

# SAMPLE PAPER

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# SET

## (Spectrum Entrance Test)

for Students Presently in Class 10<sup>th</sup>



**Class: X**  
**Time: 2 Hours**

**Max. Marks: 225**

## **INSTRUCTIONS**

1. The question paper contains **75** questions in four parts ( Part A : Science , Part B : Mathematics and Part C : Mental Ability ) and **24** pages.

Part A contains 25 questions, Part B contains 30 questions and Part C contains 20 questions.

Each question has four options A, B, C & D, out of which **only one option is correct.**

Each question carries **+3 marks** for correct answer and **-1 mark** for wrong answer.

*Please ensure that the Question Paper you have received contains all the QUESTIONS and Pages. If you found some mistake like missing questions or pages then contact immediately to the Invigilator.*

2. Indicate the correct answer(s) for each question by filling appropriate bubble(s) in your OMR sheet.
3. Use only HB pencil for darkening the bubble(s).
4. Use of Calculator, Log Table, Slide Rule and Mobile is not allowed.
5. For example if only 'B' choice is correct then, the correct method for filling the bubble is

A	B	C	D
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

The answer of the question in any other manner (such as putting ☑ , cross ⊗ , or partial shading ● etc.) will be treated as wrong.

**PART A : SCIENCE**

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**Q.1 to Q.25** has four choices (A), (B), (C), (D) out of which only **ONE** is correct.

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1. Examine the following elements :

N, O, F, Ne

P, S, Cl, Ar

Br, Kr

In modern periodic table, on which side these elements are placed-

- (A) Top left side      (B) Bottom left side      (C) Top right side      (D) Middle side

2. A saturated hydrocarbon has 50 hydrogen atom. The number of carbon atom in the hydrocarbon will be:

- (A) 24      (B) 26      (C) 25      (D) 23

3. Rutherford's alpha-particle scattering experiment was responsible for the discovery of

- (A) Atomic Nucleus      (B) Electron      (C) Proton      (D) Neutron

4. Which of the following pairs represents isotones (same no of neutrons)?

(A)  ${}_6\text{C}^{12}$ ,  ${}_6\text{C}^{13}$ ,  ${}_6\text{C}^{14}$

(B)  ${}_{18}\text{Ar}^{40}$ ,  ${}_{20}\text{Ca}^{42}$ ,  ${}_{21}\text{Sc}^{43}$

(C)  ${}_{18}\text{Ar}^{40}$ ,  ${}_{20}\text{Ca}^{40}$ ,  ${}_{21}\text{Sc}^{41}$

(D)  ${}_7\text{N}^{14}$ ,  ${}_8\text{O}^{16}$ ,  ${}_9\text{F}^{19}$

5. Dry ice is –

(A) Water in solid state

(B) Water in gaseous state

(C)  $\text{CO}_2$  in liquid state

(D)  $\text{CO}_2$  in solid state

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**ROUGH WORK**

6. Name the process by which a drop of ink spreads in a beaker of water –  
(A) Diffusion                      (B) Vaporization                      (C) Condensation                      (D) Sublimation
7. Which of the following is not a chemical change-  
(A) Electrolysis of water  
(B) Boiling of water  
(C) Digestion of food  
(D) Burning of magnesium ribbon in oxygen to form magnesium oxide.
8. Of these, the metal which occurs in a free state is \_\_\_\_\_  
(A) Na                      (B) Mg                      (C) Zn                      (D) Pt
9. Which of the following statements about the following reactions is correct?  
$$\text{ZnO} + \text{CO} \rightarrow \text{Zn} + \text{CO}_2$$
  
(A) ZnO is being oxidizing                      (B) CO is being reduced  
(C) CO<sub>2</sub> is being oxidized                      (D) ZnO is being reduced
10. Nitrogen molecule involves formation of  
(A) single covalent bond                      (B) double covalent bond  
(C) triple covalent bond                      (D) ionic bond
11. Graphite is used as a lubricant because it is  
(A) greyish black                      (B) insoluble in water  
(C) having high melting point                      (D) soft, slippery

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**ROUGH WORK**

12. Which of the following is a combustion reaction –  
(A) Boiling of water (B) Melting of wax (C) Burning of petrol (D) None of these
13. Two particles are placed at some distance. If the mass of each of the two particles is doubled, keeping the distance between them unchanged, the value of gravitational force between them will be  
(A)  $\frac{1}{4}$  times (B) 4 times (C)  $\frac{1}{2}$  times (D) unchanged
14. If the index finger points towards the north and the middle finger towards the east, by using Fleming's left hand rule what will be the direction of motion or the force acting on the conductor?  
(A) South (B) West (C) Top (D) Bottom
15. A passenger travels along a straight line with velocity  $v_1$  for first half time and with velocity  $v_2$  for next half time, then the mean velocity  $v$  is given by,  
(A)  $v = \sqrt{\frac{v_2}{v_1}}$  (B)  $v = \sqrt{v_1 v_2}$  (C)  $v = \frac{2v_1 v_2}{v_1 + v_2}$  (D)  $v = \frac{v_1 + v_2}{2}$
16. Lungs perform 2.4 J of work during each expansion. How many times do they expand per minute if their power is 2 Watts?  
(A) 50 times (B) 40 times (C) 60 times (D) 30 times

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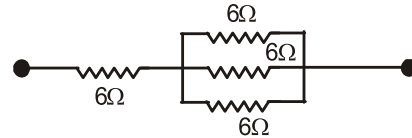
**ROUGHWORK**

17. Total internal reflection occurs when light travels from :  
(A) A rare medium to a denser medium and the angle of incidence is less than the critical angle  
(B) A denser medium to rarer medium  
(C) A rare medium to denser medium  
(D) A rarer medium to a denser medium and the angles of incidence is greater than the critical angle
18. A body at rest may have  
(A) Potential Energy    (B) Kinetic energy    (C) Velocity    (D) momentum
19. Unit of Density.  
(A)  $\text{kg/m}^3$     (B)  $\text{kg m}^3$     (C)  $\frac{\text{m}^3}{\text{kg}}$     (D) none of these
20. An object starts with velocity 5 m/s and after time 10s it has the velocity of 9m/s. Then the displacement is given by  
(A) 70 m    (B) 90m    (C) 20m    (D) 0m
21. A car moves from Nagpur to Mumbai (Distance 1000km) and then comes back. Distance and displacement of car is:  
(A) 2000 km and 0 km    (B) 0 km and 2000 Km  
(C) 1000 km and 0 km    (D) 0 km and 2000 Km
22. A person holds a mass of 100 Kg for 1 hour. Work done is:  
(A) 100 J    (B) 6000 J    (C) 360000 J    (D) Zero

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**ROUGHWORK**

23. Size of object is same as image. Which of the following is possible:  
 (A) Convex Mirror, Object at Focus                      (B) Convex Mirror, Object at Center of Curvature  
 (C) Concave Mirror, Object at Focus                      (D) Concave Mirror, Object at Center of Curvature
24. Which of the following is formula for power loss in resistance?  
 (A)  $IR^2$                       (B)  $\frac{V}{R^2}$                       (C)  $V^2R$                       (D)  $VI$
25. Find equivalent resistance of following circuit.  
 (A)  $2 \Omega$                       (B)  $4 \Omega$   
 (C)  $6 \Omega$                       (D)  $8 \Omega$




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**ROUGH WORK**

**PART B: MATHEMATICS**

**Q.26 to Q.55** has four choices (A), (B), (C), (D) out of which only **ONE** is correct.

26. A sphere and cube have the same surface area, the ratio of their respective volumes is  
 (A) 4 : 3                      (B)  $\sqrt{6} : \sqrt{\pi}$                       (C)  $\sqrt{3} : \sqrt{\pi}$                       (D) 22 : 7
27. What is the smallest number which when increased by 5 is divisible by 28, 36, 63 and 108 ?  
 (A) 761                      (B) 756                      (C) 751                      (D) 766
28. If  $x + y = 5$ ; then find the value of  $x^3 + y^3 + 15xy - 125$   
 (A) 5                      (B) 0                      (C) 1                      (D) 25
29. If the hypotenuse of a right angled triangle is 41 cm and the area of the triangle is  $180 \text{ cm}^2$ , then the difference between the lengths of the legs of the triangle must be  
 (A) 22 cm                      (B) 25 cm                      (C) 27 cm                      (D) 31 cm
30. Which point divides the line segment joining the points  $(a+b, a-b)$ ,  $(a-b, a+b)$  in the ratio  $a : b$  externally :-  
 (A)  $\left( \frac{a^2 - 2ab - b^2}{a - b}, \frac{a^2 + b^2}{a - b} \right)$                       (B)  $\left( \frac{a^2 + 2ab - b^2}{a - b}, \frac{a^2 + b^2}{a - b} \right)$   
 (C)  $\left( \frac{a^2 + 2ab + b^2}{a - b}, \frac{(a + b)^2}{a - b} \right)$                       (D)  $\left( \frac{a^2 - 2ab + b^2}{a - b}, \frac{(a + b)^2}{a - b} \right)$

**ROUGHWORK**



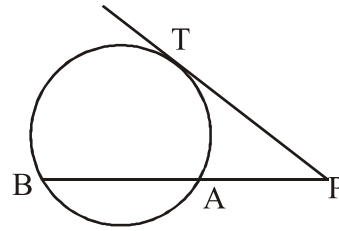
31. If the base of two similar triangles are in the ratio 2 : 3, then their perimeters are in the ratio  
(A) 4 : 9                      (B) 4 : 5                      (C) 2 : 3                      (D) 3 : 2
32. Given that  $\frac{x}{2} + \frac{y}{4} = k$  and  $\frac{2}{x} + \frac{4}{y} = \frac{k}{2}$ . What is the value of  $xy$ ? (k being a real number)  
(A) 1    (B) 4  
(C) 16    (D) Cannot be determined unless value of k is known
33. An iron block is of the form of a cylinder of 1.5 m diameter and 3.5 m in length. The block is rolled out into the form of a bar, having a square section of side 5 cm. Find the length of the bar.  
(A) 2375 m                      (B) 2475 m                      (C) 2575 m                      (D) 2600 m
34. Four watches are ringing alarm bells in the interval of 6, 12, 15 and 18 seconds. If they start at the same time, how many times they will ring together in 4 hours ?  
(A) 80                      (B) 81                      (C) 20                      (D) 21
35. In an examination, 34% of the students failed in Mathematics and 42% failed in English. If 20% of the students failed in both the subjects, then the percentage of students who passed in both the subject was  
(A) 44                      (B) 50                      (C) 54                      (D) 56

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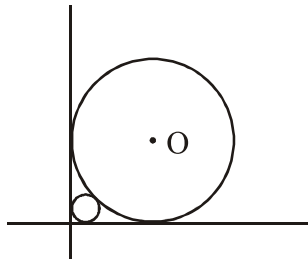
**ROUGH WORK**

36. In the figure shown, PT and PAB are the tangent and the secant drawn to a circle. If  $PT = 12$  cm,  $PB = 18$  cm, then AB is

- (A) 16 cm                      (B) 10 cm  
(C)  $4\sqrt{5}$  cm              (D) 18 cm



37. A circle placed against a right triangle centred at O is the 14 cm radius. What is the radius of the smaller circle placed in the remaining gap ?



- (A)  $7(\sqrt{2} + 1)$               (B)  $14(\sqrt{2} - 1)$               (C)  $7(\sqrt{2} - 1)^2$               (D)  $14(\sqrt{2} - 1)^2$

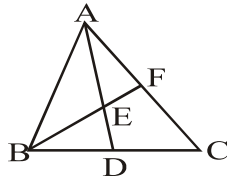
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**ROUGHWORK**

38. The length, breadth and height of a room are 15 m, 12 m and 5 m respectively. Find the cost of painting the four walls of room at the rate of Rs.100 per m<sup>2</sup>.  
 (A) 24000                      (B) 26000                      (C) 25000                      (D) 27000

39. In a  $\Delta ABC$ , D is the mid-point of BC and E is mid-point of AD, BF passes through E. What is the ratio of AF : FC ?

- (A) 1 : 1  
 (B) 1 : 2  
 (C) 1 : 3  
 (D) 2 : 3



40. If  $\sqrt{2^n} = 1024$  then  $3^{2\left(\frac{n}{4}-4\right)}$   
 (A) 3                      (B) 9                      (C) 27                      (D) 81

41. Value of K in  $p(x) = x^3 + x + k$  if  $(x-1)$  is the factor of  $p(x)$  –  
 (A) -1                      (B) 0                      (C) -2                      (D) 2

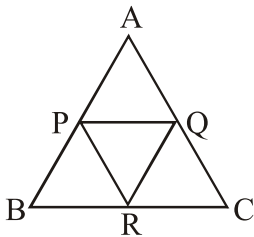
42. Center of a square (point of entersection of digonals of square), with vertices (0, 0), (4, 0), (4, 4), (0, 4) is.  
 (A) (1, 1)                      (B) (2, 2)                      (C) (3, 3)                      (D) (4, 4)

**ROUGHWORK**

43. If a and b are rational no. and  $\frac{\sqrt{5} + \sqrt{3}}{\sqrt{5} - \sqrt{3}} = a + b\sqrt{15}$ , then  $a + b =$  .
- (A) 0                      (B) 1                      (C) 31                      (D) 5
44. Find 5th and 6th terms of the arithmetic progression 0,  $\frac{1}{4}$ ,  $\frac{1}{2}$ ,  $\frac{3}{4}$ , .....
- (A)  $1, \frac{5}{4}$                       (B)  $\frac{5}{4}, 1$                       (C)  $1, \frac{7}{4}$                       (D)  $\frac{7}{4}, 1$
45. A closed metallic cylindrical box is 1.25 m high and its base radius is 35 cm. If the metal sheet costs Rs. 80 per  $\text{m}^2$ , the cost of the material used in the box is \_\_\_\_\_.
- (A) Rs. 281.60                      (B) Rs. 290                      (C) Rs. 340.50                      (D) Rs. 500
46. The value of  $4 - \frac{5}{1 + \frac{1}{3 + \frac{1}{2 + \frac{1}{4}}}}$  is
- (A)  $\frac{40}{31}$                       (B)  $\frac{4}{9}$                       (C)  $\frac{1}{8}$                       (D)  $\frac{31}{40}$

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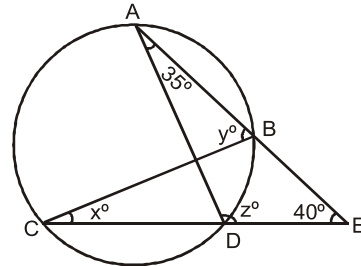
**ROUGH WORK**

47. C (3, 0) and D (3, 1) are the points of trisection of a line segment AB. Find the respective coordinates of A and B.  
 (A) (3, 2), (3, 0)      (B) (3, -1), (3, 2)      (C) (-3, 1), (3, 2)      (D) None of these
48. ABC is an equilateral triangle of side  $4\sqrt{3}$  cm. P, Q & R are midpoints of AB, CA & BC respectively. The area of triangle PQR is (in  $\text{cm}^2$ )  
 (A)  $\frac{\sqrt{3}}{4}$       (B)  $3\sqrt{3}$   
 (C)  $2\sqrt{3}$       (D)  $\sqrt{3}/2$
- 
49. In a throw of a pair of dice, what is the probability of getting a doublet?  
 (A)  $\frac{1}{3}$       (B)  $\frac{1}{6}$       (C)  $\frac{1}{2}$       (D)  $\frac{2}{3}$
50. In a pair of fractions, fraction A is twice the fraction B and the product of two fractions is  $\frac{2}{25}$ . What is the value of fraction A?  
 (A)  $\frac{1}{5}$       (B)  $\frac{1}{25}$       (C)  $\frac{2}{5}$       (D) None of these

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**ROUGHWORK**

51. In a circle two chords AB and CD intersect at an external point E. If  $\angle A = 35^\circ$ ,  $\angle E = 40^\circ$ ,  $\angle BCD = x^\circ$ ,  $\angle ABC = y^\circ$  and  $\angle ADE = z^\circ$ , then false statement is :



- (A)  $z - y = 30^\circ$       (B)  $x - y = 40^\circ$       (C)  $x + z = 140^\circ$       (D)  $y + z = 180^\circ$
52. If the sum of the zeroes of the quadratic polynomial  $f(x) = kx^2 + 2x + 3k$  is equal to their product, find the value of k.

- (A)  $\frac{2}{3}$       (B)  $\frac{-2}{3}$       (C)  $\frac{5}{6}$       (D)  $\frac{-5}{6}$

53.  $\sqrt{3 + \sqrt{5}} =$

- (A)  $\sqrt{2} + 1$       (B)  $\sqrt{\frac{5}{2}} + \sqrt{\frac{1}{2}}$       (C)  $\sqrt{\frac{7}{2}} - \sqrt{\frac{1}{2}}$       (D)  $\sqrt{\frac{9}{2}} - \sqrt{\frac{3}{2}}$

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ROUGH WORK

54.  $P = 2(4)(6) \dots (20)$  and  $Q = 1(3)(5) \dots (19)$ . What is the HCF of P and Q?  
(A)  $3^3 5$                       (B)  $3^4 5$                       (C)  $3^4 5^2 7$                       (D)  $3^3 5^2$
55. The curved surface area of a cone of height 12 cm and base radius 5 cm is.  
(A)  $715/7$                       (B)  $1430/7$                       (C) 1430                      (D) 715

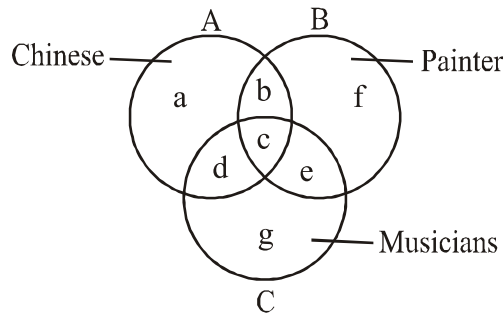
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**ROUGH WORK**

**PART C: MENTAL ABILITY**

**Q.56 to Q.75** has four choices (A), (B), (C), (D) out of which only **ONE** is correct.

**Directions (Q.56 & 57) :** In the figure given below, there are three intersecting circles each representing certain section of people. Different regions are marked a - g. Read the statements in each of the following questions and choose the letter of the region which correctly represents the statements.

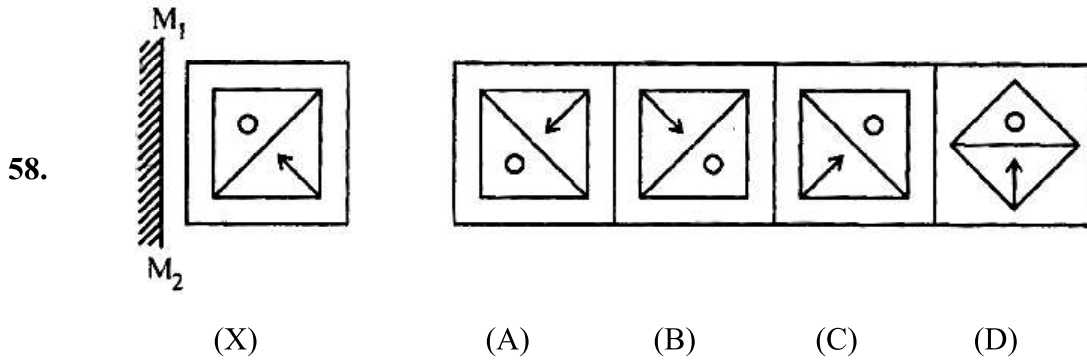


56. Painters who are neither Chinese nor musicians  
 (A) b                      (B) c                      (C) f                      (D) g
57. Chinese who are painters as well as musicians  
 (A) a                      (B) b                      (C) c                      (D) d

**ROUGHWORK**



**Direction (Q.58) :** In each of the following questions, choose the correct mirror-image of the Fig. (X) from amongst the four alternatives (1), (2), (3) and (4) given along with it. The mirror represented by a line  $M_1M_2$



**Direction (Q.59 to 61) :** Study the following information carefully and answer the questions below.

A team of five is to be selected from amongst five boys A, B, C, D and E and four girls P, Q, R and S.

Some criteria for selection are –

A and S have to be together.

P cannot be put with R.

D and Q cannot go together.

C and E have to be together.

R cannot be put with B.

Unless otherwise started, these criteria are applicable to all questions below

59. If two of the members have to be boys, the team will consist of  
 (A) ABSPQ                      (B) ADSQR                      (C) BDSRQ                      (D) CESPQ

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ROUGHWORK

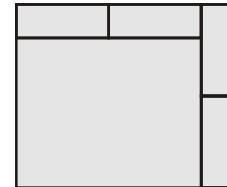
60. If two of the members are girls and D is one of the members, the members of the team other than D are  
 (A) PQBC (B) PQCE (C) PSAB (D) PSCE
61. If including P at least three members are girls, the members of the team other than P are  
 (A) QSAB (B) QSBD (C) QSCE (D) RSAD

**Direction (Q.62 & 63) : In each of the following questions, one term in the number series is wrong. Find out the wrong term.**

62. 6, 15, 35, 77, 165, 221  
 (A) 35 (B) 77 (C) 165 (D) 221
63. 2, 6, 24, 96, 285, 568, 567  
 (A) 6 (B) 24 (C) 285 (D) 567

64. What is the number of rectangles in the following figure?

- (A) 6 (B) 7  
 (C) 9 (D) 11



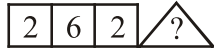
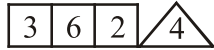
**Direction (Q.65) : In each of the following questions, choose that set of numbers from the four alternative sets, that is similar to the given set.**

65. Given set : (6, 36, 63)  
 (A) (7, 49, 98) (B) (8, 64, 46) (C) (9, 84, 45) (D) (11, 111, 84)

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**ROUGHWORK**

66. Which one will replace the question mark?



- (A) 2                                      (B) 4                                      (C) 6                                      (D) 8

67. How many times do the hands of a clock coincide in a day?

- (A) 20                                      (B) 21                                      (C) 22                                      (D) 24

**Direction (Q.68) :** In the following question there are equations that have become wrong due to wrong order of signs. Choose the correct order of signs from the four alternatives given below. So that the equations become right.

68.  $8 = 2 + 4 - 16$

- (A)  $\times + =$                                       (B)  $\div \times =$                                       (C)  $- + =$                                       (D)  $\times \div =$

**Direction (Q.69) :** In each blank space write one of +, -, × and ÷ signs so that the equation is true.

69.  $15 \ 5 \ (15 \ 3) = 80$

- (A)  $\times, \div, +$                                       (B)  $\times, \div, -$                                       (C)  $\times, +, \div$                                       (D)  $\times, -, \div$

70. Nine carpenters can make nine chairs in nine days, then one carpenter will make three chairs in how many days?

- (A) 3                                      (B) 9                                      (C) 27                                      (D) 18

ROUGH WORK

**Directions (Q.71) : Study the following information and answer the questions given below:**

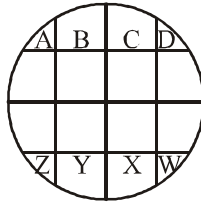
- (i) A rectangular wooden block is having length 6 cm, breadth 4 cm and height 1 cm.
- (ii) Both sides having dimension 4 cm. 1 cm are painted with black colour.
- (iii) Both sides having dimension 6 cm. 1 cm are painted in red colour.
- (iv) Both sides with dimension 6 cm. 4 cm are painted in green colour.
- (v) The block is cut into size equal pairs of 1 cm each (from 6 cm side) and into 4 equal parts of 1 cm each (from 4 cm side).

71. If cubes having only "black as well as green" colour are removed, then how many cubes will remain?  
(A) 4                      (B) 8                      (C) 12                      (D) None of these

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**ROUGH WORK**

**Directions (Q.72 to 74) :** A posse of four policeman. A, B, C and D is combining a circular park divided into sixteen plots. P, Q, R and K are the offenders whom they have to catch after given moves. The figure below shows their positions. Note that the by-lanes are North-South and East-West.



72. Who two are positioned North-West and South-East ?  
 (A) W and A                      (B) B and Y                      (C) A and W                      (D) Z and D
73. If A, B, C and D were to move clockwise four plots and W, X, Y and Z were to move anti-clockwise six plots, then who two would be in North and South directions respectively ?  
 (A) B and X                      (B) Y and D                      (C) Z and A                      (D) W and C
74. If both A, B, C, D and P, Q, R, K move clockwise three plots, then who two would be positioned North-East and South-West ?  
 (A) A and W                      (B) B and X                      (C) C and X                      (D) D and Z

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**ROUGH WORK**

**Direction (Q.75) :** There is some relationship between the two terms to the left of :: and the same relationship holds between the two terms to its right. Find out this term.

75.  $MK : \frac{169}{121} :: JH : ?$

(A)  $\frac{100}{64}$

(B)  $\frac{100}{81}$

(C)  $\frac{64}{120}$

(D)  $\frac{81}{100}$

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**ROUGHWORK**

## Answer Key : Spectrum Sample Test Paper

### Target : Engineering

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