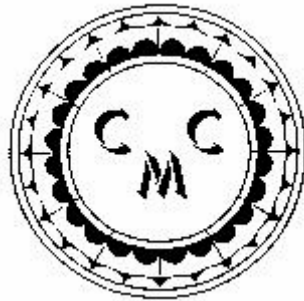


**The Fourteenth Annual  
CATONSVILLE  
MATHEMATICS  
COMPETITION**

**Friday, April 22, 2005**



**Time Limit : 2 hours**

**Circle your answer for each problem  
on the Answer Sheet**

**2 points for correct answer**

**-1 point for incorrect answer**

**0 point for no answer**

**CALCULATORS ARE ALLOWED**

**GOOD LUCK !**

# The Fourteenth Annual Catonsville Mathematics Competition



1. What is the maximum possible area of a quadrilateral with sidelengths 15, 19, 33, and 35?  
A) 432                      B) 512                      C) 576                      D) 672
2. How many 2-digit positive integers are there which are divisible by the sum of their digits?  
A) 14                      B) 15                      C) 23                      D) 25
3. How many 2-digit positive integers are there which are divisible by the product of their digits?  
A) 3                      B) 4                      C) 5                      D) 6
4. A point  $P$  moves in such a way that the **average** of squares of its distances from two fixed points on a line  $l$  differs by the square of its distance from the line  $l$  by a constant. The path traced out by  $P$  is  
A) parallel lines    B) an ellipse    C) a parabola    D) a hyperbola
5. A point  $P$  moves in such a way that the **average** of squares of its distances from two fixed points on a line  $l$  differs by the square of its distance from **another line** parallel to  $l$  by a constant. The path traced out by  $P$  is  
A) parallel lines    B) an ellipse    C) a parabola    D) a hyperbola

6. A point  $P$  moves in such a way that the **sum** of squares of its distances from two fixed points on a line  $l$  differs by the square of its distance from the line  $l$  by a constant. The path traced out by  $P$  is
- A) parallel lines    B) an ellipse    C) a parabola    D) a hyperbola
7. The year is 2605 B.C. King Neterikhet (Dzoser) of the Third Dynasty (Old Kingdom) asked his architect Imhotep of Ankhtowë to build him a pyramid 400 cubits high and with a square base 600 cubits on each side. Imhotep ordered 2.072 million hekats of stone to be quarried. However after using all the stone he had ordered he found his pyramid to be incomplete. Each trapezoidal side had area 2.4 times that of the square top. How many more thousands of hekats of stone would he need to complete the pyramid?
- A) 125                      B) 216                      C) 432                      D) 576
8.  $ABC$  is an isosceles triangle with  $AB = AC = 36$  and  $BC = 24$ . A point  $D$  lies on  $AC$  such that  $BC = BD$ .  $E$  and  $F$  are midpoints of the sides  $BC$  and  $CD$  respectively. If the lines  $AE$  and  $BF$  intersect at  $G$ , the ratio of the lengths  $BG : GF$  is
- A) 7 : 9                      B) 9 : 7                      C) 11 : 5                      D) 17 : 7
9. Harry and Billy went to a casino where there was a new game going on. You bet some money and if you win you square your money, *i.e.* if you bet \$5 and win you get \$25 back altogether and if you do not win you lose your \$5. Harry felt lucky but he had no money so he borrowed all that Billy had and bet the entire amount and won. He returned Billy all that he had borrowed. With a lot of money in his wallet Harry bought many boxes of chocolates priced at \$10, \$15, \$25 each and spent all his money. Billy bought some cheaper quality chocolates at \$5 a box, as many boxes he could with his smaller amount and still had a little money left. How much did he have left?
- A) \$1                      B) \$2                      C) \$3                      D) \$4

10. Four friends went to the same casino (see Q. 9) and each played the same game once. They had different amounts of money with them but altogether  $n$  dollars. Each of them bet all she had and won. They came out in pairs. Ann and Betty found they had \$2005 together and when Chris and Debbie came out they found they too had \$2005 together. What is  $n$  ?

A) 115

B) 120

C) 125

D) 130