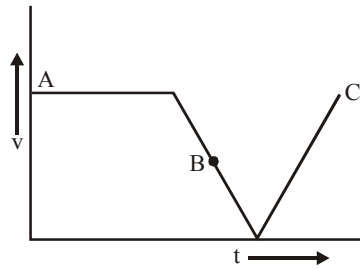


SECTION - A : PHYSICS

This section contains **15 Multiple Choice Questions**. Each question has four choices (1), (2), (3) and (4) out of which **ONLY ONE** is correct.

- A string of guitar vibrates with a time period of 3 seconds, then the sound produced by it is :
 (1) Supersonic (2) Ultrasonic (3) Audible (4) Infrasonic
- Which of the following statement is incorrect regarding refraction?
 (1) Frequency of light does not change
 (2) When light ray goes from Rarer to Denser medium it shifts towards the normal
 (3) When light ray travels from Denser to Rarer medium it shifts towards the normal
 (4) Wavelength of light changes
- Average velocity of a particle moving in a straight line with constant acceleration a and initial velocity u in first ' t ' seconds is
 (1) $u + \frac{1}{2}at$ (2) $u + at$ (3) $\frac{u + at}{2}$ (4) $\frac{u}{2}$
- The focal length of a concave mirror is 30 cm. The position of the object in front of the mirror so that the erect image is three times the size of the object is _____.
 (1) -10 cm (2) -20 cm (3) -30 cm (4) -15 cm
- Velocity-time graph of a body is shown below. It explains that



- at B force is zero (2) at B there is a force but towards motion
 (3) at B there is a force which opposes motion (4) none of the above
- Identify the value of persistence of vision.
 (1) $1/10^{\text{th}}$ of a second (2) $1/12^{\text{th}}$ of a second
 (3) $1/16^{\text{th}}$ of a second (4) $1/20^{\text{th}}$ of a second
- Refractive index of medium A with respect to medium B is $3/2$ and Refractive index of medium B with respect to medium C is $4/5$. The refractive index of medium C with respect to medium A is:
 (1) $5/6$ (2) $3/5$ (3) $1/2$ (4) Cannot be determined
- An object 25 cm high is placed in front of a convex lens of focal length 30 cm. If the height of real image formed is 50 cm. Find the distance between the object and image ?
 (1) + 45 cm (2) - 45 cm (3) - 90 cm (4) 135 cm
- A bomb of mass 20 kg at rest explodes in air into two pieces of masses 4 kg and 16 kg. The velocity of the 16 kg mass is 4 m/sec then the kinetic energy of other mass is
 (1) 500 J (2) 511 J (3) 512 J (4) 545 J
- An object of size 7 cm is placed at 27 cm in front of a concave mirror of focal length 18 cm. At what distance from the mirror should a screen be placed so that a sharp focused image can be obtained?
 (1) 54 cm (2) - 54 cm (3) +10.8 cm (4) -10.8 cm

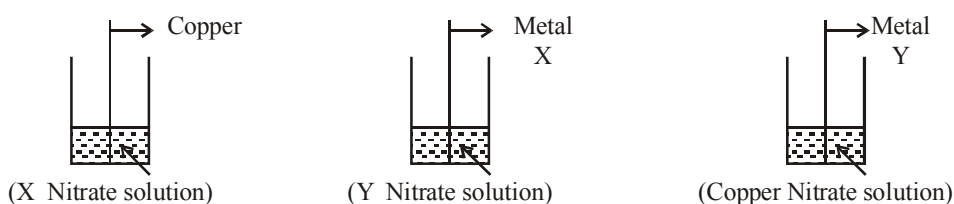
11. Given g = acceleration due to gravity and G = universal gravitational constant. Then the unit of the quantity $\left(\frac{G}{g}\right)$ is :
- (1) kg m^{-2} (2) $\text{m}^2 \text{kg}^{-1}$ (3) kg m^{-1} (4) kg m^2
12. Bullets of 0.03 kg mass each hit a plate at the rate of 200 bullets per second, with a velocity of 50 m/s and reflect back with a velocity of 30 m/s. The average force acting on the plate is
- (1) 120 N (2) 180 N (3) 300 N (4) 480 N
13. An object is placed at 20 cm from a convex mirror of focal length 10 cm. The image formed by the mirror is
- (1) Real and at 20 cm from the mirror
 (2) Virtual and at 20 cm from the mirror
 (3) Virtual and at $20/3$ cm from the mirror
 (4) Real and at $20/3$ cm from the mirror
14. The refractive index of water is $4/3$ and the other medium is $3/5$. The refractive index of water with respect to the other medium is
- (1) $\frac{20}{9}$ (2) $\frac{4}{5}$ (3) $\frac{5}{4}$ (4) $\frac{3}{5}$
15. The magnitude of the momentum of a body is numerically equal to the K.E. of the body. Then the speed of the body is:
- (1) $\frac{1}{\sqrt{2}}$ units (2) 2 units (3) $\frac{1}{\sqrt{3}}$ units (4) $\sqrt{3}$ units

SECTION-B : CHEMISTRY

This section contains **15 Multiple Choice Questions**. Each question has four choices (1), (2), (3) and (4) out of which **ONLY ONE** is correct.

16. When 25.2 g of Sodium bicarbonate is heated, we will get 5.3 g of Sodium carbonate, 2.2 g of Carbon dioxide and 0.9 g of water along with some amount of undecomposed Sodium bicarbonate. The mass of Sodium bicarbonate left undecomposed is :
- (1) 8.4 g (2) 4.2 g
 (3) 16.8 g (4) Cannot be predicted
17. Which of the following pairs have identical values of e/m ?
- (1) A proton and a neutron (2) A deuterium and an α -particle
 (3) An electron and γ -rays (4) A proton and a deuterium.
18. Which of the following correctly represents 360g of water ?
- (I) 2 moles of H_2O
 (II) 20 moles of water
 (III) 6.022×10^{23} molecules of water
 (IV) 1.2044×10^{25} molecules of water
- (1) I (2) I & IV (3) II & III (4) II & IV

19. Acetic acid was added to a solid X kept in a test tube. A colourless and odourless gas was evolved. The gas was passed through lime water which turned milky. It was concluded that
- (1) solid X is sodium hydroxide and the gas evolved is CO_2
 - (2) solid X is sodium bicarbonate and the gas evolved is CO_2
 - (3) solid X is sodium acetate and the gas evolved is CO_2
 - (4) solid X is sodium chloride and the gas evolved is CO_2
20. The mole of oxygen atoms present in 2 moles of a compound, which consists of a bivalent metal and a chlorate ion is
- (1) 4 mole
 - (2) 6 mole
 - (3) 8 mole
 - (4) 12 mole
21. Copper pyrites are concentrated by
- (1) Electromagnetic method
 - (2) Gravity method
 - (3) Froth floatation process
 - (4) All the above methods
22. The acid which is most widely used as food preservative is
- (1) Tartaric acid
 - (2) Benzoic acid
 - (3) Citric acid
 - (4) Oxalic acid
23. Following setup was arranged by Reema to find the reactivity of metals.

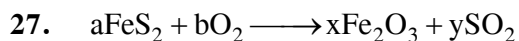


The observation are as follows:

- (a) Clean copper metal did not react with 1M solution of X Nitrate.
- (b) Clean Metal X dissolved in 1M solution of Y Nitrate and Metal Y was deposited.
- (c) Clean Metal Y did not react with 1M copper Nitrate solution.

Metal X and Y could be respectively

- (1) Gold and aluminium
 - (2) Zinc and iron
 - (3) Lead and silver
 - (4) Gold and silver
24. The number of electrons present in α -particle is
- (1) 2
 - (2) 1
 - (3) 3
 - (4) 0
25. How many electrons are present in third energy level of an element with $Z = 17$?
- (1) 7
 - (2) 8
 - (3) 5
 - (4) 10
26. The compound that has both ionic bond and covalent bond is
- (1) Boric acid (H_3BO_3)
 - (2) Sodium chloride (NaCl)
 - (3) Ethyl alcohol ($\text{C}_2\text{H}_5\text{OH}$)
 - (4) Ammonium chloride (NH_4Cl)



The above equation balances when

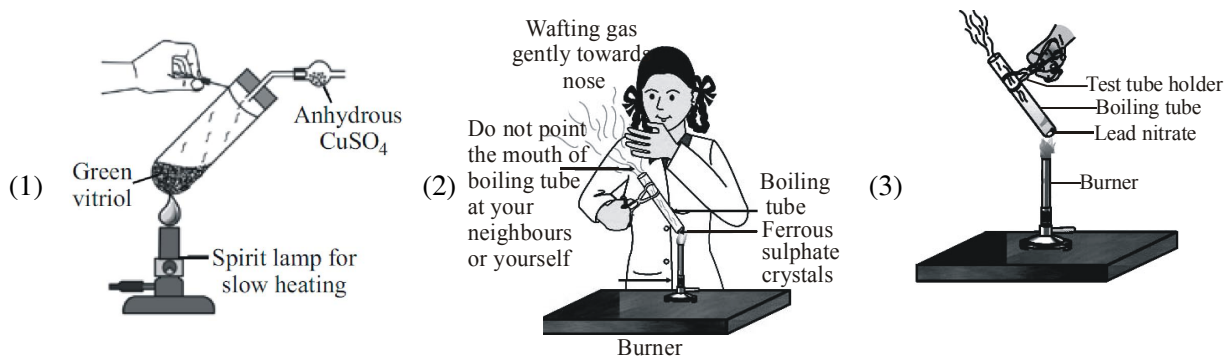
(1) $a = 4, b = 11, x = 2, y = 8$

(2) $a = 11, b = 4, x = 8, y = 2$

(3) $a = 2, b = 4, x = 8, y = 2$

(4) $a = 4, b = 11, x = 8, y = 2$

28. Shikha conducted following experiments



Which of the given observation is incorrect?

(I) Colour of CuSO_4 changes from white to blue in experiment (1)

(II) In experiment (2), yellow residue is left behind while in experiment (3) reddish brown solid is left behind.

(III) The colourless vapour evolved in experiment (1) extinguishes the glowing splint.

(IV) Colour of green vitriol change from green to blue in experiment (1).

(V) White residue is left behind in test tube in experiment (3)

(1) I, III, IV

(2) II, III, V

(3) II, III, IV

(4) II, IV, V

29. An element X reacts with dilute H_2SO_4 as well as with NaOH to produce salt and $\text{H}_2(\text{g})$. Hence, it may be concluded that :

(I) X is an electropositive element

(II) Oxide of X is basic in nature

(III) Oxide of X is acidic in nature

(IV) X is an electronegative element

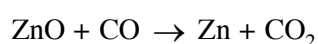
(1) I, II, III

(2) IV, I, II

(3) III, IV, I

(4) II, III, IV

30. Which of the statements given below for the reaction is correct ?



(1) ZnO is being oxidised

(2) CO is being reduced

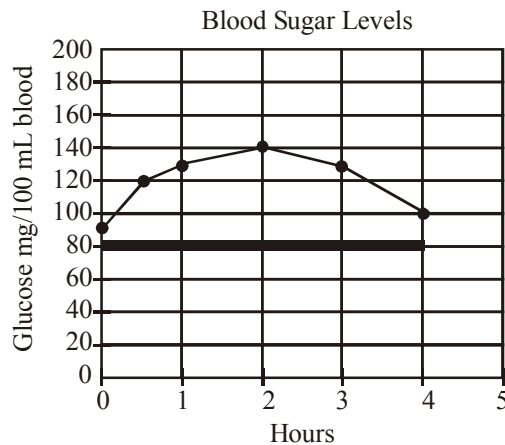
(3) CO_2 is being oxidised

(4) ZnO is being reduced

SECTION-C : BIOLOGY

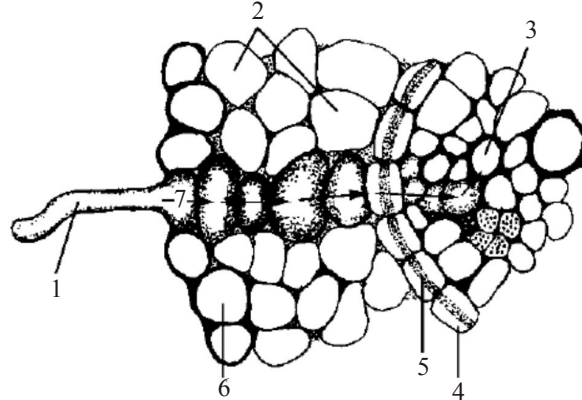
This section contains **15 Multiple Choice Questions**. Each question has four choices (1), (2), (3) and (4) out of which **ONLY ONE** is correct.

31. An hour after Priya ate breakfast, her body began to break down the food into glucose, fatty acids, and amino acids. These nutrients were then absorbed into her bloodstream. The graph below shows a normal, gradual rise in blood sugar after a meal and then a gradual return to a concentration of about 100 milligrams (mg) of glucose per 100 mL of blood. If by five hours after eating, Priya's blood sugar has not returned to normal, what might be the problem?



- (1) Priya's liver might not be producing enough glycogen.
 (2) Priya's gall bladder might not be producing enough bile.
 (3) Priya's pancreas might not be producing enough insulin.
 (4) Priya's stomach might not be producing enough hydrochloric acid.
32. The diseases that spread by contact with infected persons are
- (1) Diphtheria and Taeniasis
 (2) Tetanus and food poisoning
 (3) Bubonic plague and malaria
 (4) Small pox and syphilis
33. The excretory organ of *Pila* is
- (1) Organ of Bojanus
 (2) Flame cells
 (3) Nephron
 (4) Malpighian tubules

34. The drawing shows cross - section of a plant root. The lines (1-6) indicate parts and the arrow (7) indicates a pathway in the root. Which of the following options provide a correct explanation of the drawing?



- (1) 1 – trichome, 2 – cortex, 3 – phloem, 4 – pericycle, 5 – endodermis, 6 – epidermis, 7– pathway of water and sugars
 (2) 1 - root hair, 2 – cortex, 3 – xylem, 4 – endodermis, 5 – Casparian strip, 6 - epidermis, 7 – pathway of water and minerals
 (3) 1 - root hair, 2 – cortex, 3 – xylem, 4 – Casparian strip, 5 -pericycle, 6 – epidermis, 7 – pathway of water and minerals
 (4) 1 – root hair, 2 – endodermis, 3 – xylem, 4 – epidermis, 5 – Casparian strip, 6 - periderm, 7 – pathway of water and minerals
35. Which of the following statements correctly explains why a plant becomes bushier when the tip of its shoot is removed?
- (1) The removal of the plant tip also removes the auxin that is suppressing lateral buds from developing
 (2) Due to excessive production of abscisic acid at shoot tip
 (3) Due to excessive transfer of chloroplast from shoot tip to branches
 (4) None of the above
36. CFCs cause
- (1) depletion of ozone layer (2) depletion of CO₂
 (3) acid rain (4) carbon monoxide poisoning
37. Which of the following belongs with the group below?
- GILLS, SHELL, FOOT
- (1) Thorax (2) Abdomen (3) Mantle (4) Tentacles
38. Diastole in a cardiac cycle marks
- (1) The relaxation period after contraction of the heart
 (2) The forceful pumping action of the heart.
 (3) The contraction period after relaxation of heart.
 (4) The number of heart beats per minute.
39. During hibernation, the frog respire by
- (1) lungs only (2) partly by lungs and partly by skin
 (3) both skin and lungs (4) skin only

40. Vicky had her blood examined and the doctor diagnosed the ailment as malaria. Which micro-organism must have been detected in the blood sample of Vicky?
 (1) Virus (2) Bacteria (3) Protozoa (4) Mosquito
41. The kidneys function to filter the blood to produce urine for excretion. This process occurs in millions of tiny structures called nephrons within the kidney. The substance exiting the blood and entering the nephron is called filtrate (F). This filtrate is modified by the nephron via two mechanisms; secretion (S) of substances into and reabsorption (R) of substances out of the filtrate. The final product is excreted (E). Which equation correctly summarises this process?
 (1) $F - (R \times S) = E$ (2) $F - (R + S) = E$
 (3) $F + R + S = E$ (4) $F - R + S = E$
42. If the level of CO_2 in blood keeps on increasing breathing will become
 (1) Slow and shallow (2) Irregular (3) Deep and slow (4) Deep and fast
43. Pancreatic juice contains enzymes which digest
 (1) proteins and carbohydrates only (2) proteins and fats only
 (3) fats and carbohydrates only (4) proteins, fats and carbohydrates
44. Osmoregulatory structure present in Annelids is
 (1) Flame cell (2) Nephridia (3) Kidney (4) Nephron
45. In photosynthesis ATP produced in _____ is utilized in dark reaction for formation of _____ respectively.
 (1) Light reaction, carbohydrate (2) Dark reaction, carbohydrate
 (3) Dark reaction, enzymes (4) None of these

SECTION-D : MATHEMATICS

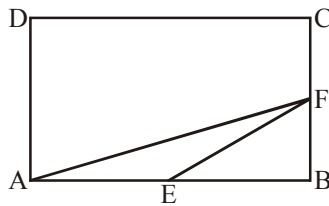
This section contains **15 Multiple Choice Questions**. Each question has four choices (1), (2), (3) and (4) out of which **ONLY ONE** is correct.

46. The sum of digits of a two-digit number is 7 and the ten's place digit is 25% less than the unit's place digit. What is the number?
 (1) 25 (2) 43 (3) 16 (4) 34
47. If p and q are positive integers and (p - q) is an even number, then $(p^2 - q^2)$ will always be divisible by
 (1) 4 (2) 6 (3) 12 (4) 8
48. In the given figure, AC = 10 m, BD = 15 m, AD = 22 m. Find BC.

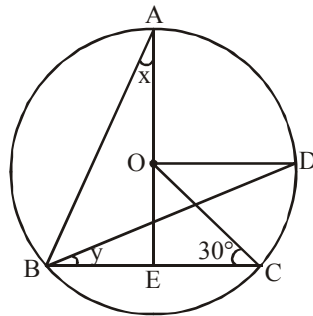


- (1) 1 m (2) 2 m (3) 3 m (4) 4 m
49. An angle 12° more than twice of its complementary angle, then angle is
 (1) 36° (2) 64° (3) 48° (4) 32°

50. In the figure, ABCD is a rectangle, E is the midpoint of AB, F is the midpoint of BC. What is the ratio of the area of the rectangle ABCD and the area of the triangle AEF?

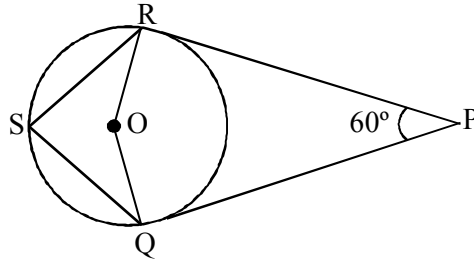


- (1) 4 : 1 (2) 8 : 1 (3) 16 : 1 (4) 5 : 2
51. If α, β are the zeros of polynomial $p(x) = x^2 + 2x - 3$, then $\frac{1}{\alpha} - \frac{1}{\beta} = ?$
- (1) $\frac{4}{3}$ (2) $-\frac{4}{3}$ (3) $\pm\frac{4}{3}$ (4) None of these
52. If $\sec\theta = \frac{5}{4}$, then the value of $E = \frac{\sin\theta - 2\cos\theta}{\tan\theta - \cot\theta}$ is
- (1) $\frac{7}{5}$ (2) $\frac{12}{7}$ (3) $\frac{7}{12}$ (4) $\frac{5}{7}$
53. In the given figure, O is the centre of the circle, $\angle BCO = 30^\circ$, $\angle AEB = 90^\circ$ and $OD \parallel BC$. Find x.



- (1) 15° (2) 30° (3) 45° (4) None of these
54. An integer from 10 to 99 (both inclusive) is randomly chosen so that each such integer is equally likely to be chosen. The probability that atleast one digit of the chosen integer is 6 is
- (1) $\frac{1}{5}$ (2) $\frac{1}{10}$ (3) $\frac{1}{9}$ (4) $\frac{19}{90}$
55. The ratio of the area of a square to that of the square drawn on its diagonal is
- (1) 1 : 1 (2) 1 : 2 (3) 1 : 3 (4) 1 : 4
56. If the radii of two cylinders are in the ratio 2:3 and their heights are in the ratio 3 : 4. The ratio of their volumes is
- (1) 2 : 1 (2) 3 : 1 (3) 1 : 3 (4) 1 : 2
57. If $x^3 + ax^2 + bx - 6$ has a factor $x^2 + 3$, then $a + b$ is
- (1) 1 (2) -1 (3) 2 (4) -2
58. If $\sec\theta + \tan\theta = p$ then $\operatorname{cosec}\theta$ is equal to
- (1) $\frac{p^2 - 1}{p^2 + 1}$ (2) $\frac{p^2 + 1}{p^2 - 1}$ (3) $\frac{p}{p^2 + 1}$ (4) $\frac{p^2 + 1}{p}$
59. If the difference between mean and mode is 63, the difference between mean and median is
- (1) 189 (2) 21 (3) 31.5 (4) 48.5

60. In figure, PR and PQ are tangents, $\angle QOR$ is equal to



- (1) 140° (2) 120° (3) 180° (4) 170°

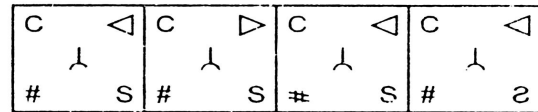
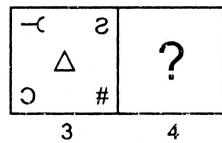
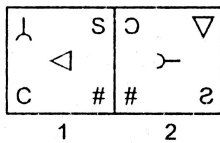
SECTION-E : MENTAL ABILITY

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. The second figure in the first part of the problem figures bears a certain relationship to the first figure. Similarly one of the figures in answers figures bears the same relationship to the first figures in the second part. You have to select the figure from the set of answer figures which would replace the sign of questions mark (?).

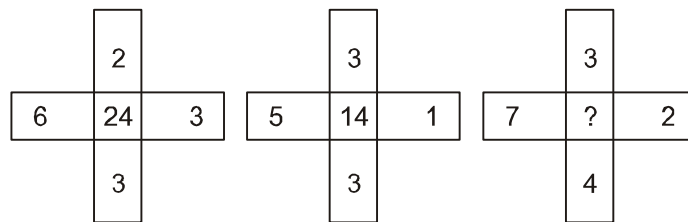
Problem Figures

Answer Figures



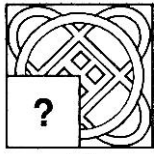
62. How many times do the hands of a clock make an angle of 90° in 36 hours ?
 (1) 11 (2) 66 (3) 22 (4) 44
63. If G means 'add to', H means 'multiply by', I means 'Subtract from' and J means 'divide by', then
 $60 J 4 G 6 H 12 I 10 = ?$
 (1) 78 (2) 88 (3) 77 (4) 103
64. Some girls are sitting in a line. Meenakshi is on 17th place from left and Sonakshi is on 18th place from right. Meenakshi is to the left of Sonakshi. There are 8 girls in between them. How many girls are there in the line?
 (1) 43 (2) 42 (3) 41 (4) 44
65. At what time, between 7 and 8 o'clock, the hands of the clock overlap?
 (1) 7:40 (2) $7:35\frac{3}{11}$ (3) $7:38\frac{2}{11}$ (4) $7:33\frac{5}{11}$

71. Pointing to a woman, Jitendra said, "She is the daughter of my grandfather's only daughter". How is Jitendra related to the woman ?
 (1) Son (2) Cousin (3) Uncle (4) None of these
72. If the first day of a leap year is Monday, then what day will be on the last day of that year ?
 (1) Wednesday (2) Tuesday (3) Thursday (4) Sunday
73. **Direction : Study the following information carefully to answer the question.**
 Eight friends P, Q, R, S, T, U, V and W are sitting around a circle facing the centre. V is third to the right of Q and is second to the left of R. Q is second to the left of T and on the immediate right of S. U is between Q and T. P is not on the left of R.
 Who is on the immediate left of S ?
 (1) Q (2) P (3) U (4) V
74. A cuboid of dimensions (7 cm × 3 cm × 1 cm) is painted black on both the surfaces of dimensions (3 cm × 1 cm), green on the surfaces of dimensions (7 cm × 3 cm) and red on the surfaces of dimensions (7 cm × 1 cm). Now the block is divided into various smaller cubes of side 1 cm each. The smaller cubes so obtained are separated.
 How many cubes will be formed?
 (1) 6 (2) 12 (3) 16 (4) 21
75. A person moves towards north a distance of 20 m from a point P and reaches at Q. He turns 135° in clockwise direction and goes $40\sqrt{2}$ m. From here he turns 135° clockwise and goes 25 m. How far did he from initial point :
 (1) 25 m (2) 20 m (3) 15 m (4) 30 m
76. What should come in the place of question mark.



- (1) 26 (2) 28 (3) 0 (4) 19
77. If the word 'PORTER' can be coded as 'MBNZQN', how can 'REPORT' be written ?
 (1) NQMNBZ (2) NQMBNZ (3) NBQMNZ (4) NQBMNZ
78. **Direction : Read the information given below and answer the question.**
 (i) A, B, C, D, E and F are six students in a class.
 (ii) B and C are shorter than F but heavier than A.
 (iii) D is heavier than B and taller than C.
 (iv) E is shorter than D but taller than F.
 (v) F is heavier than D.
 (vi) A is shorter than E but taller than F.
 Which of the following statements is true for F as regards to height and weight :
 (1) He is lighter than E and taller than E
 (2) He is heavier than B and taller than E
 (3) He is heavier than B and C but shorter than D
 (4) He is lighter than E and also shorter than E

79. In the given question, complete the missing portion of the given pattern by selecting from the given alternatives (1), (2), (3) and (4).



(X)



(1)



(2)



(3)



(4)

80. In this question some statements followed by conclusions 1, 2, 3 and 4 have been given you have to take the given statements to be true even if they seem to be at variance from commonly known facts. Read all the conclusions and then decide which of the given conclusions logically follows from the given statements disregarding commonly known facts. Give Answer :

Statements :

Some questions are answers.

Some answers are writers.

All the writers are poets.

Conclusions :

1. Some writers are answers.

2. Some poets are questions.

3. All the questions are poets.

4. Some poets are answers

(1) Only (1) and (2) (2) Only (1) and (4) (3) Only (2) and (3) (4) Only (2) and (4)

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	4	3	1	2	3	3	1	4	3	2	2	4	1	1	2
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	3	2	4	2	4	3	2	3	4	1	4	1	4	1	4
Que.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans.	3	4	1	2	1	1	3	1	4	3	4	4	4	2	1
Que.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans.	4	1	3	2	2	3	2	2	1	2	3	1	2	2	2
Que.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
Ans.	1	2	3	1	3	3	3	4	3	3	2	2	2	4	1
Que.	76	77	78	79	80										
Ans.	1	2	3	3	2										