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Q. 1. If k is a natural number and the roots of the equation $x^2 + 11x + 6k = 0$ are rational numbers, then find the smallest value of k.

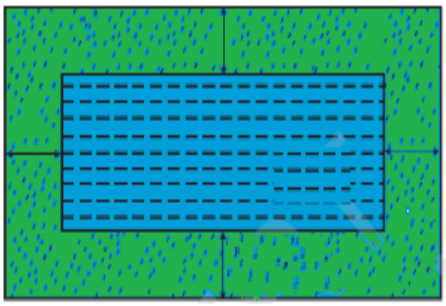
Q. 2. If the equation $x^2 + 2cx + ab = 0$ has two distinct real roots, then prove that the equation $x^2 - 2(a + b)x + a^2 + b^2 + 2c^2 = 0$ has no real roots.

Q. 3. A peacock is sitting on the top of a pillar, which is 9 m high. From a point 27 m away from the bottom of the pillar, a snake is coming to its hole at the base of the pillar. Seeing the snake, the peacock pounces on it. If their speeds are equal, at what distance from the hole is the snake caught?

Q. 4. A train travels at a certain average speed for a distance of 63 km and then travels a distance of 72 km at an average speed of 6 km/h more than its original speed. If it takes 3 hours to complete the total journey, what is its original average speed?

Q. 5. At present Asha's age (in years) is 2 more than the square of her daughter Nisha's age. When Nisha grows to her mother's present age, Asha's age would be one year less than 10 times the present age of Nisha. Find the present ages of both Asha and Nisha.

Q. 6. In the centre of a rectangular lawn of dimensions $50\,m \times 40\,m$, a rectangular pond has to be constructed so that the area of the grass surrounding the pond would be $1184\,m^2$. Find the length and breadth of the pond.



Q. 7. A trader bought a number of articles for Rs. 900, five were damaged and he sold each of the rest at Rs. 2 more than what he paid for it, thus getting a profit of Rs. 80 on the whole transaction. Find the number of articles he bought.

Q. 8. A person on tour has Rs. 4200 for his expenses. If he extends his tour for 3 days, he has to cut down his daily expenses by Rs. 70. Find the original duration of the tour.

Q. 9. A pole has to be erected at a point on the boundary of a circular park of diameter 13 metres in such a way that the differences of its distances from two diametrically opposite fixed gates A and B on the boundary is 7 metres. Is it possible to do it so? If yes, at what distances from the two gates should the pole be erected?

Q. 10. A motor boat whose speed is 18 km/h in still water takes 1 hour more to go 24 km upstream than to return to the same spot. Find the speed of the stream.

Q. 11. If $(m + 1)^{th}$ term of an A.P. is twice the $(n + 1)^{th}$ term, prove that $(3m + 1)^{th}$ term is twice the $(m + n + 1)^{th}$ term.

Q. 12. How many numbers lie between 10 and 300, which when divided by 4 leave a remainder 3?

Q. 13. Find the value of x for which $(8x + 4)$,$(6x - 2)$ and $(2x + 7)$ are in A.P.

Q. 14. The sum of three numbers in an A.P. is 12 and the sum of three cubes is 288. Find the numbers.

Q. 15. Split 207 into three parts such that these are in A.P. and the product of the two smaller part is 4623.

Q. 16. The angles of a triangle are in A.P. The greatest angle is twice the least.Find all the angles.

Q. 17. The sum of the first p, q, rterms of an A.P. are a, b, c respectively. Show that

$\frac{a}{p}(q-r)+\frac{b}{q}(r-p)+\frac{c}{r}(p-q)=0.$

Q. 18. Show that the sum of an A.P. whose first term is a, the second term is b and the last term is c, is equal to $\frac{(a+c)(b+c-2a)}{2(b-a)}$.

Q. 19. If S_n denotes the sum of first *n* terms of an A.P., then prove that $S_{12}=3(S_8-S_4)$.

Q. 20. Solve the question: $(-4)+(-1)+2+5+\cdots+x=437$.

Q. 21. Find the zeroes of the quadratic polynomial $4x^2+5\sqrt{2}x-3$ by factorisation method and verify the relationship between the zeroes and coefficients of the polynomial.

Q. 22. αandβ are zeroes of the polynomial $p(x)=x^2-(k+6)x+2(2k-1)$. Find the value of *k* if $\alpha+\beta=\frac{1}{2}\alpha\beta$

Q. 23. If one of the zeroes of the cubic polynomial $x^3+ax^2+bx+c$is -1, then prove that the product of other two zeroes is $b-a+1$.

Q. 24. If α and β are two zeroes of the polynomial $25x^2-15x+2$,find a quadratic polynomial whose zeroes are $\frac{1}{2\alpha}$and $\frac{1}{2\beta}$.

Q. 25. If the polynomial $6x^4+8x^3+17x^2+21x+7$ is divided by another polynomial $3x^2+4x+1$, the remainder comes out to be $ax+b$, find the values of *a* and *b*.

Q. 26. If the remainder on division ofx^3+2x^2+kx+3 by $x-3$ is 21, find the quotient and the value of *k*. Hence, find the zeroes of the cubic polynomial$x^3+2x^2+kx-18$.

Q. 27. Given that $x-\sqrt{5}$ is a factor of the polynomial $p(x)=x^3-3\sqrt{5}x^2-5x+15\sqrt{5}$, find all the zeroes of the polynomial $p(x)$.

Q. 28. Find a quadratic polynomial whose sum and product of the zeroes are $-\frac{3}{2\sqrt{5}}$and $-\frac{1}{2}$.Also find the zeroes of the polynomial

Q. 29. Find the value of m if one zero of the polynomial$(m^2+4)x^2+63x+4m$ is reciprocal of the other.

Q. 30. What real number should be subtracted from the polynomial$2x^3+5x^2-14x+10$ so that the polynomial $2x-3$ divides it exactly?