Chapter 1: Patterns in Mathematics

1. **The following series follows a fixed pattern:**
   2, 3, 3, 4, 4, 4, 5, 5, 5, 5, 6, …
   If the pattern continues, determine how many times the number 9 appears in the NEXT 20 terms.

   a) 3 b) 4 c) 7 d) 8

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2. **The following number series is based on a pattern. One term is incorrect. Identify the incorrect term.**
   2, 3, 6, 11, 18, 25, 38, 51, 66, 83

   a) 11 b) 25 c) 51 d) 66

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3. **What will come in place of "?" in the given series?**

   1@3, #5#, 7@9, #11#, 13@15, ?, 19@21

   a) @17@ b) #15# c) 16#18 d) #17#

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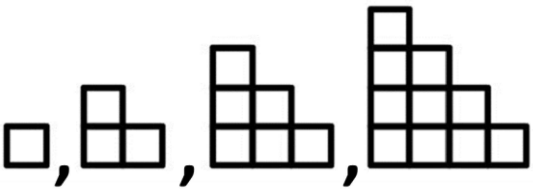
4. **The first four terms of a block series are shown below.**
   If the pattern continues in the same manner, which term of the series will be the first to contain more than 20 blocks?



   a) 5th term b) 6th term c) 7th term d) 8th term

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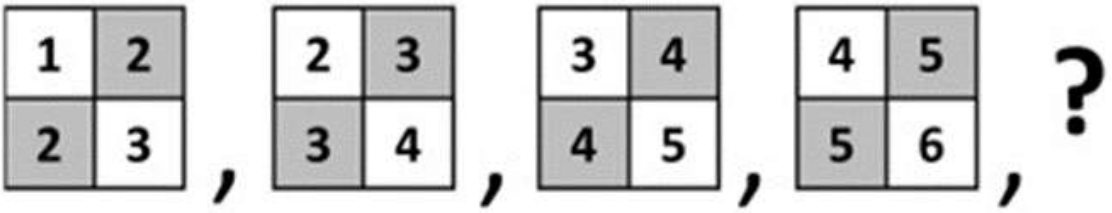
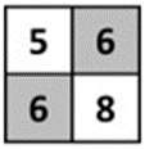
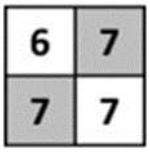
5. **What will come in place of "?" in the given series?**



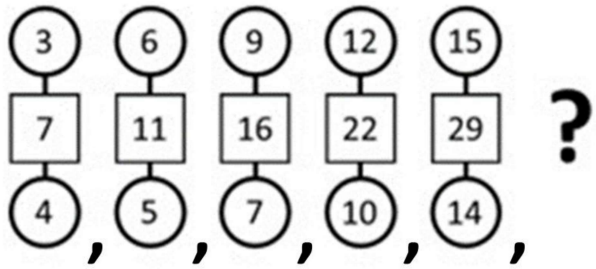
   a) 

   b) 

   c) 

   d) 

6. **What will come in place of "?" in the given series?**



a) 

b) 

c) 

d) 

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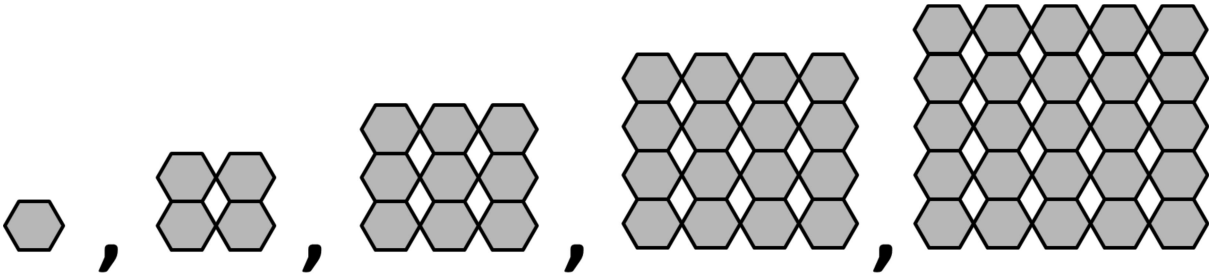
7. **The first five terms of a series formed using grey hexagons and white diamonds are given below. If the same pattern continues, how many diamonds will be present in the term where the number of hexagons is 144?**



a) 100 b) 135 c) 121 d) 169

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8. **Given below are two sets of numbers, P and Q. Which number from Set P can be interchanged with a number from Set Q such that both new sets follow a particular series or pattern?**
   Set P: (18, 22, 24, 27, 30)
   Set Q: (21, 24, 27, 31, 36)

a) 18 b) 27 c) 22 d) 30

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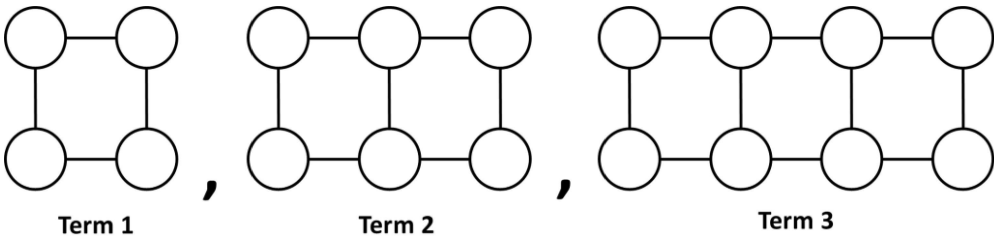
9. **The first three terms of a series of circles are shown below. If the pattern continues in the same manner, how many circles will be there in term 91?**



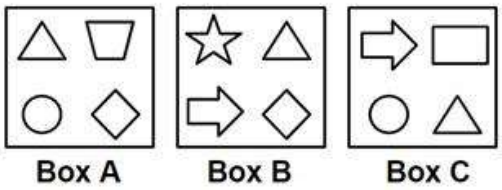
a) 184 b) 180 c) 194 d) 204

10. A pyramid has to be formed by combining cubes. Every level will have two fewer cubes than the level below it. If a pyramid is formed using at most 30 cubes, what is the maximum number of levels it can have?

a) 3 b) 4 c) 5 d) 6

The Thinking Spot

You must shoot exactly one item from each box, to eliminate it from its box. When an item is shot, the same item in the adjacent box is also eliminated. What is the MAXIMUM number of items that can be eliminated, after all 3 shots?



(a) 4 (b) 5 (c) 6 (d) 7

Chapter 3: Number Play

1. **Sachin plays a game using a standard die numbered 1 to 6. At each roll he scores points equal to the number shown. He may roll the die any number of times.**
   The game ends when the number 6 appears three times (the three 6's need not be consecutive).
   If the total score at the end of the game is 29, what is the minimum number of rolls Sachin could have made?

   a) 4 b) 5 c) 6 d) 7

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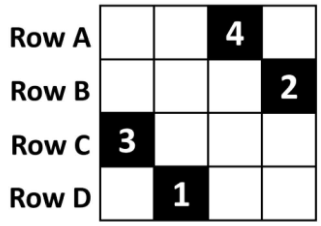
2. **In the given grid, each white square contains 1, 2, 3, or 4 hidden coins.**
   Each black square shows the maximum number of coins present in any of its adjacent white squares.
   If every row has the same total number of coins, what is the MAXIMUM possible number of white squares that contain exactly one coin?
   Note: *Two squares are adjacent only if they share a common side. Squares that share a common corner alone, are NOT considered as adjacent*



   a) 5 b) 6 c) 7 d) 8

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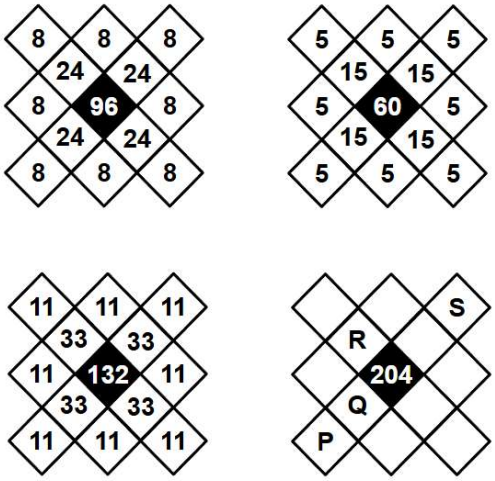
3. **If each of the given terms follows the same theme, what will be the value of P + Q + R + S?**



   a) 134 b) 136 c) 119 d) 142

4. **An arrow between any two squares, always points towards the square having a larger number. A and B are two DIFFERENT numbers. If the largest 5-digit number is formed using all five squares, what will be the difference between the final number and 10000?**

a) 44332 b) 54545 c) 54432 d) 44432

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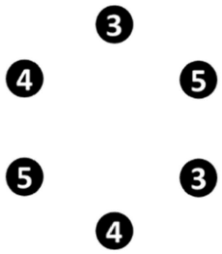
5. **How many different triangles can be formed by connecting the black dots in the image below, where the sum of the numbers at their corners is 12?**



a) 7 b) 6 c) 8 d) 5

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6. **Amat and Ankit each picked three numbers from the set {1, 2, 3, 4, 5, 6}.**
   - 3 different numbers picked by Amat add up to give the highest possible sum
   - 3 different numbers picked by Ankit add up to the second highest possible sum
   Which pair of numbers were picked by both Amat and Ankit?

   a) 3 and 4 b) 4 and 5 c) 5 and 6 d) 2 and 5

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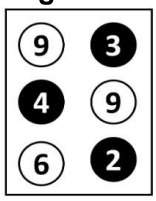
7. **A box contains six numbered circles coloured black and white.**
   A 6-digit number must be formed using all six circles, and the colours must alternate throughout the number. The first circle may be either black or white.
   Among all such numbers that can be formed, take the second smallest number and the second largest number. What is the difference between these two numbers?



Box

a) 683233 b) 684324 c) 685314 d) 583297

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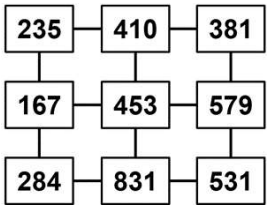
8. **I am a 5-digit number made up of both even and odd digits. I read the same backwards and forwards (palindrome). The greatest difference between at least two of my digits is 9. What is the smallest possible sum of my digits?**

   a) 9 b) 10 c) 11 d) 13

9. Count the number of blocks that are connected to at least one block containing a smaller number and one block containing a larger number than the number in it.



a) 2 b) 3 c) 4 d) 5

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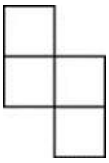
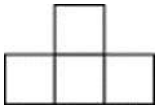
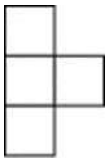
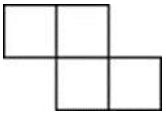
10. A 3 × 3 grid of digits is given below. Avi, Sam, Riya, and Maya each select a different digit from the grid such that:

- **The sum of the digits chosen by Avi and Sam is equal to the digit chosen by Maya**
- **The digit chosen by Riya is the largest among the four chosen digits**

Which of the following options shows a possible set of cells chosen by all four friends?

Note: *You cannot rotate the question or option images*

2	5	8
7	4	6
0	9	3

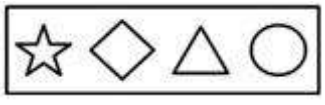
a)  b)  c)  d) 

The Thinking Spot

Four friends A, B, C, and D each selected a different shape from the shapes shown below, such that:

- **A selected a shape that is neither beside B's shape nor D's shape**
- **C and D did not select the triangle**

Who among them chose the circle?



(a) A (b) B (c) C (d) D