# ALL INDIA RPS OLYMPIAD-2021

**(Organized by RPS Education Society Mahendergarh Haryana)**

**M.M. 70** **Class 10th** **Time: 70 minutes**

## English (10)

1. …… we known about the meeting, we would have attended.
   (a) Has (b) Were (c) Have (d) Had
2. Mania for stealing articles is called –
   (a) Nymphomania (b) Kleptomania
   (c) Dromomania (d) Pyromania
3. The wounded man cried and …….
   (a) wreath (b) wreathed (c) writhed (d) Reeth
4. Suddenly the room filled with a deafening silence.
   The literary device in the given sentence is –
   (a) Metonymy (b) Oxymoron (c) Onomatopoeia (d) Simile
5. Choose the part of the sentence which is incorrect.
   He is / the best artist / of the time but unfortunately / least recognised.
   (i) (ii) (iii) (iv)
   (a) (i) (b) (ii) (c) (iii) (d) (iv)
6. Letter after letter ……. the need for hard work.
   (a) Pinpoints (b) Pinpointing (c) Pinspointed (d) Pinpoint
7. Don't long for what you can not have.
   The given sentence has a/an ……
   (a) Adjective clause (b) Noun clause
   (c) Relative clause (d) Adverb clause
8. He said to me, "If I were there, I would snub him."
   The correct indirect form of the given sentence is –
   (a) He said to me that if he was there, he would snub him.
   (b) He told me that if he had been there, he would snub him.
   (c) He told me that if he were there, he would snub him.
   (d) He told me that if he had been there, he would have snubbed him.
9. Scarcely had we stepped out, …….. it began to rain.
   (a) Then (b) Than (c) As (d) When
10. The city <u>itself</u> does not receive much rainfall.
    The underlined word is –
    (a) Emphatic Pronoun (b) Reflexive Pronoun
    (c) Relative Pronoun (d) Reciprocal Pronoun

**Mathematics (20)**

11. Two different points C and D, lie on the same side of AB so that $\Delta ABC$ *and* $\Delta BAD$ are congruent with $AB = 9, BC = AD = 10$ *and* $CA = DB = 17$ . The intersection of these two triangular regions has area $\frac{m}{n}$ , where $m$ *and* $n$ are relatively prime positive integers, then $(m+n)$ is:
(a) 113 (b) 59 (c) 58 (d) 115

12. What is the product of real roots of the equation $x^2 + 18x + 30 = 2\sqrt{x^2 + 18x + 45}$
(a) 30 (b) 40 (c) 50 (d) 20

13. ABC is a field in the form of an equilateral triangle. Two vertical poles of heights 45 m and 20 m are situated at A and B respectively. The angles of elevation of the tops of the two poles from C are complementary to each other. There is a point D on AB such that from it, angles of elevation of the tops of two poles are equal. Then AD is equal to:
(a) $17\frac{5}{12}m$ (b) $20\frac{10}{13}m$ (c) $20\frac{5}{13}m$ (d) $17\frac{10}{12}m$

14. If the larger base of an isosceles trapezium equals a diagonal and smaller base equals the altitude, then the ratio of the smaller base to the larger base is:
(a) $\frac{2}{3}$ (b) $\frac{3}{4}$ (c) $\frac{3}{5}$ (d) $\frac{2}{5}$

15. Let $A(3,4)$ *and* $B(5,8)$ be two points. If C is a point on the x-axis such that $AC + BC$ is minimum, then coordinates of C are.
(a) $\left(\frac{11}{3},0\right)$ (b) $\left(\frac{-11}{3},0\right)$ (c) $\left(\frac{15}{3},0\right)$ (d) $\left(\frac{17}{6},0\right)$

16. For $x^2 + 2x + 5$ to be a factor of $x^4 + px^2 + q$ , the values of $p$ *and* $q$ must be, respectively.
(a) -2,5 (b) 5,25 (c) 6,25 (d) 10,20

17. Let S be the set of positive integers $n$ for which $\frac{1}{n}$ has the repeating decimal representation $0.\overline{ab} = 0.ababab.....$ , with a and b different digits. What is the sum of elements of S?
(a) 11 (b) 44 (c) 110 (d) 143

18. In a triangle ABC, the median from B to CA is perpendicular to the median from C to AB. If median from A to BC is 30, then $\left(AB^2 + BC^2 + CA^2\right)$ is:
(a) 2000 (b) 2400 (c) 2300 (d) 2500

19. If $\frac{\text{Sin}^4\theta}{3}+\frac{\text{Cos}^4\theta}{4}=\frac{1}{7}$ , then which of the following is correct.

(a) $\tan^2\theta=\frac{9}{16}$ (b) $\text{Sin}^2\theta=\frac{3}{17}$ (c) $\text{Sin}^2\theta=\frac{3}{7}$ (d) $\text{Cos}^2\theta=\frac{2}{7}$

20. If the (convex) area bounded by the x-axis and the lines $y=mx+4,\ x=1\ and\ x=4$ is 7, then $m=.....$

(a) $\frac{-1}{2}$ (b) $\frac{-2}{3}$ (c) $-2$ (d) $\frac{-3}{2}$

21. The first four terms in an A.P are $x+y,\ x-y,\ xy\ and\ \frac{x}{y}$ , what is the fifth term?

(a) $\frac{123}{40}$ (b) $\frac{-15}{8}$ (c) $\frac{27}{20}$ (d) $\frac{-6}{5}$

22. A rectangular swimming pool is 48m long and 20m wide. The shadow edge of the pool is 1m deep. For every 2.6m that one walks up the inclined base of the swimming pool, one gains an elevation of 1m. What is the volume $\left(in\ m^3\right)$ of the water in the swimming pool? (Assume that pool is filled up to the brim)

(a) 5280 (b) 9600 (c) 7690 (d) 10560

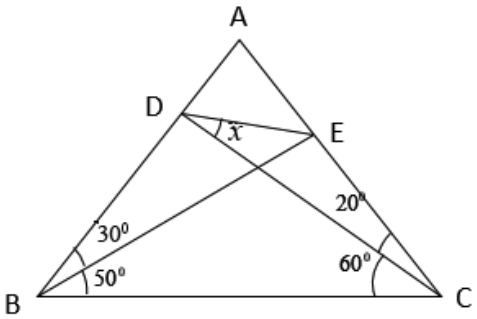
23. When 15 is added to a list of integers, the mean is increased by 2. When 1 is added to enlarged list, the mean of enlarged list is decreased by 1. How many integers were in the original list?

(a) 5 (b) 6 (c) 7 (d) 4

24. If $\tan\alpha\ and\ \tan\beta$ are the roots of $x^2-px+q=0$ , $\cot\alpha\ and\ \cot\beta$ are roots of $x^2-rx+s=0$ , then $r\,s$ is necessarily.

(a) $\frac{1}{pq}$ (b) $\frac{p}{q^2}$ (c) $\frac{q}{p^2}$ (d) $\frac{p}{q}$

25. As shown in figure $AB=AC$ , find the value of $x$ .




(a) $55^0$ (b) $20^0$ (c) $30^0$ (d) $40^0$

26. If $x+\frac{1}{y}=1$ *and* $y+\frac{1}{z}=1$ , then what is the value of $\left(z+\frac{1}{x}+1\right)$ .

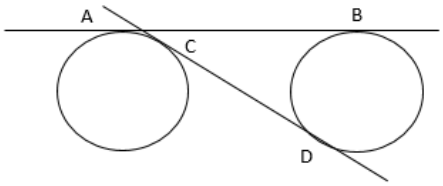
(a) 0 (b) 1 (c) 2 (d) 3

27. A dice is constructed so that when it is thrown each even number is thrice as likely to come up as each of the odd number. What is the probability of getting 5 or 6, when it is thrown once?

(a) $\frac{1}{6}$ (b) $\frac{2}{9}$ (c) – (d) $\frac{1}{3}$

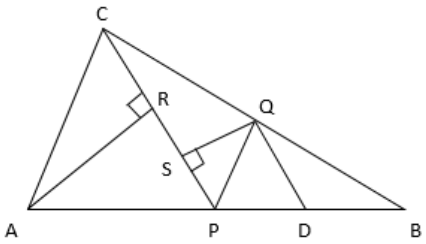
28. If two equal circles of radius 5 cm have two common tangent $AB$ *and* $CD$ which touch the circle on A, C and B, D respectively and if $CD=24cm$ , find the length of AB.

(a) 27 cm
(b) 25 cm
(c) 26 cm
(d) 30 cm

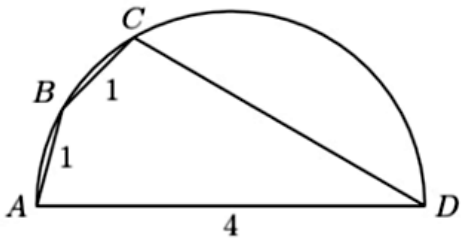



29. In the figure (not drawn to scale) given below, P is a point on AB such that $AP:PB=4:3$ and $PQ$ is parallel to AC and QD is parallel to CP. In $\Delta ARC$, $\angle ARC=90^0$ and in $\Delta PQS$, $\angle PSQ=90^0$ . The length of $QS$ is 6 cm. What is $AP:PD$ ?

(a) 10:3
(b) 2:1
(c) 7:3
(d) 8:3



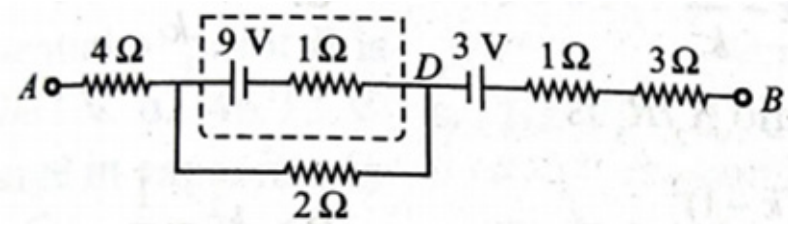

30. Quadrilateral ABCD is inscribed in a circle with side AD as a diameter of length 4cm. If sides AB and BC each have length 1cm, then perimeter of quadrilateral ABCD (in cm) is.




(a) $\frac{19}{2}$ (b) $\frac{25}{3}$ (c) $\frac{17}{2}$ (d) $\frac{33}{4}$

## Science (20)

31. $V_A - V_B = 16V$ otherdata is shown in the figure




(i) 3.5 A current is flowing through 2Ω (ii) 2.5 A current is flowing through 4Ω

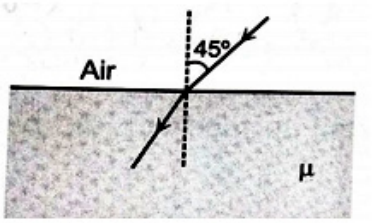
(iii) 1.5 A current is flowing through 3Ω

(iv) 7V is potential difference between the terminals of 9V battery.

Which of the above statements is/are correct?

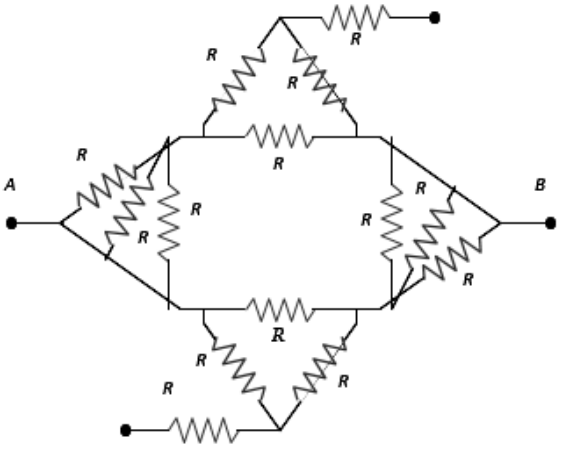
(a) ii, iii, iv (b) i, ii, iii (c) ii, iv (d) i, iii, iv

32. In the figure shown, for an angle of incidence 45°, at the top surface, what is the minimum refractive index needed for total internal reflection at vertical face?




a) $\frac{\sqrt{2}+1}{2}$ b) $\sqrt{\frac{3}{2}}$ c) $\sqrt{\frac{1}{2}}$ d) $\sqrt{2}+1$

33. Find equivalent resistance between A and B




(a) R (b) $\frac{3R}{4}$ (c) $\frac{R}{2}$ (d) 2R

34. "All Physics is either impossible or trivial. It is impossible untill you understand it and then it be comes trivial" – Ernest Rutherford. This is true to a large extent. For understanding Physics one must focus on correct concepts. One student has learned the following concepts.
(i) Two charged bodies having finite size and having similar charge can never attract each other.
(ii) Electric potential at a point due to a point charge is defined as the amount of workdone by an external agent in carrying a unit test charge from infinity to that point.
(iii) One point charge is exerting some force on another charge when both are placed in vaccum. When both are placed in water than the force exerted by that point charge on another charge will remains same
(iv) If only one charged body is available then we can obtain a charge many times greater than itself in magnitude.
Which of these is/are correct.
a) iii, iv only b) ii, iii, iv only c) i, ii, iii only d) All are correct

35. Moving charges can produce magnetic field. Each metal has charges inside it.
A person (1st) is having a rod in his hand and is moving on a straight road. Another person (2nd) is sitting on the ground and observing the motion of the 1st person. Some statements are given based on the above data.
(i) For 1st person as rod is moving and hence charges are moving so there will be magnatic field produced due to rod.
(ii) For 2nd person as rod is moving and hence charges are moving so there will be magnetic field produced due to rod.
(iii) Magnetic field produced by moving rod will be so small that so it can not be measured. Due to this no one can detect this field.
(iv) Magnetic field produced by moving rod will be observed only by 2nd person as rod is not moving with respect to 1st person.
Which is/are correct?
a) iv only b) iii, iv only c) ii, iii, iv only d) None of these

36. If the length of the filament of a heater is reduced by 10%, the power of the heater will –
(a) increase by about 9% (b) increase by about 11%
(c) increase by about 19% (d) decrease by about 10%

37. Some statements are given:
(i) When a short pulse of white light is incident from air to a glass slab at normal incidence then after travelling through the slab the first colour to emerge is violet.
(ii) A passenger in an aeroplane should never see a secondary rainbow.
(iii) A convex mirror can form real image
(iv) Sun appears raddish during sunrise or sunset due to atmosphric refraction.
Which is/are correct.
a) i, iii b) iii c) i, iii, iv d) ii, iii

38. Two solutions of a substance (non electrolyte) are mixed in the following manner 480 ml of 1.5 M first solution + 520 ml of 1.2 M second solution. What is the Molarity of final mixture?
(a) 1.20 M (b) 1.344 M (c) 1.50 M (d) 2.70 M

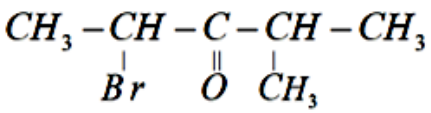
39. The density (in g/ml) of a 3.60 M sulphuric acid solution that is 29% $H_2SO_4$ (Molar Mass of $H_2SO_4 = 98\ g/mol$) by mass will be.
(a) 1.45 (b) 1.64 (c) 1.88 (d) 1.22

40. Chloride ion and potassium ion are isoelectronic. Then :
a) their size are same b) $Cl^-$ ion is bigger than $K^+$ ion
c) $K^+$ ion is relatively bigger d) their size depends on other cation and anion

41. Find the successive elements of the periodic table with ionisation energies 2372, 520, 890, KJ/mol respectively
(a) Li, Be, B (b) H, He, Li (c) B, C, N (d) He, Li, Be

42. pH of water is 7.0 at $25^oC$. If water is heated to $70^oC$, the :-
a) pH will decrease and the solution becomes acidic
b) pH will remain constant at 7
c) pH will increase
d) pH will decrease but solution will be neutral

43. Give the I.U.P.A.C name of the following compounds –



(a) 2 Methyl-2 Bromohexan-3-one (b) 2 Bromo-4 Methyl pentan-3-one
(c) 2 Methyl-2- Bromo hexan-3-al (d) 2-Bromo-2- Methyl pentan-3-al

44. Which is not a characteristic of homologous series
(a) It contains similar physical properties (b) It contains similar chemical properties
(c) Functional group remains same throughout the series (d) None of these

45. The first product of C4 pathway is
(a) PGA (b) Oxaloacetate (c) Malic acid (d) Phosphoenol Pyruvate

46. During cardiac cycle, the duration of ventricular diastole is,
(a) 0.3 sec (b) 0.4 sec (c) 0.5 sec (d) 0.1 sec

47. After tubectomy in young fertile females,
(a) oogenesis stops (b) menstrual cycle stops
(c) fertilisation will not occur (d) Hormones get imbalanced

48. Which is not a Green House Gas?
(a) $NO_2$ (b) $N_2O$ (c) $CO_2$ (d) $CH_4$

49. In case of incomplete dominance, monohybrid F1 ……. ratio is $1:2:1$ .
(a) Genotype (b) Phenotype
(c) Both Genotype & Phenotype (d) None of these

50. Generative cell in pollen divides forming,
(a) Two male gametes (b) One vegetative nuclei & one male gamete
(c) Three male gametes (d) All of these

## Social Science (10)

51. Which of the two leaders launched the Home Rule Movement?
(a) Annie Besant and Bal Gangadhar Tilak (b) Bal Gandhar Tilak and Lala Lajpat Rai
(c) Annie Besant and Lala Lajpat Rai (d) Bal Gangadhar Tilak and Gopal Krishna Gokhole

52. Who repealed the Vernacular Press Act of 1878?
(a) Lord Dufferin (b) Lord Macaulay (c) Lord Ripon (d) Lord Lytton

53. Duars generally found in
(a) Utranchal (b) Assam (c) Himdari (d) J & K

54. Kopili hydel project is located in ……
(a) Jharkhand (b) West Bengal (c) Sikkim (d) Assam

55. Which of the following pair connects through Golden Quadrilateral Super highways
(a) Machilipatnam, Lucknow, Paradwip, Ratnagiri (b) Puri, Jamshedpur, Dhule, Beawar
(c) Gopalpur, Vizag, Solapur, Kanpur (d) Vijaypura, Panaji, Jadhpur, Rajkot

56. A remote and backward village in Gendathur that has earned rare distinction of being rich in rainwater harvesting is located in the state of :
a) Rajasthan b) Assam c) Meghalaya d) Karnataka

57. By which name shifting agriculture in Vietnam known as?
a) Ladang b) Ray c) Roca d) Milpa

58. From which language the word 'Federalism' is derived?
a) Arabic b) French c) Latin d) German

59. Samachar Chandrika was published by
(a) Raja Ram Mohan Roy (b) Hindu Orthdoxy
(c) Both (d) None of these

60. Which one is not properly matched?

| | |
|---|---|
| a) Shiromani Akali Dal | 1) Punjab |
| b) DMK | 2) Kerala |
| c) Shiv Sena | 3) Maharashtra |
| d) Biju Janata Dal | 4) Odisha |

## Aptitude/ Reasoning (10)

61. In a six-node network, two nodes are connected to all the other nodes. Of the remaining four, each is connected to four nodes. What is the total number of links in the network?
(a) 13 (b) 15 (c) 7 (d) 26

62. In a watch, the minute hand crosses the hour hand for the third time exactly after every 3 hr 18 min and 15 s of watch time. What is the time gained or lost by this watch in one day?
(a) 4 min 10 s lost (b) 13 min 50 s lost
(c) 13 min 20 s gained (d) 14 min 40 s gained

63. A, B, C, D, ..., X, Y, Z are the players who participated in a tournament. Everyone played with every other player exactly once. A win scores 2 points, a draw scores 1 point and a loss scores 0 point. None of the matches ended in a draw. No two players scored the same score. At the end of the tourna ment, by ranking list is published which is in accordance with the alphabetical order. Then
(a) M wins over N (b) N wins over M
(c) M does not play with N (d) None of these

64. Abraham, Border, Charlie, Dennis and Elmer, and their respective wives recently dined together and were seated at a circular table. The seats were so arranged that men and women alternated and each woman was three places away from her husband. Mrs Charlie sat to the left of Mr Abraham. Mrs Elmer sat two places to the right of Mrs Border. Who sat to the right of Mr Abraham?

(a) Mrs Dennis (b) Mrs Elmer

(c) Mrs Border (d) Mrs Border or Mrs Dennis

65. A newspaper has 6 Sheets consisting of 24 pages in total. If page number 17 of the newspaper is missing then find the set of missing pages in the newspaper, from the alternatives given below:

(a) 6,7,16,17 (b) 7,8,17,18 (c) 8,9,17,18 (d) 9,10,16,17

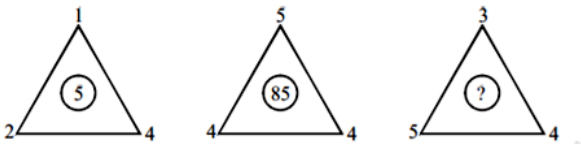
66. A family went for a vacation. Unfortunately, it rained daily for 13 days when they were there. But wherever it rained in the mornings, they had clear afternoons and vice versa. In all, they enjoyed 11 mornings and 12 afternoons. How many days in all did they stay there?

(a) 7 (b) 6 (c) 5 (d) 10

67. A person needs to find the fastest two horses from 16 horses. Only a race of 4 horses can be conduct ed at a time. What is the minimum number of races to be conducted to determine the fastest two?

(a) 15 (b) 18 (c) 20 (d) 25

68. In the questions given below the numbers in the figures arc related. Identify their relationship and find the missing number in the given figure:




(a) 60 (b) 63 (c) 130 (d) 144

69. In how many ways can 7 people be seated at a round table if 2 particular people must not sit next to each other?

(a) 720 (b) 240 (c) 120 (d) 480

70. There are 17 steps to go to the first floor of a building from the ground floor. Rishika starts climbing up from the first step of the ground level. Tanu starts coming down from the fifth step from the floor level of the first floor. If both have stared at the same time with same speed, at which step would they meet, counting from the first step from the floor level of the first floor?

(a) 10 (b) 11 (c) 13 (d) 12

## SPACE FOR ROUGH WORK

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