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| **HY/MAAK/1123/A 09-NOV-2023**  **HALF YEARLY EXAMINATION ( 2023-24)**  **ANSWER KEY**  **Subject: MATHEMATICS**  **Grade: 11** | |
| **1** | d |
| **2** | C) R – { - 2, 3 } |
| **3** | a |
| **4** | A) |
| **5** | D) |
| **6** | A) 42 cm |
| **7** | B) |
| **8** | C) |
| **9** | A) |
| **10** | C) |
| **11** | C)null set |
| **12** | B)11 |
| **13** | A)8 |
| **14** | C)1001 |
| **15** | D) |
| **16** | C) a rational number |
| **17** | D) |
| **18** | B)12th |
| **19** | D) |
| **20** | A) |
|  | Section - B |
| **21** | 1. Z = Z = |
| **22** | x belongs to (-2,0] |
| **23** | =  = + (8) + + + ….. +  Þ – 8n – 9 = + + ….. +  = 64 [+ + ….. + ] |
| **24** | a = - 3 and also given that  =  a = r = - 3  = = - 218 |
| **25** | Suppose m1 be the slope of line joining  (9, 5) and (- 1, 1) and m2 be the slope of the line joining (3 , - 5)  \ = = = =  And = = =  Since =  Hence the given lines are parallel. |
| **26** | Domain – R  here f (x) =  put y = Þ y + y =  Þ = y  Þ = = x = ±  Þ ³ 0  Þ £ 0  Þ 0 £ y < 1  Þ yÎ ,  Range of f ( x ) = , |
| **27** | LHS =  = [multiplying by 2 in numerator and denominator]  =  = = =  = = tan2θ  = RHS |
| **28** | =  = - [ + + 3 ´ ´ + 3 ´ 2 ´ ]  = - [8 + + 4i + = - [8 - + 4i - [  = [ + i]  = - [ + ] = - |
| **29** | + = 2  = 2  Putting x = and y = 1, we get  + = 2  = 2[4 + 20 + 5]  = 58 |
| **30** | Perpendicular line 4x + 7y + 10 = 0 is 7x – 4y + k = 0 put x = - 8and y = 12 so k = 104 now solve the both the equations to get foot x = 5 y = 1 |
| **31** | Slope of BC = - = -  Let m be the slope of AB.  Since ABC is an equilateral triangle ÐABC = 60°  \ tan60° =  Þ = Þ = ±  Þ m + = – 3m or m + = - + 3m  Þ 4m = 0 or 2m = 2 Þ m = 0 or .  \ The equations of the other two sides of the DABC are  y – 3 = 0 ´ (x – 2), y – 3 = (x – 2)  i.e., y – 3 = 0, x – y + 3 - 2 = 0 |
|  | Section - D |
| **32** | \ Total letters in the word PERMUTATIONS = 12.  Hence T = 12  (i) Now first letter is P and last letter is S which are fixed.  So the remaining 10 letters are to be arranged between P and S.  \ Number of Permutations  = = = 1814400  (ii) Thee are vowels in the word PERMUTATIONS. All vowels can be put together.  \ Number of permutations of all vowels together =  = = = 120  Now consider the 5 vowels together as one letter. So the number of letters in the word when all vowels are together = 8.  \ Number of permutations = = = 20106  Hence the total number of permutations = 120 ´ 20160 = 2419200  14 ´ 10!/2!  iii) |
| **33** | Hence the total number of PERMUTATIONS  =  =  by C and D  =  =  by C and D  =  =  = |
| **34** | Coordinates of F are F i.e., F(0, 2)  Û 4(y – 5) = 3(x – 4) Û 3x – 4y + 8 = 0  Hence, the equation of median CF is 3x – 4y + 8 = 0  ii. Draw BL ^ AC, then, BL is the altitude through B.  Slope of AC = = 2  Let the slope BL be m.  Since BL ^ AC, we hae 2m = - 1 and therefore m = -  Thus, the slope of BL is -  So, the equation of BL is given by  = - Û 2(y – 3) = - (x + 2) Û x + 2y – 4 = 0  Hence the equation of the altitude BL is x + 2y – 4 = 0  iii. Let D be the midpoint BC.  Then, the coordinates of D are D i.e., D(1, 4)  Through D, draw DP ^ BC  Slope of BC = = =  Let the slope of PD be m.  Since PD ^ BC, we have m ´ = - 1 Þ m = - 3  So, the slope of PD is – 3.  So, the equation PD is given by  = - 3 Û -3(x – 1) = (y - 4) Û 3x + y – 7 = 0  Hence, the equation of the right bisector of BC is 3x + y – 7 = 0 |
|  | SECTION - E |
| **35** | : cosx = - anx x lies in the IIIrd quadrant  Sin x/2, cos, sin2x are - , and |
| **36** | Solution: Let x litres of 2% boric acid solution be added to 640 litres of 8% boric acid solution  Total mixture = (x + 640) litres.  According to gien,  2% of x + 8% of 640 > 4% of (x + 640)  And 2% of x + 8% of 640 < 6% of (x + 640)  Þ x + ´ 640 > (x + 640) and  x + ´ 640 < (x + 640)  Þ 2x + 8 ´ 640 > 4x + 4 and 2x + 8 ´ 640 < 6x + 6 ´ 640  Þ 4 ´ 640 > 2x and 2 ´ 640 < 4x  Þ 1280 > x and 320 < x  Þ x > 1280 and 320 < x  Þ 320 < x < 1280 |
| **37** | When all the digits are different, four digits can be formed in ways i.e., = 120 ways  With one repetition, the four digits can be formed in  ´ ´ = 5 ´ 6 ´ 12 = 360 ways,  With double repetition, the four digit numbers can be formed in  ´ = 60 ways  So the total number of four digit numbers = 120 + 360 + 60 = 540 |
| **38** | \ Their sum = a + ar + a = 21  Þ a (1 + r + ) = 21  Also sum of their squares = + + = 189  Þ (1 + + ) = 189  Dividing (ii) by the squre of (i), we get  =  Þ =  r = 2 or r = ½  a = 12 or a = 3  gp is 3, 6, 12 or 12, 6, 3 |