INTERNATIONAL MATHEMATICS AND SCIENCE OLYMPIAD FOR PRIMARY SCHOOLS (IMSO) 2009

Mathematics Contest (Second Round) in Taiwan, Essay Problems

Name:_____ School:_____ Grade:_____ Number:_____

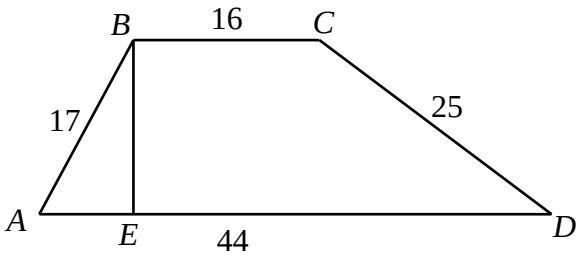
Answer the following 10 questions, and show your detailed solution in the space provided after each question. Each question is worth 4 points.
Time limit: 60 minutes.

1. There are two clocks. One of them gains 6 seconds in every hour, while the other loses 9 seconds in every hour. If they are both set to show the same time, and then set going, how long will it be before the time displayed on them is exactly 1 hour apart?

2. Replace the asterisks in 86**** with the digits 1, 2, 3 and 4. Using each of them once so that the six-digit number obtained is the largest possible number divisible by 132.

3. There are two isosceles triangles. They are equal in area. In both triangles all edges measure an exact number of cm, and the two edges of equal length are 13 cm. In one of them the third edge measures 10 cm. What is the length of the third edge of the other?

4. In a quadrilateral *ABCD*, *BC* is parallel to *AD*. *E* is the foot of the perpendicular from *B* to *AD*. Find *BE* if *AB*=17, *BC*=16, *CD*=25 and *AD*=44.



5. Three different numbers from 1 to 10 were written on three cards. The cards were shuffled and dealt to three players. Each player got one card and wrote down the number of his card. Then the cards were collected and dealt again. After several deals the three players reported the totals of their written numbers, which were 13, 15, and 23. What numbers were written down on the cards at the beginning?

6. Five students A, B, C, D, and E competed in solving a math problem. The complete solution to the problem was awarded 10 points and a partial solution – an integer between 2 and 9. Each student scored some number of points so that : A, B, and C were awarded 15 points together; and B, C and D were awarded 12 points together. All students got different scores. The student A had the highest score and student E who scored 6 points, was placed third. What was the score of student D?

7. A grandmother has two grandsons. Her age is a two-digit number. The first digit is equal to the age of the first grandson, and the second digit is equal to the age of the second grandson. If the sum of their ages is 69, how old is the grandmother?

8. A 'Lucky number' has been defined as a number which can be divided exactly by the sum of its digits. For example: 1729 is a Lucky number since 1 + 7 + 2 + 9 = 19 and 1729 can be divided exactly by 19. Find the smallest Lucky number which is divisible by 13

9. In the middle of a large field there is a wooden hut on a rectangular base measuring 10 m by 6 m. Outside the hut, and tethered by a chain to one corner is a goat. Over what area can the goat graze if the tether is 15 m long?
(Using $\pi = 3.14$)

10. A chess-board is made up of 64 black and white squares in the normal way, each having an edge length of 10 cm. On this board the largest possible circle is drawn so that it's circumference does not pass through a black square. What is the radius of the circle?