1. 17.5% of what number is 4.5% of 28000?

2. Let x and y be two randomly selected real numbers between -4 and 4. The probability that $(x-1)(y-1)$ is positive can be written in the form $\frac{m}{n}$ for relatively prime positive integers m and n. Compute $m+n$.

3. In the xy-plane, Mallen is at $(-12, 7)$ and Anthony is at $(3, -14)$. Mallen runs in a straight line towards Anthony, and stops when she has traveled $\frac{2}{3}$ of the distance to Anthony. What is the sum of the x and y coordinates of the point that Mallen stops at?

4. What are the last two digits of the sum of the first 2021 positive integers?

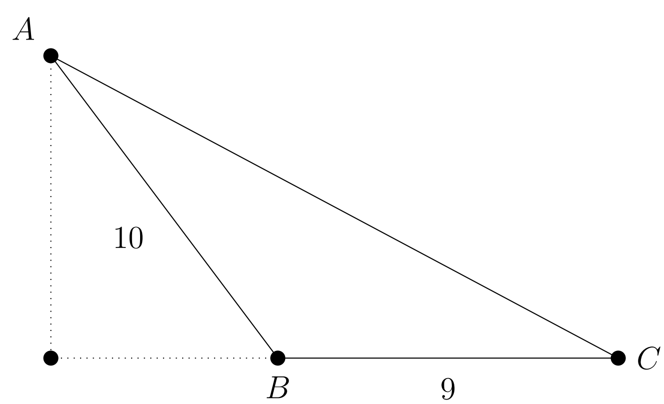
5. A bag has 19 blue and 11 red balls. Druv draws balls from the bag one at a time, without replacement. The probability that the 8th ball he draws is red can be written in the form $\frac{m}{n}$ for relatively prime positive integers m and n. Compute $m+n$.

6. How many terms are in the arithmetic sequence $3, 11, \ldots, 779$?

7. Ochama has 21 socks and 4 drawers. She puts all of the socks into drawers randomly, making sure there is at least 1 sock in each drawer. If x is the maximum number of socks in a single drawer, what is the difference between the maximum and minimum possible values of x?

8. What is the least positive integer n such that $\sqrt{n+1} - \sqrt{n} < \frac{1}{20}$?

9. Triangle $\triangle ABC$ is an obtuse triangle such that $\angle ABC > 90°$, $AB = 10$, $BC = 9$, and the area of $\triangle ABC$ is 36. Compute the length of AC.



10. If $x + y - xy = 4$, and x and y are integers, compute the sum of all possible values of $x+y$.

11. What is the largest number of circles of radius 1 that can be drawn inside a circle of radius 2 such that no two circles of radius 1 overlap?

12. 22.5% of a positive integer N is a positive integer ending in 7. Compute the smallest possible value of N.

13. Alice and Bob are comparing their ages. Alice recognizes that in five years, Bob's age will be twice her age. She chuckles, recalling that five years ago, Bob's age was four times her age. How old will Alice be in five years?

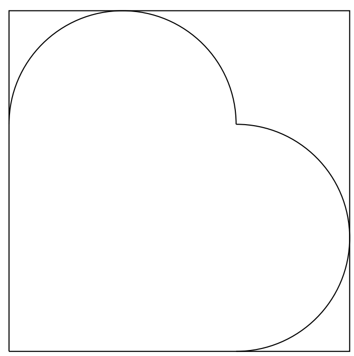
14. Say there is 1 rabbit on day 1. After each day, the rabbit population doubles, and then a rabbit dies. How many rabbits are there on day 5?

15. Ajit draws a picture of a regular 63-sided polygon, a regular 91-sided polygon, and a regular 105-sided polygon. What is the maximum number of lines of symmetry Ajit's picture can have?

16. Grace, a problem-writer, writes 9 out of 15 questions on a test. A tester randomly selects 3 of the 15 questions, without replacement, to solve. The probability that all 3 of the questions were written by Grace can be written in the form $\frac{m}{n}$ for relatively prime positive integers m and n. Compute $m + n$.

17. Compute the number of anagrams of the letters in BMMTBMMT with no two M's adjacent.

18. From a 15 inch by 15 inch square piece of paper, Ava cuts out a heart such that the heart is a square with two semicircles attached, and the arcs of the semicircles are tangent to the edges of the piece of paper, as shown in the below diagram. The area (in square inches) of the remaining pieces of paper, after the heart is cut out and removed, can be written in the form $a - b\pi$, where a and b are positive integers. Compute $a + b$.



19. Bayus has 2021 marbles in a bag. He wants to place them one by one into 9 different buckets numbered 1 through 9. He starts by putting the first marble in bucket 1, the second marble in bucket 2, the third marble in bucket 3, etc. After placing a marble in bucket 9, he starts back from bucket 1 again and repeats the process. In which bucket will Bayus place the last marble in the bag?

20. What is the remainder when $1^5 + 2^5 + 3^5 + \cdots + 2021^5$ is divided by 5?