

## EXERCISE 4.1

Choose the correct answer from the given four options in the following questions:

1. Which of the following is a quadratic equation?

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

(B)  $-2x^2 = (5 - x)(2x - (2/5))$

(C)  $(k + 1)x^2 + (3/2)x = 7$ , where  $k = -1$

(D)  $x^3 - x^2 = (x - 1)^3$

Solution:

(D)  $x^3 - x^2 = (x - 1)^3$

Explanation:

The standard form of a quadratic equation is given by,

$$ax^2 + bx + c = 0, a \neq 0$$

(A) Given,  $x^2 + 2x + 1 = (4 - x)^2 + 3$

$$x^2 + 2x + 1 = 16 - 8x + x^2 + 3$$

$$10x - 18 = 0$$

which is not a quadratic equation.

(B) Given,  $-2x^2 = (5 - x)(2x - 2/5)$

$$-2x^2 = 10x - 2x^2 - 2 + 2/5x$$

$$52x - 10 = 0$$

which is not a quadratic equation.

(C) Given,  $(k + 1)x^2 + 3/2 x = 7$ , where  $k = -1$

$$(-1 + 1)x^2 + 3/2 x = 7$$

$$3x - 14 = 0$$

which is not a quadratic equation.

(D) Given,  $x^3 - x^2 = (x - 1)^3$

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

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

which represents a quadratic equation.

2. Which of the following is not a quadratic equation?

(A)  $2(x - 1)^2 = 4x^2 - 2x + 1$

(B)  $2x - x^2 = x^2 + 5$

(C)  $(\sqrt{2x} + \sqrt{3})^2 + x^2 = 3x^2 - 5x$

(D)  $(x^2 + 2x)^2 = x^4 + 3 + 4x^3$

Solution:

(D)  $(x^2 + 2x)^2 = x^4 + 3 + 4x^3$

A quadratic equation is represented by the form,

$$ax^2 + bx + c = 0, a \neq 0$$

(A) Given,  $2(x - 1)^2 = 4x^2 - 2x + 1$

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

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

which is a quadratic equation.

(B) Given,  $2x - x^2 = x^2 + 5$

$$2x^2 - 2x + 5 = 0$$

which is a quadratic equation.

(C) Given,  $(\sqrt{2x} + \sqrt{3})^2 = 3x^2 - 5x$

$$2x^2 + 2\sqrt{6x} + 3 = 3x^2 - 5x$$

$$x^2 - (5 + 2\sqrt{6})x - 3 = 0$$

which is a quadratic equation.

(D) Given,  $(x^2 + 2x)^2 = x^4 + 3 + 4x^2$

$$x^4 + 4x^3 + 4x^2 = x^4 + 3 + 4x^2$$

$$4x^3 - 3 = 0$$

which is a cubic equation and not a quadratic equation.

**3. Which of the following equations has 2 as a root?**

(A)  $x^2 - 4x + 5 = 0$

(B)  $x^2 + 3x - 12 = 0$

(C)  $2x^2 - 7x + 6 = 0$

(D)  $3x^2 - 6x - 2 = 0$

**Solution:**

(C)  $2x^2 - 7x + 6 = 0$

If 2 is a root then substituting the value 2 in place of x should satisfy the equation.

(A) Given,

$$x^2 - 4x + 5 = 0$$

$$(2)^2 - 4(2) + 5 = 1 \neq 0$$

So, x = 2 is not a root of  $x^2 - 4x + 5 = 0$

(B) Given,  $x^2 + 3x - 12 = 0$

$$(2)^2 + 3(2) - 12 = -2 \neq 0$$

So, x = 2 is not a root of  $x^2 + 3x - 12 = 0$

(C) Given,  $2x^2 - 7x + 6 = 0$

$$2(2)^2 - 7(2) + 6 = 0$$

Here, x = 2 is a root of  $2x^2 - 7x + 6 = 0$

(D) Given,  $3x^2 - 6x - 2 = 0$

$$3(2)^2 - 6(2) - 2 = -2 \neq 0$$

So, x = 2 is not a root of  $3x^2 - 6x - 2 = 0$

**4. If  $\frac{1}{2}$  is a root of the equation  $x^2 + kx - \frac{5}{4} = 0$ , then the value of k is**

(A) 2                      (B) -2

(C)  $\frac{1}{4}$                     (D)  $\frac{1}{2}$

**Solution:**

(A) 2

If  $\frac{1}{2}$  is a root of the equation

$x^2 + kx - \frac{5}{4} = 0$  then, substituting the value of  $\frac{1}{2}$  in place of x should give us the value of k.

Given,  $x^2 + kx - \frac{5}{4} = 0$  where,  $x = \frac{1}{2}$

$$(\frac{1}{2})^2 + k(\frac{1}{2}) - (\frac{5}{4}) = 0$$

$$(\frac{k}{2}) = (\frac{5}{4}) - \frac{1}{4}$$

$$k = 2$$

5. Which of the following equations has the sum of its roots as 3?

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

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

(C)  $\sqrt{2}x^2 - 3/\sqrt{2}x + 1 = 0$

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

**Solution:**

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

The sum of the roots of a quadratic equation  $ax^2 + bx + c = 0$ ,  $a \neq 0$  is given by,  
Coefficient of  $x$  / coefficient of  $x^2 = - (b/a)$

(A) Given,  $2x^2 - 3x + 6 = 0$

Sum of the roots =  $-b/a = -(-3/2) = 3/2$

(B) Given,  $-x^2 + 3x - 3 = 0$

Sum of the roots =  $-b/a = -(3/-1) = 3$

(C) Given,  $\sqrt{2}x^2 - 3/\sqrt{2}x + 1 = 0$

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

Sum of the roots =  $-b/a = -(-3/2) = 3/2$

(D) Given,  $3x^2 - 3x + 3 = 0$

Sum of the roots =  $-b/a = -(-3/3) = 1$

