



ECIS Mathematics League
Archimedes League 2006
(Suggested age 12-14)

Section One

**Calculators are not
allowed**

Time: 40 minutes

- 1 Find the next number in the pattern: 41, 32, 23, 14, 5...

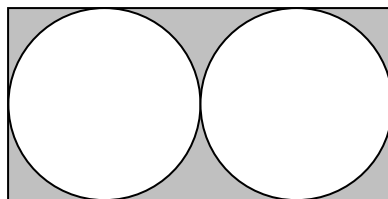
- 2 Evaluate $10\,000 - 1\,000 + 100 - 10 + 1$

- 3 The height of a triangle is reduced by one-third but its area remains the same. How much must the base increase by for this to be true (be careful, the answer is not 3!)?

- 4 $A - B = B$
 $B \times C = A$
 $D \div B = E$
 $C \times C = E$
 $C + E = A$
What is the sum $A + B + C + D + E$?

- 5 A sheet of paper 160 mm long and 240mm wide is folded in half 6 times, each time folding parallel to the shortest edge. Assuming each fold is perfect leaving perfect rectangles, what is the area of the smallest rectangle?

6. What percentage of the rectangle is white (leave π in your answer)?





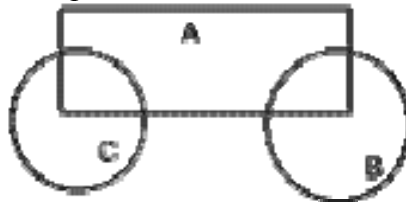
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Section Two

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Time: 40 minutes

- 1 Find the average of $\frac{2}{3}$, 0.7 , and $\frac{55}{100}$.
- 2 The Fibonacci sequence is 1, 1, 2, 3, 5, 8, 13, 21, Write next three terms of the sequence.
- 3 Cici, Didi, Fifi, Gigi and Mimi have different amounts of money. Neither Gigi nor Cici have as much money as Fifi. Both Cici and Didi have more money than Mimi. Gigi has more money than Mimi but less than Cici. Who has the smallest amount of money?
- 4 In a park there are three flowerbeds which overlap as shown in the diagram. Flowerbed A has 500 plants, in B there are 450 and in C there are 350. Flowerbeds A & B have 50 plants in the shared area, while flowerbeds A and C share 100 plants. What is the total number of plants in the three flowerbeds?



- 5 Complete the table below using the rule: the sum of any three successive numbers in the table is 20.

8								5		
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- 6 If $5x - 3 = 5$, find the value of $10x - 10$.



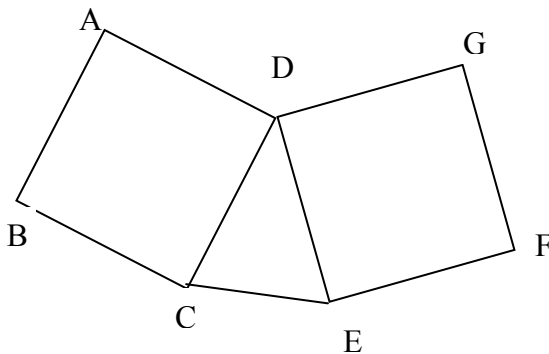
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Section Three

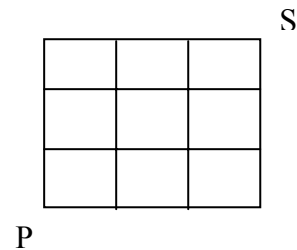
**Calculators are not
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Time: 40 minutes

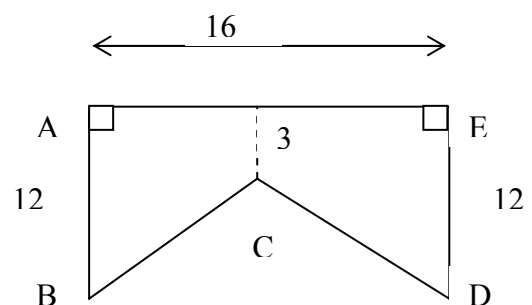
1 On the diagram below angle DCE is 70° and ABCD and DEFG are equal squares. Find in degrees obtuse angle ADG.



- 2 If 10% of X is equal to 25% of 16, what is the value of X?
- 3 If $(a,b) \otimes (c,d) = ac + bd$ and $(x,3) \otimes (-2,5) = 3$, then find the value of x.
- 4 Mark is counting forwards 1, 2, 3, ...; at the same time and at the same speed, Elena is counting backwards $x, x-1, x-2, \dots$. When Mark says 53, Elena says 75. What must x be?
- 5 On the diagram below point of intersection S is three blocks East and three blocks North of the point of intersection P. A person walks six blocks from P to S along the streets shown (black lines). What is the number of different paths from P to S?



6 Find the area of the given pentagon ABCDE.





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Answers:

Round 1

1. -4
2. 9091
3. by one – half, (accept 1.5b or 3/2 b)
4. 27
5. $600 \text{ mm}^2 \left(\frac{160}{2^3} \times \frac{240}{2^3} \right)$
6. 25π

Round 2

1. 23/36
2. 34, 55, 89
3. Mimi
4. 1150
5. 87587587587
6. 6

Round 3

1. 140
2. 40
3. 6
4. 127
5. 20
6. 120 units square (accept without units)