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Mathematics Essay Problems

International Mathematics and Science
Olympiad (IMSO)
for Primary School 2004

Jakarta, November 29 - December 3, 2004

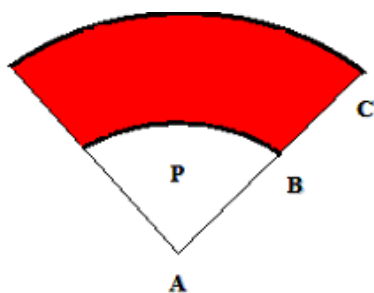
Instructions:

- * Write down your name and country on every page.
- * Answer all 13 questions.
- * You have 90 minutes to work on this test.
- * Write down your answer and the explanation on the space below the question.

Name :
Country :

1. In a classroom, $\frac{1}{4}$ of the pupils are girls. After 10 boys leave the room, the portion of the girls in the room becomes $\frac{1}{3}$. What is the total number of pupils before the 10 boys leave?

2. If $AB = BC$, and the area of P is 3 cm^2 , shown as in the figure below, what is the area of the shaded region, in cm^2 ?

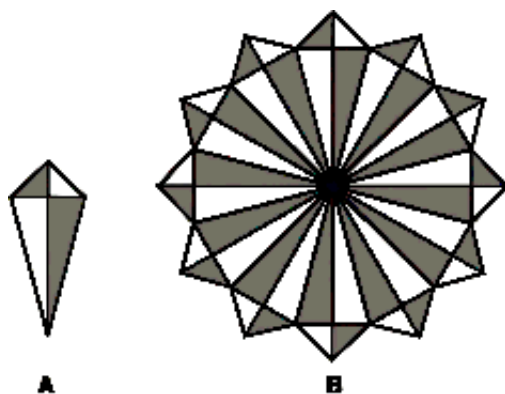


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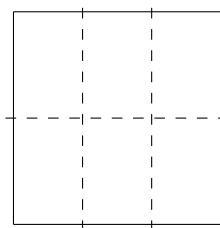
3. Udin bought some mangoes from the market. He paid 13,000 rupiahs for every 7 mangoes. He sells the mangoes at the price of 7,000 rupiahs for every 3 of them. When he sells out all the mangoes, he gets a profit of 50,000 rupiahs. How many mangoes did he buy from the market?
4. In a contest, one gets 8 points for every correct answer, and 5 points is deducted for every wrong answer. Ben gets 65 points for a total of 26 questions in this contest. How many questions did he answer correctly?

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5. Figure A is a kite with diagonals 10 cm and 4 cm. Figure B is constructed from a number of figure A . Find the area of the shaded region in figure B , in cm^2 .



6. A square is divided into six congruent rectangles, as shown in the figure. The total sum of the perimeter of the six rectangles is 100 cm. What is the area of the original square, in cm^2 ?



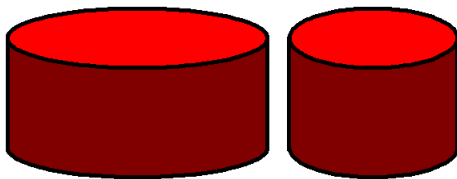
Name :
Country :

7. A grandfather's clock rings once every 15 minutes after the hour, rings twice every 30 minutes after the hour, and rings 3 times every 45 minutes after the hour. The clock rings the same number of times as the hour, at the exact hour (for example, rings once at 1 o'clock, rings 12 times at 12 o'clock). What is the total number of times the clock rings from 5:55 pm to 6:05 am the next day?
8. We want to put nine identical balls in three boxes. The blue box can contain at most 2 balls, the red box can contain at most 4 balls, while the white box can contain at most 5 balls. In how many ways can we put the nine balls in the three boxes?

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9. A tank was completely filled with water. Overnight, the tank lost 7% of its content. After that, if 301 liters of the water was used, then the tank is exactly half-filled. Find the capacity of the tank, in liter.

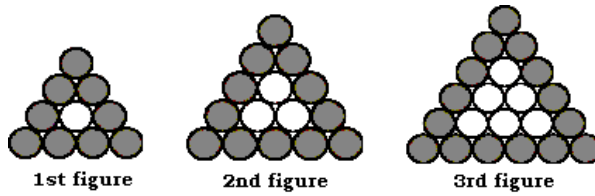
10. A cake shop sells cakes in two sizes: small and large. The radius of the small cake is 5 cm and the radius of the large one is 10 cm. The heights are the same. The price of the large cake is 4,000 rupiahs and the small one is 2,000 rupiahs. There are two packages: package *A* contains one large cake, and package *B* contains two small cakes. Which package is cheaper?



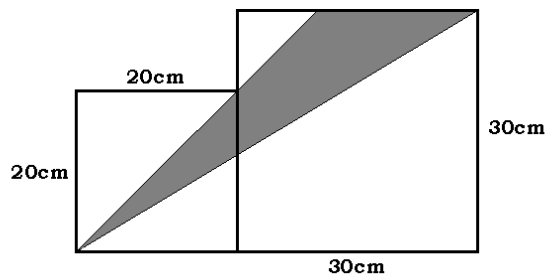
Name :

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11. If the pattern continues in the following figures, how many shaded circles are there in the 20th figure?



12. In the figure below, find the area of the shaded region, in cm²?



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Country :

13. The average height of children in a group is 139 cm. Andi, whose height is 140 cm, is a member of the group. When he left the group, Beni, Coki, Doni and Ernie want to become member. But the remaining members of the group want to keep the average height unchanged. The height of Beni is 138 cm, Coki is 139 cm. Doni and Ernie are of the same height, that is 141 cm. If choosing more than one new member is allowed, in how many ways can the group choose?