

NASSAU COUNTY INTERSCHOLASTIC MATHEMATICS LEAGUE

2007 – 2008

Acceptable Calculators Allowed

Team Contest #6

The degree of accuracy will be specified in the problem.

40 Minutes

T1. At the beginning of February, the price of 240 barrels of oil was x dollars. At the end of February, the price of 175 barrels of oil was $0.48x$ dollars. Compute, to the nearest tenth, the percent increase in the price of oil from the beginning of February to the end of February.

T2. The sum of the squares of the lengths of the sides of a right triangle is 5,000. If the length of the longer leg and the length of the hypotenuse differ by 2, compute, to the nearest hundredth, the length of the altitude to the hypotenuse of the triangle.

T3. Compute x such that $x - \frac{1}{x} = 4\sqrt{6}$, compute $\left|x + \frac{1}{x}\right|$.

T4. Compute the number of integers for which $|x^2 - 7x - 31| \leq 13$.

T5. $\triangle ABC$ has its vertices at $A(2, 0)$, $B(3, 5)$, and $C(0, c)$. Compute the sum of all values of c such that $\triangle ABC$ is a right triangle.

T6. A cube is inscribed within a sphere as shown in the diagram below. Point O is the common center of the cube and the sphere. Points A and B are the endpoints of one edge of the cube and points on the surface of the sphere. Let θ be the angle whose vertex is at the common center of the sphere and the cube and whose sides are radii drawn to the endpoints of one edge (side) of the cube. Compute the degree-measure of θ to the nearest tenth.

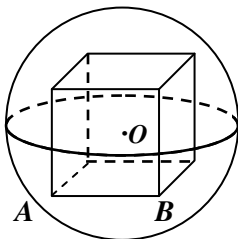


Figure not drawn to scale.