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ESSAY PROBLEMS

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.
* Use pen to write your answer.
* Use pencil only to draw figures.

Name : .....
Country : .....

1. John gives $\frac{1}{6}$ of his marbles to Alex and 20 marbles to Simon. John's remaining marbles is now 55. How many marbles does John have originally?
   answer:

2. The total number of ducks and chickens in the garden is 335. If the number of chickens is $\frac{2}{3}$ of the number of ducks, how many chickens are there in the garden?
   answer:

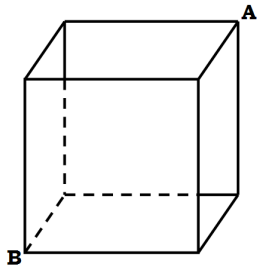
Name : .....
Country : .....

3. Mr. Sweet has three kinds of books: 120 mathematics, 144 biology, and 100 physics books. He is going to give all the books to the schools in his village such that each school receives the same number of mathematics, biology and physics books. How many schools, at most, receive books from Mr. Sweet?
answer:

4. Jerry is riding a motorbike at 60 km/hour while Tom is riding his motorbike at 45 km/hour in the same direction from the same starting point. Jerry left $1\frac{1}{3}$ hours later than Tom did. How long will it take Jerry to catch up Tom?
answer:

Name : .....
Country : .....

5. An ant moves on the surface of a cube from vertex A to vertex B. Draw the shortest path from A to B passed by the ant.



answer:

6. Jack and Ben are cycling from A to B. Jack travels at a speed of 15 km/hour while Ben travels at a speed of 12 km/hour. It takes Ben 15 minutes more to complete his travel than Jack does. What is the distance between A and B?
answer:

Name : .....
Country : .....

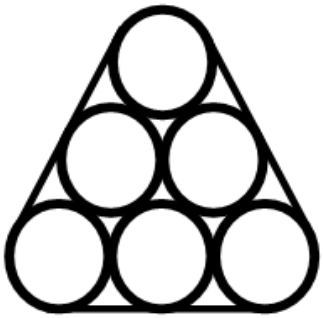
7. A student carried out an experiment to compare the lifetime of two types of light bulbs. She obtained the following results:

   a. The lifetime of type A bulbs are 140, 125, 135, 141, 135, 142 and 123 days.

   b. The lifetime of type B bulbs are 135, 125, 145, 122 and 139 days.

   Which type of light bulb has a longer lifetime? Why?
   answer:

8. Six circles in the figure are tied with a string. If the radius of each circle is 7 cm, find the length of the string. (Use $\pi = \frac{22}{7}$.)



answer:

Name : .....
Country : .....

9. Barbara writes numbers consisting of four digits: 3, 5, 7 and 9, according to the following rules:

   - Digit 7 does not appear in the first nor the last positions.
   - Digit 7 should be to the right of the digit 5. (For example, digit 5 in the number 7395 appears to the right of digits 7, 3 and 9).

   Find all such possible numbers.
   answer:

10. The triangles inside the equal circles (in Figure A and Figure B) below are both equilateral. The area of the triangle in Figure A is 1 cm^2. Find the area of the triangle in Figure B.

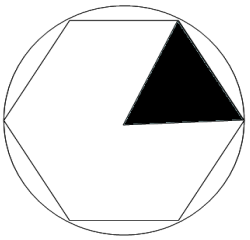


FIGURE A

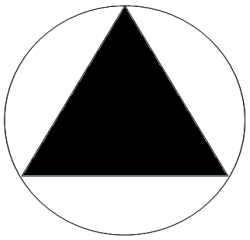


FIGURE B

answer:

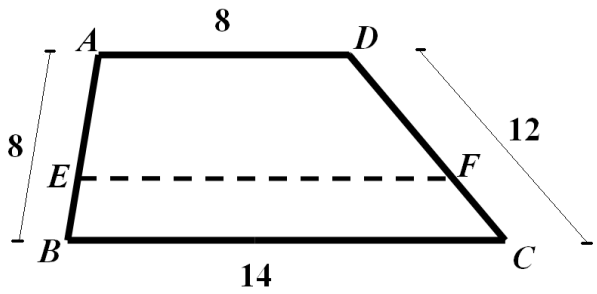
Name : .....
Country : .....

11. The pages of a book are numbered using 840 digits, starting from page 1. How many pages does the book have? (For example, page 37 uses two digits, namely digits 3 and 7. From page 1 to page 11, thirteen digits are used.)
answer:

12. How many positive whole numbers less than 2005 can be found, if the number is equal to the sum of two consecutive whole numbers and also equal to the sum of three consecutive whole numbers? (For example, 21=10+11=6+7+8.)
answer:

Name : .....
Country : .....

13. In the figure, $ABCD$ is a trapezoid with parallel sides $AD = 8$ cm, $BC = 14$ cm and non-parallel sides $AB = 8$ cm, $CD = 12$ cm. A line EF is drawn parallel to BC so that the perimeters of each of the two trapezoids formed are equal. What is the length of CF?



answer: