1. A rectangular garden 50 feet long and 10 feet wide is enclosed by a fence. To make the garden larger, while using the same fence, its shape is changed to a square. By how many square feet does this enlarge the garden?

2. Mary is 42 years old. Caitlin is 5 years younger than Betty, and Betty is half as old as Mary. How old is Caitlin?

3. A complete cycle of a traffic light takes 60 seconds. During each cycle the light is green for 25 seconds, yellow for 5 seconds, and red for 30 seconds. At a randomly chosen time, what is the probability that the light will NOT be green?

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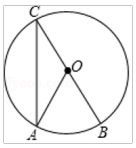
4. See the following picture. BC is the diameter of circle O, point A is on the circle O, connecting AO and AC. If $\angle AOB = 62°$, what is $\angle ACB$?



5. Let $f(x+3) = 4x^2 + 7x + 5$ and $f(x) = ax^2 + bx + c$. What is a+b+c?

6. What is the units digit of $19^{99} + 99^{99}$

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7. If $f(3) = 3$ and $f(x+y) = f(x) + y$, what is $f(15)$?

8. Consider right triangle ABC, with hypotenuse AB. What is the length of the altitude drawn from point C to AB, given that AB is 17 meters long and BC, a leg, is 15 meters long?

9. Pentagon $ABCDE$ has 3 right angles $\angle EAB$, $\angle ABC$ and $\angle CDE$. $AE = BC = 3$, $CD = DE$. If the area of the pentagon is 72 m^2, what is the length of AB?

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10. Ms. Ai wants to distribute 7 identical pieces of candy to 4 children. In how many ways can this be done if each child must receive at least one piece of candy?

11. Find the remainder when 16! is divided by 17.

12. Two concentric circles, one of radius 1 and one of radius 2, have tangents lines constructed such that they share the same intersection with the circle of radius 2. Find the angle between 90° and 180° created by the two lines.

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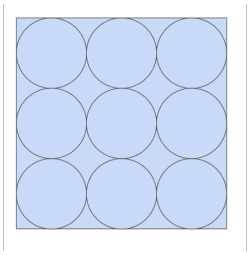
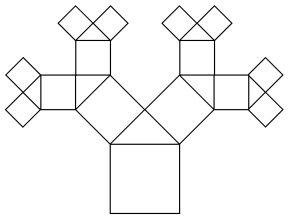
13. Jack cuts 9 congruent circles from a square piece of pastry to make 9 pies, as shown below. What is the greatest whole number of pies that Jack could make with the remaining pastry dough?



14. Jill went with Bill to get donuts instead of pies. The store offers plain, apple-cider, or glazed. If they want to get at least one of each kind, then in how many ways can they buy a dozen (12) donuts?

15. Jack, Jill, Bill, and their 5 distinguishable classmates sit at a round table. Jack wants Jill to sit as close to him as possible, but Jack wants Bill to sit as far away from him as possible. How many distinct seating arrangements will make Jack happy?

16. In this diagram, all internal angles are either 45° or 90°. If the sum of the area of all the squares in this diagram is 1, what is the area of the largest square?



17. One hundred light switches all start in the off position, and one hundred people successively adjust them. The first person toggles every switch. The second person, starting at switch 2, toggles every other switch. The third person, starting at switch 3, toggles every third switch etc. How many switches will be on after the one hundredth person finishes adjusting the switches?

18. A circle centered at the origin starts as a point. At time = 0 seconds its radius begins increasing, expanding at a constant 1 unit/second. At the same time, a horizontal line, which starts at $y = -2$, begins moving upwards at a constant 1 unit/second. The two shapes begin to intersect at time = 1 second and the points of intersection trace out a curve on the xy plane as the two shapes continue to change. A polynomial y = f(x) can describe this curve traced out by the points of intersection. Find the sum of the coefficient(s) of term(s) of f(x).

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19. Alex and Ben play a game in which they take turns flipping a fair coin. Whoever flips heads first wins. If Alex flips first, what is the probability that he wins?

20. Zhang Wu wants to climb up 10 stairs. He can do this in two ways: either climbing up them normally like a rational human being, or risking his life and jumping them 2 or 3 steps at a time. Zhang Wu decided to choose the latter. However, he has a $\frac{1}{2}$ chance of success for a 2 step jump and a $\frac{1}{3}$ chance of success for a 3 step jump. If he fails, he gets hurt and also gets sent back to the stair from which he originally attempted the jump. What is the expected number of jumps Zhang Wu would take to reach the top?

21. Two standard dice with 6 sides are thrown consecutively and the faces are recorded. Given that the sum of the two faces equals to 10, what is the probability that the first throw equals to 5?