# Team Round

Calculator allowed

1. If $x + y = 10$ and $x - y = \frac{1}{10}$, what is the value of $x^2 - y^2$? (3 points)

2. On a quiz, 10% of people scored a 100%, 25% scored a 90%, 50% scored a 80%, and 15% scored a 70%. What is the average percent score? (2 points)

3. Bob pays for 50 blue marbles and 10 red marbles. Jim pays 3 times as much for 30 blue marbles and 40 red marbles. How many times more expensive is a red marble than a blue marble? (3 points)

4. How many whole numbers between 100 and 400 contain the digit 2? (3 points)

5. Mr. Green receives a 10% raise every year. By what percent has his salary increased after four raises? (3 points)

6. The sum of all numbers in a set of data is 5976 and the mean of the data is 332. How many elements are in the set of data? (2 points)

7. A 2-Dimensional triangular building schematic is drawn out using meters. Logan has already found one angle as well as one side, but needs help finding the missing sides x_1 and x_2. Round all answers to the nearest thousandth. (3 points)
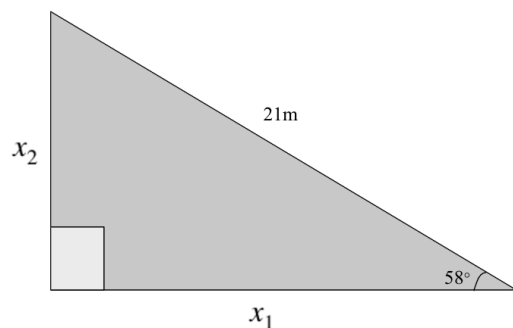

8. Bob, Joe, and Jim are writing problems for a math contest. Bob writes a problem every 30 minutes, Joe writes a problem every 20 minutes, and Jim writes a problem every 5 minutes. Bob goes and gets a pizza for 15 minutes, while the rest of the group works. The group works for 2 more hours with a 10% decrease in efficiency for everybody while they are eating. How many problems did they write? (4 points)

(If two people each write a fraction of a problem, they do not add. For example, if Bob writes 4.5 problems and Jim writes 2.7, that would be considered 6 problems, not 7)

9. Joe is cutting the net of a cylinder out of a piece of paper. The components of the cylinder are a rectangle and two circles, as shown below. What is the volume of the cylinder? Either leave in terms of π or round to three decimal places. (3 points)

   Note that both of the circles are congruent.
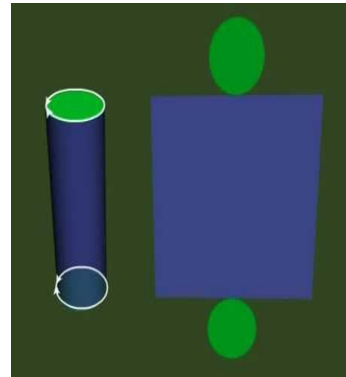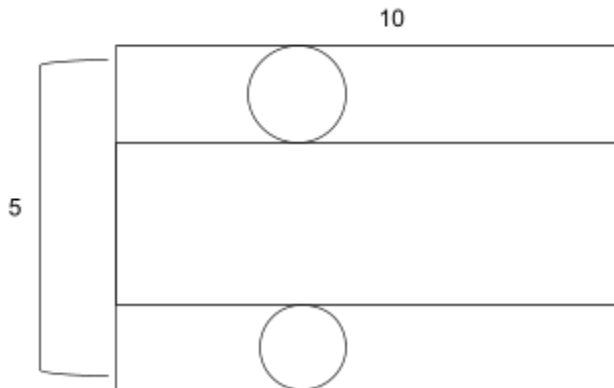
10. There is a series defined by a recursive function called a such that
   $a(n) = (-1)^{n-1}2 + a(n-1)$, where n represents the nth term in the series. Additionally, $a_1 = 1$. With those initial conditions, find the value of this expression:
   $$(3^{2019}a(2019) + 3^{2019}a(2018))\sqrt{a(10) + a(100)}$$

   (4 points)