ (d) $x^2 + 4x + 23 = 0$

(iv) If one root of a quadratic equation is $\frac{1+\sqrt{5}}{7}$, then its other root is

(a) $\frac{1+\sqrt{5}}{7}$ (b) $\frac{1-\sqrt{5}}{7}$ (c) $\frac{-1+\sqrt{5}}{7}$ (d) $\frac{-1-\sqrt{5}}{7}$

Case Study 7

Formation of Quadratic Equation

Quadratic equations started around 3000 B.C. with the Babylonians. They were one of the world's first civilisation, and came up with some great ideas like agriculture, irrigation and writing. There were many reasons why Babylonians needed to solve quadratic equations. For example to know what amount of crop you can grow on the square field.

Based on the above information, represent the following questions in the form of quadratic equation.

(i) The sum of squares of two consecutive integers is 650.

(a) $x^2 + 2x - 650 = 0$ (b) $2x^2 + 2x - 649 = 0$ (c) $x^2 - 2x - 650 = 0$ (d) $2x^2 + 6x - 550 = 0$

(ii) The sum of two numbers is 15 and the sum of their reciprocals is 3/10.

(a) $x^2 + 10x - 150 = 0$ (b) $15x^2 - x + 150 = 0$ (c) $x^2 - 15x + 50 = 0$ (d) $3x^2 - 10x + 15 = 0$

(iii) Two numbers differ by 3 and their product is 504.

(a) $3x^2 - 504 = 0$ (b) $x^2 - 504x + 3 = 0$ (c) $504x^2 + 3 = x$ (d) $x^2 + 3x - 504 = 0$

(iv) A natural number whose square diminished by 84 is thrice of 8 more of given number.

(a) $x^2 + 8x - 84 = 0$ (b) $3x^2 - 84x + 3 = 0$ (c) $x^2 - 3x - 108 = 0$ (d) $x^2 - 11x + 60 = 0$

(v) A natural number when increased by 12, equals 160 times its reciprocal.

(a) $x^2 - 12x + 160 = 0$ (b) $x^2 - 160x + 12 = 0$ (c) $12x^2 - x - 160 = 0$ (d) $x^2 + 12x - 160 = 0$

Case Study 8

Factorization Method

Amit is preparing for his upcoming semester exam. For this, he has to practice the chapter of Quadratic Equations. So he started with factorization method. Let two linear factors of $ax^2 + bx + c$ be $(px + q)$ and $(rx + s)$.

$\therefore \quad ax^2 + bx + c = (px + q)(rx + s) = prx^2 + (ps + qr)x + qs.$

Now, factorize each of the following quadratic equations and find the roots.

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

(a) 1, 6 (b) $\frac{1}{2}, \frac{-2}{3}$ (c) $\frac{1}{3}, \frac{-1}{2}$ (d) $\frac{3}{2}, -2$

(ii) $2x^2 + x - 300 = 0$

(a) $30, \frac{2}{15}$ (b) $60, \frac{-2}{5}$ (c) $12, \frac{-25}{2}$ (d) None of these

(iii) $x^2 - 8x + 16 = 0$

(a) 3, 3 (b) 3, –3 (c) 4, –4 (d) 4, 4

(iv) $6x^2 - 13x + 5 = 0$

(a) $2, \frac{3}{5}$ (b) $-2, \frac{-5}{3}$ (c) $\frac{1}{2}, \frac{-3}{5}$ (d) $\frac{1}{2}, \frac{5}{3}$

(v) $100x^2 - 20x + 1 = 0$

(a) $\frac{1}{10}, \frac{1}{10}$ (b) –10, –10 (c) $-10, \frac{1}{10}$ (d) $\frac{-1}{10}, \frac{-1}{10}$

Case Study 9

Concept of Quadratic Equation

If $p(x)$ is a quadratic polynomial *i.e.*, $p(x) = ax^2 + bx + c$, $a \neq 0$, then $p(x) = 0$ is called a quadratic equation. Now, answer the following questions.

(i) Which of the following is correct about the quadratic equation $ax^2 + bx + c = 0$?

(a) a, b and c are real numbers, $c \neq 0$
(b) a, b and c are rational numbers, $a \neq 0$
(c) a, b and c are integers, a, b and $c \neq 0$
(d) a, b and c are real numbers, $a \neq 0$

(ii) The degree of a quadratic equation is

(a) 1 (b) 2 (c) 3 (d) other than 1

(iii) Which of the following is a quadratic equation?

(a) $x(x + 3) + 7 = 5x - 11$
(b) $(x - 1)^2 - 9 = (x - 4)(x + 3)$
(c) $x^2(2x + 1) - 4 = 5x^2 - 10$
(d) $x(x - 1)(x + 7) = x(6x - 9)$

(iv) Which of the following is incorrect about the quadratic equation $ax^2 + bx + c = 0$?

(a) If $a\alpha^2 + b\alpha + c = 0$, then $x = -\alpha$ is the solution of the given quadratic equation.
(b) The additive inverse of zeroes of the polynomial $ax^2 + bx + c$ is the roots of the given equation.
(c) If α is a root of the given quadratic equation, then its other root is $-\alpha$.
(d) All of these

(v) Which of the following is not a method of finding solutions of the given quadratic equation?

(a) Factorisation method
(b) Completing the square method
(c) Formula method
(d) None of these

HINTS & EXPLANATIONS

5. (i) **(a)**: To have no real roots, discriminant ($D = b^2 - 4ac$) should be < 0.
(a) $D = 7^2 - 4(-4)(-4) = 49 - 64 = -15 < 0$
(b) $D = 7^2 - 4(-4)(-2) = 49 - 32 = 17 > 0$
(c) $D = 5^2 - 4(-2)(-2) = 25 - 16 = 9 > 0$
(d) $D = 6^2 - 4(3)(2) = 36 - 24 = 12 > 0$

(ii) **(b)**: To have rational roots, discriminant ($D = b^2 - 4ac$) should be > 0 and also a perfect square.
(a) $D = 1^2 - 4(1)(-1) = 1 + 4 = 5$, which is not a perfect square.
(b) $D = (-5)^2 - 4(1)(6) = 25 - 24 = 1$, which is a perfect square.
(c) $D = (-3)^2 - 4(4)(-2) = 9 + 32 = 41$, which is not a perfect square.
(d) $D = (-1)^2 - 4(6)(11) = 1 - 264 = -263$, which is not a perfect square.

(iii) (c): To have irrational roots, discriminant ($D = b^2 - 4ac$) should be > 0 but not a perfect square.

(a) $D = 2^2 - 4(3)(2) = 4 - 24 = -20 < 0$

(b) $D = (-7)^2 - 4(4)(3) = 49 - 48 = 1 > 0$ and also a perfect square.

(c) $D = (-3)^2 - 4(6)(-5) = 9 + 120 = 129 > 0$ and not a perfect square.

(d) $D = 3^2 - 4(2)(-2) = 9 + 16 = 25 > 0$ and also a perfect square.

(iv) (d): To have equal roots, discriminant ($D = b^2 - 4ac$) should be $= 0$.

(a) $D = (-3)^2 - 4(1)(4) = 9 - 16 = -7 < 0$

(b) $D = (-2)^2 - 4(2)(1) = 4 - 8 = -4 < 0$

(c) $D = (-10)^2 - 4(5)(1) = 100 - 20 = 80 > 0$

(d) $D = 6^2 - 4(9)(1) = 36 - 36 = 0$

(v) (a): To have two distinct real roots, discriminant ($D = b^2 - 4ac$) should be > 0.

(a) $D = 3^2 - 4(1)(1) = 9 - 4 = 5 > 0$

(b) $D = 3^2 - 4(-1)(-3) = 9 - 12 = -3 < 0$

(c) $D = 8^2 - 4(4)(4) = 64 - 64 = 0$

(d) $D = 6^2 - 4(3)(4) = 36 - 48 = -12 < 0$

6. **(i) (b):** Roots of the quadratic equation are 2 and -3.

$\therefore$ The required quadratic equation is

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

(ii) (a): We have, $2x^2 + kx + 1 = 0$

Since, $-1/2$ is the root of the equation, so it will satisfy the given equation.

$$\therefore \quad 2\left(-\frac{1}{2}\right)^2 + k\left(-\frac{1}{2}\right) + 1 = 0 \Rightarrow 1 - k + 2 = 0 \Rightarrow k = 3$$

(iii) (d): If the roots of the quadratic equations are opposites to each other, then coefficient of x (sum of roots) is 0.

So, both (a) and (b) have the coefficient of $x = 0$.

(iv) (c): The given equation is $(x - 2)^2 + 19 = 0$

$\Rightarrow x^2 - 4x + 4 + 19 = 0 \Rightarrow x^2 - 4x + 23 = 0$

(v) (b): If one root of a quadratic equation is irrational, then its other root is also irrational and also its conjugate *i.e.*, if one root is $p + \sqrt{q}$, then its other root is $p - \sqrt{q}$.

7. **(i) (b):** Let two consecutive integers be x, $x + 1$.

Given, $x^2 + (x + 1)^2 = 650$

$\Rightarrow 2x^2 + 2x + 1 - 650 = 0$

$\Rightarrow 2x^2 + 2x - 649 = 0$

(ii) (c): Let the two numbers be x and $15 - x$.

Given, $\frac{1}{x} + \frac{1}{15 - x} = \frac{3}{10}$

$\Rightarrow 10(15 - x + x) = 3x(15 - x)$

$\Rightarrow 50 = 15x - x^2 \Rightarrow x^2 - 15x + 50 = 0$

(iii) (d): Let the numbers be x and $x + 3$.

Given, $x(x + 3) = 504$

$\Rightarrow x^2 + 3x - 504 = 0$

(iv) (c): Let the number be x.

According to question, $x^2 - 84 = 3(x + 8)$

$\Rightarrow x^2 - 84 = 3x + 24 \Rightarrow x^2 - 3x - 108 = 0$

(v) (d): Let the number be x.

According to question, $x + 12 = \frac{160}{x}$

$\Rightarrow x^2 + 12x - 160 = 0$

8. **(i) (b):** We have, $6x^2 + x - 2 = 0$

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

$\Rightarrow (3x + 2)(2x - 1) = 0$

$\Rightarrow x = \frac{1}{2}, \frac{-2}{3}$

(ii) (c): $2x^2 + x - 300 = 0$

$\Rightarrow 2x^2 - 24x + 25x - 300 = 0$

$\Rightarrow (x - 12)(2x + 25) = 0$

$\Rightarrow x = 12, \frac{-25}{2}$

(iii) (d): $x^2 - 8x + 16 = 0$

$\Rightarrow (x - 4)^2 = 0 \Rightarrow (x - 4)(x - 4) = 0 \Rightarrow x = 4, 4$

(iv) (d): $6x^2 - 13x + 5 = 0$

$\Rightarrow 6x^2 - 3x - 10x + 5 = 0$

$\Rightarrow (2x - 1)(3x - 5) = 0$

$\Rightarrow x = \frac{1}{2}, \frac{5}{3}$

(v) (a): $100x^2 - 20x + 1 = 0$

$\Rightarrow (10x - 1)^2 = 0 \Rightarrow x = \frac{1}{10}, \frac{1}{10}$

9. **(i) (d)** **(ii) (b)**

(iii) (a): $x(x + 3) + 7 = 5x - 11$

$\Rightarrow x^2 + 3x + 7 = 5x - 11$

$\Rightarrow x^2 - 2x + 18 = 0$ is a quadratic equation.

(b) $(x - 1)^2 - 9 = (x - 4)(x + 3)$

$\Rightarrow x^2 - 2x - 8 = x^2 - x - 12$

$\Rightarrow x - 4 = 0$ is not a quadratic equation.

(c) $x^2(2x + 1) - 4 = 5x^2 - 10$

$\Rightarrow 2x^3 + x^2 - 4 = 5x^2 - 10$

$\Rightarrow 2x^3 - 4x^2 + 6 = 0$ is not a quadratic equation.

(d) $x(x - 1)(x + 7) = x(6x - 9)$

$\Rightarrow x^3 + 6x^2 - 7x = 6x^2 - 9x$

$\Rightarrow x^3 + 2x = 0$ is not a quadratic equation.

(iv) (d) **(v) (d)**