



MATRIX OLYMPAD

CSR Initiative of Matrix Education, Sikar to motivate and reward young talent.

✓ Total Questions : 60

✓ Maximum Marks : 240

✓ Duration : 2 Hrs.

PAPER PATTERN

| Part | (I) Physics | (II) Chemistry | (III) Biology | (IV) Mathematics | (V) Logical Reasoning & IQ |
|---------------------|-------------|----------------|---------------|------------------|----------------------------|
| Number of Questions | 7 | 6 | 7 | 30 | 10 |

Marking Scheme: +4 For Each Correct Answer (There is no negative for wrong answer)

Instructions :

1. This Booklet is your **Question Paper**. DO NOT **break seal** of Booklet until the invigilator instructs to do so.
2. The Answer Sheet is provided to you separately which is a machine readable Optical Response Sheet (ORS). You have to mark your answer in the ORS by darkening bubble, as per your answer choice , by using **Black /Blue** ball point pen only.
3. If you are found involved in **cheating** or disturbing others then your ORS will be cancelled.
4. Do not **damage** the ORS sheet in any manner. If ORS is damaged or not completed properly, your results will not be prepared.
5. If you have any **confusion** in filling-up ORS sheet, please **contact** your invigilator. Incomplete ORS will be not be evaluated.
6. You can take the question paper home once the ORS is submitted.



Answer Key and Video
Solutions Kindly Scan
QR Code and subscribe
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PART I : PHYSICS

This section contains **07 Multiple Choice Questions (Q : 01 to Q : 07)**. Each question has four choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct.

- | | | | | | | | | | | | | | | | | | | | | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------|------|-------|-----|---|---|---|-----|---|---|---|-----|---|---|---|-----|---|---|---|
| <p>1. A car travels a 250 metres distance with a constant velocity of 18 km/h towards the north. The velocity of the car after 40 seconds, starting from rest will be-</p> <p>(A) 5 m/s (B) 10 m/s (C) 15 m/s (D) 20 m/s</p> <p>2. A racing car moves on a circular track of a radius of 7 meters. The distance and displacement travelled by the car after 1.5 revolutions will be, respectively -</p> <p>(A) 66 m, 14 m (B) 56 m, -14m (C) 56 m, 16 m (D) 44 m, 14 m</p> <p>3. As we go to the higher altitudes, the atmospheric pressure decreases, then the boiling point of liquids-</p> <p>(A) Increases (B) Decreases (C) Remains constant (D) First increases then decreases</p> | <p>4. At what temperature reading, the Celsius and Fahrenheit scales are equal ?</p> <p>(A) 0 (B) 40 (C) - 40 (D) 100</p> <p>5. Which of the following statement/s is/are True(T) or False(F) ?</p> <p>(i) Velocity can be positive, negative, and zero. (ii) Speed is neither zero nor negative for a moving body. (iii) Acceleration in uniform circular motion is zero.</p> <p>Code :</p> <table border="0"> <tr> <td></td> <td>(i)</td> <td>(ii)</td> <td>(iii)</td> </tr> <tr> <td>(A)</td> <td>T</td> <td>F</td> <td>F</td> </tr> <tr> <td>(B)</td> <td>T</td> <td>T</td> <td>T</td> </tr> <tr> <td>(C)</td> <td>F</td> <td>F</td> <td>T</td> </tr> <tr> <td>(D)</td> <td>T</td> <td>T</td> <td>F</td> </tr> </table> | | (i) | (ii) | (iii) | (A) | T | F | F | (B) | T | T | T | (C) | F | F | T | (D) | T | T | F |
| | (i) | (ii) | (iii) | | | | | | | | | | | | | | | | | | |
| (A) | T | F | F | | | | | | | | | | | | | | | | | | |
| (B) | T | T | T | | | | | | | | | | | | | | | | | | |
| (C) | F | F | T | | | | | | | | | | | | | | | | | | |
| (D) | T | T | F | | | | | | | | | | | | | | | | | | |

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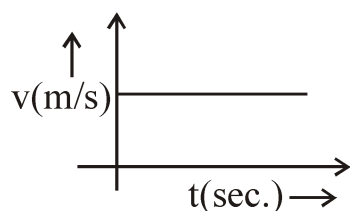
6. Match **Column – I** with **Column – II** and select the correct answer using the codes given below.

| Column – I | Column – II |
|-----------------------------------|---------------|
| P. Land breeze | 1. Summer |
| Q. Heat from the sun to the earth | 2. Convection |
| R. Light-coloured clothes | 3. Radiation |

Code :

- | | <i>P</i> | <i>Q</i> | <i>R</i> |
|-----|----------|----------|----------|
| (A) | 2 | 1 | 3 |
| (B) | 3 | 2 | 1 |
| (C) | 3 | 1 | 2 |
| (D) | 2 | 3 | 1 |

7. During a trip to Jaipur, the school bus's motion is shown in a velocity-time graph for some time interval. Jaadu, the student in the 7th class, is having a problem understanding the graph.



According to the v–t graph, the bus is _____ for this given time interval.

- (A) at rest
 (B) moving with zero acceleration
 (C) moving with variable velocity
 (D) moving with variable acceleration

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PART II : CHEMISTRY

This section contains **06 Multiple Choice Questions (Q : 08 to Q : 13)**. Each question has four choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct.

8. Which fibre is known as the “Golden fibre”?
- (A) Cotton (B) Wool
(C) Jute (D) Silk

9. The scientific name of mulberry silk moth is :
- (A) Bombyx mori (B) Bombyx silki
(C) Bombyx biti (D) Bombyx lurrea

10. From which of the following wool fibre is not obtained ?
- (A) Goat
(B) Lamma
(C) Alpaca
(D) Silk moth

11. Which of the following statement/s is/are **True(T)** or **False(F)** ?

- (i) Antacids neutralise the bases that are present in stomach.
(ii) Lemon juice turns methyl orange into red.
(iii) Organic acids are also known as strong acids.

Code :

- | | (i) | (ii) | (iii) |
|-----|-----|------|-------|
| (A) | T | F | F |
| (B) | T | T | T |
| (C) | F | F | T |
| (D) | F | T | F |

12. Match **Column – I** with **Column – II** and select the correct answer using the codes given below.

| Column – I | Column – II |
|--------------------|--------------------------|
| P. Slaked lime | 1. Common salt |
| Q. Sodium chloride | 2. NaHCO_3 |
| R. Baking soda | 3. Used in white washing |

Code :

| | P | Q | R |
|-----|---|---|---|
| (A) | 1 | 2 | 3 |
| (B) | 3 | 2 | 1 |
| (C) | 3 | 1 | 2 |
| (D) | 2 | 3 | 1 |

13. In our stomach hydrochloric acid helps in digestion. But excess of Acid in the stomach causes acidity and indigestion. It can be treated by neutralising the acid with a mild base. These bases are called antacids. Milk of magnesia is an antacid which contains a mild base. Which of the following substance is used to treatment of Acidity and Indigestion ?

- (A) Magnesium hydroxide
(B) Calcium hydroxide
(C) Calcium oxide
(D) Zinc carbonate

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PART III : BIOLOGY

This section contains **07 Multiple Choice Questions (Q : 14 to Q : 20)**. Each question has four choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct.

14. In biology, a relation between two organisms in which one organism is benefited and the other is usually harmed is called _____.

- (A) Mutualism
- (B) Commensalism
- (C) Parasitism
- (D) None of these

15. Which of the following is not an adaptive feature in polar bear ?

- (A) White fur
- (B) Strong sense of smell
- (C) Long curved and sharp claws
- (D) Long tail

16. Hydrochloric acid secreted by stomach does not participate in _____.

- (A) Killing bacteria which may enter the stomach.
- (B) Making medium in the stomach acidic.
- (C) Breaking up fats into fatty acids.
- (D) All the above

17. Which of the following is the correct sequence of human nutrition ?

- (A) Ingestion → Egestion → Digestion → Absorption → Assimilation
- (B) Egestion → Ingestion → Absorption → Assimilation → Digestion
- (C) Digestion → Assimilation → Ingestion → Absorption → Egestion
- (D) Ingestion → Digestion → Absorption → Assimilation → Egestion

18. Which of the following statement/s is/are **True(T)** or **False(F)** ?

- (i) Carbon dioxide is essential for photosynthesis to take place.
- (ii) The products of photosynthesis are not simple sugars.
- (iii) Photosynthesis occurs in the green leaves of plants.

Code :

- | | (i) | (ii) | (iii) |
|-----|-----|------|-------|
| (A) | T | T | F |
| (B) | T | F | T |
| (C) | T | T | T |
| (D) | F | T | T |

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19. Match **Column – I** with **Column – II** and select the correct answer using the codes given below.

| Column – I | Column – II |
|------------|-------------|
|------------|-------------|

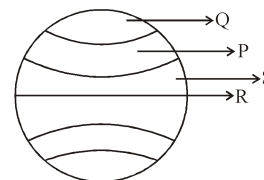
| | |
|--------------|-------------------|
| P. Incisors | 1. Cracking teeth |
| Q. Canines | 2. Cutting teeth |
| R. Premolars | 3. Tearing teeth |

Code :

| | P | Q | R |
|-----|---|---|---|
| (A) | 2 | 3 | 1 |
| (B) | 1 | 2 | 3 |
| (C) | 3 | 2 | 1 |
| (D) | 2 | 1 | 3 |

20. Based on the temperature, the earth is divided into three zones; Torrid Zone, Temperate Zone and Frigid Zone. The Tropical or Torrid Zone lies near the Equator.

Choose the correct option for the given figure ?



- (A) P-Temperate Zone, Q-Torrid Zone, R-Equator, S-Frigid Zone
 (B) P-Frigid Zone, Q-Temperate Zone, R-Equator, S-Torrid Zone
 (C) P-Temperate Zone, Q-Equator Zone, R-Torrid Zone, S-Frigid Zone
 (D) P-Temperate Zone, Q-Frigid Zone, R-Equator, S-Torrid Zone

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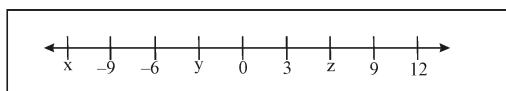
PART IV : MATHEMATICS

This section contains 30 Multiple Choice Questions (Q : 21 to Q : 50). Each question has four choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct.

21. Add the additive inverse of $(-12 + 16 - 42 \div 3$ of 7) to the product of -2 , -3 and -4 .

(A) 26
(B) 32
(C) -32
(D) -26

22. Based on the number line, find the value of $x - y - z$.

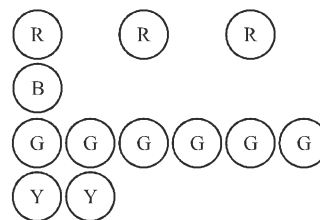


(A) -21
(B) -15
(C) -3
(D) 15

23. If X is the smallest five digit number formed by all the digits 0, 3, 5, 7, 2 (using each digit only once) and Y is the greatest five digit number formed by all the digits 0, 5, 7, 9, 1 (using each digit only once). Then find $Y - X$.

(A) 64741
(B) 77144
(C) 66938
(D) 77153

24. Gopal has a bag that contains 3 red, 1 blue, 6 green and 2 yellow marbles. What fractional part of the bag of marbles is red ?



(A) $\frac{1}{12}$
(B) $\frac{1}{6}$
(C) $\frac{1}{4}$
(D) $\frac{1}{2}$

25. What is the missing value in the box ?

$$6\frac{3}{4} \times 1.2 = 1.2 + 0.9 + 1.2 + 1.2 \times \boxed{?}$$

(A) 4
(B) 3
(C) 8
(D) 6

Space for rough work

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26. Out of the given fractions $\frac{5}{7}, \frac{7}{13}, \frac{4}{7}, \frac{4}{15}$ and $\frac{9}{14}$, which is the third highest ?

- (A) $\frac{5}{12}$
(B) $\frac{7}{13}$
(C) $\frac{4}{7}$
(D) $\frac{4}{15}$

27. The mean of the ages of 20 students is 10 years. 5 students with the mean age of 15 years leave the class. Mean of the ages the remaining students will be :

- (A) 4
(B) 5.66
(C) 6.25
(D) 8.33

28. From the following table find the values of p , q and r .

| Scores | Tally mark | Frequency |
|--------|------------|-----------|
| 0 | | r |
| 1 | | l |
| 25 | | l |
| 34 | p | 3 |
| 67 | | 2 |
| 71 | | q |
| 73 | | 1 |

- (A) $p \rightarrow ||, q = 2$ and $r = 2$
(B) $p \rightarrow ||, q = 1$ and $r = 1$
(C) $p \rightarrow, ||, q = 1$ and $r = 2$
(D) $p \rightarrow, ||, q = 1$ and $r = 2$

29. The mean, median and mode of four numbers is 8. The smallest number is 7. The numbers are :

- (A) 7, 7, 8, 8
(B) 7, 8, 8, 8
(C) 7, 8, 8, 9
(D) 8, 8, 8, 8

30. 4 is added to a number and the sum is multiplied by 5. If 20 is subtracted from the product and the difference is divided by 8, the result is equal to 10. Find the number.

- (A) 16
(B) 12
(C) 8
(D) 20

31. Solve: $x - \left(2x - \frac{3x - 4}{7} \right) = \frac{4x - 27}{3} - 3$

- (A) 6
(B) 4
(C) 3
(D) 1

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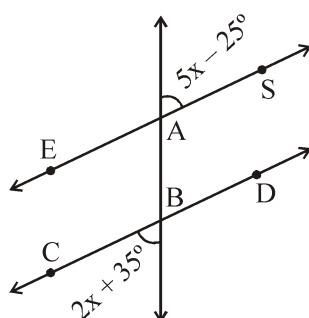
32. If $C = \frac{x-a}{x-b}$ then the value of x is :

- (A) $\frac{bC-a}{C-1}$
(B) $\frac{C-a}{C-b}$
(C) $\frac{C+a}{C+b}$
(D) $\frac{1-C}{a-bC}$

33. The sum of three consecutive multiples of 6 is 1098. Find the number.

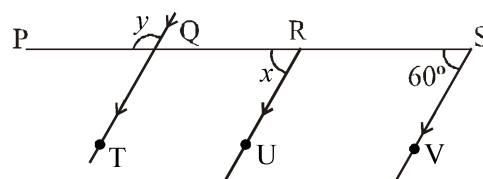
- (A) 360, 368 and 370
(B) 362, 368 and 370
(C) 360, 366 and 372
(D) 360, 366 and 371

34. If in the given figure $ES \parallel CD$, then $\angle ABC$ is equal to :



- (A) 75°
(B) 105°
(C) 115°
(D) 85°

35. In the given figure, PQR is a transversal line, $QT \parallel RU \parallel SV$. Find the value of x and y .

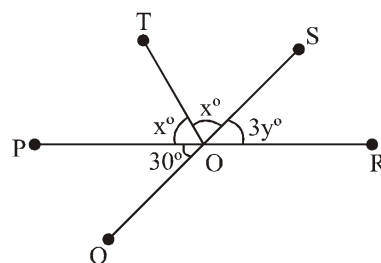


- (A) $60^\circ, 120^\circ$
(B) $40^\circ, 140^\circ$
(C) $80^\circ, 100^\circ$
(D) $50^\circ, 130^\circ$

36. The adjacent angles of a rhombus are $2x - 35^\circ$ and $x + 5^\circ$. Find x .

- (A) 70°
(B) 40°
(C) 35°
(D) 45°

37. In the given diagram, POR and QOS are straight lines. Find the value of $x + y$.



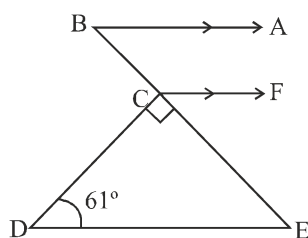
- (A) 85
(B) 95
(C) 105
(D) 115

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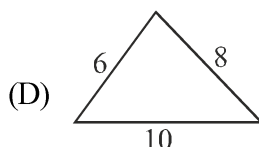
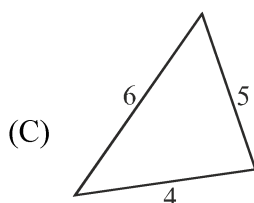
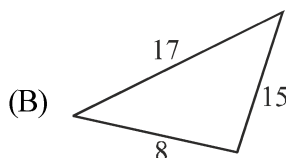
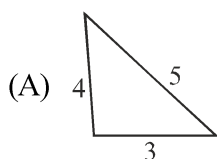
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38. In the given figure $BA \parallel CF \parallel DE$. BCE is a straight line and $\angle DCE$ is a right angle. Find $\angle BCF$ -



- (A) 150°
(B) 115°
(C) 151°
(D) 105°
39. Which of the following is not a right-angled triangle?



40. One side of a triangle is produced and the exterior angle so formed is 140° . If the interior opposite angles are in the ratio $2 : 5$, then find the measure of each angle of the triangle.
(A) $45^\circ, 75^\circ, 60^\circ$ (B) $40^\circ, 70^\circ, 70^\circ$
(C) $40^\circ, 100^\circ, 40^\circ$ (D) $40^\circ, 75^\circ, 65^\circ$

41. Which of the following statement/s is/are **True(T)** or **False(F)** ?

- (i) Division by zero is not defined.
(ii) -3 is greater than zero.
(iii) Zero is an integer.

Code :

(i) (ii) (iii)

- (A) T F T
(B) T T F
(C) F F T
(D) F T F

42. Which of the following statement/s is/are **True(T)** or **False(F)** ?

- (i) Two adjacent angles are said to form linear pair of angles if their non-common arms are two opposite rays.
(ii) When a transversal cuts two parallel lines alternate interior angles are not equal.
(iii) Two lines are parallel if alternate interior angles add up to 180° .

Code :

(i) (ii) (iii)

- (A) T F F
(B) T T T
(C) F F T
(D) F T F

Space for rough work

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43. Which of the following statement/s is/are **True(T)** or **False(F)** ?

- (i) The sum of any two sides of the triangle is greater than the third side.
- (ii) If any side of a triangle is produced then the exterior angle so formed is not equal to the sum of the interior opposite angles.
- (iii) A median of a triangle is a line segment joining a vertex to the centroid of the triangle.

Code :

(i) (ii) (iii)

- (A) T F F
- (B) T T T
- (C) F F T
- (D) F T F

44. Match **Column – I** with **Column – II** and select the correct answer using the codes given below.

| Column – I | Column – II |
|------------------------------------------------------------|-------------|
| P. $9 - \{7 - 24 \div (8 + 6 \times 2 - 16)\}$ | 1. 16 |
| Q. $(-3) \times (-12) \div (-4) + 3 \times 6$ | 2. 9 |
| R. $5 \times 2 - [3 - \{5 - (7 + 2 \text{ of } 4 - 19)\}]$ | 3. 8 |

Code :

| P | Q | R |
|-------|---|---|
| (A) 2 | 3 | 1 |
| (B) 3 | 1 | 2 |
| (C) 3 | 2 | 1 |
| (D) 1 | 2 | 3 |

45. Match **Column – I** with **Column – II** and select the correct answer using the codes given below.

| Column – I | Column – II |
|-------------------------------------------------------|-------------|
| P. If $\frac{2y}{3} - 5 = 3$, then the value of y is | 1. 2 |
| Q. If $-4(2 + y) = 8$, then the value of y is | 2. 12 |
| R. If $4 + 3(y + 2) = 16$, then the value of y is | 3. -4 |

Code :

| P | Q | R |
|-------|---|---|
| (A) 2 | 3 | 1 |
| (B) 3 | 1 | 2 |
| (C) 2 | 1 | 3 |
| (D) 1 | 2 | 3 |

Space for rough work

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46. Match **Column – I** with **Column – II** and select the correct answer using the codes given below.

| Column – I | Column – II |
|------------|-------------|
|------------|-------------|

P. In a $\triangle ABC$, if
 $\angle A = 30^\circ$,
 $\angle B = 50^\circ$
 then $\angle C = ?$

Q. In a $\triangle ABC$, BC is
 extended to D .
 If $\angle ABC = 90^\circ$,
 $\angle BAC = 40^\circ$, then
 $\angle ACD = ?$

R. In a $\triangle ABC$, if
 $\angle A = x$,
 $\angle B = 2\angle A$,
 $\angle C = 3\angle A$, then $x = ?$

Code :

| | <i>P</i> | <i>Q</i> | <i>R</i> |
|-----|----------|----------|----------|
| (A) | 2 | 3 | 1 |
| (B) | 2 | 1 | 3 |
| (C) | 3 | 2 | 1 |
| (D) | 1 | 2 | 3 |

Paragraph for Questions 47 & 48

A group of 20 people went to Restaurant. 9 of them ordered a meal of Rs 42.20 each and 7 of them ordered a meal of Rs 47.60 each and rest ordered a meal of Rs 50 each.

47. How much money spent by 9 people who ordered same meal ?
 (A) Rs 369.80
 (B) Rs 379.80
 (C) Rs 309.80
 (D) Rs 389.80
48. Total money spent by 20 people is :
 (A) Rs 915
 (B) Rs 895
 (C) Rs 913
 (D) Rs 900

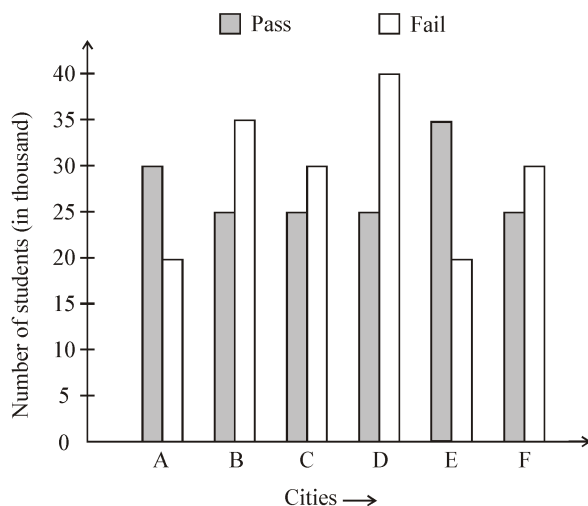
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Paragraph for Questions 49 & 50

Study the graph given below and answer the questions that follow.



49. The total number of students failing in the entrance exam from all the cities together is :

(A) 175000
(B) 168000
(C) 165000
(D) 217500

50. The ratio of the number of students passing in the entrance exam for city B to those passing from city E is :

(A) 5 : 7
(B) 1 : 1
(C) 5 : 4
(D) 6 : 5

Space for rough work

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PART V : LOGICAL REASONING & IQ

This section contains **10 Multiple Choice Questions (Q : 51 to Q : 60)**. Each question has four choices (A), (B), (C) and (D) out of which **ONLY ONE** is correct.

51. Which of the following numbers will replace the question mark in given series :

$$\frac{1}{2}, \frac{3}{4}, ?, \frac{5}{4}$$

(A) 1

(B) $\frac{1}{4}$

(C) $\frac{3}{4}$

(D) $\frac{2}{3}$

52. Find the next term :

RD, SF, TJ, UP, ?

(A) XY

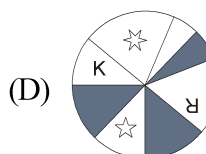
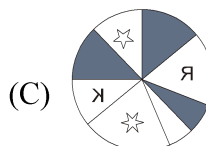
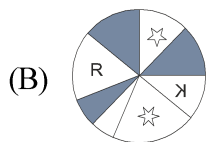
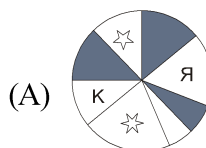
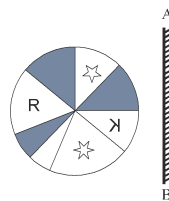
(B) YY

(C) XX

(D) VX

Direction (53 – 54) : If the mirror placed on the line AB, then identify the correct mirror image of the given questions figure from the answer figure :

53.



54.



(A) 4FORM7

(B) 4MROF7

(C) 4MROF7

(D) 4FORM7

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55. Which two numbers should be interchanged to make the given equation correct ?

$$81 + 45 \div 3 - 18 \times 9 = 32$$

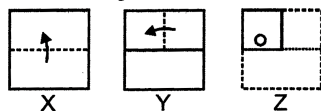
- (A) 81 and 18
(B) 45 and 18
(C) 3 and 9
(D) 45 and 9

56. In a row of 54 people, A is 15th place from the left side and B is 20th place from right side. Find the number of people between A and B ?

- (A) 19
(B) 20
(C) 21
(D) 18

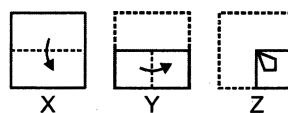
Direction (57 – 58) : The sequence of folding a piece of paper and the manner in which the folded paper has been cut in shown in the following question figures. How would this paper look (in the respective options) when unfolded ?

57.



- (A)
- (B)
- (C)
- (D)

58.



- (A)
- (B)
- (C)
- (D)

59.

When I was going to the office from my house early in the morning. My shadow formed on my left hand side. In which direction is my house from the office ?

- (A) North-west
(B) North
(C) South
(D) East

60.

Neha departs from her home and walks 51m towards the South and then turns left and walks 44m. Now she turns left again and walks 83m. How far is she from a pole that is exactly 32m North from her home now? (Assuming that all turns are 90 degree only)

- (A) 14m
(B) 44m
(C) 7m
(D) 39m

Space for rough work

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