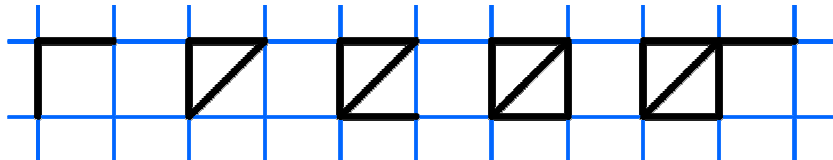


Comprehensive school mathematics competition 4.11.2009

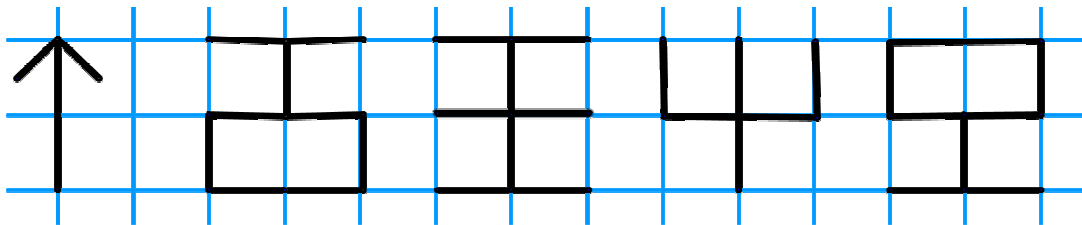


Competition time is 50 minutes. Write all answers into a separate answer paper. Justify your answers with an expression, a drawing or an explanation. Return this question paper together with the answer paper.

1. a) Draw the seventh figure of the sequence.



b) Draw the next figure of the sequence. What is the rule of the sequence?



2. Calculate how many

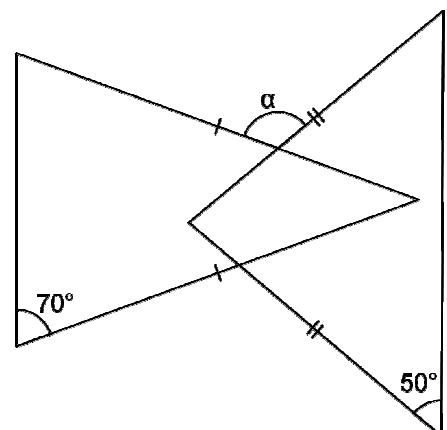
- a) grams (g) is one ounce (oz.)
- b) ounces (oz.) is one pound (lb.)
- c) grams (g) is one pound (lb.).

3. Calculate the sum, the difference and the quotient of the numbers

$$1 \text{ and } \frac{1}{999\,999\,999\,999}$$



4. Figure out the size of angle α .
Bases are parallel.



5. Draw a circle whose radius is six squares. Divide the circumference of the circle into eight equal parts. Draw eight arcs of a semi-circle so that one end point of an arc is one of the division points and another is the centre of the circle. Draw a clear picture using a compass.

Shade every other of the formed areas. What fraction of the area of the circle is shaded? Justify your answer.

6. Calculate the sum of the missing numbers.
Write down the operations or explain your solution.

Each column, each row, and each one of the $3 \cdot 3$ blocks of the grid needs to have digits 1, 2, 3, ..., 9 only one time each.

	9	3	7		2			
	7					5		
8				5				6
3		9					1	
	6		1		7		5	
	4					8		2
4				3				1
		1					8	
			8		5	2	9	

7. Vertices of a square are at the intersections of lines on squared paper and the side is five units of length (sides of small squares) long. A circle is drawn so that one of the vertices is the centre of the circle and the circumference of the circle goes through the vertex that is opposite to the centre. How many intersections of lines on the paper does the circumference of the circle cross? Draw a picture. Check your answer by calculating.
8. An online community has girls and boys as members.
Every girl has four girls and five boys as friends.
Every boy has three boys and seven girls as friends.
- Does the online community have more girls or more boys?
Justify your answer.
 - What is the least possible amount of members at the online community?
Justify your answer.