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| **HYMATGR11SET1AK2019-20** | | | | |
| **HALF YEARLY EXAMINATION (2019 - 20)** | | | | |
| **SUBJECT: MATHEMATICS (SET 1)**  **GRADE: XI** | | | MAX. MARKS: 80TIME: 3 hours | |
| **SECTION A (1 mark each)** | | | | |
| 1. | *n (A) + n (B)* | 11. | | 40, 10 |
| 2. | 6, 4 | 12. | |  |
| 3. |  | 13. | | 253 |
| 4. |  | 14. | | 41 |
| 5. | 0 | 15. | | 8 |
| 6. | 64 | 16. | | (3, 4) |
| 7. | 5 | 17. | |  |
| 8. | 3 | 18. | |  |
| 9. |  | 19. | | 60 |
| 10. |  | 20. | | -1+i |
| **SECTION B (2 marks)** | | | | |
| 21. | Domain: *R –* { -1 , 1 } ……………………………… 1/2    Range: Let      , ………………………………….1  Range = ………………………………… 1/2 | | | |
| 22. | ………………………………… 1/2  ………………………………… 1/2  ………………………………… 1/2  is purely real ………………………………… 1/2 | | | |
| 23. | 5 boys can be arranged in *5!* ways ………………………………… 1/2  There are 6 places for the girls to be arranged. They can be arranged in ways. ……………… 1/2  Total number of arrangements = 5! = 14400 ………………………………… 1 | | | |
| 24. | = ………………………………… 1/2  =  ………………………………… 1/2    ………………………………… 1  **OR**  = ………………………………… 1/2  ………………………………… 1/2  ………………………………… 1 | | | |
| 25. | ………………………………… 1/2  =  = ………………………………… 1/2  = ………………………………… 1  **OR**  Let the 2 A.P’s be  *a, a + d, a + 2d, ……………………..*  *A, A + D, A + 2D, …………………….*  Ratio of sums = … (1) ….………….……………… 1/2  ………..(2) …………………………………1/2  Comparing (1) and (2)  ………………………………… 1/2  ………………………………… 1/2 | | | |
| 26. | c = 4,  ………………………………… 1/2  ………………………………… 1  Equation of ellipse is given by  Therefore, ………………………………… 1/2 | | | |
| **SECTION C** | | | | |
| 27. | 2 marks for Venn diagram  1 marks for each answer. | | | |
| 28. | 1. ………………………………… 1   is true   1. Assume *P(n)* is true for *n = k*   ………………………………… 1/2   1. To prove *P(k+1)* is also true     LHS =  =  =  , where ……………………2  Therefore P(k +1) is true whenever P(k) is true. Hence P(n) is true n by the principle of mathematical induction. ………………………………… 1/2 | | | |
| 29. | Lines – 3marks  Shading region – 1 mark | | | |
| 30. | MM, AA, TT, H, E, I, C, S   1. All 4 letters different:   No. of selections =  No. of words = ………………………………… 1   1. 2 same and 2 distinct   No. of selections = ………………………………… 1   1. 2 same of one kind and 2 alike of other kind   No. of selections =  No. of words = ………………………………… 1  Total = 1680 + 756 + 18 = 2454 ………………………………… 1  **OR**   1. For an even four-digit number the unit’s place can be filled in3 ways. The remaining three place can be filled in5P3ways.   So Required no. of digits=35P3 = 360 =180 ………………………………… 1   1. For the number to be exactly divisible by 4 the last two places can be filled in 8 ways-(12, 16, 24, 32, 36, 52, 56, 64). The other two places can be filled in 4P2 ways   So Required no. of digits=84P2=96 ………………………………… 2   1. For the number to be exactly divisible by 5 the last two places can be filled in 1 way-(25) The other two places can be filled in 4P2 ways   So Required no. of digits = 4P2 = 12 ………………………………… 1 | | | |
| 31. | Equation of the line QR: …… (1)  A (1,2) lies on ………………… (2)  Solving (1) and (2),  …………………………2  Therefore, P =  Using distance formula, AP = ……………………1  *units.* ……………………1 | | | |
| 32. | Since (h,k) lies on  …………….. (1)  Equation of the circle is given by,  Points (4,1) and (6,5) lie on the circle. Therefore, ………………… (2)  ………………… (3) …………………………..1/2  Subtracting (3) from (2)  ………………………… (4) ……….……………………1  Solving (1) and (4)  ……….……………………1    Using the point (6,5) and the center of the circle (3,4), *r* is given by  ……….……………………1/2  Equation of the circle: ……….………………… 1  **OR**  According to the fig, AB = 100m  Thus AC =BC = 50m and the longest and shortest wires attached to the cable are 30m and 6m respectively. Let the coordinates of the point with supporting wire attached to the roadway, 18 m away from the middle be (18, y)  The equation of the parabola is of the form x2 = 4ay  The coordinates of the point B are (50, 24). Substituting this for x and y in the equation of the parabola,  (50)2 = 4a(24) ……………………………………..1/2  ⇒ n……………………………………..1  Hence equation of the parabola is ⇒……………………..1  The x coordinates at required point is 18. ……………………………..1/2  ∴ y =3.11 Hence length of wire = 3.11 + 6 = 9.11 m ……………………………………..1  Hence the length of the supporting wire attached to the roadway 18m from the middle is 9.11 m approx. | | | |
| **SECTION D** | | | | |
| 33. | Let Q (a, b) be the image of (1, 2)  Equation of the given line is …….(1)  Image will lie on the perpendicular to this line with equation …………………….1  This line passes through (1, 2) …………………………………...1  Equation of the line is  …..…………………….1/2  Solving equations 1 and 2, ………………………………………1  M is the midpoint of PQ  M =  ………………………………………1  ………………………………………1/2  **OR**  …………………………………………2  …………………………………………2  ..……………………………2 | | | |
| 34. | …………………………………………1  …………………………………………1    …………………………………………1  …………………………………………1  …………………………………………2 | | | |
| 35. | Subtracting,  …………………………………………3        …………………………………………3 | | | |
| 36. | ……………………….. (1)  ……………………… (2)  …………………….. (3) ……………………………1  (2) (1)    ……………………… (4) ………………………………1  (3) (2)    …………………... (5) ………………………………….1  From (4) and (5),    ………………………………….1  Using (1)    ………………………………….1  Therefore, ………………………………….1 | | | |
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