1. Find the reflection of the point (11, 16, 22) across the plane $3x + 4y + 5z = 7$.

2. Find the radius of a circle inscribed in a triangle with side lengths 4, 5, and 6.

3. Find the volume of a regular cubeoctahedron of side length 1. This is a solid whose faces comprise 6 squares and 8 equilateral triangles, arranged as in the diagram below.

4. Given triangle $ABC$. $D$ lies on $BC$ such that $AD$ bisects $\angle BAC$. Given $AB = 3$, $AC = 9$, and $BC = 8$. Find $AD$.

5. Find the sum of angles $A, B, C, D, E, F, G, H, I$ in the following diagram:

6. In the diagram below, let $OT = 25$ and $AM = MB = 30$. Find $MD$. 
7. \( \triangle ABC \) is a triangle with \( AB = 5 \), \( BC = 6 \), and \( CA = 7 \). Squares are drawn on each side, as in the image below. Find the area of hexagon \( DEFGHI \).

8. A sphere of radius 1 is internally tangent to all four faces of a regular tetrahedron. Find the tetrahedron’s volume.

9. For an acute triangle \( \triangle ABC \) and a point \( X \) satisfying \( \angle ABX + \angle ACX = \angle CBX + \angle BCX \), find the minimum length of \( AX \) if \( AB = 13 \), \( BC = 14 \), and \( CA = 15 \).

10. \( A, B, C, D \) are points along a circle, in that order. \( AC \) intersects \( BD \) at \( X \). If \( BC = 6 \), \( BX = 4 \), \( XD = 5 \), and \( AC = 11 \), find \( AB \).