1. A certain triangle with integer side lengths has one side of length 6 and another of length 28 . What is the positive difference between the maximum and minimum lengths of the third side?
2. In square $A B C D$ with side length 6 , point $E$ is on $D C$ such that $A E$ trisects angle $D A B$. What is the perimeter of $A B C E$ ?
3. Let a circle with center $O$ have a radius of 16 . Define segment $A B$ with length 15 such that it is tangent to the circle and A is on the circle. What is the length of segment OB ?
4. Square corners, 5 units on a side, are removed from a 20 unit by 30 unit rectangular sheet of cardboard. The sides are then folded to form an open box. Find the surface area, in square units, of the interior of the box.

5. In the triangle $\mathrm{ABC}, \mathrm{AB}=7, \mathrm{AC}=14$, and $\mathrm{BC}=18$. Let D be the midpoint of AB and E be the midpoint of $A C$. Define point $P$ as the intersection between the angle bisector of angle $B A C$ and the line DE. What is EP - DP?
6. Equilateral triangle JAY has side length 3 and is upright on the ground, with point J above the ground . It then rolls on the ground until J is the point not on the ground again. Let $d$ be the quantity of the length of the path J travels, and let $e$ be the distance between J's starting and ending points. What is $e^{*} d$ ?
7. Triangle GRT has $\mathrm{GR}=5, \mathrm{RT}=12$, and $\mathrm{GT}=13$. The perpendicular bisector of GT intersects the extension of GR at O. Find TO.
8. A pyramid has a square base with sides of length 1 and has lateral faces that are equilateral triangles. A cube is placed within the pyramid so that one face is on the base of the pyramid and its opposite face has all its edges on the lateral faces of the pyramid. What is the side length of this cube?
9. In a plane there are 4 circles and 6 lines. What is the maximum number of intersection points among these figures?
10. Let $B C=6, B X=3, C X=5$, and let $F$ be the midpoint of $\overline{B C}$. Let $\overline{A X} \perp \overline{B C}$ and $A F=\sqrt{247}$. If $A C$ is of the form $\sqrt{b}$ and $A B$ is of the form $\sqrt{c}$ where $b$ and $c$ are nonnegative integers, find $2 c+3 b$.

Answers:
1.10
2.18-2sqrt(3)
3.sqrt(481)
4.500
5.3
6. 36 pi
7.169/10
8.sqrt(2)-1
9.75
10. 1288

