Candidates have to do questions 31 to 90 **EITHER** from Part II (Mathematics and Science) **OR** from Part III (Social Studies/Social Science).

PART II

MATHEMATICS AND SCIENCE

Directions: Answer the following questions by selecting the **most appropriate** option.

31. The ratio between the length and the perimeter of a rectangular plot is 1:3. What is the ratio between the length and breadth of the plot?

(1) 1: 2
(2) 2: 1
(3) 3: 2
(4) Data inadequate

Ans: (2)

32. If $a * b = a^2 + b^2$ and $a . b = a^2 - b^2$, the value of $(5 * 2) . 25$ is

(1) 215
(2) 225
(3) 226
(4) 216

Ans: (4)

33. If a, b and c are three natural numbers in ascending order, then

(1) $c^2 - a^2 > b$
(2) $c^2 - a^2 = b^2$
(3) $c^2 - a^2 < b^2$
(4) $c^2 + b^2 = a^2$

Ans: (1)

34. 'Buy three, get one free.' What is the percentage of discount being offered here ?

(1) 33.33%

(2) 25%

(3) 20%

(4) 28.56%

Ans: (1)

35. The Value of $\sqrt{2} + \sqrt{3} + \sqrt{2} - \sqrt{3}$ is

(1) $\sqrt{6}$
(2) 6
(3) $2\sqrt{2}$
(4) $2\sqrt{3}$

Ans: (3)

36. When recast, the radius of an iron rod is made one-fourth. If its volume remains constant, then the new length will become

(1) 1/4 times of the original

(2) 1/16 times of the original

(3) 16 times of the original

(4) 4 times of the original

Ans: (3)

37. Find the value of 547527/82 if 547.527/0.0082 = x

(1) x/10

(2) 10 x

(3) 100 x

(4) x/100

Ans: (3)

38. The smallest number by which 68600 must be multiplied to get a perfect cube is

(1) 5

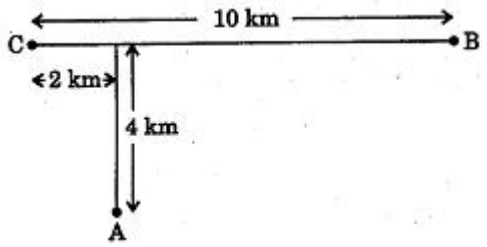
(2) 10

(3) 8

(4) 12

Ans: (1)

39. A cyclist at 'C' is cycling towards 'B'. How far will he have to cycle from C before he is equidistant from both A and B ?



(1) 4 km

(2) 3 km

(3) 6 km

(4) 5 km

Ans: (4)

40. Unit's digit in 13^{2003} is

(1) 1

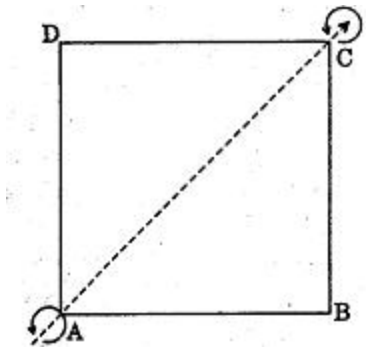
(2) 3

(3) 7

(4) 9

Ans: (3)

41. A square sheet ABCD when rotated on its diagonal AC as its axis of rotation sweeps a



(1) cone

(2) spindle

(3) cylinder

(4) trapezium

Ans: (2)

42. The area of a triangle with base x units is equal to the area of a square with side x units. Then the altitude of the triangle is

(1) x/2 units

(2) x units

(3) 2x units

(4) 3x units

Ans: (3)

43. Which is greatest among 33 and half %; 4/15 and 0.35 ?

(1) 33 and half %

(2) 4/15

(3) 0.35

(4) Cannot be compared

Ans: (3)

44. The factorisation of $25 - p^2 - q^2 - 2pq$ is

(1) (5 + p + q) (5 - p + q)

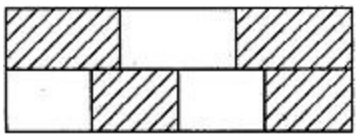
(2) (5 + p + q) (5 - P - q)

(3) (5 + p - q) (5 - p + q)

(4) (5 + p - q) (5 - p - q)

Ans: (2)

45. A rectangle is divided horizontally into two equal parts. The upper part is further divided into three equal parts and the lower part is divided into four equal parts.Which fraction of the original rectangle the shaded part ?



(1) 3/5

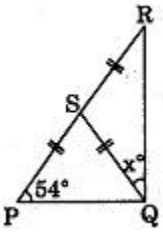
(2) 2/7

(3) 4/7

(4) 7/12

Ans: (4)

46. In the given figure, PS = SQ = SR and $\angle SPQ = 54°$. Find the measure of $\angle x$.



(1) 54°

(2) 72°

(3) 108°

(4) 36°

Ans: (1)

47. 2x - 13, 2x - 11, 2x - 9, 2x - 7 are consecutive

(1) Prime numbers

(2) Even numbers

(3) Odd numbers

(4) Natural numbers

Ans: (3)

48. The fractional equivalent of 57.12% (approx.) is

(1) 349/625

(2) 359/625

(3) 357/625

(4) 347/625

Ans: (3)

49. The ratio of the side and height of an equilateral triangle is

(1) 2 : 1

(2) 1 : 1

(3) 2 : √3

(4) √3 : 2

Ans: (3)

50. If two adjacent sides of a square paper are decreased by 20% and 40% respectively, by what percentage does the new area decrease?

(1) 48%

(2) 50%

(3) 52%

(4) 60%

Ans:

51. 4/16 - 1/8 = 3/8

6/7 - 2/9 = 4/2

The above represents the work of a student. If this error pattern continues, the student's answer to 5/11 - 2/7 will be

(1) 7/18

(2) 3/4

(3) 3/7

(4) 2/18

Ans: (2)

52. A teacher in grade-VI provided each child with a centimeter grid paper and a pair of scissors. She wanted them to explore how two-dimensional shapes can be folded into three-dimensional objects. Which of the following concepts are the students exploring?

(1) Rotation

(2) Reflection

(3) Nets

(4) Decimals

Ans:

53. When doing exponents, the work observed in a learner's notebook was as follows :

$4^3 \times 4^2 = 4^5$

$6^4 \times 6^4 = 6^8$

$7^3 \times 3^7 = 21^{10}$

The learner has not understood how to

(1) add exponents

(2) add exponents and multiply

(3) multiply numbers with same base

(4) multiply numbers with different bases

Ans: (4)

54. Teachers, while discussing problem-solving as an approach to teaching of mathematics, articulated four views. Which of the following views does **not** justify the real meaning of this approach?

(1) 'I think questions on problem-solving should be made from situations based on real life.'

(2) 'I think many questions found in the mathematics textbook can be used for problem-solving.'

(3) 'I think it is better to connect problem-solving with general mathematics class.'

(4) 'I think there is no correlation between problem-solving and mathematical reasoning.'

Ans:

55. Given linear equations I, II and III, a learner is not able to solve III algebraically. The most likely area of difficulty is that the learner has not understood

$$\begin{aligned} 5x + 4y &= 8 \\ 9x + 4y &= 10 \end{aligned}$$

II

$$\begin{aligned} 6x + 2y &= 1 \\ 4x + 3y &= 1 \end{aligned}$$

III

(1) that two equations can be added or subtracted to solve them

(2) that two equations can be solved by method of substitution

(3) the method of solving equations using graphs

(4) that both the equations in III can be altered by multiplying with suitable numbers

Ans: (2)

56. When introducing mensuration, a teacher writes all the formulae on the board before proceeding further. This reflects that she is following the

(1) Inductive approach

(2) Deductive approach

(3) Experimental approach

(4) Practical approach

Ans: (2)

57. Ameena is playing with matchsticks and adds one  at each stage : 
Appu, on the other hand, makes a table:

Number of L's	**1 2 3 ...**
Number of matchsticks	2 4 6 ..

What is your observation about the two children in this situation?

(1) Ameena is only playing and Appu is doing mathematics

(2) Ameena will need lots of matchsticks to come to a generalisation. However, Appu would be faster

(3) Both Ameena and Appu are trying to make generalisations

(4) Ameena would be learning by doing and Appu may not be able to see the pattern at all

Ans: (1)

58. To be good in mathematics, one needs to

(1) remember solutions

(2) have mastery over calculations

(3) create and formulate problems through abstract thinking and logical reasoning

(4) memorise formulae

Ans: (3)

59. Students make errors while solving mathematical problems because

(1) they do not practise enough

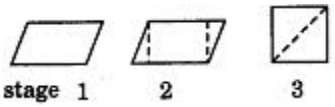
(2) they do not refer to multiple textbooks

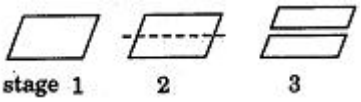
(3) their socio-economic status affects their performance

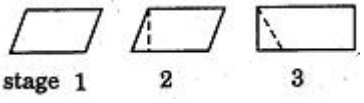
(4) they make alternative interpretations of concepts in their attempt to make meaning

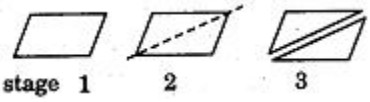
Ans: (4)

60. With an activity on paper folding, a teacher was trying to depict the relationship of the areas of a parallelogram and a triangle. Which of the following best depicts the transformation of stages?

(1) 

(2) 

(3) 

(4) 

Ans: (4)

61. Bakelite is used in making electrical appliances because it is a

(1) thermoplastic

(2) good conductor of heat

(3) good conductor of electricity

(4) good insulator of electricity

Ans: (4)

62. In which of the following cases of motion, are the distance moved and the magnitude of displacement equal ?

(1) A car moving on a straight road

(2) A car moving in a circular path

(3) A pendulum oscillating to and fro

(4) The Earth revolving around the Sun

Ans: (1)

63. LED and CFL are very commonly used as sources of light in homes. Which of the following statements is true ?

(1) CFL is better because LED contains toxic materials

(2) LED is better because CFL contains toxic materials

(3) Both are equally good

(4) Neither of them is good because both contain toxic materials

Ans: (2)

64. An air bubble inside water behaves like a

(1) concave lens

(2) convex lens

(3) plano-convex lens

(4) concave mirror

Ans: (1)

65. A feather weighing 5 gm and a nail weighing 10 gm have the same kinetic energy. Which of the following statements is true about the momentum of the two bodies ?

(1) The lighter body will have higher momentum

(2) The heavier body will have higher momentum

(3) Both will have equal momentum

(4) It is not possible to compare the momentum. of two objects

Ans: (2)

66. If the pressure over a liquid increases, its boiling point

(1) decreases

(2) Increases

(3) does not change

(4) first decreases and then increases

Ans: (2)

67. A doctor prescribes a medicine to treat hyperacidity. The main ingredient of the medicine is

(1) $Al(OH)_3$

(2) $MgCl_2$

(3) $CaC0_3$

(4) Na_2C0_3

Ans: (1)

68. Non-metallic oxides

(1) are acidic in nature

(2) are basic in nature

(3) are amphoteric in nature

(4) turn red litmus paper blue

Ans: (1)

69. The inner surfaces of food cans are coated with tin and not with zinc because

(1) zinc is costlier than tin

(2) zinc is more reactive than tin

(3) zinc has a higher melting point than tin

(4) zinc is less reactive than tin

Ans: (2)

70. A man goes door to door posing as a goldsmith. He promises to bring back the glitter on dull gold ornaments. An unsuspecting woman gives a set of gold bangles to him which he dips in a particular solution. The bangles sparkle but their weight has considerably reduced. The solution used by the impostor probably is

(1) dil. HCI

(2) cone. HCI

(3) a mixture of cone. HCI and cone. $HN0_3$

(4) cone. $HN0_3$

Ans: (3)

71. Bleeding is stopped by the application of alum to a wound because

(1) the wound is plugged by the alum chunk

(2) alum coagulates the blood and forms a clot

(3) alum reduces the temperature near the wound

(4) alum is an antiseptic

Ans: (2)

72. When an iron nail is dipped in copper sulphate solution, the colour of copper sulphate solution fades and a brownish layer is deposited over the iron nail. This is an example of

(1) combination reaction

(2) decomposition reaction

(3) double displacement reaction

(4) displacement and redox reactions

Ans: (4)

73. While diluting sulphuric acid, it is recommended that the acid should be added to water because

(1) acid has strong affinity for water

(2) acid may break the glass container

(3) dilution of acid is highly exothermic

(4) dilution of acid is highly endothermic

Ans: (3)

74. The thumb of humans moves more freely than other fingers due to the presence of

(1) pivotal joint

(2) gliding joint

(3) hinge joint

(4) saddle joint

Ans: (4)

75. Root cap is absent in

(1) Xerophytes

(2) Hydrophytes

(3) Mesophytes

(4) Halophytes

Ans: (2)

76. Adding salt and sugar to food substances helps In preserving them for a longer duration. It is because excess salt and sugar

(1) plasmolyse the microbial cells

(2) cause rupturing of microbial cells

(3) cause change in the shape of microbial cells

(4) remove water from food

Ans: (1)

77. Hormone Adrenaline

(1) helps control level of sugar in the blood

(2) helps the body to adjust stress level when one is very angry or worried

(3) helps control height

(4) helps control balance of electrolytes in the body

Ans: (2)

78. The green house effect which is causing an increase in the atmospheric temperature is mainly due to

(1) oxygen

(2) nitrogen

(3) carbon dioxide

(4) sulphur

Ans: (3)

79. Green plants appear to release oxygen instead of carbon dioxide into the atmosphere during the day time because

(1) green plants do not respire during the night time

(2) green plants respire only during the night time

(3) green plants respire during the day time but are involved in photosynthesis during the night time

(4) the rate of photosynthesis is higher than the rate of respiration during the day time

Ans: (4)

80. A common characteristic feature of plant sieve-tube cells and mammalian erythrocytes is

(1) absence of nucleus

(2) absence of chloroplast

(3) absence of cell wall

(4) presence of haemoglobin

Ans: (1)

81. Most Boards of Education have banned the dissection of animals because

(1) animals are no longer available for dissection

(2) procuring animals has become an expensive proposition

(3) there is a need to sensitise students to prevention of cruelty to animals

(4) they may spread new diseases

Ans: (3)

82. The main aim of conducting Mathematics and Science Olympiads is to

(1) promote excellence in the subject by nurturing creativity and experimentation

(2) grade students according to their capabilities

(3) help students score high marks in professional examinations

(4) grade schools based on the performance of their students

Ans: (1)

83. Four applicants for a post of TGT (Science) were asked to plan a lesson on "Consequences of Deforestation", Which one of the following lesson plans reflects the scientific approach ?

(1) Explains in detail the consequences of deforestation

(2) Provides a variety of examples to explain the concept

(3) Includes activities that children can perform in groups and draw conclusions through a Power Point presentation

(4) Mentions about the use of ICT to help students understand the concept

Ans: (3)

84. Ms. Patel, Principal of a School XYZ, is keen about integrated approach to teaching of Science rather than teaching different disciplines separately. The basis of this is

(1) non-availability of qualified teachers in her school to teach separate disciplines

(2) difficulty to adjust the teachers in the time-table

(3) difficulty of students to adjust to different teachers

(4) all the disciplines are interlinked and a teacher can draw on cross-curricular linkages

Ans: (4)

85.A teacher plans to teach "Components of Food" in Class-VI. Which of the following can be used as an essential question ?

(1) List the food items your mother serves you in lunch.

(2) Why does your mother serve you a meal with a variety of food items ?

(3) Does your mother prepare a definite set of food items for lunch every day?

(4) Do you eat all the items served in your lunch every day?

Ans: (2)

86. While teaching the concept, "force can change the shape of an object" to students, a teacher plans the following activities:

a. Explain concepts using commonly observed examples.

b. Provide a dough on a plate and ask the students to press it down with the hand.

c. Show an audio-visual• film explaining the concept with some examples.

The teacher is using different approaches to learning because

(1) she wants to prove her knowledge

(2) she knows she must follow her lesson plan

(3) she wants to prepare students for a test

(4) there are different kinds of learners in the class and she wants to address multiple intelligences

Ans:

87. Which of the following can be assessed when Geeta is using only MCQ as a tool to assess "Nutrition in Humans" ?

(1) Analytical ability to classify food items and make a poster

(2) Misconceptions related to food habits

(3) Learners' ability to apply knowledge and prepare a role play to present in the morning assembly

(4) Learners' ability to comprehend the importance of components of food and write a long essay

Ans: (2)

88. A Science teacher plans group activities to teach "Properties of Air" to her students of Class-VI. Which one set of attributes would she like to have in the students she selects as group leaders ?

(1) Freedom to choose roles, work at their own pace and understanding

(2) Ordering students to take roles and deliver in consonance with their understanding

(3) Giving major roles to brighter students to ensure the group finishes first

(4) Assigning roles as per capability, motivating and coordinating among the group members

Ans: (4)

89. While selecting a performance task to help students develop research oriented skills in a Science class, a teacher may pick up a topic

(1) from the content given in the syllabus which must be completed in time

(2) which majority of the students in a class find interesting

(3) which she thinks is important for the students

(4) related to a problem faced by students in their day-to-day functioning and which is a part of the concepts to be covered for this class

Ans: (4)

90. While investigating 'how water affects the germination of seeds', a teacher asked the students to soak bean seeds on a bed of cotton wool for a few days and observe the changes. What is the guideline that she forgot to mention?

To place

(1) many seeds on wet cotton

(2) a few seeds on wet cotton

(3) many seeds on dry cotton

(4) a few seeds on dry cotton

Ans: (2)