Muqabila e Ilm o Hisaab

Multiple-Choice Question Sheet

Participant Name _____

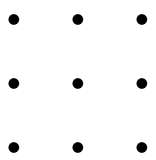


Figure 1

QUESTION 1:
What is the minimum number of points that must be removed from the diagram (Figure 1) so that in the remaining picture no three points lie on one line?

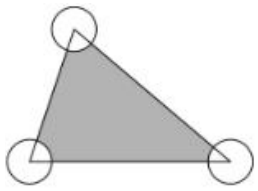
(A) 1 **(B)** 2 **(C)** 3 **(D)** 3 **(E)** 3

QUESTION 2:
Suppose the product of 4 different natural numbers is 100. What is the sum of those 4 numbers?

(A) 25 **(B)** 11 **(C)** 15 **(D)** 18 **(E)** 20

QUESTION 3:
When cubed and squared, how many positive whole numbers have the same amount of digits?

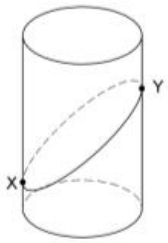
(A) 2 **(B)** 3 **(C)** 11 **(D)** Insufficient information to determine **(E)** Infinitely many



(image not to scale)

QUESTION 4:
The area of the triangle shown is equivalent to $8 \times 10^6\ m^2$. Each of the three circles has a radius of 2 metres and its centre is in one of the vertices of the triangles. What is the area of shaded region (in square metres?)

(A) $8 \times 10^6\ m^2$ **(B)** $8 \times 10^6 - 2\pi$ **(C)** $4 \times 10^6 - 4\pi$ **(D)** $8 \times 10^6 - \pi$ **(E)** $(8 - 2\pi) \times 10^6$

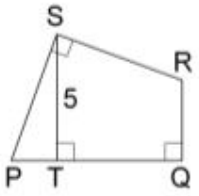


QUESTION 5:
A rectangular metal sheet is wrapped around a cylinder. It is then cut straight at an angle, through points X and Y as shown in the figure. Which picture shows the sheet when the lower part of the metal sheet is unrolled?

(A)  **(B)**  **(C)**  **(D)**  **(E)** 

QUESTION 6:
In a cylinder are a number of balls. A different positive whole number is written on each ball. On 30 of the balls, numbers that are divisible by 6 are written. On 20 balls, numbers that are divisible by 7 are written. On 10 balls, numbers that are divisible by 42 are written. What is the minimum number of balls in the cylinder?

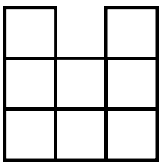
(A) 30 **(B)** 40 **(C)** 53 **(D)** 54 **(E)** 60



QUESTION 7:
Determine the area of the quadrilateral PQRS as shown above, where $PS = RS$, $ST \perp PQ$, $\angle PSR = \angle PQR = 90$, and $ST = 5$.

(A) 20 **(B)** 22.5 **(C)** 25 **(D)** 27.5 **(E)** Insufficient information to determine

QUESTION 8:
The 3x3x3 cube below consists of 27 small cubes. Some of the small cubes are removed. If the cube is looked at from the right, from above, and from the front, the following is seen:



How many little cubes were removed?

(A) None of these options **(B)** 4 **(C)** 5 **(D)** 6 **(E)** 7

QUESTION 9:
Grandpa gives 180 marbles to 10 of his grandchildren. No two grandchildren get the same amount of marbles. Haris ends up with the most marbles. What is the minimum number of marbles Haris could have?

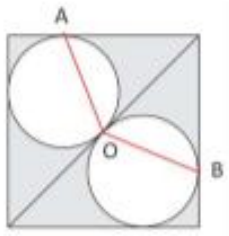
(A) 19 **(B)** 20 **(C)** 21 **(D)** 22 **(E)** 23

QUESTION 10:
It is given that an irregular hexagon has a perimeter that is twice the area of a right angled triangle. The area of the triangle is 10 square centimetres. Which of the following could be the area of the hexagon?

(A) 13 **(B)** 14 **(C)** 21 **(D)** 28.87 **(E)** Insufficient information to determine

QUESTION 11:
Shahmeer has 38 matchsticks. He uses all the matches and makes a triangle and a square. The triangle and the square do not share any matchsticks. Each side of the triangle consists of 6 matchsticks. How many matchsticks are on one side of the square?

(A) 3 **(B)** 9 **(C)** 18 **(D)** 38 **(E)** None of these options



QUESTION 12:
The 2 circles shown above are tangents to each other and also to the two sides of a square. What is the value of the angle AOB, in degrees, determined by these three points of tengency?

(A) 13 **(B)** 26 **(C)** 21 **(D)** 24 **(E)** 18

QUESTION 13:
The packaging of a soft cheese mentions the total amount of fat in: 24%. The same packaging also mentions the following: 64% fat in the dry substance. How much water, as a percentage, is in the soft cheese?

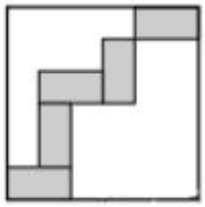
(A) 88% **(B)** 37.5% **(C)** 49% **(D)** 42% **(E)** 62.5%

QUESTION 14:
Six weeks are $n!$ seconds. What is n?

(A) 6 **(B)** 7 **(C)** 8 **(D)** 10 **(E)** 12

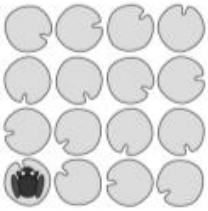
QUESTION 15:
How many digits does the result of $(2^{22})^5 \times (5^{55})^2$ have?

(A) 22 **(B)** 55 **(C)** 77 **(D)** 110 **(E)** 111



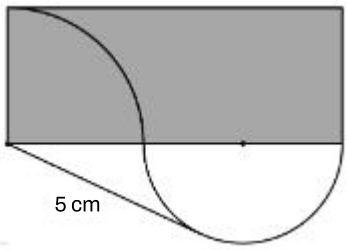
QUESTION 16:
Five rectangles that are congruent are positioned in a square with sides of length 24 as shown. How big is the area of one of these rectangles (in square centimetres)?

(A) 12 **(B)** 16 **(C)** 18 **(D)** 24 **(E)** 32



QUESTION 17:
On a pond, 16 lily pads are arranged in a 4x4 grid as shown. A frog sits ona lilly pad in one of the corners of the grid. The frog jumps from one lily pad to another horizontally or vertically. In doing so, he always jumps over at least one lily pad. He never lands on the same lily pad twice. What is the maximum number of lily pads, excluding the one he is originally sitting on, on which he can land?

(A) 12 **(B)** 16 **(C)** 18 **(D)** 24 **(E)** 32



QUESTION 18:
What is the area of the rectangle, as shown in the figure above?

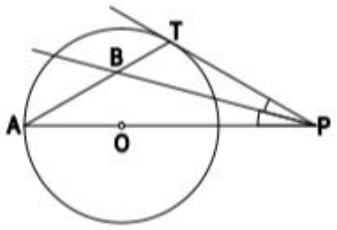
(A) Insufficient information to calculate **(B)** 25 **(C)** 30 **(D)** 32.1 **(E)** Somewhere between 30 and 40

QUESTION 19:
If you add the numbers on opposite faces of the die shown, you would get the same total three times. The numbers on the hidden faces are prime numbers. Which number is on the face opposite to 14?

(A) It can't be a prime number **(B)** 13 **(C)** 17 **(D)** 19 **(E)** 23

QUESTION 20:
3 different natural numbers have the same product and sum. If we let those three numbers be a, b, and c, then the square of $(ab + ac + ad)$ is:

(A) What? This is unsolvable! **(B)** 12,349 **(C)** 11 **(D)** None of these options **(E)** 299



QUESTION 21:
In the diagram shown, PT is a tangent to circle O. PB is the angle bisector of angle TPA. How big is the angle TBP?

(A) 30° **(B)** 40° **(C)** None of these **(D)** 75° **(E)** It depends on the location of the point P

QUESTION 22:
What is the last digit of the answer to the product of $1 \times 3 \times 5 \times 7 \times 9^2 \times 7 \times 5 \times 3 \times 1$?

(A) 1 **(B)** 3 **(C)** 5 **(D)** 7 **(E)** 9

QUESTION 23:
Two isosceles triangles (not similar) have at least one side of 20 cm and have equal perimeters. If one of them has a side of 8 cm, which of the following measures can be the measure of one side of the other triangle (in centimetres)?

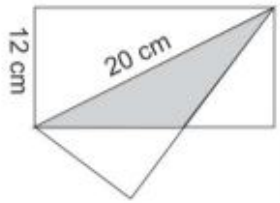
(A) 8 **(B)** 10 **(C)** 12 **(D)** 14 **(E)** None of these

QUESTION 24:
Hafsa observed that the number 2020 has an intriguing property: the number formed by the two digits on the left half is equal to the nuber formed by the two digits on the right half. How many four-digit numbers, including 2020, have this same property?

(A) 49 **(B)** 50 **(C)** 81 **(D)** 90 **(E)** 99

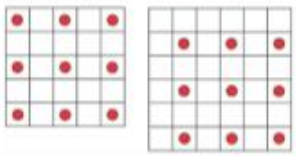
QUESTION 25:
Who is the mother of the daughter of the mother of Luton's daughter?

(A) Luton's sister **(B)** Luton **(C)** Luton's mother **(D)** Luton's niece **(E)** Luton's aunt



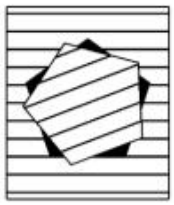
QUESTION 26:
A rectangular piece with one side of 12 cm is folded along its 20 cm diagonal. What is the overlapping area of the folded parts, indicated in the diagram (in square centimetres)?

(A) 24 **(B)** 36 **(C)** 48 **(D)** 50 **(E)** 75

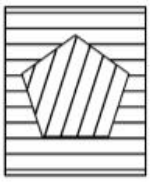
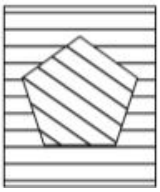
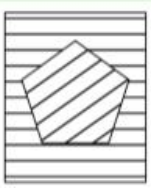
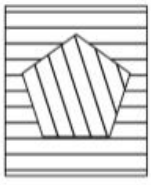
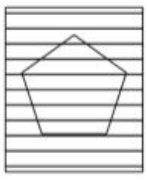


QUESTION 27:
Shayan plays with $n \times n$ boards by placing a token in each of the cells with no common points with other cells containing tokens. In the picture above, we see how to place as many chips as possible on a 5x5 and a 6x6 board. In this way, how many chips can Shayan possibly put on a 2020x2020 board?

(A) 2020 **(B)** Impossible to calculate **(C)** 674^2 **(D)** 1010^2 **(E)** 2020^2

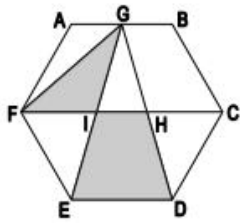


QUESTION 28:
A regular pentagon is cut out of a page of lined paper. Step by step this pentagon is then rotated 21° counter clockwise about its midpoint. The result after step one is shown in the diagram. Which of the diagrams shows the situation when the pentagon fills the hole entirely again for the first time?

(A)  **(B)**  **(C)**  **(D)**  **(E)** 

QUESTION 29:
How many ways are there to write 1001 as the sum of two prime numbers?

(A) It is impossible to write it as the sum of prime numbers **(B)** One **(C)** Two **(D)** Three **(E)** More than three



QUESTION 30:
A regular hexagon is shown above. G is the midpoint of AB. H and I are the intercepts of the line segments GD and GE respectively, with the line segment FC. What is the ratio of the areas of the triangle GIF and the trapezium IHDE?

(A) ½ **(B)** ⅓ **(C)** ¼ **(D)** $\frac{\sqrt{3}}{3}$ **(E)** None of these

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