DAV KNG

APTITUDE TEST FOR ADMISSION INTO +2 SCIENCE/FOCUS-40 (2025-26)

ID NO. | | | | | | |

TIME: 3 Hours
(2:00 pm -5:00 pm)

SET A

:Guidelines to the Candidates:

1. This Booklet contains printed 14 pages and 2 blank pages for rough work. Any defect found should be brought to the notice of the invigilator immediately.
2. Fill in the particulars in the OMR sheet given to you separately as per the directions given therein.
3. This test is of three hours duration.
4. There are four choices in every question as A., B., C. and D. .Only one is correct.
   Each question carries 4 marks.
5. (i) The test consists of 100 multiple choice questions comprising Mathematics (40), Science (40) and Mental ability (20) carrying maximum of 400 marks
   (ii) -1 mark will be awarded for each wrong answer/multiple answers.
   (iii) No mark will be awarded for any overwriting/scratching answer.
6. Each candidate must show his/her Admit Card to the invigilator whenever required.
7. No candidate shall leave his/her seat during examination.
8. Do not tear / remove any page of the Booklet.
9. Calculation, if any, may be done at the blank page of this booklet provided at the end for rough work. No calculator is allowed.
10. After finishing the test the booklet with the OMR sheet is to be handed over to the invigilator before leaving the room.

FASCIMILE STAMP of Centre Superitendant

Signature of Invigilator with Date :

MATHEMATICS

1. A cylindrical vessel of diameter 4 cm is partly filled with water. 300 lead balls are dropped in it. The rise in water level is 0.8 cm. The diameter of each ball is
   A. 0.8 cm
   B. 0.4 cm
   C. 0.2 cm
   D. None of these
2. A rocket is in the form of a circular cylinder closed at the lower end with a cone of the same radius attached to the top. The cylinder is of radius 2.5 cm and height 21 cm and the cone has the slant height 8 cm. The volume of the rocket is
   A. 395.14 cm^3
   B. 462.26 cm^3
   C. 504.21 cm^3
   D. None of these
3. If the radius of the base of a cone is halved, keeping the height same, then the ratio of the volume of the reduced cone to that of the original cone is
   A. 1:4
   B. 2:3
   C. 4:1
   D. 3:2
4. A solid is hemispherical at the bottom and conical from the top. If the surface area of the two parts are equal ,then the ratio of its radius and the height of its conical part is
   A. 1:3
   B. $1:\sqrt{3}$
   C. $\sqrt{3}:2$
   D. 3:2
5. A sequence a,a+d,a+2d,…,a+nd, has odd number of terms ,then median is
   A. $a+\left(\frac{n-1}{2}\right)d$
   B. $a+\left(\frac{n}{2}-1\right)d$
   C. $a+\left(\frac{n+1}{2}\right)d$
   D. None of these
6. If half the number of observation in a raw data of 2n values are multiplied by 2 and other half divided by 2,then
   A. The mean remains unchanged
   B. The new mean is greater than the old mean
   C. The new mean is less than the old mean
   D. It is not possible to compare the two means because of inadequate data.
7. If the difference of mode and mean of a data is 36,then the difference of median and mean is
   A. 36
   B. 6
   C. 12
   D. 18
8. The mean of 50 observations is 20.If 6 is subtracted from each of the observation and then each of them is multiplied by 4,then the new mean is
   A. 56
   B. 42
   C. 48
   D. 60
9. A number is selected from the set {1,2,3,4,5,6,7,8}.The probability that it will be a root of the equation $x^2-6x+8=0$ is
   A. $\frac{1}{2}$
   B. $\frac{1}{4}$
   C. $\frac{1}{8}$
   D. $\frac{1}{6}$

10. Two dice are thrown at a time. The probability that the difference of the numbers shown on the dice is 1, is

A. $\frac{5}{18}$ C. $\frac{1}{6}$

B. $\frac{1}{36}$ D. None of these

11. Aman and Raman go to a watch shop where they find 8 different varieties of watches. If they buy one watch each, then the probability that they both buy the same variety of watches is

A. $\frac{3}{8}$ C. $\frac{9}{64}$

B. $\frac{7}{64}$ D. $\frac{1}{8}$

12. A box contains 54 balls each of which is red, green or black. The probability of selecting a red ball at random from the box is $\frac{1}{3}$, and the probability of selecting a green ball at random is $\frac{4}{9}$.Number of black balls does the box contain is

A. 10 C. 15

B. 8 D. 12

13. If ΔABC is an equilateral triangle such that A (2,2) and centroid of the triangle is $(-2,2)$ then the length of its side is

A. 4 units C. $4\sqrt{3}$ units

B. 6 units D. 9 units

14. If $cos^2\theta + 2sin^2\theta + 3cos^2\theta + 4sin^2\theta + \ldots\ldots + 200sin^2\theta = 10050$,where $\theta$is an acute angle ,then the value of $(\sin\theta + 3\cos\theta)^2$ *is*

A. 8 C. 2

B. 4 D. 1

15. If $\sin\theta + \cos\theta = \frac{3}{2}$ then $\sin\theta.\cos\theta$ *is* equal to

A. 1 C. 5/8

B. 2/3 D. 0

16. The angle of elevation of the top of a tower from the bottom of a building is twice that from its top. If the height of the tower is 75 m and the angle of elevation of the top of the tower from the bottom of the building is 60°,then height of the building is

A. 25 m C. 50 m

B. 37.5 m D. 60 m

17. From the top of a rock, the angle of depression of the top and the foot of a tree are 30° and 60° respectively. If the height of the tree is 50 m, then the height of the rock is

A. 60 m C. 75 m

B. 70 m D. 100 m

18. If the altitudes from two vertices of a triangle to the opposite sides are equal, then the triangle is

A. Equilateral C. Scalene

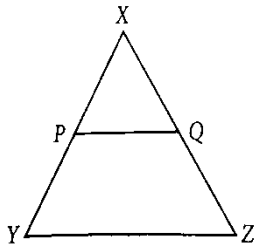
B. Isosceles D. Right-angled

19. The perimeter of two similar triangles DEF and GHI are 22 cm and 44 cm respectively. If EF=9 cm and HI:GI=3:2,then the length of GI is

A. 12 cm C. 6 cm

B. 18 cm D. 10 cm

20. In $\Delta\, XYZ$,if $PQ \parallel YZ, XP = (a+2)$ cm, $PY = 2\ cm$, $XQ = 56$ cm and $QZ = (a-4)$ cm, then the value of $\left(a - \frac{1}{a}\right)$ is



A. $\frac{145}{12}$ C. $\frac{143}{12}$

B. $\frac{143}{2}$ D. $\frac{145}{2}$

21.The co-ordinates of the circumcentre of the triangle formed by the points O(0,0),P(x,0),Q(0,y) are

A. (x,y) B. $(\frac{x}{2}, \frac{y}{2})$ C.$(\frac{x}{2}, \frac{y}{2})$ D. (y,x)

22. If a point P(x,y) is equidistant from A(5,1) and B(-1,5), then

A. 5x=y B. x=5y C. 3x=2y D. 2x=3y

23. The perpendicular bisector of the line segment joining the points A (1,5) and B(4,6) cuts the y-axis at

A. (0,13) B. (0,-13) C. (0 , 12) D. (13, 0)

24. If the mid-point of the line segment joining the points A(3,4) and B (k,6) is P(x,y) and x + y – 10 = 0, then the value of k is

A. – 7 B. 7 C. 10 D. 3

25. The n^{th} term of an A.P , the sum of whose n terms is S_n is

A. $S_n + S_{n-1}$ B. $S_n - S_{n-1}$ C. $S_n + S_{n-1}$ D. $S_n - S_{n+1}$

26. The sum of n terms of two A P 's are in the ratio 5n+4:9n+6. Then, the ratio of their 18^{th} term is

A. $\frac{179}{321}$ B.$\frac{178}{321}$ C. $\frac{175}{321}$ D. $\frac{176}{321}$

27. If the sum of p terms of an A.P is q and the sum of q terms is p, then the sum of p + q terms will be

A. 0 B. p-q C. p + q D. – (p+q)

28. If four numbers in A.P. are such that their sum is 50 and the greatest number is 4 times the least, then the numbers are

A. 5,10,15,20 B. 4,10,16,22 C. 3,7,11,15 D. none of these

29. If $(a^2 + b^2)\,x^2 - 2(ac + bd)\,x + c^2 + d^2 = 0$ has no real roots, then

A. $ad = bc$ B. $ab = cd$ C. $ac = bd$ D. $ad \neq bc$

30. If one root of the equation $ax^2 + bx + c = 0$ is three times the other, then

A. $b^2 = 16ac$ B. $b^2 = 3ac$ C. $3b^2 = 16ac$ D. $16b^2 = 3ac$

31. Had Ajita scored 10 more marks in her mathematics test out of 30 marks, 9 times these marks would have been the square of her actual marks. How many marks did she get in the test ?

A. 15 B. 20 C. 22 D. 17

32. If one root of the equation $4x^2 - 2x + (\beta - 4) = 0$ be the reciprocal of the other, then $\beta =$

A. 8 B. -8 C. 4 D. -4

33. One equation of a pair of dependent linear equation is $-5x + 7y = 2$. The second equation can be

A. $10x + 14y + 4 = 0$ B. $-10x - 14y + 4 = 0$

C. $-10x + 14y + 4$ D. $10x - 14y = -4$

34. For which value(s) of k will the pair of equations

$Kx + 3y = k - 3$

$12x + ky = k$; $k \neq 0$ have no solution ?

A. k=6 B. k=-6 C. k=± 6 D. k=12

35. If the sum of the ages of a father and his son in years is 65 and twice the difference of their ages in years is 50, then the age of father is

A. 40 years B. 45 years C. 55 years D. 65 years

36. The area of the triangle formed by the line $\frac{x}{a} + \frac{y}{b} = 1$ with the coordinate axes is

A. ab B. 2ab C. $\frac{1}{2}$ ab D. $\frac{1}{4}$ ab

37. At one end A of a diameter AB of a circle of radius 5cm, tangent XAY is drawn to the circle. The length of the chord CD parallel to XY and at a distance 8cm from A is

A. 4cm B. 5cm C. 6cm D. 8cm

38. If two tangents inclined at an angle of 60^0, are drawn to a circle of radius 3cm, then length of each tangent is equal to

A. $\frac{3\sqrt{3}}{2}$ cm B. 6cm C.3cm D. $3\sqrt{3}$ cm

39. Two circles touch each other externally at P . AB is a common tangent to the circle touching them at A and B. The value of $\angle APB$ is

A. 30° B. 45° C. 60° D. 90°

40. From a point P which is at a distance of 13cm from the centre O of a circle of radius 5cm, the pair of tangents PQ and PR to the circle are drawn. Then the area of the quadrilateral PQOR is

A. 60 cm^2 B. 30 cm^2 C. 65 cm^2 D. 32.5 cm^2

GENERAL SCIENCE

41. A bus is moving with a velocity 10 m/s on a straight road. A scooterist wishes to overtake the bus in 100 *s*. If the bus is at a distance of 1 *km* from the scooterist, with what velocity should the scooterist chase the bus

A. 50 *m*/*s* B. 40 *m*/*s*

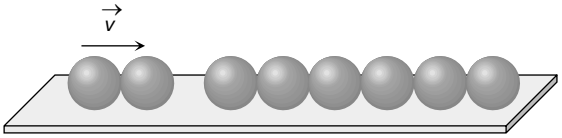
C. 30 *m*/*s* D. 20 *m*/*s*

42. What is the shape of the graph between the speed and kinetic energy of a body

A. Straight line B. Hyperbola

C. Parabola D. Exponential

43. Six identical balls are lined in a straight groove made on a horizontal frictionless surface as shown. Two similar balls each moving with a velocity *v* collide elastically with the row of 6 balls from left. What will happen



A. One ball from the right rolls out with a speed 2*v* and the remaining balls will remain at rest

B. Two balls from the right roll out with speed *v* each and the remaining balls will remain stationary

C. All the six balls in the row will roll out with speed *v*/6 each and the two colliding balls will come to rest

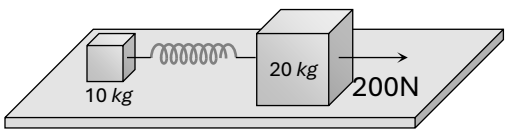
D. The colliding balls will come to rest and no ball rolls out from right

44. The kinetic energy of a body decreases by 36%. The decrease in its momentum is

A. 36% B. 20%

C. 8% D. 6%

45. The masses of 10 *kg* and 20 *kg* respectively are connected by a massless spring as shown in figure. A force of 200 *N* acts on the 20 *kg* mass. At the instant shown, the 10 *kg* mass has acceleration $12\,m/\sec^2$. What is the acceleration of 20 *kg* mass



A. $12\,m/\sec^2$ B. $4\,m/\sec^2$

C. $10\,m/\sec^2$ D. Zero

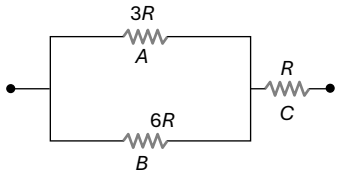
46. The plane faces of two identical plano convex lenses, each with focal length *f* are pressed against each other using an optical glue to form a usual convex lens. The distance from the optical centre at which an object must be placed to obtain the image same as the size of object is

A. $\frac{f}{4}$ B. $\frac{f}{2}$

C. f D. $2f$

47. The three resistances *A*, *B* and *C* have values 3*R*, 6*R* and *R* respectively. When some potential difference is applied across the network, the thermal powers dissipated by *A*, *B* and *C* are in the ratio

A. 2 : 3 : 4
B. 2 : 4 : 3
C. 4 : 2 : 3
D. 3 : 2 : 4



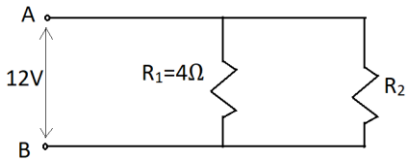
48. Calculate the ratio of the power used in the 2Ωresistor in each of the following circuit.

i. A 6V battery in series with 1Ω and 2Ω resistors.
ii. A 4V battery in parallel with 12Ω and 2Ω resistors.

A. 1:2 C. 1:1
B. 2:1 D. 3:2

49. Calculate the value of the unknown resistor R_2, so that 9A current will flow in the circuit.

A. 2Ω
B. 5Ω
C. 0.5Ωd.
D. 3Ω

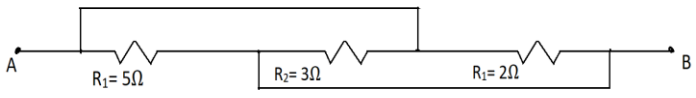


50. Which of the following is ***not*** correct?

A. Two magnetic lines of forces don't intersect each other.
B. The direction of the magnetic field is in the direction of the north pole of the magnetic compass.
C. Solenoid diameter is greater than its length.
D. Magnetic fields of a solenoid and a bar magnet are

51. What will be the equivalent resistance of the circuit shown?

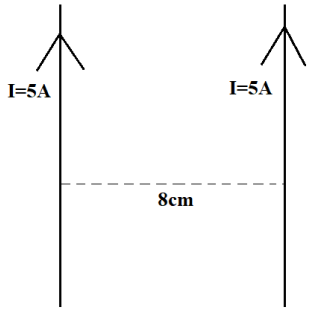
A. 1 Ω
B. 0.55 Ω
C. 0.96 Ω
D. 2 Ω



52. 100 J of work is done by transferring 20 units of positive charges from point 'A' to point 'B' in a circuit. What is the potential difference in these two points?

A. 5V
B. 2000V
C. 50V
D. 500V

53. What will be the strength of magnetic field produced at the midpoint of both the current carrying conductors?



A. Infinity
B. 10tesla
C. Zero tesla
D. None of the above

54. Short circuiting means-

A. A direct contact between live and the earth wire.
B. A direct contact between neutral and the earth wire.
C. A direct contact between live and the neutral wire.
D. None of the above

55. The formula of phosphate of X is XPO_4. The formula of its sulphate and chloride would be respectively:

A. $X_2(SO_4)_3$, XCl_3 B. XSO_4, XCl_2
C. $X(SO_4)_2$, X_2Cl D. X_2SO_4, XCl

56. In Shimla, where the atmospheric pressure is less than the normal atmospheric pressure (1 atm). The boiling point of water will be:

A. less than 100°C B. more than 100°C
C. 0°C D. 100°C

57. The table given below gives information about four unknown substances.
[Room temperature = 30°C]

Substance	Melting point (°C)	Boiling point (°C)
I	–188	-40
II	–110	34
III	16	117
IV	37	340

Which of the following substance is a volatile liquid at room temperature?

A. I B. II C. III D. IV

58. Structure of nuclei of three atoms X, Y and Z are as follows:

I. X has 90 Protons and 146 Neutrons
II. Y has 92 Protons and 146 Neutrons
III. Z has 90 Protons and 148 Neutrons

Which of the following statement is correct based on the above data?

A. X and Z are isotopes; Y and Z are isobars
B. X and Y are isotopes; X and Z are isobars
C. Y and Z are isobars; X and Y are isotopes
D. X and Z are isotopes; X and Y are isobars

59. An element X has 7 electrons in its L shell. What is true about the element X?

A. It belongs to period 9 of modern periodic table.
B. Its atom contains 9 protons.
C. It has a valency of 7.
D. Its atoms can accept an electron to acquire noble gas configuration.

A. (I) and (II) B. (II) and (Ill)

C. (III) and (IV) D. (Il) and (IV)

60. Arun has prepared 1% (by mass) solution of NaCl in water. Which of the following correctly represents the composition of the solution?

A. 1g NaCl + 100 g water B. 1 g NaCl + 99 g water
C. 1 g NaCl + 1000 g water D. 1 g NaCl + 999 g water

61. The chemical reaction between Hydrogen sulphide and iodine to give Hydrogen iodide and sulphur is given below:

$H_2S + I_2 \rightarrow 2HI + S$.

The oxidizing and reducing agents involved in this redox reaction are:

A. Iodine and sulphur, respectively
B. Iodine and hydrogen sulphide, respectively
C. Sulphur and iodine, respectively
D. Hydrogen sulphide and sulphur, respectively

62. In the double displacement reaction between aqueous potassium iodide and aqueous lead nitrate, a yellow precipitate of lead iodide is formed. While performing the activity if lead nitrate is not available, which of the following can be used in place of lead nitrate?

A. Lead sulphate (insoluble) C. Ammonium nitrate
B. Lead acetate D. Potassium sulphate

63. Name the products formed when iron filings are heated with dilute hydrochloric acid

A. Fe (III) chloride and water C. Fe (II) chloride and hydrogen gas
B. Fe (II) chloride and water D. Fe (III) chloride and hydrogen gas

64. A metal carbonate (X) on thermal decomposition produces a solid residue and a gas (Y). When (Y) is passed through aqueons solution of another substance (Z) gives back X. The compounds X, Y and Z respectively are

A. $Ca(OH)_2$, $CaC0_3$, CO_2
B. $Ca(HCO_3)_2$, $Ca(OH)_2$,$CaCO_3$
C. $CaCO_3$,CO_2,$Ca(OH)_2$
D. $CaCO_3$, CO_2,$Ca(HCO_3)_2$

65. A salt X which is an ingradient of antacid on thermal decomposition gives another salt Y which on recrystallisation gives the compound (Z) which is used for removing permanent hardness of water. The compounds X. Y and Z are respectively.

A. $Mg(OH)_2$, MgO, $MgCO_3$
B. Na_2CO_3, $NaHCO_3$, NaOH
C. $CaCO_3$. CaO, $Ca(HCO_3)_2$
D. $NaHCO_3$, Na_2CO_3, $Na_2CO_3 \cdot 10H_2O$

66. Acidity of magnesium hydroxide and basicity of phosphoric acid are respectively

A. 2,2
B. 2,3
C. 3,2
D. 1,3

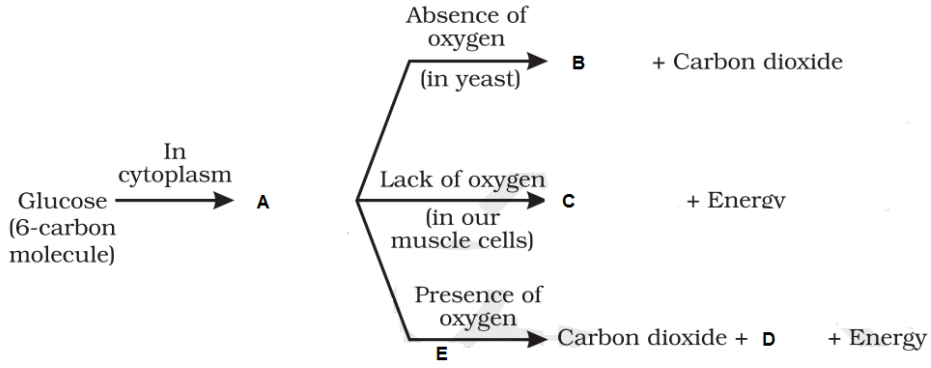
67. Fresh milk has a pH of 6. On changing into curd its pH becomes

A. More than 6
B. Less than 6
C. Remains 6
D. pH of curd can't be calculated

68. Which of the following metals does not displace H_2 gas from dilute HCl or dilute H_2SO_4?

A. Mg
B. Cu
C. Zn
D. Al

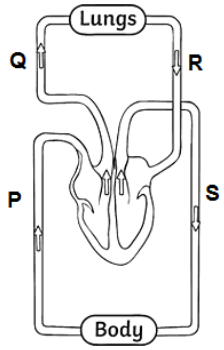
69. Complete the equation given below by filling A,B,C,D and E.



Options-

A. A- Lactic acid, B- Ethanol, C-Pyruvate, D-H2O, E- Cytoplasm
B. A- Pyruvate, B- Lactic acid, C- Ethanol, D- H2O, E- Mitochondria
C. A- Pyruvate, B- Ethanol, C- Lactic acid, D- H2O, E- Mitochondria
D. A- Ethanol, B- Pyruvate, C- Lactic acid, D- H2O, E- Cytoplasm

70. Given below schematic representation of double circulation in human. Which of the following labeled part of circulatory system has the highest concentration of oxygen?



A. P and Q
B. P and R
C. R and S
D. Q and R

71. A heterozygous pea plant bearing axial and violet flowers is crossed with another pea plant homozygous for axial and white flowers. Work out the cross and find out the correct phenotypic ratio.

A. 1:1:1:1
B. 1:2:1
C. 9:3:3:1
D. 1:1

72. A man is admitted to a hospital. He is suffering from an abnormally low body temperature, loss of appetite and extreme thirst. His brain scan would probably show a tumour in:

A. Pons B. Cerebellum C. Hypothalamus D. Medulla oblongata

73. What would be the number of chromosomes in the cells of embryo of the seed of a plant with 42 chromosomes in its root tip

A. 63
B. 84
C. 21
D. 42

74. A person who is in long hunger strike and is surviving only with water, will have

A. More sodium in his urine
B. less amino acids in his urine
C. more glucose in his urine
D. less urea in his urine

75. In bacteria, which structures serve as mitochondria?

A. Nucleoid
B. Ribosomes
C. Cell Wall
D. Mesosomes

76. Identify the incorrectly matched pair:

	Type of epithelium	location
A	Simple squamous	Blood vessels and alveoli
B	Simple cuboidal, non-brush bordered epithelium	Proximal convoluted tubule
C	Columnar epithelium	Stomach and small intestine
D	Ciliated epithelium	Bronchioles and fallopian tubes

A. A
B. B
C. C
D. D

77. The capillaries of collenchyma tissues become thick due to the deposition of:

A. Pectin and chitin
B. Suberin and cellulose
C. Cellulose and pectin
D. Lignin and cutin

78. Increase in the concentration of the toxicant at successive trophic levels is known as:

A. Biotransformation
B. Biodeterioration
C. Biomagnification
D. Biogeochemical cycling

79. If 20kJ energy is available at the producer level, then how much energy will be transferred to the lion in the food chain: producer → deer → lion?

A. 0.2 kJ
B. 0.02 kJ
C. 0.002 kJ
D. 2 kJ

80. The % of solar radiation absorbed by all green plants for photosynthesis is about __.

A. 1%
B. 5%
C. 8%
D. 10%

MENTAL ABILITY

81. Find the odd one out:

A. Despondency
B. Euphoria
C. Melancholy
D. Sorrow

82. Find out the missing term in the series 2,10,30_____,130,222

A. 51 B. 92 C. 68 D. 89

83. What should come in place of question mark in the series given below?
7,8, 18, ?, 232,1165

A. 34 B. 57 C. 99 D. 144

84. In a certain code HILTON is written as IHTLNO, How is BILLION written in that code?

A. IBLLION
B. IBOILLN
C. IBLLOIN
D. IBLOILN

85. Each of the vowels in the word 'MAGNIFY' is replaced by number '2' and each consonant is replaced by a number which is the serial number of that consonant in the word, i.e. M by 1, G by 3 and so on. What is the total of all the numbers once the replacement is completed?

A. 22
B. 24
C. 25
D. 26

86. Arrange the given words in the sequence in which they occur in the dictionary and then choose the correct sequence.

(i)Aqueous, (ii) Aquarium, (iii) Aquiline, (iv) Aquatic

A. (iv), (iii), (ii), (i)
B. (i), (ii), (iii), (iv)
C. (ii), (iv), (i), (iii)
D. (iii), (i), (iv), (ii)

87. 'Warning' is related to 'Danger' in the same way 'Mystery' is related to_____?

A. Clue
B. Risk
C. History
D. Direction

88. Select the option in which the words share the same relationship as that shared by the given pair of words.

WimbledonTrophy : Tennis : : Walker's Cup : ?

A. Hockey
B. Polo
C. Golf
D. Wrestling

89. If in a certain code language 'TIGER' is written as 'GRTVT', then what word will be written for 'HMZPV'?

A.GREAT
B.TRACK
C.SNAKE
D.PLATE

90. If in a certain code language 'NEETA' is written as 'MVVGZ', then what word will be written for 'IZHSNR'?

A.RASHMI
B.VANDANA
C.ANJALI
D.POONA

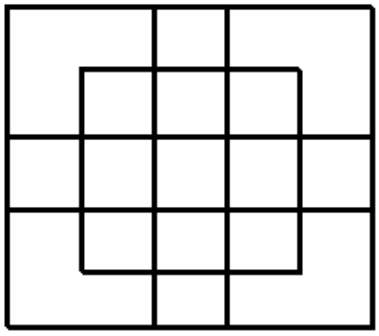
91. Find out the missing number (?)

6	18	15
3	2	5
4	3	?
8	27	9

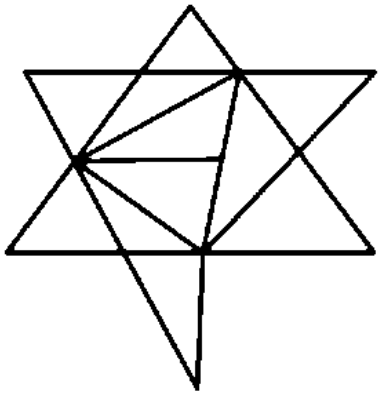
A. 11 B. 6 C. 3 D. 2

92. How many maximum square are in the following figure?

A. 18 B. 19 C. 25 D. 27



93.How many triangles are there in the following figure?



A. 21 B. 17 C. 19 D. 20

94. DIRECTION QUESTION: A, B, C and D are playing cards. A and C, and B and D are partners. D is to the right of C. The face of C is towards West. Find the direction that D is facing.

A. West B. East C. South D. North

95. Anup travels 5 km towards the west from his office, then travels 4 km towards the north, followed by 5 km towards the west and finally 6 km towards the north. What is the horizontal distance (in km) travelled by him?

A. 15 B. 10 C. 20 D. 25

96.Find the odd one out:

A. Fleas B. Parrot C. Harbor D. Grasshoppers

97.Choose the correct alternative: Influenza : Virus : : Typhoid: ?

A. Bacillus B. Parasite C. Protozoa D. Bacteria

98.Look at this series: 53, 53, 40, 40, 27, 27, ... What number should come next?

A. 12 B. 14 C. 27 D. 53

99.Choose the word which is most opposite in meaning to the word EMBRACE

A. Disobey B. Contradict C. Reject D. obscure

100. Find most opposite word of COERCIVE

A. Progressive B. Promoting C. Opinionated D. Gentle

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