1. Consider a regular hexagonal prism with side length 6 cm and height 12 cm. By finding the following:
   a. A, where A is the number of edges on the figure
   b. B, where B is the number of faces on the figure
   c. C, where C is the number of vertices on the figure
   d. D, where D is the area of one rectangular face on the figure

   Find $\frac{2A}{D} + (\frac{B+C}{2})^2$

   101
2. A circle is inscribed in a square with side length s. By finding the following:
   a. E, where E is the ratio of the circle's radius to s
   b. F, where F is the ratio of the circle's circumference to the square's perimeter
   c. G, where G is the ratio of the circle's area to the square's area

   Find $\frac{EF}{G}$

   1/2
3. Kyle is playing tennis with a perfectly circular tennis ball. Kyle hits the ball so hard that when it strikes the ground, it deforms into a hemisphere instantaneously. Consider Boyle's law, which states $P_1V_1 = P_2V_2$, where the subscripts 1 and 2 represent before and during the collision with the ground, respectively. If $P_2 = 200\ kPA$, find P_1 with appropriate units.

   100
4. Skoufis has a thin, hollow rubber cone that he likes to play with. If he puts his finger on the very tip of the cone and pushes downward until the tip touches the base of the cone, he will have a version of his original cone without a tip and with a cone-shaped divot that he holds down on with his finger. If the cone has a radius is 3, an original height of $3\sqrt{3}$, and Skoufis decreased the cone's height by half when he deformed the cone, what is the volume completely contained by his new figure?

   $\frac{27\pi\sqrt{3}}{4}$
5. Consider a sphere placed inside a cylinder such that a grand circle of the sphere parallel to the bases touches the inside of the cylinder at all points. The cylinder has a radius of 3 and a height of 6. If a point within the cylinder is chosen at random, what is the probability that the point is on or in the sphere?

   2/3
6. Hao, in order to practice his trigonometry skills, has made a paper right triangle with legs whose lengths are 10 and 24. Hao got bored of calculating sines and cosines, so he decided to balance the triangle on the tip of his finger. If the right angle is considered the origin on a Cartesian plane and the hypotenuse of the triangle is in quadrant 1, find the coordinates at which Hao must place his finger so that the triangle balances.

   (5, 12) OR (12, 5)

7. Maizie likes to measure the dimensions of her perfectly cylindrical tree in her backyard. The growth of her tree's radius over time can be modeled by the function r(x) = (15/4)(2)^(x/365), where x is the number of days since she planted the tree. The tree's height is dependent on its radius and can be modeled by the function h(r) = 2r. After how many days since its planting will the tree have a volume of 54000pi?
   1095
8. Shiv loves to eat oranges. Just recently, Shiv has decided to subscribe to the unpopular conspiracy theory that the orange-producing corporations are trying to reduce the amount of fruit in an orange by increasing the thickness of its peel while maintaining the same value as a normal orange. If Shiv's orange has a peel of thickness 1 and total radius 5, what fraction of the total volume of the orange is peel?
   61/125
9. Bob the Busy Bee spends all day making honey and depositing it in his honeycombs, whose cells are in the shape of a hexagonal pyramid. The area of the base of the pyramid is 18 mm^2 and its height is 4 mm. If Bob can only carry 36 mm^3 of honey at any one time, how many times must he fetch honey per day to fill a minimum integer number of honeycomb cells?
   2
10. A. Let A equal the measure of the smaller angle of a pair of two supplementary angles given that one is 4 degrees larger than the other.

    B. Let B equal half the number of sides in a decagon.

    C. Let C equal the measure of the larger angle of a pair of two complementary angles that have measures (2x + 21)° and (3x – 26)°.

    D. Let D equal the measure of the 4^{th} angle in a quadrilateral when the average of the other three angles is 84.

    Find A+B+C+D

    260

11. Fares is cutting pizza. What is the greatest number of pieces into which he can cut the circular pizza using only 6 cuts along straight lines? **22**
12. How many of the following are Pythagorean triples?
    (3,4,5) (5,12,13) (7,13,17) (8,15,17) (15,36,39) (25,312,313) (44,48,68) (22,44,66) (35,42,49) (24,45,51) (21,220,221) (17,144,145) (56,64,72) (16,63,65)
    4

13. A conveyor belt is wrapped around two circles, one with radius 4 and the other with radius 22. If the distance between the centers of the two circ;es is 36, what is the total length of the conveyor belt?
    $36\sqrt{3} + \frac{52\pi}{3}$
14. Find M+A+T+H (in degrees) such that
    M = the sum of the interior angles of a regular nonagon
    A = the sum of the interior angles of a regular octagon
    T = the sum of the interior angles of a regular pentagon
    H = the sum of the interior angles of a regular hexagon
    503
15. Consider the intersection of line segments AB and CD at point O. Angles AOC and BOC are vertical while angles AOC and AOD are supplementary. If the measure of angle AOC is $5x + 6$ and the measure of angle AOD is $3x - 6$, find the value of x.
    22.5