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9th International Mathematics and Science Olympiad (IMSO) for Primary School 2012

Instructions:

- * Write down your name and country on every page.
- * You have 90 minutes to work on this test.
- * Write down your detail solutions or working process in English in the space below the question.
- * Use pen or pencil to write your answer.



“Smart, Skilled, and Creative In a Joyful Competition for Excellence”

**City Montessori Inter College,
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27 Oct. – 2 Nov 2012**

NAME _____ *COUNTRY* _____

ESSAY PROBLEMS

NAME _____ *COUNTRY* _____

1. The sum of the numbers A , B and C is 390. Given that A is 3 times of B and A is one third of C , find the value of C .

ANSWER: _____

2. A palindrome is a number which reads the same backwards as forwards. A car odometer read 26962 km. After two hours driving the odometer showed the next palindrome. What was the average speed of the car, in km per hour?

ANSWER: _____ **km per hour**

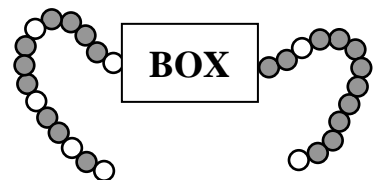
ESSAY PROBLEMS

NAME _____ COUNTRY _____

3. Class A has 10 students and class B has 15 students. In a test, the average grade for class A is 60, and the average grade for class B is 66. A new student writes the test in the office. If he is put in class A, its average will become 62. If he is put in class B, what will its average become?

ANSWER: _____

4. Helen has a string of black beads and white beads which follows a certain pattern. She put a portion of the string beads inside the box as shown in the diagram on the right. How many black beads are there in the portion of the string inside the box?



ANSWER: _____ **black beads**

ESSAY PROBLEMS

NAME _____ *COUNTRY* _____

5. Two years ago, Steve was three times as old as Bill, and in three years he will be twice as old as Bill. Find the sum of their ages.

ANSWER: _____

6. Dad walks at 6 km per hour when alone and mom walks at 4 km per hour when alone. When they walk together, they compromise at 5 km per hour. They leave home to go to the store 1 km away. Six minutes after leaving home, dad has to return for the shopping list while mom goes on. How long does mom have to wait in the store, in minutes, before dad arrives with the shopping list?

ANSWER: _____ **minutes**

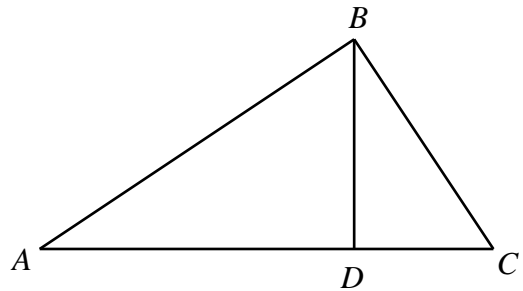
ESSAY PROBLEMS

NAME _____ COUNTRY _____

7. A says, "I ate it."
B says, "The one who ate it was either C or D."
C says, "Exactly one of A and B is lying."
D says, "C did not eat it."
If exactly two of them are lying, who ate it?

ANSWER: _____

8. In the right diagram, $\angle ABC = \angle BDC = 90^\circ$.
If $\frac{AD}{DC} = \frac{9}{4}$, then what is the value of $\frac{BD}{AC}$?



ANSWER: _____

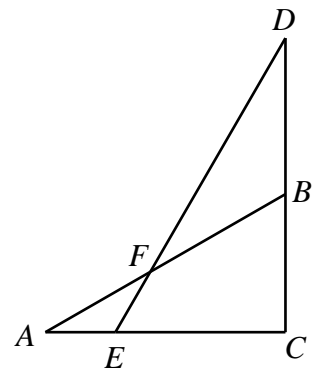
ESSAY PROBLEMS

NAME _____ COUNTRY _____

9. A three-digit number is multiplied by a two-digit number whose tens' digit is 9. The product is a four-digit number whose hundreds digit is 2. How many three-digit numbers satisfy this condition?

ANSWER: _____

10. ABC is a triangle with a right angle at C . E is a point on AC and D is a point on the extension of CB such that triangle DEC is similar to triangle ABC . AB cuts DE at F , and $AE=EF$. Calculate $\angle ABC$, in degrees.



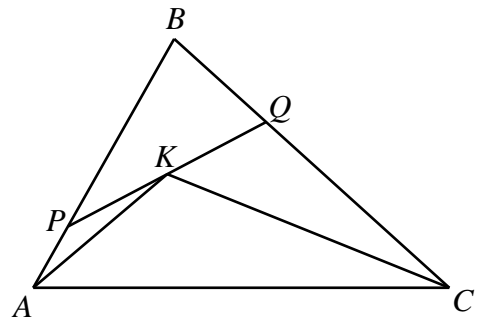
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ANSWER: _____

ESSAY PROBLEMS

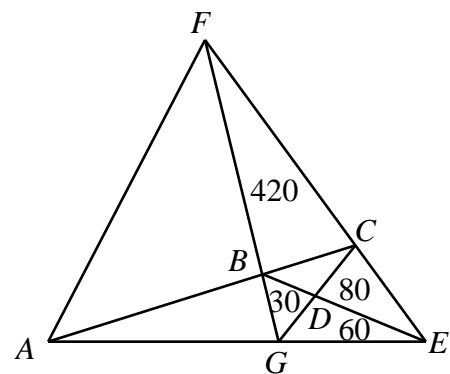
NAME _____ COUNTRY _____

11. P and Q are the points on the sides AB and BC of a triangle ABC respectively such that $BP=3PA$ and $QC=2BQ$. K is the midpoint of the segment PQ . If the area of the triangle ABC is 120 cm^2 , find the areas of the triangle AKC , in cm^2 .



ANSWER: _____ cm^2

12. A triangle is divided into seven triangles. The areas of four of them are 420 cm^2 , 80 cm^2 , 60 cm^2 and 30 cm^2 as shown in the diagram on the right. Find the area of triangle AEF , in cm^2 .

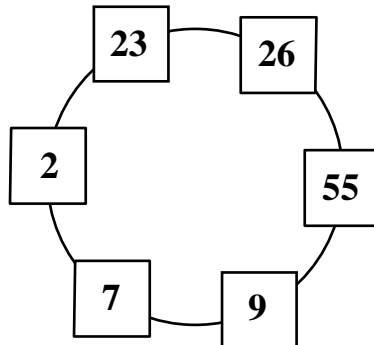


ANSWER: _____ cm^2

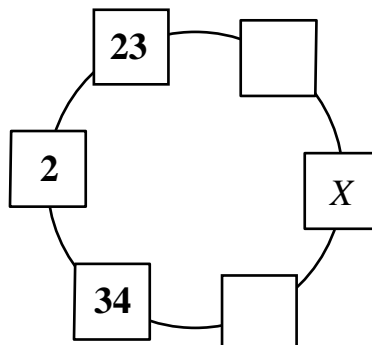
ESSAY PROBLEMS

NAME _____ COUNTRY _____

13. The diagram below shows six distinct positive integers in a ring and the sum of any two neighboring numbers is a perfect square.



The below diagram is to be filled with six different positive integers such that it has the same property. If $X \leq 20$, find all possible values of X .



ANSWER: _____