IIT ASHRAM BRINGS...

Spread Your Wings
उड़ान
A QUEST FOR SCIENCE ASPIRANTS !

CLASS 8

SCIENCE APTITUDE TEST

TIME : 3 HOURS	MAX MARK : 400	DATE : 21- 01- 2024

INSTRUCTIONS

Please read the **instructions carefully. You are** allotted 5 minutes specifically for this purpose.

Caution : Class, as given on paper above MUST be correctly marked on the answer OMR sheet before attempting the paper. Wrong Class will give wrong results.

1. This booklet consists of 100 questions. Question paper consists of 4 sections. Marking scheme is given in table below:

Section	Subject	Questions No.	Making Scheme for each questions	
			Correct Answer	Wrong Answer
PART - **I**	Mental Ability	15	4	-1
PART - **II**	Mathematics	40	4	-1
PART - **III**	Physics & Chemistry	30	4	-1
PART - **IV**	Biology	15	4	-1

3. Answers have to be marked on the OMR sheet. The Question Paper contains blank spaces for your rough work. No additional sheets will be provided for rough work.

4. Blank papers, cellular phones, smart watches, log tables, slide rule, calculator and electronic devices, in any form, are not allowed.

PART - I : MENTAL ABILITY

1. A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

   If the second half of the English alphabet is reversed then which letter will be 4th to the right of 20th letter from the right?

   (a) U   (b) K

   (c) E   (d) F

2. Cup : Lip :: Bird : ?

   (a) Grass   (b) Forest

   (c) Beak   (d) Bush

3. 6 : 18 :: 4 : ?

   (a) 14   (b) 6

   (c) 16   (d) 8

4. Find the wrong number in the series.

   1, 2, 6, 15, 31, 56, 91

   (a) 31   (b) 15

   (c) 56   (d) 91

5. Pointing to a person, a man said to a woman, "His mother is the only daughter of your father." How was the woman related to the person ?

   (a) Aunt   (b) Mother

   (c) Wife   (d) Daughter

6. In a certain code language COMPUTER is written as RFUVQNPC. How will MEDICINE be written in that code language?

   (a) MFEDJJOE   (b) EOJDEJFM

   (c) MFEJDJOE   (d) EOJDJEFM

7. If South-East becomes North, North-East becomes West and so on. What will West become?

   (a) North-East   (b) North-West

   (c) South-East   (d) South-West

8. In the following question, a matrix of certain characters is given. These characters follow a certain trend, row-wise or column wise. Find out this trend and choose the missing character accordingly.

72	24	6
96	16	12
108	?	18

   (a) 12   (b) 16

   (c) 18   (d) 20

9. Find out the two signs to be interchanged for making following equation correct

   5 + 3 x 8 - 12 / 4 = 3

   (a) + and -   (b) - and /

   (c) + and x   (d) + and /

10. Arrange the words given below in a meaningful sequence.

    1.Presentation   2.Recommendation

    3. Arrival   4.Discussion   5.Introduction

    (a) 5, 3, 4, 1, 2   (b) 3, 5, 4, 2, 1

    (c) 3, 5, 1, 4, 2   (d) 5, 3, 1, 2, 4

11. Find the missing number in the following series?

    3, 5, 5, 19, 7, 41, 9, ?

    (a) 71   (b) 61

    (c) 79   (d) 69

12. How many 4's are there preceded by 7 but not followed by 3?

    5 9 3 2 1 7 4 2 6 9 7 4 6 1 3 2 8 7 4 1

    3 8 3 2 5 6 7 4 3 9 5 8 2 0 1 8 7 4 6 3

    (a) Four   (b) Three

    (c) Six   (d) Five

Space for Rough Work

13. Nitin ranks 18th in a class of 49 students. What is rank from the last ?
    (a) 31   (b) 18
    (c) 32   (d) 19

14. If you write down all the numbers from 1 to 100, then how many times do you write 3 ?
    (a) 11   (b) 18
    (c) 20   (d) 21

15. What is the product of all the numbers in the dial of a telephone?
    (a) 1,58,480   (b) 1,59,450
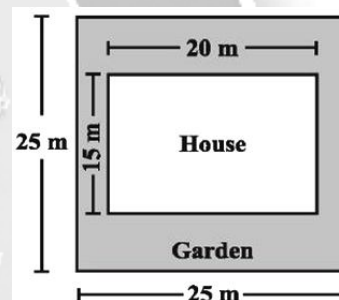   (c) 1,59,480   (d) None of these

PART - II : MATHEMATICS

1. A terminating decimal term in the following is
   (a) 3/16   (b) 1/15
   (c) 5/14   (d) 2/11

2. Rational number 3/40 is equal to:
   (a) 0.75   (b) 0.12
   (c) 0.012   (d) 0.075

3. A father's age is 7 times as old as his son. Two year ago, the father was 13 times as old as his son. What are their present ages? (Son and father respectively)
   (a) 6, 24   (b) 8, 32
   (c) 4, 28   (d) 9, 36

4. The sum of two numbers is 69 and their difference is 17. Find the numbers.
   (a) 43, 26   (b) 46, 23
   (c) 51, 18   (d) 52, 17

5. By selling a Shirt at Rs. 210 a shopkeeper loss 10%. What will be the actual price of the Shirt?
   (a) Rs. 233.33   (b) Rs. 267.67
   (c) Rs. 250   (d) Rs. 230

6. If the cost price of 20 greeting cards is equal to the selling price of 16 greeting cards. Find the gain or loss percent
   (a) 20%   (b) 30%
   (c) 25%   (d) 40%

7. The present population of a town is 12500 and it is increasing at the rate of 8% per annum. What will be the population of the town after 2 years?
   (a) 14580   (b) 13670
   (c) 14350   (d) 13780

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8. Maria goes to purchase some clothes for her and her daughter from the mall the shopkeeper allows her the successive discount of 30% and 20% on the suit she purchases for herself. Find the single discount equivalent to these successive discounts on her suit.
   (a)   40%   (b)   44%
   (c)   42%   (d)   35%

9. The number of cubical ice pieces of side 3 cm that can be cut from a cube of ice of side 9 cm is
   (a)   16   (b)   26
   (c)   27   (d)   28

10. A rectangular piece of paper is 71 cm long and 10 cm wide. A cylinder is formed by rolling the paper along its breadth. Find the volume of the cylinder. (in cm^3)
    (a)   654   (b)   764
    (c)   500   (d)   564.78

11. Find the number of lead balls of radius 1 cm each that can be made from a sphere of radius 4 cm.
    (a)   24   (b)   85
    (c)   64   (d)   46

12. If 40% of the number exceeds 25% of the number by 54, then the number is
    (a)   350   (b)   240
    (c)   360   (d)   260

13. A candidate gets 71% of votes and wins the election by 756 votes. If there are only two candidates, then the total number of votes is
    (a)   1800   (b)   1850
    (c)   1860   (d)   1812

14. A and B can do a work in 72 days. B and C in 120 days. A and C in 90 days. In how many days can A alone do the work?
    (a)   80   (b)   100
    (c)   110   (d)   120

15. Abscissa of the all the points on y - axis is:
    (a)   0   (b)   1
    (c)   -1   (d)   any number

16. Data collected in a survey shows that 40% of the buyers interested in buying a particular brand of toothpaste. The central angle of the sector of the pie chart representing this information is:
    (a) 120^0 (b) 150^0
    (c) 144^0 (d) 40^0

17. In a quadrilateral ABCD, the angles A, B, C and D are in the ratio 1:2:3:4, Then the measure of each angles of the quadrilateral is
    (a) $36^0,72^0,108^0,144^0$
    (b) $45^0,110^0,55^0,150^0$
    (c) $15^0,130^0,45^0,150^0$
    (d)   none of these

18. Adjacent sides of a rectangle are in the ratio 5 : 12, if the perimeter of the rectangle is 34 cm, find the length of the diagonal.
    (a)   13 cm   (b)   12cm
    (c)   25 cm   (d)   5 cm

19. If $(3a + 4b) = 16$ and $ab = 4$. Find the value of $(9a^2 + 16b^2)$
    (a)   160   (b)   100
    (c)   120   (d)   140
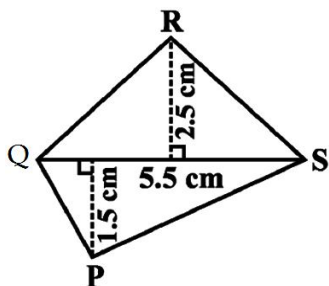
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20. Solve $(4x^2 + 5)(4x^2 + 5)$
    (a) $16x^4 + 25 + 40x^2$
    (b) $16x4 + 28 + 30x^2$
    (c) $16x^4 + 30 + 20x^2$
    (d) $16x^4 + 8 + 25x^2$

21. Find the circumference of a circle whose area in sq. cm is equal to its circumference.
    (a) π cm
    (b) 2π cm
    (c) 4π cm
    (d) 8π cm

22. The base radius of a cylinder is 20 cm and its height is 2016 cm. Find its curved surface area in sq. cm.
    (a) 253,440
    (b) 234,550
    (c) 332,550
    (d) 372,440

23. Find the area of a regular hexagon of perimeter 36 cm.
    (a) $36\sqrt{3}$ cm^2
    (b) $54\sqrt{3}$ cm^2
    (c) $72\sqrt{3}$ cm^2
    (d) $12\sqrt{3}$ cm^2

24. If the area of a right isosceles triangle is 54 sq. cm, then find its hypotenuse(in cm).
    (a) $12\sqrt{6}$
    (b) $3\sqrt{6}$
    (c) $6\sqrt{6}$
    (d) $5\sqrt{6}$

25. $x - \dfrac{1}{x} = 4$,then find the value of $x^2 + \dfrac{1}{x^2} = ?$
    (a) 15
    (b) 16
    (c) 17
    (d) 18

26. Find the number of factors of 64.
    (a) 5
    (b) 6
    (c) 7
    (d) 8

27. If $\sqrt{6} \times \sqrt{216} = \sqrt{y} - 4$, then y _____.
    (a) 1600
    (b) 1225
    (c) 900
    (d) 625

28. What will be the unit digit of $\sqrt[3]{15625}$?
    (a) 5
    (b) 0
    (c) 3
    (d) 4

29. The smallest number by which 432 should be multiplied so as to get a perfect square is _____.
    (a) 4
    (b) 3
    (c) 5
    (d) 6

30. The value of expression 5n - 2, when n= -2 is
    (a) -12
    (b) 8
    (c) 1
    (d) -8

31. If ab = 6 and a + b = 5 then the value of $(a^2 + b^2)$ is
    (a) 11
    (b) 12
    (c) 13
    (d) 16

32. The area of the garden (shaded portion) in the below figure is

    (a) 300 m^2
    (b) 625 m^2
    (c) 325m^2
    (d) none of these

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33. The area of the below figure is

(a) 45 cm^2 (b) 11 cm^2
(c) 49 cm^2 (d) none of these

34. In simplified form $(3^0 + 4^0 + 5^0)^0$ is equals to
(a) 12 (b) 3
(c) 12 (d) 1

35 The value of $\left[\left\{\left(-\dfrac{1}{2}\right)^2\right\}^{-2}\right]^{-1}$ is
(a) -1/16 (b) 1/16
(c) 16 (d) -16

36. The length of the shadow of a 3 m high pole at a certain time of the day is 3.6 m. What is the length of the height of another pole whose shadow at that time is 54 m long?
(a) 30 m (b) 40 m
(c) 45 m (d) none of these

37. Find the number of diagonals of a 21-sided polygon.
(a) 168 (b) 189
(c) 210 (d) 231

38. If $5x + 2y = 13$ and $2x + 5y = 1$, then the value of $x + y$ is _____.
(a) 1 (b) 2
(c) 3 (d) 5

39. $\sqrt{\sqrt[3]{343} \times \sqrt{784}}$ = _____.
(a) 7 (b) 14
(c) 21 (d) 28

40. If $(729)^{x+3} = (27)^{5+x}$, then find the value of x^x.
(a) 1 (b) 0
(c) -1 (d) undefined

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PART - III : PHYSICS & CHEMISTRY

1. Assertion(A): It is not possible to talk directly to a person on the surface of the Moon.
   Reason(R): Sound waves are mechanical waves.
   (a) A and R are true and R is the correct explanation of A.
   (b) A and R are true, but R is not the correct explanation of A.
   (c) A is true but R is false.
   (d) Both A and R are false

2. Match the statements of Column A with those of Column B

Column A	Column B
(A) Mechanical wave	(p) Crests and troughs
(B) Non-mechanical wave	(q) Compressions and rarefactions
(C) Longitudinal wave	(r) Light
(D) Transverse wave	(s) Ripples

   (a) A→s; B→r; C→p; D→q
   (b) A→s; B→r; C→q; D→p
   (c) A→r; B→s; C→p; D→q
   (d) A→p; B→r; C→q; D→s

3. Sound produced by a tuning fork travels from air to glass. Which of the following physical quantities remains the same?
   (a) Velocity   (b) Frequency
   (c) Wavelength   (d) Amplitude

4. A light ray incident on a reflecting surface with glancing angle of 60°. The angle of deviation is _____.
   (a) 60°   (b) 30°
   (c) 120°   (d) 90°

5. What is the number of images formed, when the angle between two mirrors is 72°?
   (a) 4   (b) 5
   (c) 6   (d) 3

6. Assertion (A): When visible light is passed through a prism, violet colour is seen at the bottom of the screen.
   Reason (R): Prism has the highest refractive index for violet light.
   (a) A and R are true and R is the correct explanation of A.
   (b) A and R are true, but R is not the correct explanation of A.
   (c) A is true but R is false.
   (d) Both A and R are false.

7. What happens when a glass rod is rubbed with silk cloth?
   (a) the electrons flow from glass rod to silk cloth.
   (b) the glass rod becomes a negatively charged body.
   (c) the glass rod becomes a positively charged body.
   (d) Both (a) and (c).

8. In which of the following, the principle of chemical effects of electricity is used?
   (a) Telephones   (b) Electroplating
   (c) Electric bell   (d) Eectric motor

9. Sonic vibrations sent down from a ship return after 2 seconds. What is the depth of the sea, if the speed of sound in water is 1.5 km s^{-1}?
   (a) 150 m   (b) 3 km
   (c) 1.5 km   (d) 750 m

10. Which of the following is not a non-contact force?
    (a) Muscular   (b) Magnetic
    (c) Gravitation   (d) Electric

11. If no force acts on a body at rest, then what effect can be observed?
    (a) The body changes shape.
    (b) The body moves with increased speed.
    (c) The body remains at rest.
    (d) The body breaks up.

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12. Ram throws four stones having the same weight on four different surfaces. The surfaces are icy, dry, sandy, and cemented. He throws each stone with the same force. On which of the given surfaces will the stone go the maximum distance before it stops?

    (a) Icy surface   (b) Dry surface

    (c) Sandy surface   (d) Cemented surface

13. In electrolytic solutions, which of the following act as carriers of charge?

    (a) Protons   (b) Electrons

    (c) Neutrons   (d) Ions

14. Suppose you are in a car and there is a thunderstorm. Which of the following is the best way to protect yourself from possible harm?

    (a) Remaining in the car

    (b) Getting out of the car and taking cover under the car

    (c) Running to a nearby tree

    (d) Getting out and standing under an electric pole

15. While sitting on the first bench, Muthu finds it difficult to read what is written on the blackboard. However, he can clearly see the same when he sits on the last bench. It can be concluded that Muthu is suffering from

    (a) myopia   (b) cataract

    (c) astigmatism   (d) hypermetropia

16. Which property of coke makes it useful in the manufacture of steel?

    (a) Availability in pure form.

    (b) Toughness.

    (c) Porosity.

    (d) Ability to act as reducing agent.

17. Hydrocarbon burns to produce heat, light and_____

    (a) $CO_2 + H_2O$ (b) $CO + O_2$

    (c) $CO_2 + H_2$ (d) $CO + H_2$

18. Which of the following statements is/are correct?

    (I) Most synthetic fibres are obtained from coal, petroleum and natural gas.

    (II) Acrylic fibres closely resemble wool.

    (III) Most synthetic fibres have very high moisture absorbing capacity.

    (IV) Polyester is prepared from cellulose.

    (a) I and II only   (b) II and III only

    (c) IV only   (d) All of these

19. Which one of the following statements is correct? Statement 1: Polywool is a mixture of polyester and wool Statement 2: Polycot is a mixture of polyester and nylon.

    (a) Statement 1

    (b) Statement 2

    (c) Both statements are correct

    (d) Both statements are incorrect.

20. A substance X is obtained from an exhaustible natural resource. It is a black and thick liquid with an unpleasant smell. It is a mixture of about 200 substances. Some of the products such as synthetic dyes, plastic paints, explosives, perfumes, etc are obtained using this resource. The substance X is

    (a) Coke   (b) Coal tar

    (c) Bitumen   (d) Lubricating oil

21. Which of the following statements about fossil fuels is correct?

    (a) Only petroleum is prepared in the laboratory

    (b) Petrochemicals are products of coal and petroleum

    (c) Both coal and petroleum are prepared in the laboratory

    (d) Petrochemicals are products of petroleum and natural gas

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22. Four substances P, Q, R, and S were brought one by one near a lighted candle. It was observed that only substance Q burns readily. Substances P and R burn after sustained heating and substance S does not burn at all. Among all the substances given, which substance has the lowest ignition temperature?

    (a) P   (b) Q
    (c) R   (d) S

23. The calorific value of a fuel is 330000 kJ/kg. 0.9634 kg of the fuel is taken for combustion. The total amount of heat energy (in kJ) produced during combustion is

    (a) 317922kJ   (b) 215677kJ
    (c) 3179.22kJ   (d) 317.922kJ

24. Which of the following air pollutants is wrongly matched with the effect it causes?

    (a) Dust - reduces photosynthesis in green plants.
    (b) Carbon monoxide - reduces oxygen in the blood.
    (c) Chlorofluorocarbons - damages nerves and tissues.
    (d) Nicotine - hardens and narrows blood vessels.

25. Properties of substances W, X, Y and Z are listed below:

    W: A liquid metal
    X: A liquid non-metal
    Y: Gaseous non-metal
    Z: A non-metal which conducts electricity.W, X, Y and Z are respectively

    (a) Iron, iodine, hydrogen and oxygen
    (b) Gold, sulphur, chlorine and hydrogen
    (c) Copper, phosphorus, nitrogen and carbon
    (d) Mercury, bromine, oxygen and graphite.

26. An unknown metal X when placed in copper sulphate solution, red brown pieces of copper fall to the bottom of the test tube.When metal X is placed in aluminium sulphate solution, no change is observed. Metal X can be

    (a) Sodium   (b) Potassium
    (c) Iron   (d) Calcium.

27. Substance X reacts with dilute HCl violently, V reacts slowly while Z does not react at all. X, Y and Z could be respectively

    (a) Cu, Al, Fe   (b) Al, Na, Cu
    (c) Na, Cu, Fe   (d) K, Al, Cu

28. A list of natural resources is given.

    I. Wind   II. Coal
    III. Minerals   IV. Petroleum
    V. Sunlight   VI. Biomass

    Which of the following pairs of natural resources is exhaustible?

    (a) II and IV   (b) I and V
    (c) IV and VI   (d) V and VI

29. Which of the following products is not obtained from petroleum?

    (a) Coke   (b) Diesel
    (c) Paraffin wax   (d) Lubricating oil

30. Carbonization is a

    (a) Fast process in which dead vegetation converts into coal
    (b) Slow process in which dead vegetation converts into coal
    (c) Fast process in which dead organisms of the sea get converted into petroleum
    (d) Slow process in which dead organisms of the sea get converted into petroleum

Space for Rough Work

PART - IV : BIOLOGY

1. Which one of the following is not a communicable disease?
   - (a) Cancer
   - (b) Common cold
   - (c) Malaria
   - (d) Dengue fever

2. Diseases can spread through
   - (a) Aerosols
   - (b) Sexual contact
   - (c) Water
   - (d) All the above

3. Which of the following can change its shape?
   - (i) Amoeba
   - (ii) Neuron
   - (iii) WBC
   - (iv) RBC
   - (a) (i) only
   - (b) (i) and (ii)
   - (c) (i) and (iii)
   - (d) (i), (ii), (iv)

4. Male sex hormone is produced by
   - (a) Female gonad
   - (b) Prostate gland
   - (c) Testes
   - (d) Both (a) and (c)

5. Scrotum helps to maintain
   - (a) Low pH
   - (b) Low temperature
   - (c) High temperature
   - (d) High pH

6. Which one of the following is a wrong statement?
   - (a) Testes are located outside the body.
   - (b) Sperm production requires a temperature higher than normal internal temperature.
   - (c) Semen constitutes sperm and also other substances that nourish the sperm.
   - (d) Tail of sperm helps in the movement.

7. Separation of grains from chaff is called
   - (a) Threshing
   - (b) Harvesting
   - (c) Winnowing
   - (d) Weeding

8. Which one of the following is not a rabi crop?
   - (a) Maize
   - (b) Wheat
   - (c) Linseed
   - (d) Mustard

9. Genetic engineering involves manipulation in
   - (a) DNA
   - (b) RNA
   - (c) Gamete
   - (d) Protein

10. Female reproductive systems contains
    - (a) testis
    - (b) penis
    - (c) ovaries
    - (d) sperms ducts

11. The process of intake of food and its utilisation is called
    - (a) excretion
    - (b) respiration
    - (c) digestion
    - (d) nutrition

12. Which one isa carnivorous only
    - (a) Dog
    - (b) Horse
    - (c) Deer
    - (d) Lion

13. Saliva has the enzyme -
    - (a) pepsin
    - (b) ptyalin
    - (c) trypsin
    - (d) rennin

14. If the stomach did not produce any hydrochloric acid, which enzyme will not function?
    - (a) Ptyalin
    - (b) Trypsin
    - (c) Pepsin
    - (d) Collagenase

15. Number of chambers in the stomach of ruminants is -
    - (a) 4
    - (b) 3
    - (c) 2
    - (d) 1

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