INSTRUCTIONS

1. The booklet is your Question Paper. Do not break the seal of this booklet before being instructed to do so by the invigilator.

2. Blank spaces and blank pages are provided in the question paper for your rough work. No additional sheets will be provided for rough work.

3. Blank papers, clipboards, log tables, slide rules, calculators, cameras, cellular phones, pagers and electronic gadgets are **NOT** allowed inside the examination hall.

4. The answer sheet, a machine-readable Optical Response Sheet (ORS), is provided separately.

5. On breaking the seal of the booklet check that it contains 22 pages and all the 100 questions.

6. A candidate has to write his/her answers in the ORS sheet by darkening the appropriate bubble with the help of **Black ball point pen** as the correct answer of the question attempted.

7. Question Paper Format:
   The question paper consists of 2 parts. **Part-I**: IQ (Mental Ability) & **Part-II**: Physics, Chemistry, Biology & Mathematics

8. Marking Scheme:
   **Part-I**: For each question of **Part-I**, you will be awarded 4 marks if you darken the bubble corresponding to the correct answer and **zero mark** if no bubbles are darkened. **No negative** marks will be awarded for incorrect answers in this part.

   **Part-II**: For each question of **Part-II**, you will be awarded 4 marks if you darken the bubble corresponding to only the correct answer and **zero mark** if no bubbles are darkened. In all other cases **minus one (−1) mark** will be awarded.

Time : 2 Hrs. Maximum Marks : 400

Please read the instructions carefully. You are allotted 5 minutes specifically for this purpose.
PART - I
IQ (MENTAL ABILITY)

This section contains 30 multiple choice questions. Each question has four choices (1), (2), (3) and (4) out of which ONLY ONE is correct.

1. In the given figure, P is 400 km eastward of O and Q is 300 km northward of O. R is exactly in the middle of Q and P. Find the distance between R and P?

   ![Diagram of OQPR]

   (1) 250 km  (2) 250 $\sqrt{2}$ km  (3) 300 km  (4) 400 km

2. Study the information given below?

   (i) 8 trees - mango, guava, papaya, pomegranate, lemon, banana, raspberry and apple are in two rows [4 in each row] facing North and South.

   (ii) Lemon is between mango and apple but just opposite to guava.

   (iii) Banana is at one end of a line and is just next in the right of guava or either banana tree is just after guava tree.

   (iv) Raspberry tree which is at one end of a line, is just diagonally opposite to mango tree.

Which tree is just opposite to Pomegranate tree?

   (1) Mango  (2) Banana  (3) Papaya  (4) Data is inadequate

3. If it was Saturday on 17th December, 2002 what was the day on 22nd December, 2004?

   (1) Monday  (2) Tuesday  (3) Wednesday  (4) Sunday

4. Arrange the following in a meaningful sequence?


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

5. Ajay ranked sixteenth from the top and twenty-ninth from the bottom among those who passed an examination. Six boys did not participate in the competition and five failed in it. How many boys were there in the class?

   (1) 40  (2) 44  (3) 50  (4) 55

SPACE FOR ROUGH WORK
6. If the positions of the fifth and twelfth letters of the word GLORIFICATIONS are interchanged, and likewise the positions of the fourth and fourteenth letters, the third and tenth letters, the second and eleventh letters and the first and the thirteenth letters are interchanged, which of the following will be the twelfth letter from the right end?
(1) I (2) O (3) R (4) T

7. If the given interchanges namely : signs + and ÷ and numbers 2 and 4 are made in signs and numbers, which one of the following four equations would be correct?
(1) 2 + 4 ÷ 3 = 3 (2) 4 + 2 ÷ 6 = 1.5 (3) 4 ÷ 2 + 3 = 4 (4) 2 + 4 ÷ 6 = 8

8. Some of the cricket players are tennis players, some tennis players are hockey players, no cricket player is a hockey player. Which of the following diagrams correctly represents the above statements?

9. CK  16  9  JR
   OS  24  19  TX
   KM  ?  ?  PV
(1) 14, 21  (2) 21, 14  (3) 56, 84  (4) 84, 56

10. Choose the number set similar to a given number set
    11 : 1210
(1) 8 : 448  (2) 6 : 2160  (3) 7 : 1029  (4) 9 : 729

11. Select a figure from amongst the figures (1), (2), (3) & (4) which will continue the series as established by the five problem figures.

12. Find the odd amongst the set of figures of a series given below.

   (1) 2 (2) 4 (3) 3 (4) 5

SPACE FOR ROUGH WORK
13. In the following questions consists of two sets of figures. Figures A, B, C and D constitute the Problem Set while figures 1, 2, 3, 4 and 5 constitute the Answer Set. There is a definite relationship between figures A and B. Establish a similar relationship between figures C and D by selecting a suitable figure from the Answer Set that would replace the question mark (?) in fig. (D).

**Problem Set**  
A B C D

**Answer Set**  
1 2 3 4

14. Find the correct mirror image of the figure (x) from the given options:

![Fig.(X)](image)

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

15. Find the correct water image of the figure (x) from the given options:

![Fig.(X)](image)

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

16. In the following question Fig.(X), is embedded in any of the four option (1), (2), (3) & (4). Find the option which contain fig.(X) as its part.

![Fig.(X)](image)

(1) (2) (3) (4)
17. In the following questions, find out which of the answer figures (1), (2), (3) and (4) completes the given figure matrix?

![Figure matrix (X)](image)

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

18. In the following problems, a square transparent sheet (X) with a pattern is given. Figure out from amongst the four alternatives as to how the pattern would appear when the transparent sheet is folded at the dotted line.

<table>
<thead>
<tr>
<th>Transparent sheet</th>
<th>Response figures</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Transparent sheet" /></td>
<td><img src="image" alt="Response figures" /></td>
</tr>
</tbody>
</table>

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

19. Which number is opposite to number 5?

![Number cube](image)

(i) 3 2 5 6
(ii) 4 1 2 5
(iii) 4 2 5 3
(iv) 5 2 6 3

(1) 6  (2) 5  (3) 1  (4) 3

SPACE FOR ROUGH WORK
20. In the following question, from amongst the figures marked (1), (2), (3) & (4), select the one which satisfies the same condition of placement of dots in the figure (X)

Fig. (X) (1) (2) (3) (4)

Direction for (Q.21 & Q.22) : Read the following information carefully to answer the questions given below it:

(i) ‘A + B’ means that A is the father of B.
(ii) ‘A – B’ means that A is the wife of B.
(iii) ‘A × B’ means that A is the brother of B.
(iv) ‘A ÷ B’ means that A is the daughter of B

21. If it is given P ÷ R + S + Q, which of the following is true?
   (1) P is the daughter of Q  (2) Q is the aunt of P
   (3) P is the aunt of Q  (4) P is the mother of Q

22. If it is given P – R + Q, which of the following statements is true?
   (1) P is the mother of Q  (2) Q is the daughter of P
   (3) P is the aunt of Q  (4) P is the sister of Q

Direction for (Q.23 to Q.25) : In each of the following questions, group the given figures into three classes using each figure only once

23. (1) 1, 6, 7; 2, 3, 4; 5, 8, 9
    (2) 1, 7, 8; 3, 5, 6; 2, 4, 9
    (3) 1, 6, 8; 3, 4, 7; 2, 5, 9
    (4) 1, 6, 9; 3, 4, 7; 2, 5, 8
Direction for (Q.26 to Q.28) :- A cube is painted red on two adjacent surfaces and black on the surfaces opposite to red surfaces and green on the remaining faces. Now the cube is cut into sixty four smaller cubes of equal size.

26. How many smaller cubes have less than three surfaces painted?
   (1) 8  (2) 24  (3) 28  (4) 48

27. How many smaller cubes with two surfaces painted have one face green and one of the adjacent faces black or red?
   (1) 8  (2) 16  (3) 24  (4) 28

28. How many smaller cubes have atleast one surface painted with green colour?
   (1) 8  (2) 24  (3) 32  (4) 56

Direction for (Q.29 & Q.30) :- In each of the following number series, a wrong number is given. Find out that wrong number.

29. 3, 2, 8, 9, 13, 22, 18, 32, 23, 42
   (1) 8  (2) 9  (3) 13  (4) 22

30. 445, 221, 109, 46, 25, 11, 4
   (1) 25  (2) 46  (3) 109  (4) 221

SPACE FOR ROUGH WORK
PART - II

SECTION-A : PHYSICS

This section contains 15 multiple choice questions. Each question has four choices (1), (2), (3) and (4) out of which ONLY ONE is correct.

31. A heavy box of 30 kg is placed on a horizontal surface. Find the normal reaction, if the acceleration due to gravity is 10 m/s².
   (1) 60 N    (2) 300 kg    (3) 300 N    (4) 30 N

32. Which of the following doesn't reduce friction?
   (1) Ball bearing   (2) Lubricant   (3) Rolling   (4) Grooving and treading

33. The given figure shows a beaker containing a solution of copper sulphate and two carbon electrodes. A battery is placed next to it. In order that the electrode E be plated with copper ____-

   ![Diagram](image)

   (1) E must be connected to H and F to G    (2) E must be connected to F and H to G
   (3) E must be connected to G and F to H    (4) E and F must be connected to G

34. Earthquakes at two places A and B were measured by a seismograph which recorded the magnitude as 2 and 4. The magnitude of tremors and the destructive energy at A and B can be compared as
   (1) Tremors at B are two times those at place A
   (2) Tremors at B are four times those at place A
   (3) Tremors at B are 100 times those at place A
   (4) Tremors at B are 1000 times those at place A

35. Which of the following statements is false in case of a comet?
   (1) They revolve around in highly elliptical orbits.
   (2) Tail of a comet is always directed away from the sun.
   (3) They are commonly known as shooting stars.
   (4) Their period of revolution round the sun is very long.
36. Choose the correct statement(s) from the following

(1) Mechanical waves need medium for their propagation

(2) Sound cannot travel through vacuum

(3) Mechanical waves transport energy from one place to another

(4) All of the above

37. Which property of convex mirror makes them ideal to be used as rear-view mirrors?

(1) They form real images and cover a wide area.

(2) They form real, erect & diminished images.

(3) They form diminished & erect images and cover a wide area.

(4) They form magnified & erect images and cover a small area.

38. A coin is dipped in the molten wax in a glass tube. When we heat the upper part of the glass tube, the wax around the coin will not melt because

(1) Wax has a very high melting point

(2) Wax is a good conductor of heat

(3) Glass is a good conductor of heat

(4) Wax and glass are bad conductors of heat

39. Low atmospheric pressure exists on the earth in which of the following latitudes?

(1) At the equator only

(2) At 30° N and S

(3) At the poles

(4) At the equator and at 60° N and S

40. Different size bags are required to pack separately one kilogram each of cotton, potatoes and iron chunks. Which property of matter explains this?

(1) Temperature  (2) Density  (3) Mass  (4) Pressure

SPACE FOR ROUGH WORK
41. The ultrasonic waves take 4 seconds to travel from the ship to the bottom of the sea and back to the ship (in
the form of an echo). What is the depth of the sea? (Speed of sound in water = 1500 m/s.)
(1) 3000 m (2) 2000 m (3) 1000 m (4) 500 m

42. Two mirrors are arranged as shown in the figure. Light is incident on the first mirror at an angle of 35°. The
light reflects towards a second mirror. What will be the angle ‘θ’?

43. Which of the following statement is NOT true?
(1) Lightning and spark from woolen clothing are essentially the same phenomena
(2) When you rub a plastic scale on your dry hair, it acquires a charge
(3) Charge acquired by a glass rod when it is rubbed with silk is called as negative charge
(4) Static charges are called so, because they do not move by themselves

44. Read the given statements and mark the correct option.
Statement 1: A person seated in a moving train is at rest with respect to another train moving in the opposite
direction.
Statement 2: If the train covers equal displacement in equal intervals of time then it moves with uniform
acceleration.
(1) Both statements 1 and 2 are true and statement 2 is the correct explanation of statement 1.
(2) Both statements 1 and 2 are true but statement 2 is not the correct explanation of statement 1.
(3) Statement 1 is true but statement 2 is false.
(4) Both statements 1 and 2 are false.

45. A copper disc has a circular hole drilled in it so that it can act as a washer for a nut and bolt. If this washer
is heated equally all over, which of the given options will be true?

<table>
<thead>
<tr>
<th>Circumference of inner hole</th>
<th>Circumference of washer</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Remains constant</td>
<td>Increases</td>
</tr>
<tr>
<td>(2) Decreases</td>
<td>Increases</td>
</tr>
<tr>
<td>(3) Increases</td>
<td>Decreases</td>
</tr>
<tr>
<td>(4) Increases</td>
<td>Increases</td>
</tr>
</tbody>
</table>

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SPACE FOR ROUGH WORK
46. Tina sets up apparatus for an experiment as shown in the figure. She performed the same experiment by changing threads (a, b and c). She found that weight required to break the thread is in the order \( x > y > z \), where \( x = \) weight required to break \( a \), \( y = \) weight required to break \( b \) \( z = \) weight required to break \( c \). \( a \), \( b \) and \( c \) can be ________

![Thread and Weight Diagram]

- (1) Nylon Wool Cotton
- (2) Nylon Cotton Wool
- (3) Wool Cotton Nylon
- (4) Cotton Nylon Wool

47. Minamata disease first occurred in

- (1) Japan
- (2) Russia
- (3) China
- (4) Korea

48. Potable water is the one that is

- (1) Kept in a pot
- (2) Fit to drink
- (3) Not fit to drink
- (4) Used only in laboratory
49. What are X, Y and Z?

<table>
<thead>
<tr>
<th></th>
<th>X</th>
<th>Y</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Water</td>
<td>Oil</td>
<td>Gas</td>
</tr>
<tr>
<td>2</td>
<td>Oil</td>
<td>Water</td>
<td>Gas</td>
</tr>
<tr>
<td>3</td>
<td>Water</td>
<td>Gas</td>
<td>Oil</td>
</tr>
<tr>
<td>4</td>
<td>Gas</td>
<td>Oil</td>
<td>Water</td>
</tr>
</tbody>
</table>

50. The silk produced in Brahmaputra valley is called

(1) Muga silk  (2) Wild silk  
(3) Sheer silk  (4) Both (1) and (2)

51. Which is NOT a semimetal?

(1) nitrogen  (2) silicon  
(3) boron  (4) germanium

52. Petroleum, a crude oil, is a complex mixture of substances. It is refined by the process called

(1) Decomposition  (2) Evaporation  
(3) Fractional distillation  (4) Sublimation

53. Sudha took a small amount of sulphur in deflagrating spoon and heated it over a burner. As soon as it started burning she put it in a gas jar and covered with a lid. After sulphur stopped burning she added a small amount of water in it and dissolved the gas in water by shaking it. She then tested the solution with red and blue litmus paper. What did she observe?

(1) In the solution the blue litmus paper turned red.  
(2) In the solution the red litmus paper turned blue.  
(3) There was no change in the colour of litmus paper.  
(4) Blue litmus paper turned red and red litmus paper turned blue.
54. Ramesh mixed some iron filings with sulphur powder in a China dish. In another dish he mixed iron filings and sulphur powder and heated the mixture. Which of his observations is not correct?

(1) Dish X shows a physical change while dish Y shows a chemical change.
(2) In dish X sulphur powder and iron filings can be seen separately.
(3) In dish Y a new substance is formed on heating the mixture.
(4) The change which has taken place in dish Y is reversible.

55. The given diagrams show the reactions of three metals with dilute hydrochloric acid. What are metals P, Q and R?

<table>
<thead>
<tr>
<th>P</th>
<th>Q</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Copper</td>
<td>Magnesium</td>
<td>Zinc</td>
</tr>
<tr>
<td>(2) Copper</td>
<td>Zinc</td>
<td>Magnesium</td>
</tr>
<tr>
<td>(3) Magnesium</td>
<td>Zinc</td>
<td>Copper</td>
</tr>
<tr>
<td>(4) Zinc</td>
<td>Magnesium</td>
<td>Copper</td>
</tr>
</tbody>
</table>

**SPACE FOR ROUGH WORK**
56. The ratio of hydrogen and oxygen in water, by volume
   (1) 2 : 1  (2) 1 : 2  (3) 2 : 2  (4) 1 : 1

57. The example of detergent is:
   (1) Lauryl alcohol
   (2) Lauryl sulphuric acid
   (3) Sodium stearate
   (4) Sodium lauryl sulphate.

58. Stagnant water in blocked drains is:
   (1) a good place for breeding flies and mosquitoes
   (2) very good for agricultural purposes
   (3) used to generate electricity
   (4) all the above

59. Bending a copper wire is an example of what property?
   (1) Chemical  (2) Elements  (3) Conservation  (4) Physical

60. When you introduce a glass plate into the luminous zone of a candle flame for a few seconds, the observation is as shown in figure (b). What does the observation indicate?

   (1) Deposition of burnt CO₂ particles present in the air around the flame.
   (2) Deposition of unburnt carbon particles in the luminous zone of the flame.
   (3) Deposition of molten wax.
   (4) All of these.
SECTION-C : BIOLOGY

This section contains **20 multiple choice questions**. Each question has four choices (1), (2), (3) and (4) out of which **ONLY ONE** is correct.

61. Which is not a pathway by which plants obtain atmospheric nitrogen?
   (1) Chemical fertilizers   (2) Lightening
   (3) Photosynthesis         (4) Symbiotic bacteria

62. Where does fertilization take place in the below diagram?

![Diagram]

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

63. Which diagram below illustrates fertilization that would lead to development of a normal human female?

(1) ![Diagram 1]  (2) ![Diagram 2]
(3) ![Diagram 3]  (4) ![Diagram 4]

64. Which letter in the diagram below indicates the structure that is most closely associated with protein building?

![Diagram]

(1) A  (2) B  (3) C  (4) D
65. What characteristic of the plasma membrane is illustrated in this drawing?

(1) selective permeability (2) phospholipid bilayer
(3) fluid mosaic construction (4) impermeability to water

66. Humus is present in

(1) A-horizon (2) B-horizon (3) C-horizon (4) Bed rock

67. Use the diagram below to answer the question that follows.

Identify the structure labeled C?

(1) Amnion (2) Yolk sac (3) Allantois (4) Umbilical cord

68. Heat of damp grain in storage occurs due to

(1) Infestation by insects (2) Decrease in atmospheric pressure
(3) Decrease in humidity (4) High moisture content and growth of moulds
69. An environmental toxin is discovered that interferes with certain cellular functions. When affected cells are examined, it is observed that proteins that are normally found on the plasma membrane are instead found in the cytoplasm. Other proteins are also located improperly. Which structure is most likely affected by the toxin?

(1) Lysosomes  (2) Mitochondria  (3) Cell wall  (4) Golgi apparatus

70. Identify the process that is taking place in the illustration below.

(1) Endospore formation  (2) Conjugation  (3) Chemosynthesis  (4) Binary fission

71. Growing two or more crops in the same land without any definite pattern is called:

(1) intra cropping  (2) inter cropping  (3) mixed cropping  (4) ultra cropping

72. Which of the following is true for intercropping?

(1) Seeds of two crops are mixed before sowing
(2) Harvesting and threshing are not possible separately
(3) Pesticides can be easily applied to individual crops
(4) There are no set pattern of rows of crops

73. A carnivore with stripes on its body moves very fast while catching its prey. It is likely to be found in

(1) Polar regions  (2) Deserts  (3) Oceans  (4) Tropical rainforests

74. An embryo of a seed consists of

(1) plumule  (2) radicle, plumule and cotyledons
(3) plumule and radicle  (4) radicle and cotyledons
75. In the cycle shown below, which processes are represented by letters A and B?

(1) A—excretion, B—respiration  (2) A—transpiration, B—excretion
(3) A—photosynthesis, B—transpiration  (4) A—respiration, B—photosynthesis

76. Which is taking place in this diagram?

(1) Inhalation; the diaphragm is contracting.  (2) Exhalation; the diaphragm is relaxing.
(3) Inhalation; the chest cavity is reduced.  (4) Exhalation; the rib cage is expanding.

77. Use the diagram to answer the question.

Name and describe the importance of the structure labeled A.

(1) stigma; where pollination occurs  (2) anther; where pollen grains form
(3) pistil; where fertilization takes place  (4) anther; where ovaries are found
78. Match column I with column II and select the correct option from the codes given below.

<table>
<thead>
<tr>
<th>Column I</th>
<th>Column II</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Endemic species</td>
<td>(i) species that exist in very small number</td>
</tr>
<tr>
<td>(b) Endangered species</td>
<td>(ii) species found exclusively in a particular area</td>
</tr>
<tr>
<td>(c) Vulnerable species</td>
<td>(iii) species that are likely to become endangered</td>
</tr>
<tr>
<td>(d) Rare species</td>
<td>(iv) species that are likely to get extinct in the near future</td>
</tr>
</tbody>
</table>

(1) a-(ii), b-(iii), c-(i), d-(iv)  (2) a-(iv), b-(ii), c-(iii), d-(i)
(3) a-(iii), b-(i), c-(ii), d-(iv)  (4) a-(ii), b-(iv), c-(iii), d-(i)

79. In the diagram shown below, where does peristalsis occur?

(1) A and D  (2) C and F  (3) C and E  (4) E and F

80. Two arteries and two veins are labeled in the diagram above. Which two are veins?

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

SPACE FOR ROUGH WORK
SECTION-D: MATHEMATICS

This section contains 20 multiple choice questions. Each question has four choices (1), (2), (3) and (4) out of which ONLY ONE is correct.

81. Find the area of square ABCD.

82. Which system of equations has exactly ONE point of intersection?
   (1) \( y = -x -20, \) \( y = x + 7 \)
   (2) \( y = 3x -1.5, \) \( y = 3x + 10 \)
   (3) \( y = \frac{1}{2}x - 2, \) \( y = 0.5x + 4 \)
   (4) \( y = -x + 5, \) \( y = -x + 3 \)

83. The formula used for converting the temperature from degrees Fahrenheit (F) to degrees Celsius is \( ^\circ C = \frac{5}{9}(^\circ F - 32). \) If the outside temperature in Dalton is 80°F, what is the approximate temperature in degrees Celsius?
   (1) 176°C
   (2) 140°C
   (3) 41°C
   (4) 27°C

84. On a regulation softball field, the distance from home plate to second base is 60\( \sqrt{2} \) feet. Coach LaSota has four players stand in the field as shown in the diagram. What is the distance from one player to another?
   (1) 16.4 feet
   (2) 15\( \sqrt{2} \) feet
   (3) 21 feet
   (4) 20\( \sqrt{2} \) feet

SPACE FOR ROUGH WORK
85. Triangle ABC has the following side lengths AB = 10 centimeters, AC = 12 centimeters, and BC = 8 centimeters. Line DE is parallel to side BC, and the length of AD is 4 centimeters. What is the length of AE?

![Diagram](image)

(1) 3.3 cm (2) 4.8 cm (3) 6 cm (4) 8 cm

86. In the figure below, lines u and v are parallel. If the measure of angle 1 is 50°, what is the measure of angle 8?

![Diagram](image)

(1) 25° (2) 45° (3) 50° (4) 130°

87. Ms. Collier showed her class the pattern of equilateral triangles below.

![Pattern](image)

The table shows the data that the students were asked to find.

<table>
<thead>
<tr>
<th>Number of Triangles</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outer Perimeter (units)</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>p</td>
</tr>
</tbody>
</table>

Which of the following is a function rule for the sequence shown in the table?

(1) \( p = 2n \) (2) \( p = 3n + 1 \) (3) \( p = 3n - 1 \) (4) \( p = n + 2 \)
88. The following tree diagram shows several routes for traveling from Atlanta to Valdosta. According to the tree diagram, how many different routes are possible?

![Tree Diagram]

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

89. Half the population of Tifton decreased by 30 is equal to 7,500. Which equation models this situation?

(1) \( \frac{1}{2} p + 30 = 7,500 \)  (2) \( \frac{1}{2} p - 30 = 7,500 \)  (3) \( \frac{1}{2} p - 7,500 = 30 \)  (4) \( \frac{1}{2} p + 7,500 = 30 \)

90. The eighth graders have collected 83 canned goods so far in a food drive. Their goal is to collect MORE THAN 125 cans altogether. What is the least number of cans they still need to collect to meet this goal?

(1) 41  (2) 42  (3) 43  (4) 44

91. In the sixth grade, Craig was 54 inches tall. In the seventh grade, he was 57 inches tall, and now in the eighth grade, he is 61 inches tall. How many inches has Craig grown since sixth grade?

(1) 5 in.  (2) 6 in.  (3) 7 in.  (4) 8 in.

92. Bonita built a wooden frame shaped like an isosceles right triangle. The legs of the frame are 5 feet long. Which is the best estimate for the length of the hypotenuse?

(1) 5 ft  (2) 6 ft  (3) 7 ft  (4) 8 ft

93. If \( a = \frac{\sqrt{5} + 1}{\sqrt{5} - 1} \) and \( b = \frac{\sqrt{5} - 1}{\sqrt{5} + 1} \), then the value of \( \frac{a^2 + ab + b^2}{a^2 - ab + b^2} \) is:

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

94. Find the missing term in the following problem \( \left( \frac{3x}{4} - \frac{4y}{3} \right)^2 = \frac{9x^2}{16} + \frac{16y^2}{9} \)

(1) 2xy  (2) \(-2xy\)  (3) 12 xy  (4) \(-12 xy \)
95. If the mean of a, b, c is M and \(ab + bc + ca = 0\), then the mean of \(a^2, b^2, c^2\) is :

(1) \(M^2\)  
(2) \(3M^2\)  
(3) \(6M^2\)  
(4) \(9M^2\)

96. In a right angled triangle, if the square of the hypotenuse is twice the product of the other two sides, then one of the angles of the triangle is :-

(1) 15°  
(2) 30°  
(3) 45°  
(4) 60°

97. In fig, D and E are the mid-points of the sides AC and BC respectively of \(\Delta ABC\). If \(\text{ar}(\Delta BED) = 12\ cm^2\), then \(\text{ar}(\Delta BED) =\)

(1) \(36\ cm^2\)  
(2) \(48\ cm^2\)  
(3) \(24\ cm^2\)  
(4) None of these

98. In fig, O is the centre of the circle. PQ is tangent to the circle and secant PAB passes through the centre O. If PQ = 5 cm and PA = 1 cm, then the radius of the circle is

(1) 8 cm  
(2) 12 cm  
(3) 10 cm  
(4) 6 cm

99. The monthly income of two persons are in the ratio 4 : 7, and their expenses are in the ratio 11 : 20. If each of them saves Rs. 400 per month, then their monthly income must be respectively:

(1) Rs. 3600, Rs. 4200  
(2) Rs. 4000, Rs. 7000  
(3) Rs. 4200, Rs. 7350  
(4) Rs. 4800, Rs. 8400

100. If \(x * y = x + y + \sqrt{xy}\), the value of \(6 * 24\) is

(1) 41  
(2) 42  
(3) 43  
(4) 44