

2015 π Math Contest

TEAM ROUND

INSTRUCTIONS

1. DO NOT OPEN THIS BOOKLET UNTIL YOUR PROCTOR TELLS YOU.
2. This is a 15 question test. Team members may work together to solve the problems without disturbing other teams.
3. Write down your answer to each problem on the Team Answer Form. Only this form will be collected at the end of this round. All answers must be complete, legible and simplified to lowest terms.
4. SCORING: Your team will receive 20 points for each correct answer. No point will be given for problems left unanswered or incorrect answers.
5. No aids are permitted other than scratch paper, graph paper, rulers, compasses, protractors, and erasers. No calculators are allowed. No problems on the test will *require* the use of a calculator.
6. Figures are not necessarily drawn to scale.
7. When your proctor gives the signal, begin working on the problems. You will have **20 minutes** to complete the test.

1. Simplify the following expression

$$7 \times \left(\frac{7}{11} + \frac{2}{7} + \frac{4}{11} \right).$$

2. What is $8 \times (0 - 1 + 2 \times 3 \div 4 - 5 + 6 \times 7 \div 8)$?
3. An escalator is 30 feet long. If Richard walks up the escalator at the rate of 6 feet per second and the escalator moves down at the rate of 1 foot per second, how many seconds will it take Richard to walk up the escalator?
4. On Wednesday, Sam had some rabbits. On Thursday, he woke up early to find that the number of rabbits had doubled overnight. Thursday afternoon, Sam's friend Brian gave him seven more rabbits. After this, Sam counted all of his rabbits and found that he had 15 rabbits. How many rabbits did Sam have on Wednesday?
5. Aaron the squirrel is drawing a triangle with a base of 15 inches and a height of 4 inches. He accidentally measures the base as 19 inches. By how many square inches did the area change due to this error?

6. Farmer John has some bicycles and tricycles in his garage. He counts a total of 12 wheels. Given that he owns at least one bicycle and one tricycle, how many bicycles and tricycles does Farmer John have in total?

7. One angle of a triangle is 20 degrees less than a right angle. Another angle of the same triangle is 15 degrees less than a right angle. Find the measure of the third angle of this triangle, in degrees.

Note: You may use the fact that the sum of the three angles in a triangle is 180 degrees.

8. Rachel made some cookies for her friends. She gave half her cookies to her best friend Casey. She then gave one third of the remaining cookies to another friend Bessie. Finally she gave the remaining 6 cookies to Diana. How many cookies did Rachel make?

9. Last year, Mayank's age was a perfect square. Next year, his age will be a perfect cube. How old is Mayank if he is less than 100 years old?

Note: When a natural number is written *twice* and multiplied, the result is called a *perfect square*. For example $2 \times 2 = 4$ is a perfect square. When a natural number is written *three times* and multiplied, the result is called a *perfect cube*. For example $2 \times 2 \times 2 = 8$ is a perfect cube.

10. How many two-digit numbers are there whose square is a four-digit number?

