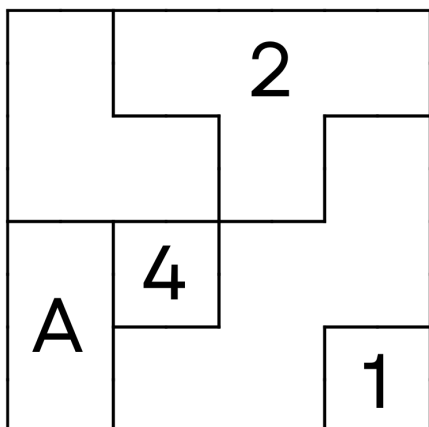


**AP Puzzles**  
**Section I — 60% of Exam Score**  
**Time — 20 minutes**  
**16 Questions**

1. Refer to the puzzle below:

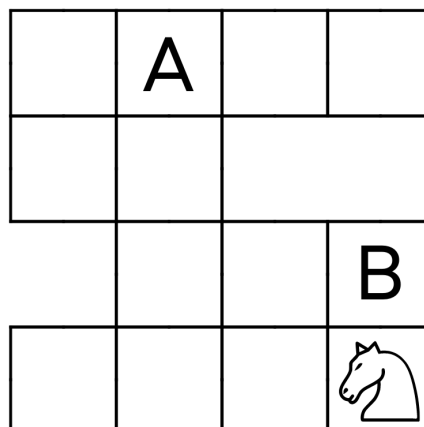


This is a Four-Number puzzle. Number each region with only a 1, 2, 3, or a 4. Adjacent regions (i.e. that share a border) cannot have the same number.

Some regions already have a number assigned to them. Use logical deduction to answer this question: Which (if any) numbers can possibly be located in the region labeled A?

- (A) Only 2
- (B) 1 and 2
- (C) Only 3
- (D) No numbers can reside in Region A.

2. Refer to the figure below:



The knight can't move to squares that have been removed from this 4×4 chessboard. Evaluate if the following statements are true:

I: It is eventually possible for the knight to reach Square A.

II: It is eventually possible for the knight to reach Square B.

- (A) I only
- (B) II only
- (C) I and II
- (D) Neither I nor II

3. For how many positive integers  $n$  is the number  $n^2 + n$  odd?

- (A) 0
- (B) 1
- (C) 2
- (D) Infinitely many

4. There are four boxes set up in the following formation:

A	B
C	D

There are four items, and each box contains exactly one of those items. The items: a block of gold, a block of silver, a block of bronze, and a BLT sandwich.

You are given the following clues:

I: The boxes containing the block of gold and block of silver do not share a border.

II: The block of bronze is not in Box B or Box D.

III: The BLT sandwich is not in Box B.

Which box is the BLT sandwich in?

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

5. Refer to question 4. Which box is the block of gold in?

- (A) Box A
- (B) Box B
- (C) Box C
- (D) Impossible to tell

6. Solve the following code:

> gerrf ner abg jnssyrf

If the first word of this code means "trees", what must the letter "n" mean?

- (A) "h"
- (B) "a"
- (C) "i"
- (D) "r"

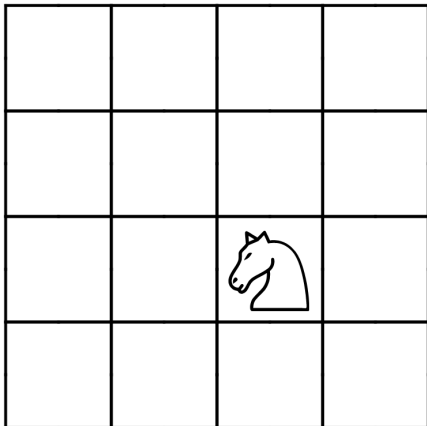
7. You are at an ice cream parlor. There are 8 unique ice cream flavors, 2 ways to hold your ice cream (cup or cone), and 10 unique toppings. You must choose one unique flavor, either a cup or a cone, and one unique topping.

If you choose cinnamon jelly beans as your topping, your ice cream will spontaneously combust. (Cinnamon jelly beans are 1 of the 10 unique toppings).

How many distinct orders from the ice cream parlor will not spontaneously combust?

- (A) 150
- (B) 144
- (C) 10
- (D) 16

8. A knight resides on a center square of a 4×4 chessboard, as shown:



Every time the knight moves, the square it leaves turns into lava – meaning the knight cannot return to that square. The knight is considered “trapped” if it cannot legally move to a square. The knight cannot exit the chessboard.

The knight can successfully trap itself in  $n$  moves. What is the smallest possible value of  $n$ ?

- (A) 3
- (B) 4
- (C) 5
- (D) 6

9. Refer to the figure in question 8. All (four) squares directly adjacent to the knight are turned into lava – so the knight cannot use those squares.

Now, the knight can successfully trap itself in  $k$  moves. What is the smallest possible value of  $k$ ?

- (A) 1
- (B) 2
- (C) 3
- (D) 4

10. Consider the following Mini-Sudoku:

	2	4	
	1		
A			
3			2

No row or column can contain repeats of the same number. Solve the puzzle. What number must 'A' be?

- (A) 1
- (B) 2
- (C) 3
- (D) 4

11. Refer to the following sequence of numbers:

1, 20, 9, 40, 25, 60, \_\_, \_\_

What is the sum of the two numbers that will come next?

- (A) 49
- (B) 129
- (C) 240
- (D) 80

12. You are planning the most epic birthday party ever. Thousands of people will attend, and since you need sufficient food + drink, you have 500 large bottles of grape juice. However, exactly one of the bottles is poisoned.

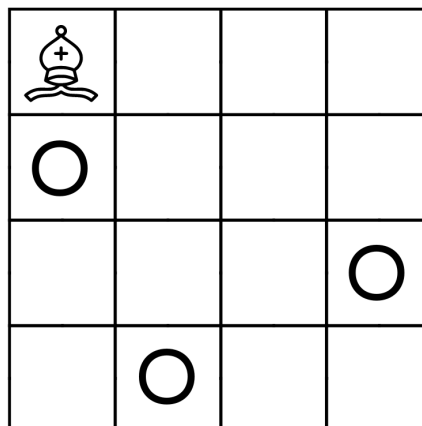
Anyone who drinks even the smallest bit of grape juice from the poisoned bottle will die within 8 - 10 hours. The poison exhibits no symptoms until death.

You have 500 mice at your disposal. You may make a mouse drink from any number of the 500 bottles.

Your party begins in 15 hours. What is the minimum number of mice you need, to find – with 100% certainty – the poisoned bottle of grape juice?

- (A) 9
- (B) 50
- (C) 250
- (D) 500

13. See the diagram below.



The bishop located in the top left square, and only has two moves at any given point:

I: Move diagonally any number of squares in any diagonal direction.

II: Move exactly one square down.

For this question, ignore the presence of the Os. How many squares can the bishop never move to?

- (A) 0
- (B) 2
- (C) 4
- (D) 8

14. Refer to question 13.

The bishop wishes to land on all of the Os indicated on the board. What is the minimum number of moves that the bishop needs, from its starting position, to visit all 3 Os?

- (A) 4
- (B) 5
- (C) 6
- (D) 7

15. Refer to question 13.

The bishop in question 13 is replaced with a king. The king is a normal chess king and can move one square in any direction (including diagonally).

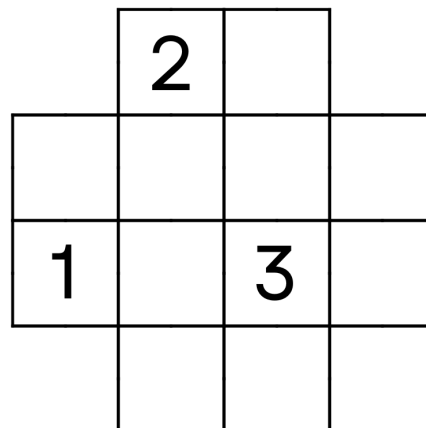
Now, the 3 squares labeled 'O' in question 13 are pits of lava and completely uninhabitable. The king cannot land on the pits of lava.

The king loves chocolate, and places a piece of chocolate on every square he lands on. There is already a piece of chocolate in the top left corner.

How many moves must the king make so that every square (that's not a lava pit) has at least one square of chocolate?

- (A) 11
- (B) 12
- (C) 13
- (D) 14

16. Review the figure below.



This is a 4×4 chessboard with the corners removed. A chess knight begins at Square 1, and hops to Squares 2 and 3 in succession.

Every time the knight moves, the square it leaves turns into lava – meaning the knight cannot return to that square. The knight is now at Square 3, which means that Squares 1 and 2 are now lava.

The knight is considered “trapped” if it cannot legally move to a square. The knight cannot exit the chessboard.

The knight will try to make as many moves as possible before becoming trapped. When the knight is finally trapped, how many squares will be lava?

- (A) 6
- (B) 10
- (C) 11
- (D) 12