1. Consider a circle of radius 4 units. Let
A = the length of the diameter, in units
B = the area of the circle, in square units
C = the circumference of the circle, in units
D = 2
Give the value of A + B + C + D, to the nearest integer.

2. Consider triangle ABC with right angle at B. If angle A is 30 degrees and the length of $\overline{BC}$ is 2, let the length of $\overline{AB} = c$ and the length of $\overline{AC} = b$.
Consider also triangle XYZ with right angle at Y. If angle X is 45 degrees and the length of $\overline{XZ}$ is 2, let the length of $\overline{XY} = z$ and the length of $\overline{YZ} = x$.
To the nearest integer, give $b + c + x + z$.

3. A building in the middle of nowhere has a radar system that tracks the outside of the building. The building is 35 feet by 40 feet long. The center of the radar's scanning area is at a corner of the building. If the radar sweeps in a circular motion, and scans an area of $160\pi\ ft^2$ outside the building, then, to the nearest foot, what is the radius of the radar's circular scanning area?

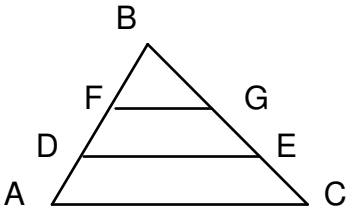
4. An equilateral triangle has two sides with lengths $2x + 5$ and $4x - 1$.
A square has two sides with lengths $y^2 + 3y + 9$ and $y^2 + 6y + 3$.
A rhombus has two sides with lengths $\frac{1}{z}$ and $\frac{2}{3}$.
Give xyz.

5. Five statements are given below, with a numerical value assigned to each statement in parentheses. Add the numbers next to the false statements, and give the sum.
(-2) If both pairs of opposite angles in a quadrilateral are congruent, then the quadrilateral is a parallelogram.
(1) You can prove that a quadrilateral is a rectangle by proving that the diagonals are congruent.
(-1) If the diagonals of a quadrilateral are perpendicular, then it is a rhombus.
(3) If a quadrilateral has all four sides congruent, then it is a square.
(-2) If a quadrilateral has both pairs of opposite sides congruent and one right angle, then it is a rectangle.

6. Let A = the area of a sector of a circle with radius 2 feet and central angle of $60°$, to the nearest square foot.
B = the straight-line distance between an 8 meter chord in a circle with diameter 10 meters, to the nearest meter.
Give A – B.

7. If an isosceles triangle has angle measures of 78 and 51, let x be the measure of the third angle, in degrees.
Let y be the number of letters in the word that is defined as the intersection of the medians of any triangle.
Let z be the number of degrees in each interior angle of a dodecagon.
Give z – x + y.

8. In triangle ABC, AB = 7 units, BC = 9 units, and AC = 10 units. Line segments $\overline{DE}$ and $\overline{FG}$ are drawn parallel to side $\overline{AC}$, with D and F on $\overline{AB}$ and E and G on $\overline{BC}$, with $\overline{DE}$ closer to $\overline{AC}$ such that the triangle is divided into three equal areas. In units, what is the length of line segment $\overline{DE}$? (Hint: If you take the ratio of areas and compare those with that of lengths, you need to take the square root of the area side of the ratio to counteract the difference in units)



9. Given triangle XYZ with right angle at Y, with the length of $\overline{XY} = 12$, the length of $\overline{YZ} = 5$. The altitude to side $\overline{XZ}$ is drawn, cutting the side of the triangle into two pieces. Give the ratio of the shorter piece to the longer piece, to the nearest hundredth.

10. A piece of cardboard has dimensions 10 inches by 12 inches. 1 inch squares are cut from each of the four corners, and the cardboard is folded into a box. Give the sum of the surface area of the box in square inches and the volume of the box in cubic inches.

11. The line with equation x + 4y = 9 intersects the x-axis at $(a, 0)$ and the y-axis at $(0, b)$. The given line also intersects another line, x + y = 0, at the point (c,d). Give the value of $a - b - c + d$, to the nearest integer.

12. Let A = the area of a square with a diagonal of length $\sqrt{2}$
B = the area of a rectangle with sides of length 4 and 8
C = the area of a parallelogram with longer side length 4 and perpendicular height to the base (the longer side) of length 4
Give ABC. Disregard all units.

13. If you need to make a pen for your dog, and you have one side of your house as one side of the pen, and you have 100 feet of fencing for the other three sides, then what is the maximum area you can enclose? Give your answer to the nearest square foot.

14. Give the area of a regular hexagon with side length 4, plus the area of a regular triangle with side length 4.

15. Triangle ABC has AB = 3, BC = 4, and AC = 5. Give the area of the triangle plus the length of the only altitude that is not a side length. Disregard units, and round to the nearest whole number.