Solution

QUADRATIC EQUATIONS WS 1

Class 10 - Mathematics

Section A

1.

(c) $x^2 - 12x + 32 = 0$

Explanation: Let the two roots be a and b, then

$a + b = 12$ ...(i)

and $a - b = 4$ ...(ii)

$\Rightarrow a = 8$ and $b = 4$ (from (i) and (ii))

$\therefore$ Required equation is $x^2 - 12x + 32 = 0$

2. **(a)** $x(x + 1) = 240$

Explanation: Let one of the two consecutive integers be x

then the other consecutive integer will be (x + 1)

$\therefore$ According to question, $(x) \times (x + 1) = 240$

$\Rightarrow x(x + 1) = 240$

3.

(d) 13 and 14

Explanation: Let the one number be x. As the sum of numbers is 27, then the other number will be (27 - x)

According to question

$x(27 - x) = 182$

$\Rightarrow 27x - x^2 = 182$

$\Rightarrow x^2 - 27x + 182 = 0$

$\Rightarrow x^2 - 14x - 13x + 182 = 0$

$\Rightarrow x(x - 14) -13(x - 14) = 0$

$\Rightarrow (x - 13)(x - 14) = 0$

$\Rightarrow x - 13 = 0$ and $x - 14 = 0$

$x = 13$ and $x = 14$

Now, the other number = 27 - 13 = 14 and 27 - 14 = 13

Therefore the required two numbers are 13 and 14.

4.

(b) $x^2 - 14x + 46 = 0$

Explanation: Given: $\alpha = 7 + \sqrt{3}$ and $\beta = 7 - \sqrt{3}$

$\therefore x^2 - (\alpha + \beta)x + \alpha\beta = 0$

$\Rightarrow x^2 (7 + \sqrt{3} + 7 - \sqrt{3})x + (7 + \sqrt{3})(7 - \sqrt{3}) = 0$

$\Rightarrow x^2 - 14x + (49 - 3) = 0$

$\Rightarrow x^2 - 14x + 46 = 0$

5.

(d) 8

Explanation: Given equation is $x^2 - 3x + (k - 10) = 0$.

Product of roots = (k - 10).

So, $k - 10 = -2 \Rightarrow k = 8$.

6. **(a)** $x^2 - 5x + 6 = 0$

Explanation: since 3 is the root of the equation, x = 3 must satisfy the equation.

Applying x = 3 in the equation $x^2 - 5x + 6 = 0$

gives, $(3)^2 - 5(3) + 6 = 0$

$\Rightarrow 9 - 15 + 6 = 0$

$\Rightarrow$ 15 - 15 = 0
$\Rightarrow$ 0 = 0
$\Rightarrow$ L.H.S. = R.H.S.

Hence, $x^2 - 5x + 6 = 0$ is a required equation which has 3 as root.

7.

(d) $x^2 - 4 = 0$
Explanation: Given that, Sum of roots of a quadratic equation = 0
One root = 2
Second root = 0 - 2 = -2
and product of roots = 2 $\times$ (-2) = -4
Required Quadratic equation will be,
x^2 + (sum of roots) x + product of roots = 0
$x^2 + 0x + (-4) = 0$
$\Rightarrow x^2 - 4 = 0$

8.

(b) $x^2 - 6x + 7 = 0$
Explanation: Let $\alpha = 3 - \sqrt{2}$ and $\beta = 3 + \sqrt{2}$
$\alpha + \beta = (3 - \sqrt{2}) + (3 + \sqrt{2}) = 6$
$\alpha\beta = (3 - \sqrt{2})(3 + \sqrt{2})$
= 9 - 2
= 7
$\therefore$ Quadratic equation is = $x^2 - (\alpha + \beta)x + \alpha\beta$
Quadratic = $x^2 - 6x + 7$

9.

(c) 5
Explanation: Given: $p(x) = 3x^2 - px - 2 = 0$
$\therefore p(2) = 3(2)^2 - p(2) - 2 = 0$
$\Rightarrow 12 - 2p - 2 = 0$
$\Rightarrow -2p = -10$
$\Rightarrow p = 5$

10. **(a)** quadratic equation
Explanation: Given: $5x^2 + 8x + 4 = 2x^2 + 4x + 6$
$\Rightarrow 5x^2 - 2x^2 + 8x - 4x + 4 - 6$
$\Rightarrow 3x^2 + 4x - 2 = 0$
Here, the degree is 2, therefore it is a quadratic equation.

11.

(d) A is false but R is true.
Explanation: We have, $x^2 + 3x + 1 = (x - 2)^2 = x^2 - 4x + 4$
$\Rightarrow x^2 + 3x + 1 = x^2 - 4x + 4$
$\Rightarrow 7x - 3 = 0$
it is not of the form $ax^2 + 6x + c = 0$
So, A is false but R is true.

12. Let one root of the given equation be α
then, its root will be $\frac{1}{\alpha}$.
Given equation is $3x^2 - 10x + k = 0$
Comparing with $ax^2 + bx + c = 0$, we have
$a = 3, b = -10 \; and \; c = k$
Now, product of the roots = $\frac{c}{a}$

$\Rightarrow \alpha \times \frac{1}{\alpha} = \frac{k}{3}$

$\Rightarrow$ k = 3

13. $(2x-1)(x-3) = (x+4)(x-2)$

$\Rightarrow 2x^2 - 7x + 3 = x^2 + 2x - 8$

$\Rightarrow x^2 - 9x + 11 = 0$

This is of the form $ax^2 + bx + c = 0$, where a = 1, b = -9 and c = 11.

Hence, the given equation is a quadratic equation.

14. We have following equation,

(2x + 3)(3x + 2) = 6(x - 1) (x - 2)

$\Rightarrow 6x^2 + 4x + 9x + 6 = 6(x^2 - 2x - x + 2)$

$\Rightarrow 6x^2 + 13x + 6 = 6x^2 - 18x + 12$

$\Rightarrow$ 13x + 18x + 6 - 2 = 0

$\Rightarrow$ 31x + 4 = 0

Cleary, It is not in the form of $ax^2 + bx + c = 0$

Therefore, it is not a quadratic equation.

15. A polynomial equation is a quadratic equation, if it is of the form $ax^2 + bx + c = 0$ such that $a \neq 0$

for $x^2 + 6x - 4 = 0$, it is a quadratic equation.

16. We have the following equation,

x(x + 3) + 6 = (x + 2)(x - 2)

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

$\Rightarrow$ 3x +10 = 0.

It is not in the form of $ax^2 + bx + c = 0$.

Therefore, the equation is not a quadratic equation.

17. We know that Quadratic polynomial with sum of roots, Products of roots.

$=x^2 - (Sum\ of\ roots)x + Product\ of\ roots.$

Sum of roots = $2\sqrt{3}$

Product of roots = 2.

The Required polynomial : $x^2 - 2\sqrt{3}x + 2$.

18. $(x-1)^2 + 2(x+1) = 0$

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

$x^2 + 3 = 0$

No, since the equation is simplified to $x^2 + 3 = 0$ whose discriminant is less than zero.

19. We have, $x^2 - 3x - \sqrt{x} + 4 = 0$. Since it has $\sqrt{x}$, or $x^{1/2}$, in which power $\frac{1}{2}$ of x is not an integer.

$\therefore$ Given equation is not a quadratic equation.

20. Let the two consecutive integers be x and x + 1.

According to question,

$\therefore$ x(x + 1) = 306

$\Rightarrow x^2 + x - 306 = 0$

This is the required quadratic equation.

21. We have the following equation,

$x^2 + x + 1 = 0$

Substituting x = 0, we get

$(0)^2 + 0 + 1$

= 0 + 0 + 1

= 1 $\neq$ RHS

$\therefore$ For x = 1, $x^2 + x + 1 \neq 0$.

Hence, x = 1 and 0 are solution of $x^2 + x + 1$.

22. Clearly, $(2x^2 - 3\sqrt{2}x + 6)$ is a quadratic polynomial.

$\therefore$ $(2x^2 - 3\sqrt{2}x + 6)$ is a quadratic equation.

23. $x^2 + 6x + 9 = 0$.

Put x = -3 in the equation

$\Rightarrow (-3)^2 + 6(-3) + 9$

$\Rightarrow 9 - 18 + 9 = 0$

Hence, it is a solution of the given equation.

24. $x^2 - 2x = (-2)(3 - x)$

$\Rightarrow x^2 - 2x = -6 + 2x$

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

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

Here, degree of equation is 2.

Therefore, it is a Quadratic Equation.

Section B

25. 21

Explanation:

Here the length of a rectangular field is three times its breadth and area is equal to 104 metre square.

Let the breadth of a rectangle = x meter

Then, the length of rectangle = 3x meter

Therefore, Area = length $\times$ breadth = 147 m^2

$\Rightarrow 3x(x) = 147$

$\Rightarrow 3x^2 = 147$

$\Rightarrow x^2 = 49$

$\Rightarrow x = \sqrt{49} \Rightarrow x = \pm 7$

$\Rightarrow$ x = 7 [Because, breadth cannot be negative]

Therefore, breadth of rectangle = 7m

and length of rectangle = 3(7) m = 21m.

26. Fill in the blanks:

(i) 1. cubic

(ii) 1. Quadratic

27. i. Let breadth of rectangular plot be x m.

Therefore, length of rectangular plot is $(2x + 1)$ m

Area of rectangle = length × breadth

$\Rightarrow 528 = x(2x + 1)$

$\Rightarrow 528 = 2x^2 + x$

$\Rightarrow 2x^2 + x - 528 = 0$

ii. Let two consecutive numbers be x and (x + 1).

It is given that $x(x + 1) = 306$

$\Rightarrow x^2 + x = 306$

$\Rightarrow x^2 + x - 306 = 0$

28. We have (2x -1) (x - 3) = (x + 5) (x - 1)

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

$\Rightarrow 2x^2 - 7x + 3 = x^2 + 4x - 5$

$\Rightarrow x^2 - 11x + 8 = 0$

It is of the form $ax^2 + bx + c = 0$, $a \neq 0$

$\therefore$ the given equation is a quadratic equation.

29. The given equation is (x - 3) (2x +1) = x (x+5)

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

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

$\Rightarrow x^2 - 10x - 3 = 0$

It is in the form of $ax^2 + bx + c = 0$, $a \neq 0$

$\therefore$ the given equation is a quadratic equation.

30. Given α and β are roots of $x^2 - 7x + 10 = 0$

$\therefore \alpha+\beta=-\frac{(-7)}{1}$ = 7 ...(i)

and $\alpha\beta=\frac{10}{1}$ = 10 ...(ii)

$\therefore(\alpha+\beta)^2=\alpha^2+\beta^2+2\alpha\beta$

$\therefore (7)^2 = \alpha^2+\beta^2 + 2(10)$ ...(from (i) and (ii))

$\Rightarrow \alpha^2+\beta^2 = 49 - 20 = 29$ ...(iii)

Now, the quadratic equation whose roots are α^2 and β^2 will be

$x^2-\left(\alpha^2+\beta^2\right)=x+\alpha^2\beta^2=0$

$\Rightarrow x^2 - 29x + (10)^2 = 0$ ...(from (ii) and (iii))

$\Rightarrow x^2 - 29x + 100 = 0$

31. Let the required consecutive positive integers be x and (x + 1).

Then, we have

$x(x+1)=306$

$\Rightarrow x^2+x-306=0$

$\Rightarrow x^2+18x-17x-306=0$

$\Rightarrow x(x+18)-17(x+18)=0$

$\Rightarrow x+18=0$ or $x-17=0$

$\Rightarrow$ x = -18 or x = 17

Since x is a positive integer, x $\neq$ -18.

$\Rightarrow$ x = 17

$\Rightarrow$ x + 1 = 17 + 1 = 18

Hence, the required positive intergers are 17 and 18.

32. $\frac{1}{x}-\frac{1}{x-2}$ = 3

$\frac{x-2-x}{x(x-2)}$ = 3

-2 = 3x(x - 2)

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

x = $\frac{6\pm\sqrt{36-24}}{6}$

x = $\frac{6\pm2\sqrt{3}}{6}$

x = $\frac{3\pm\sqrt{3}}{3}$

33. We have given that, $x^3 - 4x^2 - x + 1 = (x - 2)^3$

Applying identity on R.H.S. we get,

$(a-b)^3=a^3-b^3-3a^2b+3ab^2$

$\Rightarrow x^3-4x^2-x+1=x^3-8-6x^2+12x$

$\Rightarrow x^3-4x^2-x+1-x^3+8+6x^2-12x=0$

$\Rightarrow 2x^2-13x+9=0$

Degree of the equation is 2 and

It is of the form $ax^2+bx+c=0,$ with $a\neq0$, therefore, the given equation is quadratic.

34. Let the breadth of the plot be 'x' m

$\therefore$ Length = (2x + 1) m

Now, Area of the plot = 528 m^2

$\Rightarrow$ L $\times$B = 528 m^2

$\Rightarrow (2x+1)\times x=528\Rightarrow 2x^2+x-528=0$

This is the required quadratic equation.

35. Here, LHS = $(x + 2)^3 = x^3 + 6x^2 + 12x + 8$

Therefore, $(x + 2)^3 = x^3 – 4$ can be rewritten as

$x^3 + 6x^2 + 12x + 8 = x^3 – 4$

i.e., $6x^2 + 12x + 12 = 0$ or, $x^2 + 2x + 2 = 0$

It is of the form $ax^2 + bx + c = 0$.

So, the given equation is a quadratic equation.

36. We have $x^2 + 3x + 1 = (x - 2)^2$

$\Rightarrow x^2 + 3x + 1 = x^2 - 4x + 4$

$\Rightarrow 7x - 3 = 0$

It is not of the form $ax^2 + bx + c = 0, a \neq 0$

$\therefore$ the given equation is not a quadratic equation.

37. Since $x(x + 1) + 8 = x^2 + x + 8$ and $(x + 2)(x – 2) = x^2 – 4$

Therefore, $x^2 + x + 8 = x^2 – 4$

i.e., $x + 12 = 0$

It is not of the form $ax^2 + bx + c = 0$

Therefore, the given equation is not a quadratic equation.

38. Given, $x^2 + \sqrt{2}x - 4 = 0$

Substituting x = $\sqrt{2}$, we get

$\text{LHS} = (\sqrt{2})^2 + \sqrt{2} \times \sqrt{2} - 4 = 2 + 2 - 4 = 0 = \text{RHS}$

So, x = $\sqrt{2}$ is solution of the given equation.

Now, Substituting x = $-2\sqrt{2}$, we get

LHS = $(-2\sqrt{2})^2 + \sqrt{2} \times (-2\sqrt{2})$ - 4 = 8 - 4 - 4 = 0 = RHS

So, x =$-2\sqrt{2}$ is also a solution of the given equation.

39. Taking L.H.S.= $(x – 2)^2 + 1 = x^2 – 4x + 4 + 1 = x^2 – 4x + 5$

Therefore, $(x – 2)^2 + 1 = 2x – 3$ can be rewritten as

$x^2 – 4x + 5 = 2x – 3$

i.e., $x^2 – 6x + 8 = 0$

It is of the form $ax^2 + bx + c = 0$. Also degree of equation is 2.

Therefore, the given equation is a quadratic equation.

40. Let the number of toys produced be *x*.

$\therefore$ Cost of production of each toy = Rs $(55 − x)$

Therefore, the number of toys produced that day satisfies the quadratic equation

$\therefore x(55 – x) = 750$

$\Rightarrow x^2 – 55x + 750 = 0$

41. Let two consecutive positive integers be x and x + 1.

According to question,

$x (x + 1) = 240 \Rightarrow x^2 + x - 240 = 0$

This is the required quadratic equation.

42. $7x^2 - 12x + 18 = 0$

a = 7, b = -12, c = 18

$\alpha + \beta = \frac{-b}{a} = \frac{12}{7}$ and $\alpha\beta = \frac{c}{a} = \frac{18}{17}$

$\frac{\alpha+\beta}{\alpha\beta} = \frac{\frac{12}{7}}{\frac{18}{17}} = \frac{12}{7} \times \frac{17}{18} = \frac{34}{21}$

Hence, ratio is 34:21

43. The given equation is (x-2) (x+1) = (x-1) (x+3)

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

$\Rightarrow 3x -1 = 0$

It is not of the form $ax^2 + bx + c = 0$, $a \neq 0$

Hence, the given equation is not a quadratic equation.

44. Here the length of a rectangular field is three times its breadth and area is equal to 104 metre square.

Let the breadth of a rectangle = x meter

Then, the length of rectangle = 3x meter

Therefore, Area = length $\times$ breadth = 147 m^2

$\Rightarrow 3x(x) = 147$

$\Rightarrow 3x^2 = 147$

$\Rightarrow x^2 = 49$
$\Rightarrow x = \sqrt{49} \Rightarrow x = \pm 7$
$\Rightarrow$ x = 7 [Because, breadth cannot be negative]
Therefore, breadth of rectangle = 7m
and length of rectangle = 3(7) m = 21m.

45. Let the ten's digit of the required number be x and its unit's digit be y.
As per given condition
A two-digit number is four times the sum of its digits
Then, 10x + y = 4(x + y)
$\Rightarrow$ 6x - 3y = 0
$\Rightarrow$ 2x - y = 0......... (i)
And A two-digit number is twice the product of its digits.
Also, 10x + y = 2xy. .... (ii)
Putting y = 2x from (i) in (ii), we get
$10x + 2x = 4x^2$
$\Rightarrow 4x^2 - 12x = 0$
$\Rightarrow$ 4x(x - 3) = 0
$\Rightarrow$ x - 3 = 0
$\Rightarrow$ x = 3 [ten's digit, $x \neq 0$]
Putting x = 3 in (i), we get y = 6.
Thus, ten's digit = 3 and unit's digit = 6.
Hence, the required number is 36.

46. Substituting $x = \frac{2}{3}$ in $ax^2 + 7x + b = 0$
$\therefore \frac{4}{9}a + \frac{14}{3} + b = 0$
$\Rightarrow 4a + 42 + 9b = 0$
$\Rightarrow 4a + 9b = -42$ ....(i)
and substituting x = - 3
$\Rightarrow 9a - 21 + b = 0$
$\Rightarrow 9a + b = 21$ ....(ii)
Solving (i) and (ii), we get a = 3 and b = - 6

47. According to the question,A car covers a distance of 2592 km with a uniform speed. The number of hours taken for the journey is one half the number representing the speed in km/ hour.
Let the speed of the car be x km/hr.
There fore time taken = $\frac{x}{2}$ hour
$\therefore speed = \frac{\text{Distance}}{\text{Time}}$
$x = \frac{2592}{\frac{x}{2}}$
$\Rightarrow \quad x^2 = 2592 \times 2$
$x^2 = 5184$
$x^2 = \sqrt{5184}$
x = 72
Hence the time taken will be $\frac{72}{2} = 36$ hours.

48. Given equation is; $6x^2 - x - 2 = 0$
Substituting $x = -\frac{1}{2}$, we get
$\text{LHS} = 6 \times \left(-\frac{1}{2}\right)^2 - \left(-\frac{1}{2}\right) - 2 = \frac{6}{4} + \frac{1}{2} - 2 = 0 = \text{RHS}$
Therefore, $x = \frac{1}{2}$ is a solution of the given equation.
Now, $x = \frac{2}{3}$,
$\text{LHS} = 6 \times \left(\frac{2}{3}\right)^2 - \frac{2}{3} - 2 = 0 = \text{RHS}$
Therefore, $x = \frac{2}{3}$ is also a solution of the given equation.

49. We have the following equation,
$x^2 - 3x + 2 = 0$

Putting x = 2, we get LHS = 2^2 - 3(2) + 2

= 4 - 6 + 2

= 0 = RHS

x^2 - 3x + 2 = 0,x = 2 is a solution of the equation.

Now, putting x = -1, we get

LHS= $(-1)^2$ - 3(-1) + 2

= 1 + 3 + 2

= 6 $\neq$ RHS

x^2 - 3x + 2 = 0, x = -1 is not a solution of x^2 - 3x + 2 = 0

50. According to question,

$2P = p\left(1 + \frac{r}{100}\right)^2$

$\Rightarrow \frac{\sqrt{2}}{1} = 1 + \frac{r}{100}$

$\Rightarrow \sqrt{2} - 1 = \frac{r}{100}$

$\Rightarrow r = (\sqrt{2} - 1)100$

51. We can write it down in its factored form:

$a(x - r_1)(x - r_2)$, where a is the coefficient of x^2 and r_1, r_2 the two roots. a can be any non-zero real number, since no matter its value, the roots still are r_1 and r_2.

For example, using a = 2, we get:

2(x + 3) (x - 5)

$2x^2$ + 6x - 10x - 30 =0

= $2x^2$ - 4x - 30 = 0

hence the required quadratic equation is

$2x^2$ - 4x - 30 = 0

52. Taking, L.H.S.= x(2x + 3) = $2x^2$ + 3x

So, x (2x + 3) = x^2 + 1 can be rewritten as

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

Therefore, we get x^2 + 3x – 1 = 0

It is of the form ax^2 + bx + c = 0. Also degree is 2. So, the given equation is a quadratic equation.

Section C

53. Let the tens' place digit of the two digit number be x.

It is given that the product of digits is 12.

$\therefore$ digit at Unit's place = $\frac{12}{x}$

So, the Number = $10x + \frac{12}{x}$

If 36 is added to the number the digits interchange their places. Hence, Number after interchanging digits at Unit's & tens' places will be $(10 \times \frac{12}{x} + x)$.

$\therefore ((10x + \frac{12}{x}) + 36 = (10 \times \frac{12}{x} + x)$

$\Rightarrow$ 10x + $\frac{12}{x}$ +36 = $\frac{120}{x}$ + x

$\Rightarrow$ 9x - $\frac{108}{x} + 36 = 0$

$\Rightarrow$ $9x^2$ -108 + 36x = 0

$\Rightarrow$ x^2 + 4x -12 = 0 ...[Dividing throughout by 9]

Hence, the required quadratic equation is x^2 + 4x - 12 = 0.

54. Let Rohan's present age be x years.

Then, his mother's age is (x + 26) years.

Rohan's age after 3 years = (x + 3) years.

After 3 years the age of Rohan's mother = (x + 26 + 3) years = (x + 29) years.

According to the question,

(x + 3)(x + 29) = 360

$\Rightarrow x^2 + 32x - 273 = 0$

This is the required quadratic equation.

55. Let the ten's place digit be y and unit's place be x.

Therefore, number is 10y + x.

According to given condition,

$10y + x = 4(x + y)$ and $10y + x = 2xy$

$\Rightarrow x = 2y$ and $10y + x = 2xy$

Putting x = 2y in 10y + x = 2xy

$10y + 2y = 2.2y.y$

$12y = 4y^2$

$4y^2 - 12y = 0 \Rightarrow 4y(y - 3) = 0$

$\Rightarrow y - 3 = 0$ or $y = 3$

Hence, the ten's place digit is 3 and units digit is 6 (2y = x)

Hence the required number is 36.

Section D

56. Length of flower bed = x m

Length of grassland = 2x + 3

Total length of field = length of grassland + length of flower bed =(2x + 3) + x

= (3x + 3) m

57. Perimeter of whole figure = 2(l + b)

= 2(3x + 3 + x)

= 2(4x + 3)

= (8x + 6)m

58. A = (3x + 3)x

$1260 = 3x^2 + 3x$

$420 = x^2 + x$

$x^2 + x - 420 = 0$

$(x + 21)(x - 20) = 0$

They x = 20 is only possible value.

59. Area of grassland = $l \times b$

$= 43 \times 20$

$= 860\ m^2$

Area of flowerbed = $(\text{side})^2$

$= (20)^2$

$= 400\ m^2$

60. If Arjuna has x arrows

He used half of his arrows to cut down Bheeshm's arrow

$\therefore$ Arjuna used $\frac{x}{2}$ arrows to cut down arrows thrown by Bheeshm.

61. According to question

The no of arrows Arjuna used to laid Bheeshm unconscious on arrow bed is

$4\sqrt{x} + 1$

62. The total no of arrows Arjuna had is given by equation

$y^2 - 8y - 20 = 0$

$y^2 - 10y + 2y - 20 = 0$

$y(y - 10) + 2(y - 10) = 0$

$(y + 2)(y - 10) = 0$

$y = -2; y = 10$

$\therefore x = y^2 = 10^2 = 100$

$\therefore$ Arjuna had 100 arrows.

on taking Y=-2, we get x=4, which is not possible, because x must be greater than 9.

63. Let Arjuna has x arrows

No of arrows he used to cut arrow of Bheeshm = $\frac{x}{2}$

No of arrows used to kill rath driver = 6

No of arrows used to laid Bheeshm unconscious = $4\sqrt{x} + 1$

No of other arrows used = 6

$\therefore$ $\frac{x}{2}$ + 6 + 3 + $4\sqrt{x}$ + 1 = x

$\Rightarrow$ x + 18+ $8\sqrt{x}$ = 2x

x = 18 + $8\sqrt{x}$

on putting x = y^2, equation becomes

y^2 = 18 + 8y

y^2 - 8y - 18 = 0

64. Let the no of articles produced be x

Price of each article = 2x + 1

Price of all articles produced = ₹ 210

x(2x + 1) = 210

$2x^2$ + x - 210 = 0

65. On solving

$2x^2$ + x - 210 = 0

$x = \frac{-1\pm\sqrt{1-(4)(2)(-210)}}{2\times2}$

$x = \frac{-1\pm\sqrt{1680}}{4}$

$x = \frac{-1\pm\sqrt{1681}}{4}$

$x = \frac{-1\pm41}{4}$

x = $\frac{40}{4}$ = 10

x = 10

x = $\frac{-42}{4}$

neglected as no of article's cannot be -ve

$\therefore$ no of articles = 10

$\therefore$ cost of each article = 2x + 1

= 2 $\times$ 10 + 1

= ₹ 21

66. Since cost of 1 article = 21

$\therefore$ cost of 15 article = 21 $\times$ 15

= ₹ 315

67. Since 21 is the manufacturing cost of 1 article

$\therefore$ 1 is the manufacturing cost of $\frac{1}{21}$ article

$\therefore$ 1575 is the manufacturing cost $\frac{1}{21}$ $\times$ 1575

= 75 article

Section E

68. State True or False:

(i) **(b)** False

Explanation: False

(ii) **(a)** True

Explanation: True

(iii) **(a)** True

Explanation: True

(iv) **(b)** False

Explanation: False

A quadratic equation has exactly two roots, no more no less.

(v) **(b)** False

Explanation: False

69. Distance travelled by the train = 480 km

Let the speed of the train be x kmph

Time taken for the journey = $\frac{480}{x}$

Given speed is decreased by 8 kmph

Hence the new speed of train = (x – 8) kmph

Time taken for the journey = $\frac{480}{x-8}$

$\frac{480}{x-8} = \frac{480}{x} + 3$

$\Rightarrow \frac{480}{x-8} - \frac{480}{x} = 3$

$\Rightarrow \frac{480(x-x+8)}{x(x-8)} = 3$

$\Rightarrow \frac{480\times8}{x(x-8)} = 3$

$\Rightarrow 3x(x-8) = 480 \times 8$

$\Rightarrow x(x-8) = 160 \times 8$

$\Rightarrow x^2 - 8x - 1280 = 0$

70. Let P be the initial production (2 yr ago) and the increase in production in every year be x%.

Then, production at the end of the first year.

$P + \frac{Px}{100} = P(1 + \frac{x}{100})$

Production at the end of the second year = $P(1 + \frac{x}{100}) + \frac{x}{100}P[1 + \frac{x}{100}]$

$= P(1 + \frac{x}{100})(1 + \frac{x}{100})$

$= P(1 + \frac{x}{100})^2$

Since, production doubles in the last two years,

$\therefore P(1 + \frac{x}{100})^2 = 2P$

$\Rightarrow (1 + \frac{x}{100})^2 = 2$

$\Rightarrow (1 + \frac{x}{100}) = \sqrt{2}$

$\Rightarrow \frac{x}{100} = \sqrt{2} - 1 = 1.4142 - 1 = 0.4142$

$\Rightarrow x = 0.4142 \times 100$

$\Rightarrow x = 41.42\%$