

CLASS: X

SUBJECT: MATHEMATICS

TOPIC: QUADRATIC EQUATIONS

- 1) Find the discriminant of the quadratic equation: $3\sqrt{3}x^2 + 10x + \sqrt{3} = 0$ (64)
- 2) Solve for x:
 - a) $9x^2 - 9(a+b)x + 2a^2 + 5ab + 2b^2 = 0$ $(2a+b/3, a+2b/3)$
 - b) $4x^2 - 4a^2x + (a^4 - b^4) = 0$ $(a^2+b^2)/2, (a^2-b^2)/2$
 - c) $10ax^2 - 6x + 15ax - 9 = 0$ $(-3/2, 3/5a)$
 - d) $x^2 - 2(a^2 + b^2)x + (a^2 - b^2)^2 = 0$ $(a+b)^2, (a-b)^2$
 - e) $\sqrt{7}x^2 - 6x - 13\sqrt{7} = 0$ $(13\sqrt{7}/7, -\sqrt{7})$
- 3) find the value of k so that the quadratic equation has equal roots:
 - a) $2kx^2 - 40x + 25 = 0$ $(k = 8)$
 - b) $2x^2 - (k-2)x + 1 = 0$ $(2+2\sqrt{2})$
 - c) $kx(x-7) + 49 = 0$ $(0, 4)$
 - d) $(k-5)x^2 + 2(k-5)x + 2 = 0$ $(5, 7)$
- 4) Find the roots of the following quadratic equation by the method of completing the Square.
 - a) $a^2x^2 - 3abx + 2b^2 = 0$
 - b) $x^2 - 4ax + 4a^2 - b^2 = 0$
- 5) Solve the following quadratic equations by factorization method:
 - a) $3x^2 - 2\sqrt{6}x + 2 = 0$ $(\sqrt{2}/3, \sqrt{2}/3)$
 - b) $9x^2 - 6ax + (a^2 - b^2) = 0$ $(\frac{a^2+b^2}{3}, \frac{a^2-b^2}{2})$
- 6) write the nature of roots of quadratic equation: $4x^2 + 4\sqrt{3}x + 3 = 0$
- 7) Check whether the equation $x^3 - 4x^2 + 1 = (x-2)^2$ is quadratic or not
- 8) Solve for x: $\frac{1}{a+b+x} = \frac{1}{a} + \frac{1}{b} + \frac{1}{x}$, $a+b \neq 0$ $(-a, -b)$
- 9) If p, q are the roots of the equation $x^2 - 5x + 4 = 0$, find the value of $\frac{1}{p} + \frac{1}{q} - 2pq$ $(-27/4)$
- 10) Solve for x: $\frac{x}{x+1} + \frac{x+1}{x} = \frac{34}{15}$ $(3/2, -5/2)$
- 11) Solve for x: $\frac{1}{x-3} - \frac{1}{x+5} = \frac{1}{6}$ $(7, -9)$
- 12) If one root of a quadratic equation $3x^2 + Px + 4 = 0$ is $2/3$, find the value of p $(p = -8)$
- 13) Solve for x: $2\left[\frac{2x-1}{x+3}\right] - 3\left[\frac{x+3}{2x-1}\right] = 5$ $(-10, -1/5)$
- 14) The sum of the squares of two consecutive odd numbers is 394. Find the numbers. $(13, 15)$
- 15) The sum of the areas of two squares is 640 m^2 . If the difference in their perimeter is 64m. Find the sides of the two squares $(8\text{m}, 24\text{m})$
- 16) The difference of two numbers is 4. If the difference of their reciprocals is $4/21$, find the numbers $(3, 7)$
- 17) A plane left 30 minutes late than its scheduled time and in order to reach the destination 1500km away in time it had to increase the speed by 250 km/h from the usual speed. Find its usual speed (750 km / hr)
- 18) The hypotenuse of a grassy land in the shape of a right triangle is 1m more than twice the shortest side. If the third side is 7m More than the shortest side find the sides of grassy land $(8, 15)$
- 19) Find two consecutive numbers, whose squares have the sum 85. $(6, 7)$
- 20) The sum of the reciprocals of rehman's age 3years ago and 5years from now is $1/3$, find his present age
- 21) A natural number, when increased by 12, becomes equal to 160 times its reciprocal. Find the number (8)
- 22) A takes 6 days less than the time taken by B to finish a piece of work. If both A and B together Can finish it in 4 days; find the time taken by B to finish the work (12 days)
- 23) The speed of a boat in still water is 15 km/hr. It can go 30km upstream and return downstream to the original point in 4hrs 30min. Find out the speed of the stream (5km/hr)
- 24) A two digit number is such that the product of its digits is 18. When 63 is subtracted from the number, the digits interchange their places. Find the number (92)
- 25) Is the following situation possible? If so, determine their present ages. The sum of the ages of two friends is 20years. Four years ago, the product of their ages was 48. $(D = -48, \text{No})$
- 26) If the roots of the equation $(b-c)x^2 + (c-a)x + (a-b) = 0$ are equal, then prove that $2b = a + c$

- 27) 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? (12m)
- 28) Two trains leave a railway station at the same time. The first train travels due west and the second train due north. The first train travels 5 km/hr faster than the second train. If after two hours, they are 50 km apart, find the average speed of each train (20 km/hr)
- 29) A journey of 192 km from station A to station B takes 2 hours less by a superfast train than by an ordinary train. If the average speed of the slower train is 16 km/hr than that of the faster train, determine their average speed
- 30) Two water taps together can fill a tank in 6 hrs. The tap of larger diameter takes 9 hrs less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank
- 31) The product of Bilal's age five years ago and eight years later is 198. Find his present age (14 years)
- 32) The age of father is equal to the square of the age of his son. The sum of the age of father and five times the age of the son is 6 years. Find their ages (36y, 6y)
- 33) A train travels 180 km at a uniform speed. If the speed had been 9 km/hr more, it would have taken 1 hour less for the same journey. Find the speed of the train. (36 km/hr)
- 34) Rs 1200 were distributed equally among a certain number of students. Had there been 8 more students, each would have received Rs 5 less. Find the number of students. (40)

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SUBJECT: MATHEMATICS

TOPIC: ARITHMETIC PROGRESSIONS

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- 1) For what value of p , are $2p-1$, 7 and $3p$ three consecutive terms of an A.P? (P=3)
- 2) Find the value of k , so that $3k + 7$, $2k + 5$, $2k + 7$ are in A.P (k= -4)
- 3) Find the 15th term from the end of the A.P: $3, 5, 7, \dots, 201$ (173)
- 4) Find the 11th term from the end of the A.P: $10, 7, 4, \dots, -62$ (-32)
- 5) If S_n , the sum of first n terms of an A.P is given by $S_n = 3n^2 - 4n$, then find its n th term (6n - 7)
- 6) The sum of n terms of an A.P. is $3n^2 + 5n$. Find the A.P. Hence, find its 16th term (6n + 2, 98)
- 7) In the following A.P. find the missing term: $*, 38, *, *, *, -22$
- 8) Find the sum of all natural numbers less than 100 which are divisible by 6 (816)
- 9) Find the sum of 3 digit numbers which are not divisible by 7 (424214)
- 10) Find the sum of all three digit numbers which leave the remainder 3 when divided by 5 (99090)
- 11) Find the sum of first seven multiples of 5 (140)
- 12) Find the sum of all natural numbers up to 100, which are not divisible by 5 (4000)
- 13) In an A.P, if the 6th and 13th terms are 35 and 70 respectively, find the sum of its first 20 terms.
- 14) If the 3rd and 9th term of an A.P. are 4 and -8 respectively, which term is zero (n = 5)
- 15) The sum of 4th and 8th terms of an A.P is 24 and sum of 6th and 10th term is 44. Find A.P.
- 16) The 4th term of an A.P is equal to 3 times the first term and the 7th term exceeds twice the 3rd term by 1. Find the A.P (3, 5, 7, ...)
- 17) Which term of the A.P.? $3, 15, 27, 39, \dots$ will be 120 more than its 21st term (n = 31)
- 18) In an A.P., the first term is 25, n th term is -17 and sum to first n terms is 60. Find n and d the common difference.
- 19) Which term of the sequence 114, 109, 104, ... is the first negative term? (n = 24)
- 20) If the 4th term of an A.P is twice the 8th term, prove that the 10th term is twice the 11th term
- 21) If $2 + 5 + 8 + \dots + x = 155$, find x (n = 10, x = a₁₀ = 29)
- 22) For A.P. $a_1, a_2, a_3, \dots$, if $a_4/a_7 = 2/3$, find a_6/a_8
- 23) Find the sum of the following A.P: $1 + 3 + 5 + \dots + 199$. (10000)
- 24) Find the common difference of an AP whose first term is 100 and sum of first six terms is 5 times the sum of the next 6 terms (d= - 10)
- 25) Show that progression $7, 2, -3, -8, \dots$ is an A.P. Find its n th term (12 - 5n)
- 26) The angles of a triangle are in A.P, the last being half the greatest. Find the angles. (40°, 60°, 80°)
- 27) Find the sum of n terms of an A.P whose n th term is given by $t_n = 5 - 6n$ (2n - 3n²)
- 28) Find the middle term of A.P: $1, 8, 15, \dots, 505$ (253)
- 29) Find the number of terms of the A.P, 63, 60, 57, So that their sum is 693 (n = 22, 21)
- 30) The sum of 3 numbers in A.P is 3 and their product is -35. Find the numbers (7, 1, and -5)
- 31) How many terms of the sequence 18, 16, 14, should be taken so that their sum is 0 (n= 19)
- 32) A sum of Rs 1400 is to be used to give 7 cash prizes to students of a school for their overall academic Performance if each prize is Rs40 less than the preceding price, find the value of each of the prizes. (320, 280, 240, 200, 160, 120, 80)
- 33) Verify that $a + b, (a + 1) + b, (a + 1) + (b + 1), \dots$ is an A.P. and then write its next term (a+2) + (b+1)
- 34) Determine the A.P whose 3rd term is 16 and 7th term exceeds the 5th term by 12 (4, 6, 10, 16,)
- 35) If the n th term of the A.P. $9, 7, 5, \dots$ is the same as the n th term of the A.P. $15, 12, 9, \dots$, find n (n = 7)
- 36) Find the sum of first 22 terms of an A.P. in which $d = 7$ and 22nd term is 149 (1661)
- 37) Find the sum of the following A.P: $3, 9/2, 6, 15/2, \dots$ To 25 terms (525)
- 38) The ratio of the sum to p terms and q terms of an A.P. is $p^2 : q^2$. Prove that the common difference of the A.P. is twice the first term
- 39) In an A.P., if the sum of its 4th and 10th terms is 40, and the sum of its 8th and 16th terms is 70, then find the sum of its first 20 terms
- 40) Three consecutive positive integers are taken such that the sum of the square of the first and the product of the other two is 154. Find the integers (3, 5, 7,).

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