ROAD TO BOARD

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Studymate Foundation Paper

Date : 20/01/2019 Duration : 90 Min. Max. Marks : 90	Science & Mathematics (Set-1)	CLASS X

General Instructions:

1. All questions are compulsory.
2. Each question is allotted ONE mark for each correct response.
3. No deduction from the total score will be made if no response is indicated for the question in the answer sheet.
4. There is only **ONE** correct response for each question. Filling up **MORE THAN ONE** response in each question will be treated as wrong response and marks for wrong response will be deducted accordingly.
5. Use of calculators is not allowed.

Section A – Science

1. In an electrical circuit, three incandescent bulbs A, B and C of rating 40 W, 60 W and 100 W respectively are connected in parallel to an electric source. Which of the following is likely to happen regarding their brightness?

(A) Brightness of all the bulbs will be the same

(B) Brightness of bulb B will be more than that of A

(C) Brightness of bulb A will be the maximum

(D) Brightness of bulb C wil be less than that of B

2. What is the minimum resistance which can be made using five resistors each of 1/5 Ω?

(A) 1/5 Ω (B) 1/25 Ω (C) 1/10 Ω (D) 25 Ω

3. Magnetic induction does not involve

(A) placing a magnetic material near a magnet.

(B) touching a magnetic material with a magnet.

(C) induction of opposite pole on the nearer side of magnetic material facing the magnet.

(D) induction of similar pole on the farther side of magnetic material away from the magnet.

4. Commercial electric motors do not use

(A) an electromagnet to rotate the armature.

(B) effectively large number of turns of conducting wire in the current-carrying coil.

(C) a permanent magnetic to rotate the armature.

(D) a soft iron core on which the coil is wound.

5. The most important safety method used for protecting home appliances from short-circuiting or overloading is

(A) earthing (B) use of fuse

(C) use of stabilizers (D) use of electric meter

6. Choose the incorrect statement

(A) Fleming's right-hand rule is a simple rule to know the direction of induced current.

(B) The right-hand thumb rule is used to find the direction of magnetic fields due to current-carrying conductors.

(C) The difference between the direct and alternating current is that the direct current always flows in one direction, whereas the alternating current reverses its direction periodically.

(D) In India, the AC changes direction after every 1/50 second.

7. Choose the correct statement

(A) Sun is an expensive source of energy.

(B) There is infinite storage of fossil fuel inside the earth.

(C) Hydro and wind energy plants are renewable sources of energy.

(D) Waste from a nuclear power plant can be easily disposed off.

8. The mirror used by ENT specialists is

(A) Plane mirror (B) Concave mirror

(C) Convex mirror (D) Plano-convex mirror

9. Nature of the image formed by a convex mirror is

(A) Real, inverted, diminished (B) Virtual, erect, diminished

(C) Real, inverted, enlarged (D) Virtual, erect, enlarged

10. The power of a lens is + 3.5 D. The lens is

(A) Convex (B) Plano-convex (C) Concave (D) Plano-concave

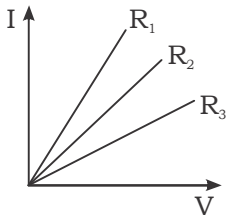
11. Which types of cells on retina respond to colours?

(A) Rod-shaped (B) Box-shaped (C) Ball-shaped (D) Cone-shaped

12. A person cannot see distinctly objects kept beyond 2 m. This defect can be corrected by using a lens of power

(A) + 0.5 D (B) – 0.5 D (C) + 0.2 D (D) – 0.2 D

13. A student carries out an experiment and plots the I-V graph of three samples of nichrome wire with resistances R_1, R_2 and R_3 respectively. Which of the following is true?



(A) $R_1 = R_2 = R_3$ (B) $R_1 > R_2 > R_3$ (C) $R_2 > R_3 > R_1$ (D) $R_3 > R_2 > R_1$

14. A cylindrincal conductor of length l and uniform area of cross-section A has resistance R. Another conductor of length $2l$ and resistance R of the same material has area of cross-section

(A) A/2 (B) 3A/2 (C) 2A (D) 3A

15. The resistivity does not change if

(A) the material is changed.

(B) the temperature is changed.

(C) the shape of the resistor is changed.

(D) both material and temperature are changed.

16. The correctly balanced equation for $FeS + O_2 \rightarrow Fe_2O_3 + SO_2$ is _____ .

(A) $2FeS + O_2 \rightarrow Fe_2O_3 + 4SO_2$ (B) $2FeS + 3O_2 \rightarrow Fe_2O_3 + 4SO_2$

(C) $4FeS + 4O_2 \rightarrow 2Fe_2O_3 + 2SO_2$ (D) $4FeS + 7O_2 \rightarrow 2Fe_2O_3 + 4SO_2$

17. Which one of the following metals do react with cold as well as hot water?

(A) Na (B) Ca (C) Mg (D) Fe

18. An element has configuration 2, 8, 1. It belongs to, _____ .

(A) 1st group and 3rd period (B) 3rd group and 1st period

(C) 1st group and 8th period (D) 17th group and 3rd period

19. The law of modern periodic table was proposed by

(A) D.I. Mendeleev (B) Dobereiner (C) H.G.I Moseley (D) Newlands

20. The first alkali metal is _____ .

(A) Hydrogen (B) Lithium (C) Sodium (D) Francium

21. Which of the following does not belong to the same homologous series?

(A) CH_4 (B) C_2H_6 (C) C_3H_8 (D) C_4H_8

22. In this reaction, alkaline $KMnO_4$ behaves as

$CH_3—CH_2—OH \xrightarrow{\text{Alkaline } KMnO_4 + \text{Heat}} CH_3—COOH$

(A) reducing agent (B) oxidising agent (C) catalyst (D) dehydrating agent

23. Identify the unsatuated compounds from the following

I. Propane II. Propene III. Propyne IV. Chloropropane

(A) I and II (B) II and IV (C) III and IV (D) II and III

24. Which of the following salts does not contain water of crystallisation?

(A) Blue vitriol (B) Baking soda (C) Washing soda (D) Gypsum

25. What happens when dilute hydrochloric acid is added to iron fillings?

(A) Hydrogen gas and iron chloride are produced.

(B) Chlorine gas and iron hydroxide are produced.

(C) No reaction takes palce.

(D) Iron salt and water are produced.

26. Which of the following is not a decomposition reaction?

(A) $CaCO_3 \rightarrow CaO + CO_2$ (B) $2KClO_3 \rightarrow 2KCl + 3O_2$

(C) Digestion of food in the body (D) $H_2 + Cl_2 \rightarrow 2HCl$

27. The composition of aqua-regia is

(A) Dil.HCl : Conc. HNO_3 (1 : 3) (B) Conc. HCl : dil. HNO_3 (1 : 3)

(C) Conc. HCl : Conc. HNO_3 (3 : 1) (D) Dil. HCl : Dil. HNO_3 (3 : 1)

28. The most abundant metal in the earth crust is?

(A) Al (B) Fe (C) O (D) Cu

29. What happens when calcium is treated with water?

(i) It does not react with water

(ii) It reacts violently with water

(iii) It reacts less violently with water

(iv) Bubbles of hydrogen gas formed stick to the surface of calcium

(A) (i) and (iv) (B) (ii) and (iii) (C) (i) and (ii) (D) (iii) and (iv)

30. Calcium phosphate is present in tooth enamel. Its nature is

(A) Basic (B) Acidic (C) Neutral (D) amphoteric

31. The development of foetus inside the uterus till birth is called

(A) Lactation (B) Fertilization (C) Gestation (D) Implantation

32. The concept of sustainable development encourages

(A) Form of growth that meets current basic needs

(B) Preservation of the resources for the need of future generation

(C) A change in all aspects of life

(D) Growth to meet current needs, preservation for the needs of future and preservation of the environment.

33. Which among the following is the function of testes at puberty?

(i) formation of germ cells (ii) secretion of testosterone

(iii) development of placenta (iv) secretion of estrogen

(A) (i) and (ii) (b) (ii) and (iii) (C) (iii) and (iv) (D) (i) and (iv)

34. Incomplete oxidation of food in Yeast releases

(A) ethyl alcohol and carbon dioxide (B) carbon dioxide and water vapour

(C) carbon dioxide and lactic acid (D) ethyl alcohol and lactic acid

35. In the given food chain, suppose the amount of energy at fourth trophic level is 2 J, what will be the energy available at the producer level?

Grass → Grasshopper → Frog → Snake → Hawk

(A) 2 J (B) 20 J (C) 200 J (D) 2000 J

36. Which of these is homozygous recessive trait?

(A) Ss (B) ss (C) SS (D) s

37. Carnivores represent

(A) Primary consumers (B) Secondary and tertiary consumers

(C) Reducers (D) Zooplankton.

38. What will be the genotypic ratio of the cross between Rr and Rr?

(A) 1:1 (B) 3:1 (C) 1:2:1 (D) 1:1:1

39. The number of chromosomes of a particular diploid species remains constant from parents to offsprings due to

(A) Meiosis after zygote formation (B) Meiosis during gamete formation

(C) Mitosis after zygote formation (D) Meiosis after embryo formation

40. DDT was accidently added to the water of a lake. All the organisms in it would be affected by DDT. Which of the organisms would be affected the most?

(A) Man (B) Birds living near the lake

(C) Fish living in the lake (D) Aquatic plants living in the lake

41. On what cellular structures are genes in eukaryotes carried?

(A) Endoplasmic reticulum (B) Nuclear membrane

(C) Chromosomes (D) Lysosome

42. The only gaseous hormone present in plants is

(A) Auxins (B) Ethylene (C) Cytokinin (D) ABA

43. The advantage of large number of thick walled spores in bread mould is

(i) that there is more probability for germination of the spores

(ii) that can tide over unfavourably conditions

(iii) formation of round shaped sporangia

(iv) formation of hyphae

(A) (i) and (iii) (B) (ii) and (iv) (C) (i) and (ii) (D) (iii) and (iv)

44. Water harvesting is an age-old concept in India. Various methods are used in different regions of India. Khadins water harvesting method is used in

(A) Rajasthan (B) Maharashtra (C) Bihar (D) Uttar Pradesh

45. Which among the following is a sexually transmitted disease

(A) Hepatitis (B) Gonorrhea (C) Laryngitis (D) Elephantiasis

Section – B (Mathematics)

46. A cone and a hemisphere have equal bases and equal volumes. The ratio of their heights is

(A) 1 : 2 (B) 2 : 1 (C) 1 : 3 (D) 3 : 1

47. The number of spherical bullets each of diameter 2 cm which can be made out of a cube of lead whose edge measures 22 cm is

(A) 1550 (B) 2050 (C) 2241 (D) 2541

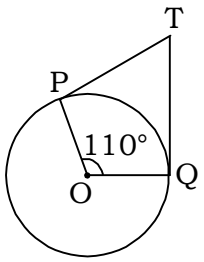
48. If tangents PA and PB from a point P to a circle with centre O are inclined to each other at angle of 80°, then ∠POA is equal to

(A) 60° (B) 70° (C) 80° (D) 50°

49. PT is tangent to a circle with centre O, OT = 56 cm. TP = 90 cm. then OP is :

(A) 104 cm (B) 107 cm (C) 106 cm (D) 105 cm

50. In the figure if TP and TQ are the two tangents to a circle with centre O so that ∠ POQ = 110°, then ∠ PTQ is equal to



(A) 60° (B) 70° (C) 80° (D) 90°

51. To draw a pair of tangents to a circle which are inclined to each other at an angle of 60°, it is required to draw tangents at end points of those two radii of the circle, the angle between them, should be

(A) 150° (B) 90° (C) 60° (D) 120°

52. To construct a triangle similar to a given ΔABC with its sides $\frac{2}{5}$ of the corresponding sides of ΔABC, first draw a ray BX such that angle CBX is an acute angle and X lies on the opposite side of A with respect to BC. The minimum number of points to be located at equal distances on ray BX is

(A) 3 (B) 5 (C) 8 (D) 2

53. To divide a line segment AB in the ratio 4 : 5, first a ray AX is drawn first such that angle BAX is an acute angle and then points A1, A2, A3, ... are located at equal distances on the ray AX and the point B is joined to

(A) A4 (B) A5 (C) A10 (D) A9

54. If a, $a-2$ and $3a$ are in AP, then the value of a is

(A) –3 (B) –2 (C) 3 (D) 2

55. The first, second and last term of an AP are respectively 4, 7 and 31. Number of terms in A.P are:

(A) 10 (B) 12 (C) 8 (D) 13

56. How many natural numbers between 1 and 1000 are divisible by 5?

(A) 197 (B) 198 (C) 199 (D) 200

57. The difference between the circumference and radius of a circle is 37 cm. The area of the circle is

(A) 111 cm^2 (B) 184 cm^2 (C) 154 cm^2 (D) 259 cm^2

58. The radius of wheel is 0.25 m. How many revolutions will it make in covering 11 km?

(A) 2800 (B) 4000 (C) 5500 (D) 7000

59. A steel wire when bent in the form of a square, encloses an area of 121 sq. cm. The same wire bent in the form of a circle. Area of the circle is:

(A) 111 cm^2 (B) 84 cm^2 (C) 154cm^2 (D) 259 cm^2

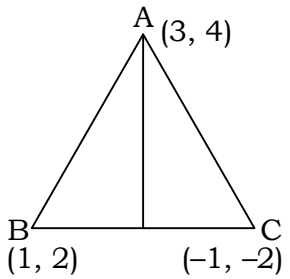
60. If the points A (2, 3), B (5, k) and C (6, 7) are collinear, then the value of k is

(A) 4 (B) 6 (C) $\frac{-3}{2}$ (D) $\frac{11}{4}$

61. What point on x - axis is equidistant from the point A (7, 6) and B (–3, 4)?

(A) (0, 4) (B) (– 4, 0) (C) (3, 0) (D) (0, 3)

62. If AP is median, then its length is



(A) 5 unit (B) – 5 unit (C) 3 unit (D) 4 unit

63. Relation between are of sector (A) and length of arc (l) for a given circle is

(A) $A=\frac{1}{2}lr$ (B) $l=\frac{1}{2}Ar$ (C) $A=\frac{1}{2}lr^2$ (D) None of these

64. Three coins are tossed once. The probability of getting at least 2 heads is :

(A) $\frac{1}{2}$ (B) $\frac{3}{4}$ (C) $\frac{3}{8}$ (D) None of these

65. The probability that a number selected at random from the number 1, 2, 2, 3, 3, 3, 4, 4, 4, 4 will be their average is

(A) $\frac{2}{5}$ (B) $\frac{3}{5}$ (C) $\frac{3}{10}$ (D) None of these

66. Pranshi and Ria are friends. The probability that both will have same birthday (ignoring a leap year) is

(A) $\frac{1}{365}$ (B) $\frac{2}{365}$ (C) $\frac{1}{(365)^2}$ (D) None of these

67. Find the values of k for which the quadratic equation $k^2x^2 - 2(k-1)x + 4 = 0$ has real and equal roots

(A) $k = 0$ or $k = \frac{1}{3}$ (B) $k = 1$ or $k = \frac{1}{3}$ (C) $k = -1$ or $k = \frac{1}{3}$ (D) $k = -3$ or $k = \frac{1}{3}$

68. The sum of two numbers is 15 and the sum ot their reciprocals is $\frac{3}{10}$. Find the numbers.

(A) 14 and 5 (B) 14 and 15 (C) 10 and 5 (D) none of these

69. Which of the following is not a quadratic equation

(A) $x - \frac{3}{x} = 4$ (B) $3x - \frac{5}{x} = x^2$ (C) $x + \frac{1}{x} = 3$ (D) $x^2 - 3 = 4x^2 - 4x$

70. Which of the following is a solution of the quadratic equation $2x^2 + x - 6 = 0$

(A) $x = 2$ (B) $x = -12$ (C) $x = \frac{3}{2}$ (D) $x = -3$

71. The height of a tower is 10m. What is the length of its shadow when Sun"s altitude is 45°?

(A) 10 m (B) 19 m (C) 20 m (D) none of these

72. If the ratio of the height of a tower and the length of its shadow is $\sqrt{3}:1$, what is the angle of elevation of the Sun?

(A) 30° (B) 60° (C) 45° (D) none of these

73. Find the angular elevation of the sun when the shadow of a 10m long pole is $10\sqrt{3}$ m.

(A) 30° (B) 60° (C) 45° (D) none of these

74. A tower subtends an angle of 30° at a point on the same level as its foot. At a second point 'h' metres above the first, the depression of the foot of the tower is 60°. The height of the tower is

(A) $\frac{h}{2}$m (B) $\frac{h}{3}$m (C) $\sqrt{3}h$ m (D) $\frac{h}{\sqrt{3}}$m

75. It cot θ = $\frac{7}{8}$, the value of $\frac{(1+\cos\theta)(1-\cos\theta)}{(1-\sin\theta)(1+\sin\theta)}$ is

(A) $\frac{49}{64}$ (B) $\frac{8}{7}$ (C) $\frac{64}{49}$ (D) $\frac{7}{8}$

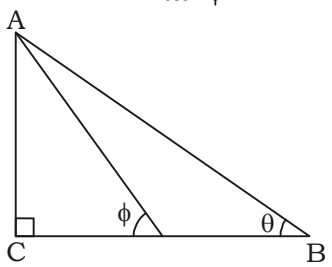
76. ΔABC is right angled at C, D is the mid-point of BC. Then, $\frac{\tan\theta}{\tan\phi}$ will be

(A) 1

(B) $\frac{1}{4}$

(C) $\frac{1}{2}$

(D) $\frac{1}{\sqrt{3}}$



77. The value of cos 1°. cos 2°. cos 3° ... cos 180°

(A) 2 (B) 1 (C) 0 (D) $\frac{1}{2}$

78. If x cos A = 1 and tan A = y, then $x^2 - y^2$ is equal to

(A) tan A (B) 1 (C) 0 (D) –tan A

79. Which one is not a possible value of cosec θ

(A) $\frac{1}{2}$ (B) 2 (C) 3 (D) 4

80. If n is a positive integer then $(n^2 - n)$ is an always

(A) even integer (B) odd integer

(C) odd or even integer (D) multiple of 2 and 4

81. There are 135 participants in english and 165 in mathematics in a seminar. Minimum number of rooms required to seat them, if each room must have the same number of participants from each of the subjects, are

(A) 20 (B) 15 (C) 25 (D) 30

82. If HCF of 65 and 117 is expressible in the form of $65x - 117$ then x is

(A) 4 (B) 2 (C) 1 (D) 3

83. If a prime number p divides a^2 then which statement is true.

(A) p divides a (B) a divides p (C) $p = a$ (D) $p > a$

84. Which one is true about prime factorisation of the denominator of the decimal expansion 278.1782

(A) it is a product of powers of 2 and 5 (B) it is a power of 2 only

(C) it is a power of 5 only (D) All of these

85. If α and β are the zeroes of polynomial $p(x) = x^2 + 2x + 1$, then $\left(\frac{1}{\alpha} + \frac{1}{\beta}\right) =$

(A) –2 (B) –1 (C) 2 (D) 1

86. If one zero of polynomial $x^2 + kx + 18$ is double of the other, then $k =$

(A) 9 (B) ±3 (C) ±9 (D) 3

87. If degree of divisor $g(x)$ is one, then the degree of the non-zero remainder $r(x)$ is

(A) 2 (B) 3 (C) 1 (D) 0

88. $kx - y = 2$ and $6x - 2y = 3$, value of k for which the above pair of linear equations have uniq solution

(A) 5 (B) 4 (C) 2 (D) All are correct

89. In a ΔABC, ∠A = x°, ∠B = $3x$°, ∠C = y° and $3y - 5x = 30$°, then ∠B =

(A) 90° (B) 60° (C) 20° (D) 45°

90. Pair of equations $y = b$ and $x = a$ have

(A) unique solution (B) no solutions (C) many solutions (D) can't say

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