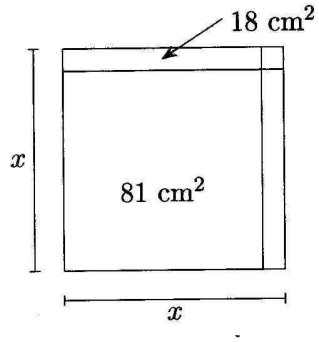
PIMS Elementary Grades Math Competition NAME: _____
3 May 2008
Target Round - Grade Six Division SCHOOL: _____

1. The square with side x has been divided into four parts as shown: two squares and two rectangles. The area of one of the rectangles is $18\,cm^2$, and the area of one of the squares is $81\,cm^2$, as shown in the figure. What is the value of x (in cm)?



_____ (cm) 1

2. When the positive whole number n is divided by 7, the remainder is 4.
What is the remainder when the number $3n + 2$ is divided by 7?

_____ 2

3. In the state of Percentia, each one of the 15 million voters voted for one of the two presidential candidates, Archimedes and Euclid. Archimedes received 750 more votes than Euclid. What percentage of the 15 million votes was for Archimedes?
Give your answer in decimal form with as many significant digits as needed.

_____(%) 3

4. Note that $6 = 2^2 + 1^2 + 1^2$ and $13 = 3^2 + 2^2 + 0^2$. So 6 and 13 can each be written as the sum of the squares of three integers. How many positive whole numbers smaller than 20 can be written as the sum of the squares of three integers?

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Grade Six (6) Division

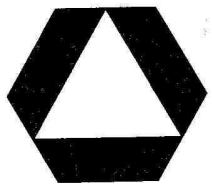
5. Adam, Bob and Charlie were hungry, so they each wanted to buy a sandwich, but none of them had enough money. Adam was short \$0.20, Bob was short \$0.30, and Charlie was short \$0.50. They pooled their money and bought two sandwiches. They were left with a total of \$1.20. How much money (in dollars) did they have altogether before they bought the two sandwiches? Express your answer using decimal notation.

_____(\$) 5

6. A bakery supplies four different types of cakes: chocolate, strawberry, vanilla, and cheese. All cakes are baked in square pans of height of $5\,cm$.
Chocolate cake is baked in a $15\,cm$ by $15\,cm$ pan, and it is cut into 3 equal pieces.
Strawberry cake is baked in a $18\,cm$ by $18\,cm$ pan, and it is cut into 4 equal pieces.
Vanilla cake is baked in a $20\,cm$ by $20\,cm$ pan, and it is cut into 5 equal pieces.
Cheese cake is baked in a $24\,cm$ by $24\,cm$ pan, and it is cut into 8 equal pieces.
Find the volume (in cm^3) of the smallest piece (of any of the four above cakes) that can be served.

_____(cm^3) 6

7. In the figure below, the vertices of the triangle are the midpoints of the sides of a regular hexagon.
What fraction of the area of the hexagon is shaded?
Express your answer as a common fraction.



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8. How many ordered triples (x, y, z) of positive whole numbers are there such that $xyz = 16$?
Note that for example the triple $(1, 4, 4)$ is to be considered different from the triple $(4, 4, 1)$.

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Grade Six (6) Division

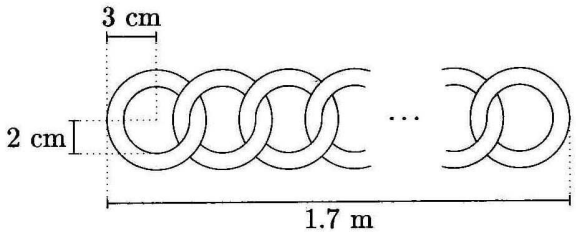
9. The combined number of apples, oranges, and bananas in a basket is N, which is greater than 90 and less than 100. The number of apples is one third of N, and the number of bananas is one fourth of N. How many apples are in the basket?

_____(apples) 9

10. A distance of 1 cm on a map represents a distance of 20 km on the ground. The city of London covers 6.25 cm^2 on the map. What is the area of London (in km^2)?

_____(km^2) 10

11. A chain is made out of rings as in the diagram below. The outer radius of each ring is 3 cm, and the inner radius is 2 cm. How many rings are needed to make the chain 1.7 m long?



_____(rings) 11

12. Dina chooses at random one of the four-digit numbers that can be formed by using four ***different*** digits chosen from 2, 3, 4, 5, and 6. What is the probability that her chosen number is divisible by 4? Express your answer as a common fraction.

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