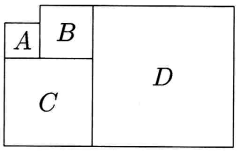
PIMS Elementary Grades Math Competition
9 May 2009
Target Round - Grade Seven Division

NAME: _____

SCHOOL: _____

1. Shapes A, B, C, and D are squares.
The perimeter of square A is 16,
and the perimeter of square B is 24.
Find the area of square D.



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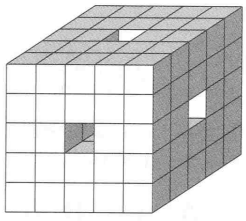
2. The odometer, which shows the total number of kilometres a car has been driven, shows 187569. What is the least number of additional kilometres that the car has to be driven, so that the odometer will again show a number made up of all different digits?

_____(km)2

3. In the multiplication problem below, different letters represent different non-zero digits.
What 4-digit number will the product be?
$AB \times BA = XYY3$

_____ 3

4. Through a 5×5×5 cube, which is made up of 1×1×1 cubes,
3 holes of size 1×1×5 are made (see picture).
This object is then submerged in paint.
How many little cubes have exactly one face covered in paint?



_____(cubes)4

Grade Seven (7) Division

5. The school Math Mania team is made up of students from the 5th, 6th, and 7th grades only. Seven students are 5th graders, eleven students are 6th graders, and one-third of the entire team are 7th graders. How many students are on the team? _____ 5

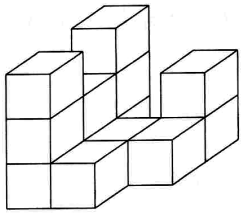
6. Simplify:

$$\frac{1}{3+\frac{1}{3+\frac{1}{3}}}$$

_____ 6

7. If a number ends in zeros, the zeros are called terminal zeros. For example, 520,000 has four terminal zeros, but 502,000 has just three terminal zeros. Let N equal the product of all positive whole numbers from 1 through 125:
$N = 1 \times 2 \times 3 \times \cdots \times 123 \times 124 \times 125.$
How many terminal zeros will N have when it is written in standard form? _____ 7

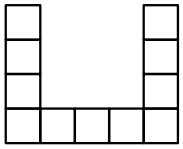
8. All cubes, in the figure below, are glued together and are of unit size. What is the largest number of additional cubes, of the same size, that might be needed in order to form a cube with side three? (Hint: Take into account the fact that some cubes are possibly missing but you do not know for sure from the figure.)



_____(cubes)8

Grade Seven (7) Division

9. The U-shaped figure consists of 11 squares of the same size.
The area of the U-shaped figure is 176 square units.
How many units are there in the perimeter of the U-shaped figure?



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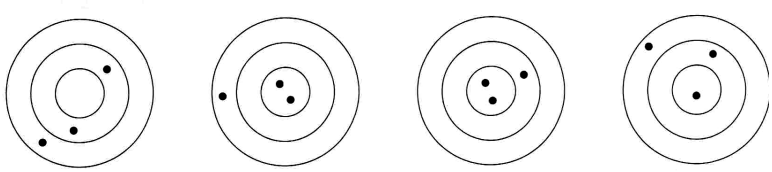
10. In an arrow shooting contest, Samantha shot 3 arrows into each of the four targets (see figure). Any hit in any of the three zones is worth a certain number of points. On the first target (on the left) she scored 29 points, on the second 43 points, and on the third 47 points.
How many points did she score on the last target?



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11. The palimage of a whole number is the number which has the same digits but in reverse order. For example, 659 and 956 are palimages; so are 1337 and 7331. Let N be the palimage of M and let $X = M + N > 2009$.
What is the smallest possible value of X ?

_____ 11

12. All the sides of a polygon with n sides intersect a straight line.
Which of the following is true:
a. n can be any integer greater than 3.
b. n must be greater than 4.
c. n must be 4.
d. n must be odd.
e. n must be even.
f. All angles of the polygon are less than 180 degs.
g. All angles of the polygon are greater than 180 degs.
h. It is impossible.

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