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Answers Key:

5 Marks

1. Let age of the boy be x years
   ∴ Age of the father be (24 - x) years
   ATQ $\frac{1}{4}x(24-x)=x+9$
   $\Rightarrow 24x-x^2=4x+36$
   $\Rightarrow x^2-20x+36=0$
   $\Rightarrow (x-18)(x-2)=0 \Rightarrow x=18, x=2$
   ⇒ Age of the boy =2 years
   and Age of Father = 24-2=22 years
   If x = 18 then age of father =24- 18 = 6 (Not Possible)
2. Let the original number of persons be x
   Then, share of each person $= Rs\frac{6500}{x}$
   If the number of persons is increased by 15.
   The, new share of each person $= Rs\frac{6500}{x+15}$
   ∴ $\frac{6500}{x+15}=\frac{6500}{x}-30$
   50.
3. 16
4. Given equation is
   $x^3-4x^2-x+1=(x-2)^3$
   $\Rightarrow x^3-4x^2-x+1=x^3-3(x^2)2+3x(2)^2-(2)^3$
   $[\because (a-b)]^3=a^3-3a^2b+3ab^2-b^3]$
   $\Rightarrow x^3-4x^2-x+1=x^3-6x^2-12x+8=0$
   $\Rightarrow 2x^2-13x+9=0$
   Which is of the form $ax^2+bx+x=0$ Hence, it is a quadratic equation. where $a\neq 0$ and b,c are any real numbers.
5. Given equation is
   $4x^2+4\sqrt{3x}+3=0$
   On dividing both sides by 4,we get
   $x^2+\sqrt{3x}+\frac{3}{4}=0 \Rightarrow x^2+\sqrt{3x}=-\frac{3}{4}$
   On adding $\left(\frac{1}{2}\quad coefficient of\quad x\right)$
   i.e. $\left(\frac{1}{2}\sqrt{3}\right)^2=\frac{3}{4}$ both sides, we get
   $x^2+\sqrt{3x}+\frac{3}{4}+\frac{3}{4}$
   $\Rightarrow \left(x+\frac{\sqrt{3}}{2}\right)^2=0$
   $\left[\because a^2+2ab+b^2=(a+b)^2\right]$
   On taking square root both sides,we get
   $x+\frac{\sqrt{3}}{2}=0 \quad and \quad x+\frac{\sqrt{3}}{2}=0 \Rightarrow x=-\frac{\sqrt{3}}{2} and \quad x=-\frac{\sqrt{3}}{2}$
6. Let the ten's digit of the number be x.
   According to the question,
   Product of the digits=12
   Ten's digit x Unit's digit=12
   Unit's digit= $\frac{12}{x}$
   Two-digit number=10x+ $\frac{12}{x}$
   Also, it is given that if 36 is added to the number, the digits get an interchange.
   10x+ $\frac{12}{x}$+36=10$\times\frac{12}{x}$+x
   $10x^2+12+36x=120+x^2$
   $9x^2-108+36x=0$
   $x^2+4x-12=0$
   which is the required quadratic equation.
   By factorisation, we get
   $x^2+6x-2x-12=0$
   $x(x+6)-2(x+6)=0$
   $(x+6)(x-2)=0$
   x+6=0 or x-2=0
   x=-6 or x=2
   But a digit can never be negative. So, x=2.
   Hence, the required two-digit number
   =10$\times$2+ $\frac{12}{2}$
   =20+6=26
7. Let the number of books bought by shopkeeper=x
   Then, cost of each book= $\frac{1200}{x}$

If 10 more books, he bought for same amount. Then, number of books=x+10 and cost of each book= $\frac{1200}{x+10}$

According to the question,

$\frac{1200}{x} - \frac{1200}{x+10} = 20$

$\frac{1200[x+10-x]}{x(x+10)} = 20$

$\frac{1200\times10}{20} = x^2 + 10x$

$600=x^2+10x$

$x^2+10x-600=0$

$x^2+30x-20x-600=0$

$x(x+30)-20(x+30)=0$

$(x+30)(x-20)=0$

$x+30=0$ or $x-20=0$

$x=-30$ or $x=20$

But number of books cannot be negative.

$x=20$

Hence, number of books bought by shopkeeper are 20.

8. 20 min and 25 min.
9. (i) no real roots
   (ii) distinct real roots.
10. Let the present age of Tanay is x years

    $(x-5)(x+10)=16$

    $\Rightarrow x^2 + 5x - 50 = 16$

    $\Rightarrow x^2 + 5x - 66 = 0$

    Here a=1, b=5, c=-66

    $\triangle = \sqrt{b^2 - 4ac} = 17$

    $x = \frac{-5\pm17}{2}$

    =-11.6

    Rejecting x = - II,

    as age cannot be negative

    Present age of Tanay is 6 years

QB 365 TM Study Material
QUESTION BANK 365

Multiple Choice Question

11. (b) $x^2 + 2x - 1 = 0$
12. (d) $b^2 - 4ac < 0$
13. (b) -5/2
14. (a) 4, -2/3
15. (d) $x^2 + x - 5 = 0$
16. (a) 12m and 18m
17. (b) 6
18. (b) $(x - 9)^2$
19. (c) $-x^2+3x-3=0$
20. (c) 10 and 6
21. (a) 0 or 5/4
22. (c) -2
23. (a) ± 3
24. (d) $\frac{-b\pm\sqrt{b^2-4ac}}{2c}$
25. (c) 7
26. (c) 11, 13
27. (b) No
28. (c) $4(\sqrt{5}+1)$
29. (d) $-\frac{2}{a}$
30. (a) 2
31. (c) Both (a) and (b)
32. (b) -3, -10
33. (a) 576
34. (d) $\frac{b^2}{4a}$
35. (b) $k \leq 4$