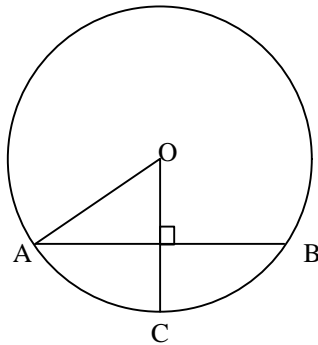# 1998 COLUMBUS  STATE UNIVERSITY INVITATIONAL

# MATHEMATICS TOURNAMENT

## CIPHERING COMPETITION

## ROUND I

1.    Find the degree of the polynomial $(x^5 + x^2)^7 (x^4 + 2)^3$.

2.    In the circle below with center O, the measure of angle AOB is $120°$ and $\overline{AB} = 8$.  Find $\overline{OA}$.



3.    If $\log_8 m + \log_8 \dfrac{1}{6} = \dfrac{2}{3}$, what is $m$?

4.    If $q$ is in Quadrant II and $\tan q = -\dfrac{4}{3}$, compute $\sin q$.

5.    How many digits are in the expansion of $2^{11}5^8$ ?

6.    How many solutions are there to $\{1,2\} \subseteq X \subseteq \{1,2,3,4,5\}$?

7.    If the product of the circumference of a circle and its diameter is 1, compute the area.

8.    Solve for x if $2^x = 2^{-19} - 2^{-20} - 2^{-21}$.

1998 COLUMBUS  STATE UNIVERSITY INVITATIONAL

MATHEMATICS TOURNAMENT

CIPHERING COMPETITION

ROUND II

1. Solve for $x$ if $\sqrt{7}\,\sqrt[3]{7}=7^{x}$.

2. Find all solutions to $|x-5|=|2x+5|$.

3. If $\log_{a} b = p$ and $\log_{a} c = q$, what is $\log_{b}\dfrac{a}{c}$ in terms of $p$ and $q$?

4. How many points with positive integer coordinates in the $xy$-plane satisfy $x+y\le 5$?

5. Express 17 in base 2.

6. How many positive integers less than 1000 are divisible by each of the integers 4,6,9,12 and 15?

7. Compute the perimeter of a rhombus having diagonals of 8 cm and 10 cm.

8. If $f(x)=3x+2$, compute $f(f(3))$.