SCIENCE

1. Which phenomenon occurs when light passes through a prism?
   (1) Reflection (2) Dispersion
   (3) Scattering (4) Polarization
2. In a glass prism, the ray of light bends:
   (1) Away from the base
   (2) Towards the normal
   (3) Away from the normal
   (4) Towards the base
3. Which colour deviates the most in a prism?
   (1) Red (2) Green
   (3) Violet (4) Yellow
4. Which of the following colour has the longest wavelength?
   (1) Blue (2) Green
   (3) Red (4) Violet
5. The splitting of white light into its constituent colours is called:
   (1) Scattering (2) Refraction
   (3) Dispersion (4) Polarization
6. One of the major enviormental concerns is the phenomenon of acid rain. Rain water is an unpolluted atmosphere will be
   (1) Neutral (2) Slightly basic
   (3) Slightly acidic (4) Strongly acidic
7. What is pH of an acidic solution
   (1) Greather than 7 (2) Equal to 7
   (3) Less than 7 (4) Greater than 10
8. H_2SO_4 is a
   (1) Monoprotic acid
   (2) Monobasic acid
   (3) Polyprotic acid
   (4) Both (1) and (2) are correct
9. pH of solution is zero. The nature of this solution is
   (1) acidic (2) basic
   (3) Neutral (4) amphoteric
10. Oxygen exhibits (–1) oxidation state
    (1) OF_2 (2) H_2O
    (3) H_2O_2 (4) HClO
11. Which of the following conditions is essential for diffusion of gases across respiratory surfaces in humans?
    (1) Moist surface and thin walls
    (2) Large surface area only
    (3) Blood vessels in lungs
    (4) Active transport of oxygen
12. A student observed that blowing air into lime water turned it milky. This indicates the presence of:
    (1) O_2 (2) CO_2
    (3) Water vapour (4) Nitrogen
13. Which statement correctly explains why alveoli are considered ideal for gaseous exchange?
    (1) They have valves to control air movement
    (2) Their walls are made of multiple layers
    (3) They contain cilia to trap particles
    (4) They have a rich capillary network and large surface area
14. If a plant's xylem is blocked, which process will be affected first?
    (1) Photosynthesis (2) Transpiration
    (3) Transport of water (4) Transport of food

Rough Work

15. Which pathway describes the movement of oxygen from the environment to the mitochondria?
(1) Nose → Larynx → Bronchi → Alveoli → Capillaries → Cell → Mitochondria
(2) Nose → Bronchi → Heart → Cell → Mitochondria
(3) Mouth → Trachea → Lung → Blood → Mitochondria
(4) Nose → Throat → Alveoli → Cell

16. Most of the digestion and absorption of the food takes place in the
(1) small intestine (2) Oesophagus
(3) stomach (4) large intestine

17. **Assertion:** Presence of HCI in stomach is necessary for the process of digestion.
Reason: HCI kills and inhibits the growth of bacteria in the stomach. In the following questions, a statement of assertion is followed by a statement of reason. Mark the correct choice as:
(1) Both assertion and reason are correct and reason is the correct explanation of assertion.
(2) Both assertion and reason are correct but reason is not the correct explanation of assertion.
(3) Assertion is true but Reason is false.
(4) Assertion is false but Reason is true.

18. The correct path of urine flow in our body is :
(1) Kidney → Ureter → Urethra → Urinary bladder
(2) Kidney → Urinary bladder → Urethra → Ureter
(3) Kidney → Ureter → Urinary bladder → Urethra
(4) Urinary bladder → Kidney → Ureter → Urethra

19. During deficiency of oxygen in tissues of human beings pyruvic acid is converted into lactic acid in:
(1) Cytoplasm (2) Chloroplast
(3) Mitochondria (4) Golgi body

20. Which is the first enzyme to mix with food in the digestive tract?
(1) Amylase (2) Pepsin
(3) Trypsin (4) Cellulase

21. Choose the correct statements that describe arteries.
(1) They have thick elastic walls, blood flows under high pressure, collect blood from different organs and bring back to heart.
(2) They have thin walls with valves inside, blood flows under low pressure, carry blood away from the heart to various organs of the body.
(3) They have thick elastic walls, blood flows under low pressure, carry blood from the heart to various organs of the body.
(4) They have thick elastic walls without valves inside, blood flows under high pressure and carry blood away from the heart to different parts of the body.

22. What is the correct representation of normal blood pressure of a human being?
(1) 180/20 mm of Hg (2) 120/80 mm of Hg
(3) 80/120 mm of Hg (4) 20/180 mm of Hg

Rough Work

23. Ingestion, digestion, absorption, assimilation and egestion are the steps in food processing in our body. Majority of absorp-tion takes place in small intestine (villi) and which is transported to different organs through the circulatory system. Starting with villi, which of the following is the correct sequence of organs that the absorbed food passes through?
    (1) Liver → Other organs → Heart
    (2) Heart → Liver → Other organs
    (3) Heart → Other organs → Liver
    (4) Liver → Heart → Other organs
24. Which one of the following statements is true about the fate of glucose, following oxidation in the presence and in the absence of oxygen?
    (1) In absence of oxygen, glucose undergoes only up to glycolysis and pyruvate is converted to lactate, while in the presence of oxygen glucose undergoes only up to glycolysis and pyruvate is converted to acetyl-CoA in the cytosol.
    (2) In absence of oxygen, glucose undergoes only up to glycolysis and pyruvate is converted to ethanol, while in the presence of oxygen glucose undergoes only up to glycolysis and pyruvate is converted to acetyl-CoA in the mitochondria.
    (3) In absence of oxygen glucose undergoes only up to glycolysis and pyruvate is converted to acetyl-CoA, while in the presence of oxygen glucose undergoes only up to glycolysis and pyruvate is converted to lactate in the muscle.
    (4) In absence of oxygen glucose undergoes only up to glycolysis and pyruvate is converted to lactate, while in the presence of oxygen glucose undergoes only up to glycolysis and pyruvate is converted to ethanol in bacterial cell.
25. If a small part of the esophagus of a person is excised, the consequence would be:
    (1) larger portion of food with large time interval
    (2) small portions of food at small time interval
    (3) small portions of food at large time interval
    (4) majorly subsist on liquid diet
26. Which of the following is a balanced chemical equation?
    (1) H2 + O2 → H_2O
    (2) $2H_2 + O_2 \rightarrow 2H_2O$
    (3) $2H_2 + 2O_2 \rightarrow 2H_2O$
    (4) $H_2 + 2O_2 \rightarrow H_2O$
27. The reaction between an acid and a base is called:
    (1) Decomposition reaction
    (2) Combination reaction
    (3) Neutralization reaction
    (4) Displacement reaction
28. What happens when zinc is added to a solution of copper sulphate?
    (1) Zinc sulphate is formed, copper is displaced
    (2) Copper sulphate remains unchanged
    (3) No reaction takes place
    (4) Zinc gets deposited on copper
29. Which of the following is a redox reaction?
    (1) $CuO + H_2 \rightarrow Cu + H_2O$
    (2) $CaCO_3 \rightarrow CaO + CO_2$
    (3) $BaCl_2 + Na_2SO_4 \rightarrow BaSO_4 + 2NaCl$
    (4) $HCl + NaOH \rightarrow NaCl + H_2O$

Rough Work

30. When ferrous sulphate crystals are heated strongly, the residue left is:
(1) FeS (2) Fe2O,
(3) $FeSO,7H_2O$ (4) FeCl

31. Which of the following changes indicates a chemical reaction?
(1) Ice melting into water
(2) Water boiling
(3) Rusting of iron
(4) Dissolution of sugar in water

32. Which of the following pairs of substances on reaction will give a displacement reaction?
(1) NaCl solution and AgNO, solution
(2) CuSO, solution and Fe metal
(3) AgNO, solution and Cu metal
(4) Both (2) and (3)

33. A shiny brown metal on strong heating with air(presence of oxygen) gets coated with a
(1) black Copper(II) oxide
(2) blue Copper sulphate
(3) green copper carbonate
(4) All of the above

34. What will be the value of x, y and z in the following balanced equation:
$xPb(NO_3)_2 \rightarrow yPbO + zNO_2 + O_2$
(1) 2,4,2 (2) 4,2,4
(3) 2,2,4 (4) None of these

35. A concave mirror forms an image 3 times larger than the object. If the image is real and inverted, what is the magnification (m) and the nature of the image?
(1) m = –3 virtual and erect
(2) m = 3 real and inverted
(3) m = –3 real and inverted
(4) m = 3 virtual and erect

36. An object is placed 30 cm from a convex lens of focal length 15 cm. What is the magnification?
(1) +1 (2) +0.5
(3) –1 (4) –0.5

37. Which mirror is used in torches, headlights of vehicles and searchlights?
(1) Convex mirror (2) Plane mirror
(3) Concave mirror (4) Cylindrical mirror

38. For a concave mirror, the principal focus is:
(1) Real and behind the mirror
(2) Real and in front of the mirro?
(3) Virtual and behind the mirror
(4) Virtual and at infinity

39. If an object is placed at 2F from a convex lens, what can be said about the image formed?
(1) Image is virtual, erect, and magnified
(2) Image is real, inverted, same size, and at 2F on the other side
(3) Image is real, inverted, and diminished
(4) Image is real, erect, and magnified

40. The focal length of a convex lens is 20 cm. An object is placed 15 cm from the lens. What is the nature and position of the image?
(1) Real, 60 cm on the opposite side
(2) Virtual, 60 cm on the same side
(3) Real, 60 cm on the same side
(4) Virtual, 60 cm on the opposite side

Rough Work

MATHS

41. If $\sin\theta = \frac{5}{13}$ and q is acute, then the value of $\frac{1+\cos\theta}{1-\cos\theta}$ is.

(1) 26 (2) 25

(3) 23 (4) –22

42. If secA + tanA = x, then the value of secA – tanA is.

(1) $\frac{1}{x}$ (2) $\frac{1}{x^2}$

(3) x (4) x2

43. The expression $\frac{1+\tan^2\theta}{1+\cot^2\theta}$ is equal to.

(1) tan2q (2) cot2q

(3) $\frac{\tan^2\theta}{\cot^2\theta}$ (4) 1

44. If sin A = cos B, then what is the relationship between angles A and B ?

(1) A = B (2) A+ B = 450

(3) A + B = 900 (4) A – B = 900

45. If sinq = a, then the value of $\frac{1-2\sin^2\theta}{\cos^2\theta}$ is.

(1) 2 – $\frac{1}{a^2}$ (2) $1-2a^2$

(3) $\frac{1-2a^2}{1-a^2}$ (4) $\frac{1-a^2}{1-2a^2}$

46. If $\tan\theta = \frac{1}{2}$, then find $\frac{1-\sin\theta}{1+\sin\theta}$.

(1) $\frac{3}{2}+\frac{\sqrt{5}}{2}$ (2) $\frac{3}{2}-\frac{\sqrt{5}}{2}$

(3) $-\frac{3}{2}-\frac{\sqrt{5}}{2}$ (4) $-\frac{3}{2}+\frac{\sqrt{5}}{2}$

47. If $\sin A = \frac{1}{\sqrt{2}}$ and $\cos B = \frac{1}{\sqrt{2}}$, then what is A + B

(1) 450 (2) 900

(3) 600 (4) 1350

48. If $\sin\theta+\cos\theta=\sqrt{2}$, then the value of $\sin^4\theta+\cos^4\theta$ is.

(1) 1 (2) $\frac{3}{4}$

(3) $\frac{1}{2}$ (4) $\frac{5}{4}$

49. What is the value of $\frac{\sin 60^0.\cos 30^0+\sin 30^0.\cos 60^0}{\sin^2 45^0}$?

(1) 1 (2) $\sqrt{3}$

(3) 2 (4) $\frac{3}{2}$

50. If $\theta = 45^0$, then value of $\frac{\sin^2\theta+\cos^2\theta}{\tan\theta+\cot\theta}$ is.

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

(3) $\frac{2}{3}$ (4) $\frac{1}{\sqrt{2}}$

Rough Work

51. If N is the sum of first 7548 prime numbers, then N is always divisible by
(1) 6 (2) 2
(3) 3 (4) None of these

52. The value of
$$\frac{1}{1+\sqrt{2}}+\frac{1}{\sqrt{2}+\sqrt{3}}+\frac{1}{\sqrt{3}+\sqrt{4}}+\frac{1}{\sqrt{4}+\sqrt{5}}+\frac{1}{\sqrt{5}+\sqrt{6}}$$
$$+.....+\frac{1}{\sqrt{15}+\sqrt{16}} \text{ is}$$
(1) 0 (2) 1
(3) 2 (4) 3

53. Square root of $9+2\sqrt{14}$ is
(1) $1+2\sqrt{14}$ (2) $\sqrt{3}+\sqrt{6}$
(3) $\sqrt{2}+\sqrt{7}$ (4) $\sqrt{2}+\sqrt{5}$

54. X and y are 2 different digits. If the sum of the two digit numbers formed by using both the digits is a perfect square, then x +y can be :
(1) 10 (2) 11
(3) 12 (4) 13

55. If $\frac{9^n\left(3^2\right)\left(3^{-n/2}\right)^{-2}-27^n}{3^{3m}\left(2^3\right)}=\frac{1}{27}$ then which of the following is true?
(1) m – 2 – 2 =0 (2) m – n – 1=0
(3) m – n + 2 = 0 (4) m – n + 2 = 0

56. If $x^a=y^b=z^c$ and y^2–zx, then the value of $\frac{1}{a}+\frac{1}{c}$ is:
(1) $\frac{b}{2}$ (2) $\frac{c}{2}$
(3) $\frac{2}{b}$ (4) 2a

57. The smallest of $\sqrt[3]{4}, \sqrt[4]{5}, \sqrt[4]{6}, \sqrt[3]{8}$ is
(1) $\sqrt[3]{8}$ (2) $\sqrt[4]{5}$
(3) $\sqrt[3]{4}$ (4) $\sqrt[4]{6}$

58. The simplest value of $\frac{\left(p^2-\frac{1}{q^2}\right)^p\left(p-\frac{1}{q}\right)^{q-p}}{\left(q^2-\frac{1}{p^2}\right)^q\left(q+\frac{1}{p}\right)^{p-q}}$
(1) 1 (2) A
(3) $\left(\frac{p}{q}\right)^{p+q}$ (4) –1

59. Find all the zeros of the polynomial $f(x)=2x^4-3x^3-3x^2+6x-2$, if two of its zeros are $\sqrt{2}$ and $-\sqrt{2}$.
(1) $\sqrt{2}, -\sqrt{2}, 1$ and $\frac{1}{2}$ (2) $\sqrt{2}, -1, -\sqrt{2}$ and $\frac{1}{2}$
(3) $-\sqrt{2}, -\sqrt{2}, 1$ and $\frac{1}{2}$ (4) None of these

60. Find the condition which must be satisfied by the coefficients of the polynomial $f(x) = x^3-px^2+qx-r$ when the sum of its two zeros is zero.
(1) pq = r (2) pq = x
(3) pq = p (4) None of these

61. The values of k, so that the equations $2x^2+kx-5=0$ and $x^2-3x-4=0$ have one root in common, are
(1) $3, \frac{27}{2}$ (2) $9, \frac{27}{4}$
(3) $-3, \frac{-27}{4}$ (4) $-3, \frac{4}{27}$

62. Simplify $x=\cfrac{1}{\sqrt{3}+\cfrac{1}{\sqrt{3}+\cfrac{1}{\sqrt{3}+.....}}}$

Rough Work

(1) $x^2+\sqrt{3}x-1=0$ (2) $x^2-\sqrt{3}x-1=0$

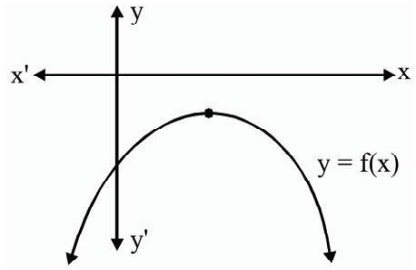
(3) $x^2-\sqrt{3}x+1=0$ (4) $x^2+\sqrt{3}x+1=0$

63. What must be subtracted from $8x^4+14x^3-2x^2+7x-8$ so that the resulting polynomial is exactly divisible by $4x^2-3x-2$.

(1) 14x –10 (2) 14x +8

(3) 9x –10 (4) None of these

64. The graph of the polynomial $f(x)=ax^2+bx+c$ is as shown in fig, then which of the following is true?



(1) a>0, b>0, c<0, d<0 (2) a<0, b>0, c>0, d<0

(3) a<0, b<0, c<0, d<0 (4) a<0, b<0, c<0, d>0

65. If α and β are the zeroes of the polynomials $f(x)=x^2-5x+k$ such that $\alpha-\beta=1$, then value of k is :

(1) 4 (2) –6

(3) 6 (4) 12

66. The product of the zeroes of the polynomial $bx(ax-b)-c(ax+b)$ is :

(1) $\frac{c}{b}$ (2) $\frac{ac-b^2}{ab}$

(3) $\frac{-c}{a}$ (4) $\frac{-b}{a}$

67. $(x^2-1)^2-x^2=0$ has :

(1) Four real roots (2) Two real roots

(3) No real roots (4) One real root

68. Find the value of $\sqrt{a\sqrt{a}\sqrt{a.....\infty}}$

(1) a (2) 0

(3) both (1) and (2) (4) Does not exit

69. If the roots of $(p-q)^2+x^2+2(p^2-q^2)x+k=0$ equal, then k =?

(1) $(p+q)^2$ (2) $(p-q)^2$

(3) p^2-q^2 (4) 0

70. Solve for 'x' : $3^{x-2}+3^x=10$, where x is a whole number.

(1) –2 (2) 0

(3) Both (1) & (2) (4) 2

71. If α and β are the roots of $2x^2-x-2=0$, then $(\alpha^{-3}+\beta^{-3}+2\alpha^{-1}\beta^{-1})$ is equal to :

(1) $\frac{-17}{8}$ (2) $\frac{23}{6}$

(3) $\frac{37}{9}$ (4) $\frac{-29}{8}$

72. If α and β are the roots of the quadratic equation $x^2-4x+3=0$, then find the value of $\alpha^4\beta^3+\alpha^3\beta^4$.

(1) 27 (2) 108

(3) –108 (4) 54

73. If $2\left(x^2+\frac{1}{x^2}\right)-9\left(x+\frac{1}{x}\right)+14=0$, then x = _____.

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

(3) 2 (4) All of these

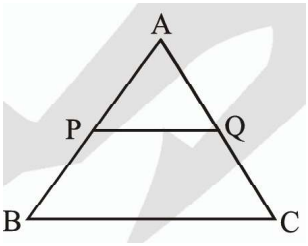
74. If one root of a quadratic equation is $\frac{1}{\sqrt{4}-\sqrt{3}}$, then the quadratic equation can be.

(1) $x^2-2\sqrt{4}x+1=0$ (2) $x^2-\sqrt{4}x+1=0$

(3) $x^2-2\sqrt{4}x+1=0$ (4) $x^2-2\sqrt{3}x+1=0$

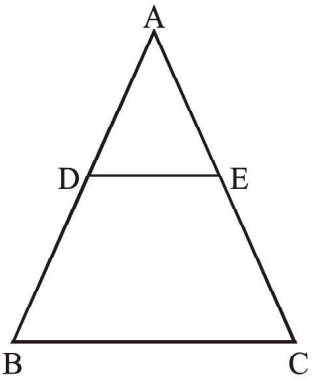
Rough Work

75. In the given figure ΔAPQ. If BC=8cm, BA=6.5cm, AP=2.8cm, then find AC-



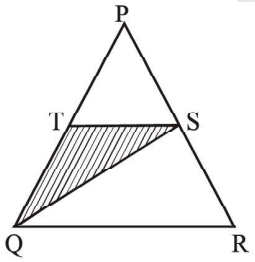
(1) 2.3 cm (2) 3.5 cm
(3) 4.5 cm (4) 5.6 cm

76. In the following figure, ΔABC is an equilateral triangle. DE is parallel to BC and and equal to half the length of BC. If AD + EC + CB = 24 cm then what is the perimeter of ΔADE?



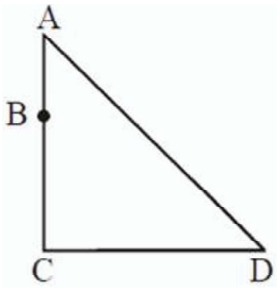
(1) 12 cm (2) 16 cm
(3) 18 cm (4) 20 cm

77. In the given figure, S and T are the mid points of sides PR and PQ respectively of ΔPQR. If $ar(\Delta PQR) = 48cm^2$, then the $ar(\Delta TSQ)$ is :



(1) 48 cm^2 (2) 24 cm^2
(3) 12 cm^2 (4) 6 cm^2

78. In the right triangle shown here, AB+AD=BC+CD, if AB =x, BC = 4 and CD =d, then x is equal to :



(1) $\frac{hd}{2h+d}$ (2) d–h
(3) h + d (4) $\frac{1}{2}h$

79. If the ratio of area of two similar triangle is 64 : 121, then find the ratio of their median :
(1) 4 : 11 (2) 8 : 11
(3) 12 : 11 (4) 16 : 11

80. In a ΔABC, $\angle C = \angle B = 2(\angle A + \angle B)$. Find the three angles.
(1) 20°, 40°, 120° (2) 60°, 20°, 100°
(3) 120°, 20°, 40° (4) 10°, 40°, 130°

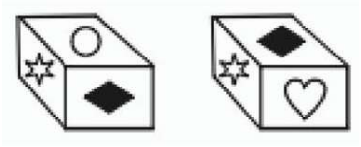
REASONING

81. 91. 6, 4, 10, 14, 43, ?
(1) 119 (2) 127
(3) 114 (4) 141

82. 4, ?, 14, 40, 88, 170
(1) 9 (2) 5
(3) 6 (4) 7

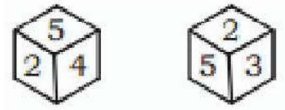
Rough Work

93. Two positions of a dice are shown below. When the heart shape is at the top what will be at the bottom?



(1) 
(2) 
(3) 
(4) 

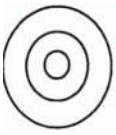
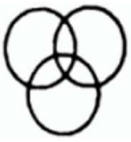
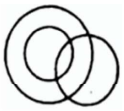
94. Two positions of a dice are shown. When 4 is at the top which number will be at bottom?



(1) 1 (2) 2
(3) 6 (4) 3

95. Raju facing North and moves 20 km, then he turned to his right and moves 20 km and then he moves 10 km in North-East, then he turned to his right and moves 20 km and then he tumed to his right and moves 20 km, and again he turned to his left and moves 20 km. Now in which direction Raju is facing?
(1) South-East (2) North-East
(3) South-West (4) North-West

96. Which of the following venn diagrams correctly represents female, mother and doctor -

(1) 
(2) 
(3) 
(4) 

97. In in a coded language the word 'RAMESH' is written as 'AEHRMS' then in the same code language 'POET' will be written as -
(1) EPTO (2) PEOT
(3) ETOP (4) OTPE

98. Select the related letters/words/numbers from the given alternatives.
5:36::7:?
(1) 36 (2) 49
(3) 64 (4) 81

99. 2483::328:?
(1) 7 (2) 5
(3) 4 (4) 6

100. How many letters are there in the word 'CREATIVE which have as many letters between them in the word as in the alphabet -
(1) 1 (2) 2
(3) 3 (4)4

Rough Work