Geometry – 8$^{\text{th}}$ Grade

1. **2 points:** A square $ACEG$ is drawn, with points B, D, F, and H placed $\dfrac{1}{5}$ of the distance between vertices A and C, C and E, E and G, and G and A, respectively. What percentage of the area of $ACEG$ is the area of $BDFH$?

2. **2 points:** A square is inscribed in a semicircle, such that one of the sides of the square lies on part of diameter of the semicircle and its two other vertices lie on the arc of the semicircle. If the area of the square is 64, what is the area of the semicircle? **Express your answer to the nearest square unit.**

3. **2 points:** A turtle named Logo embarks on a rather strange and slow journey. In each part of his trip, he slowly walks a distance equal to the next number in the Fibonacci sequence (a sequence that starts "1, 1, 2, ...", with each following term equal to the sum of the two previous terms). After each part, he turns 90 degrees to his left, or counterclockwise. For example, from his home, he begins by traveling 1 inch westward. Next, he turns 90 degrees counter-clockwise, then travels 1 inch south. How far away from his home will he be right after he has made his 10$^{\text{th}}$ turn? **Express your answer to the nearest inch.**

4. **3 points:** A triangle's vertices are at the points with coordinates $(2,0)$, $(1,8)$, and $(3,4)$. The triangle is reflected across the x-axis, across the y-axis, and then is shifted three units to the right. If the new respective coordinates of the three vertices are (a,b), (c,d), and (e,f), what is the value of $a+b+c+d+e+f$?

5. **3 points:** A broken analog clock with an hour hand and minute hand is running 20% slower than a second working analog clock. If they gave an identical time at 4:00 pm, what is the positive difference between the smaller of the two degree measurements of the angles formed by the hands on each clock at 6:30 pm?

6. **3 points:** A square target that has a side length of 20 inches is placed 20 feet away from a robot at a paintball shooting range. The robot is programmed to always hit the target, but where it hits on the target is random. When a paintball hits, paint splatters 4 inches away from the spot where it hits. What is the probability that the entirety of the paint will end up on the target? **Express your answer as a percent.**

7. **3 points:** A cone that has a height of 12 and a base radius of 6 is sliced partway down parallel to the base, such that the newly formed cone has half of the volume of the original cone. What is the height of the new cone? **Express your answer to the nearest unit.**

8. **4 points:** What is the surface area of a right rectangular pyramid, if the length of the base is 4 inches, the width of the base is 3 inches, and the height of the pyramid is 5 inches? **Express your answer to the nearest hundredth of a square inch.**

9. **4 points:** There are 12 students standing evenly spaced around a circle. The area of the circle formed by the students is 25π. What is the shortest distance between the 4th student and the 12th student? **Express your answer to the nearest tenth.**

10. **4 points:** A hexagon and triangle have the same area and are both equilateral. If A is the perimeter of the hexagon, and B is the perimeter of the triangle, what is the value of $\dfrac{A}{B}$? **Express your answer to the nearest tenth.**