TEAM CONTEST

Time：60 minutes

Instructions:

- Do not turn to the first page until you are told to do so.

- Remember to write down your team name in the space indicated on every page.

- There are 10 problems in the Team Contest, arranged in increasing order of difficulty. Each question is printed on a separate sheet of paper. Each problem is worth 40 points and complete solutions of problem 2, 4, 6, 8 and 10 are required for full credits. Partial credits may be awarded. In case the spaces provided in each problem are not enough, you may continue your work at the back page of the paper. Only answers are required for problem number 1, 3, 5, 7 and 9.

- The four team members are allowed 10 minutes to discuss and distribute the first 8 problems among themselves. Each student must attempt at least one problem. Each will then have 35 minutes to write the solutions of their allotted problem independently with no further discussion or exchange of problems. The four team members are allowed 15 minutes to solve the last 2 problems together.

- No calculator or calculating device or electronic devices are allowed.

- Answer must be in pencil or in blue or black ball point pen.

- All papers shall be collected at the end of this test.

English Version

For Juries Use Only

No.	1	2	3	4	5	6	7	8	9	10	Total	Sign by Jury
Score												
Score												

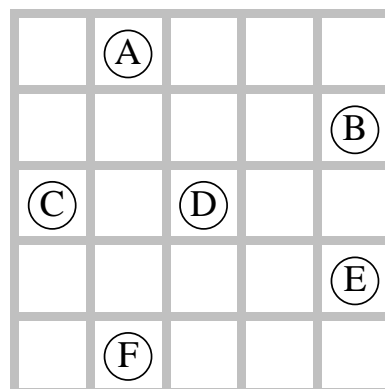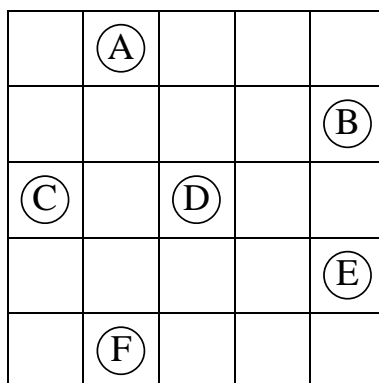# TEAM CONTEST

2nd July 2013   Burgas, Bulgaria

Team :   Score :

1. A 5 × 5 farm contains the houses of six farmers A, B, C, D, E and F, as shown in the diagram below. The remaining 19 squares are to be distributed among them. Farmer D will get 5 of these squares, farmers A and F will get 4 each and farmers B, C and E will get 2 each. The farmers can only take squares that are in the same row or column as their houses, and their squares must be connected either directly to their houses or via other squares which they get. On the diagram provided for you to record your answer, enter A, B, C, D, E or F in each blank square to indicate which farmer gets that square.

Answer:

TEAM   CONTEST

2nd July 2013   Burgas, Bulgaria

Team：_____   Score：_____

2. Meifeng wrote a short story in five days. The number of words written in each day is a positive integer. Each evening, she recorded the total number of words she had written so far. Then she divided her first number by 1×2, her second number by 2×3, her third number by 3×4, her fourth number by 4×5 and her last number by 5×6. The sum of these five fractions is 5. What is the minimum number of words in Meifeng's short story?

Answer: _____

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TEAM   CONTEST

2nd July 2013   Burgas, Bulgaria

Team :

Score :

3. The diagram below shows nine circles each tangent to all its neighbours. One of the circles is labeled 1. The remaining circles are to be labeled with 1, 2, 3, 3, 3, 4, 4 and 4, such that no two tangent circles have the same label. In how many different ways can this be done?

Answer:

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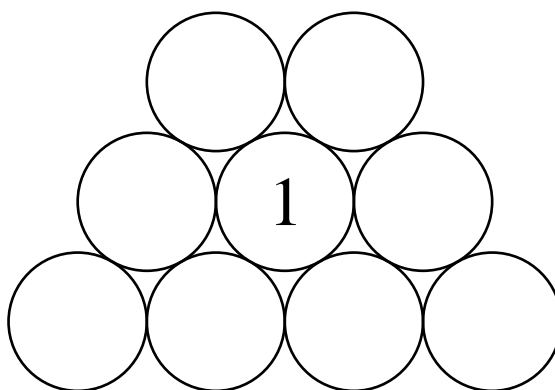
TEAM   CONTEST

2nd July 2013   Burgas, Bulgaria

Team：   Score：

4. In the diagram below, triangles *ABC* and *CDE* have the same area, and *F* is the point of intersection of *CA* and *DE*. Moreover, *AB* is parallel to *DE*, *AB* = 9 cm and *EF* = 6 cm. What is the length, in cm, of *DF* ?
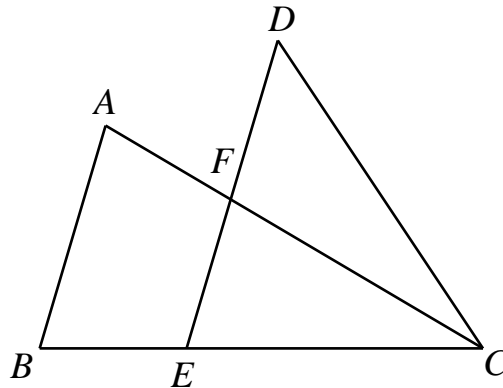
Answer: _____ cm

TEAM CONTEST

2ⁿᵈ July 2013   Burgas, Bulgaria

Team：_____   Score：_____

5. A shop has 350 souvenirs which cost 1, 2, 3, …, 349 and 350 dollars respectively. Daniela has 50 two-dollar bills and 50 five-dollar bills but no other money. She wants to buy one souvenir, and insists on paying the exact amount (without any change). How many of these 350 souvenirs can be the one she chooses?

Answer:_____

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TEAM   CONTEST
2nd July 2013   Burgas, Bulgaria

Team：_____   Score：_____

6.   The sum of 1997 positive integers is 2013. What is the positive difference
between the maximum value and the minimum value of the sum of their squares?

Answer: _____

TEAM CONTEST

2nd July 2013   Burgas, Bulgaria

Team： _____   Score： _____

7.   The number 16 is placed in the top left corner square of a 4 × 4 table. The remaining 15 squares are to be filled in using exactly once each of the numbers 1, 2, …, 15, so that the sum of the four numbers in each row, each column and each diagonal is the same. What is the maximum value of the sum of the six numbers in the shaded squares shown in the diagram below?
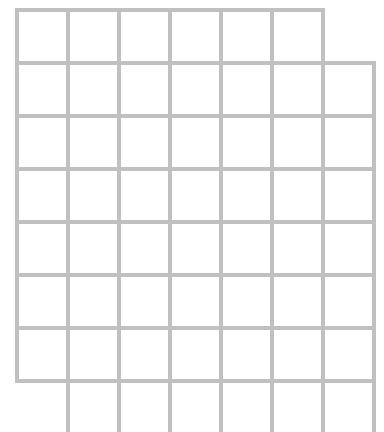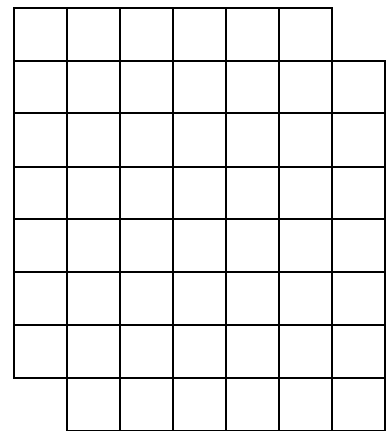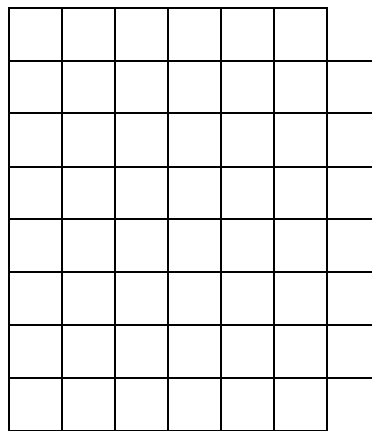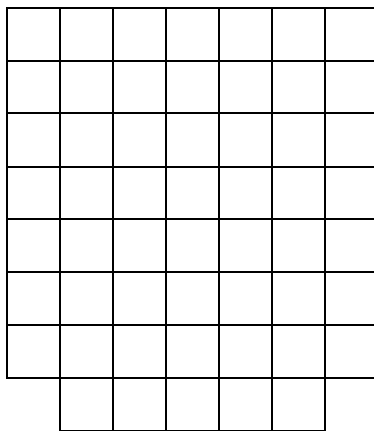
Answer: _____

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2nd July 2013   Burgas, Bulgaria

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8. Two corner squares are removed from a 7×8 rectangle in the three ways shown in the diagram below. We wish to dissect the remaining part of the rectangle into 18 copies of either the 1×3 or the 3×1 rectangle. For each of the three cases, either give such a dissection or prove that the task is impossible.

Answer:

TEAM CONTEST
2nd July 2013 Burgas, Bulgaria

Team：   Score：

9. The 9 squares in the diagram below are to be filled in using exactly once each of the digits 0, 1, …, 8, so that the equation is correct. What is the minimum value of the positive difference of the two three-digit numbers on the left side of the equation?

$$\boxed{} + \boxed{} + \boxed{} + \boxed{} = \boxed{9\ 9\ 9}$$

Answer:

TEAM CONTEST
2nd July 2013   Burgas, Bulgaria

Team：_____   Score：_____

10. Each ten-digit numbers in which each digit is 1, 2 or 3 is painted in exactly one of the colours red, green and blue, such that any two numbers which differ in all ten digits have different colours. If 1111111111 is red and 1112111111 is blue, what is the colour of 1231231231?

Answer:_____