







**4-5. Arithmetic Square (Unassigned) [Andrey Lemesh] (28, 43 points)**

Place the numbers from 1 to 9 into the square cells (a different single number in each cell), and place the given list of six numbers into the circular cells (not necessarily in the same order), so that the indicated equations are correct. Evaluate from left-to-right and top-to-bottom (ignore the usual precedence of the operators).

*It is possible for expressions and partial expressions to be negative or non-integral.*

**Answer:** For each designated row, enter the contents of the *square* (not circular) cells, in order from left to right.

**Example Answer:** 938, 641, 725

12, 19, 22, 24, 24, 24

$$\begin{array}{l} \rightarrow \begin{array}{c} \boxed{9} \div \boxed{3} \times \boxed{8} = \textcircled{24} \\ + \quad \times \quad - \\ \boxed{6} \times \boxed{4} \div \boxed{1} = \textcircled{24} \\ + \quad \times \quad + \\ \boxed{7} \times \boxed{2} + \boxed{5} = \textcircled{19} \\ = \quad = \quad = \\ \textcircled{22} \quad \textcircled{24} \quad \textcircled{12} \end{array} \end{array}$$

18, 18, 18, 18, 20, 20

$$\begin{array}{l} \textcircled{4a} \rightarrow \begin{array}{c} \boxed{\phantom{0}} \times \boxed{\phantom{0}} \times \boxed{\phantom{0}} = \textcircled{\phantom{0}} \\ + \quad \times \quad \times \\ \boxed{\phantom{0}} \times \boxed{\phantom{0}} + \boxed{\phantom{0}} = \textcircled{\phantom{0}} \\ + \quad \times \quad - \\ \boxed{\phantom{0}} + \boxed{\phantom{0}} + \boxed{\phantom{0}} = \textcircled{\phantom{0}} \\ = \quad = \quad = \\ \textcircled{\phantom{0}} \quad \textcircled{\phantom{0}} \quad \textcircled{\phantom{0}} \end{array} \end{array}$$

11, 12, 12, 12, 12, 21

$$\begin{array}{l} \textcircled{5a} \rightarrow \begin{array}{c} \boxed{\phantom{0}} + \boxed{\phantom{0}} - \boxed{\phantom{0}} = \textcircled{\phantom{0}} \\ \times \quad \div \quad + \\ \boxed{\phantom{0}} - \boxed{\phantom{0}} + \boxed{\phantom{0}} = \textcircled{\phantom{0}} \\ - \quad \times \quad + \\ \boxed{\phantom{0}} \div \boxed{\phantom{0}} \times \boxed{\phantom{0}} = \textcircled{\phantom{0}} \\ = \quad = \quad = \\ \textcircled{\phantom{0}} \quad \textcircled{\phantom{0}} \quad \textcircled{\phantom{0}} \end{array} \end{array}$$







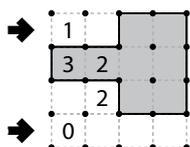
### 10-11. Slitherlink (Unequal Lengths) [Dmitry Grishchenko] (39, 62 points)

Draw a single, non-intersecting loop that only consists of line segments between the dots along the dotted lines. A number inside a cell indicates how many of the edges of that cell are part of the loop.

The loop goes straight through a different number of dots (possibly zero) before and after each turn of the loop. (In other words, if you write down the distance between two consecutive turns of the loop in the order in which you go around the loop, you will never write down two of the same number in a row.)

**Answer:** For each designated row, enter its contents from left-to-right. Use '0' for a cell inside the loop and 'x' for a cell outside the loop.

**Example Answer:** xx00, xxxx



**10a** →

2	2						
2				3		0	
			0				
				0			
							3
2							
1		1		0			2
						2	2

**10b** →

**11a** →

	3		2		3		1	
				3		2		3
								1
			3		3		3	
	2			3				
					1		3	
2	2							
		3		3				1
			1		2			

**11b** →





### 14. Doppelblock [Dmitry Grishchenko] (30 points)

Place either a block or a number from 1 to X (integers only) into each cell so that each number appears exactly once in each row and each column. (X is two fewer than the number of cells in each row.) Each row and each column will therefore have exactly two cells with blocks in them. The numbers outside the grid indicate the sum of the numbers between the two blocks in that row or column. Some cells may already be filled in for you.

**Answer:** For each designated row, enter its contents from left to right. Use 'x' to denote a block. Use only the last digit for two-digit numbers; e.g., use '0' for the number 10. Do not include any given numbers outside the grid.

**Example Answer:** 21XX3, 1X23X

		2			0	
4	→	■	3	1	■	2
		2	1	■	■	3
6	→	■	2	3	1	■
		1	■	2	3	■
5	→	3	■	■	2	1

		20	11	6	2	0	0	16	3
14a	→	1							
		5							
14b	→	14							
		6							
		14							1
		5							
		15							
		16							

### 15. Doppelblock (Variable) [Dmitry Grishchenko] (80 points)

Place either a block or a number from into each cell so that the numbers in each row and each column are precisely the numbers in the provided list (not necessarily in the same order). Each row and each column will have exactly two cells with blocks in them. The numbers outside the grid indicate the sum of the numbers between the two blocks in that row or column. Some cells may already be filled in for you.

**Answer:** For each designated row, enter its contents from left to right. Use 'x' to denote a block. Use only the last digit for two-digit numbers; e.g., use '0' for the number 10. Do not include any given numbers outside the grid.

**Example Answer:** 3X5X5, 53XX5

			{3,5,5}						
		10	5						
→		3	■	5	■	5			
13	→	■	5	3	5	■			
3	→	5	5	■	3	■			
0	→	■	■	5	5	3			
→		5	3	■	■	5			

		{1,1,2,3,5,8}							
		8	1	16	10	3	17	10	
19	→								
		19							
		5							
10	→								
				1					
15b	→								



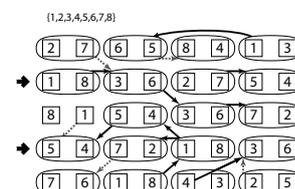




**19. Arithmetical City [Ivan Grishchenko] (151 points)**

Place a number from the provided set into each (square) cell so that each number appears at most once (but possibly zero times) in each row and column. Some groups of numbers are surrounded with ovals along rows and columns; those ovals should be considered to represent multi-digit numbers, reading the squared numbers from left-to-right (for rows) or top-to-bottom (for columns). Multi-digit numbers may not start with 0.

Some cells and/or ovals are connected with arrows. A dotted arrow points from a smaller number to a larger number (the two numbers may not be equal). A solid arrow points from a number to a positive multiple of that number (the two numbers are allowed to be equal, but neither number can be 0).



**Answer:** For each designated row, enter the contents of the (square) cells, from left-to-right. Use only the last digit for two-digit numbers; e.g., use '0' when the cell contains the number 10.

**Example Answer:** 18362754, 54721836

{0,1,2,3,4,5,6,7,8,9}

