PIMS Elementary Grades Math Competition NAME: _____
5 May 2007
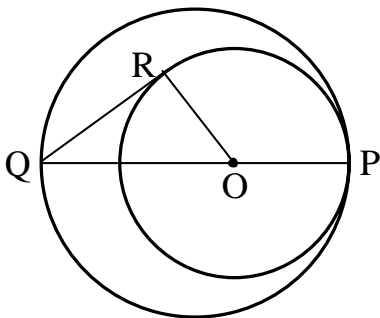Target Round - Grade Five Division SCHOOL: _____

1.   You fold a piece of paper in half 6 times.
     After the folding, how many layers of paper are there?   _____(layers)   1

2.   In the diagram, a circle of radius 6 is internally tangent at P to
     a circle of radius 8. PQ is a diameter of the larger circle,
     QR is tangent to the smaller circle,
     and OR is a radius of the smaller circle.
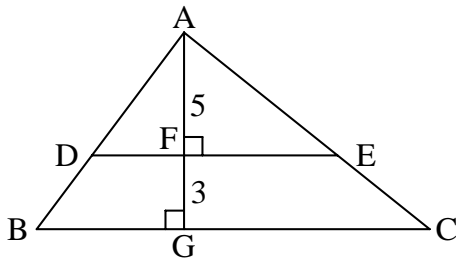   Find the area of the triangle OQR.   _____   2

3.   A water tank in the shape of a box contains 5000 litres when
     it is full. The dimensions of the base are 1.25 metres by 1 metre.
     What is the height of the tank (in metres)?   _____(metres) 3

4.   In a certain sequence, $a_1 < 0$, $a_2 > 0$, and $a_3 > 0$.
     For $n > 2$, $a_n = a_{n-1} + a_{n-2}$.
     Two consecutive terms of the sequence have values of 29 and 47.
     Find the value of $a_1 + a_2 + a_3$.   _____   4

5. Neelie has 15% more money than Nick. Together they have $43.
   How much money (in dollars) does Neelie have?   _____($) 5

6. In the diagram, BCED is a trapezoid. The length of DE is 10.
   The line segment AG is a height of the large triangle,
   and it intersects DE at F. Also given: AF=5, and FG=3.
   Find the area of the trapezoid.   _____ 6

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              A
             /|\
            / | \
           / 5|  \
         F/___|___\
     D  /  F⌐ |    \  E
       /     3|     \
    B /_____⌐_____\ C
             G
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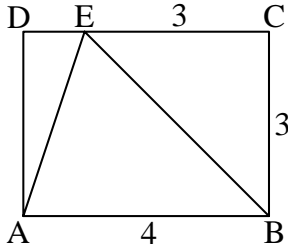
7. Dona went to Ralph's used bookstore with $21,
   and bought as many books as possible.
   Books at the store were selling at 6 for $6 or 4 for $4.50.
   How many books did she buy?   _____(books) 7

8. $\frac{1}{6}$ of Diophantus' life was spent as a youth, and then
   it took $\frac{1}{12}$ of his life to lengthen his beard. After another $\frac{1}{7}$
   of his life he got married, and then, 5 years later, a child was born.
   The child left our world to live with the angels when he turned
   2 years old and this happened 2 years before Diophantus
   reached $\frac{1}{2}$ of his life. How old was Diophantus when he died?   _____(years) 8

Grade Five (5) Division

9. ABCD is a rectangle with sides of 3 and 4. CE=3.
What is the ratio of the area of triangle DEA to the
area of triangle CEB? Express your answer as a fraction.   _____   9

D   E   3   C

3

A   4   B

10. The human body has (on average) 122 trillion cells (122×10^{12}).

On average, each gram of the human body is made up of 2×10^9 cells.
What is the average weight of the human body (in kilograms)?   _____(kg) 10

11. What is the remainder when 10^8 is divided by 97?   _____   11

12. Aziz wrote all of the ten thousand integers from the
number 1 to the number 10000, one by one, in increasing order.
The beginning of his sequence looks like this:
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, …
Note that he wrote the digit 0 for the first time when he wrote
the number "10", and he wrote it for the second time when he
wrote the number "20".
In what number N, of his sequence,
did he write the digit 0 for the 2007-th time?   _____   12