Pi Math Contest Fermat Division

Final Round - 2026

INSTRUCTIONS

1. DO NOT OPEN THIS BOOKLET UNTIL YOUR PROCTOR TELLS YOU!
2. This is a 25-question test. Each question has an integer answer between 0 and 99.
3. Before the test begins, complete all information fields on the Answer Form. Write **FERMAT** in the division field.
4. Write your answers to problems 1-25 clearly in the designated boxes on the Answer Form. Write numbers only (integers 0-99) and do not include units, words, or symbols.
5. Do not write outside the answer boxes, as marks outside the boxes may interfere with grading. Only answers written in the designated boxes on the Answer Form will be graded.
6. SCORING: You will receive 10 points for each correct answer, 1 point for each problem left unanswered, and 0 points for each incorrect answer.
7. Only pencils, pencil sharpeners, and erasers are allowed. Calculators are not allowed.
8. Figures are not necessarily drawn to scale.
9. When your proctor gives the signal, begin working on the problems. You will have **40 minutes** to complete the test.
10. After the exam, return your **Answer Form** to your proctor. You may keep the Test Booklet, and your scratch papers.
11. Problems and solutions to the test will be posted on the contest website after June 6th.

1. Evaluate $48 \div 6 + 6 \times 6 - 6$.

2. The average of nine consecutive even integers is 50. What is the largest of these integers?

3. What is the value of $\dfrac{9^4 \times 2^4}{6^4}$?

4. How many subsets of $\{1, 2, 3, 4, 5, 6\}$ contain at least one even number?

5. A rectangular box with dimensions 2, 5, and 7 has no lid. What is the least possible exterior surface area of the box?

6. What is the value of
$$95 \times 96 + 97 \times 98 - 2 \times 95 \times 98?$$

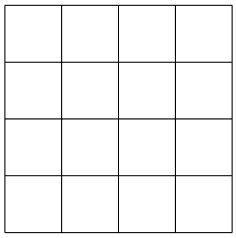
7. The four-digit number $\overline{1A1B}$ is divisible by 36. What is the largest possible value of $A + B$?

8. Barbara places two "B" tiles, two "R" tiles, and three "A" tiles into a bag. She selects two of these tiles at random, without replacement. To the nearest whole percent, what is the probability that both of these tiles are "A" tiles?

9. Ronaldo jogged 10% faster on Tuesday than he did on Monday, and jogged for 6 fewer minutes on Tuesday than he did on Monday. Given that he jogged the same distance on both days, how many minutes did Ronaldo jog on Monday?

10. What is the largest 2-digit factor of the number 111,111?

11. The figure below shows a 4×4 grid of unit squares. How many rectangles formed by the grid lines have an even area?



12. Compute the following expression:

$$\sqrt[3]{1320 + \sqrt[3]{1320 + \sqrt[3]{1320 + \ldots}}}$$

13. Five children sit in five seats around a circular table. Two of them, Amelie and Emilia, are twins and will sit next to each other. In how many ways can the children be seated? (Seats are distinct, so rotations count as different arrangements.)

14. Regular polygons P and Q are such that P has 32 more sides than Q. Each interior angle of P measures 15° more than each interior angle of Q. How many sides does P have?

15. A paper towel manufacturer produces rolls which have an inner and outer diameter of 1 inch and 3 inches as shown in Figure 1. A second manufacturer produces "mega" rolls, shown in Figure 2, and has three times the number of paper towels per roll than the roll in Figure 1. Assume that the number of paper towels per roll is directly proportional to its cross-sectional area. Rounded to the nearest whole percent, the outer diameter of the mega roll is how many percent larger than the outer diameter of the roll in Figure 1?

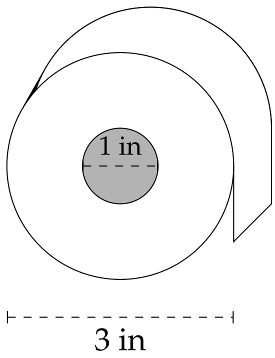


Figure 1

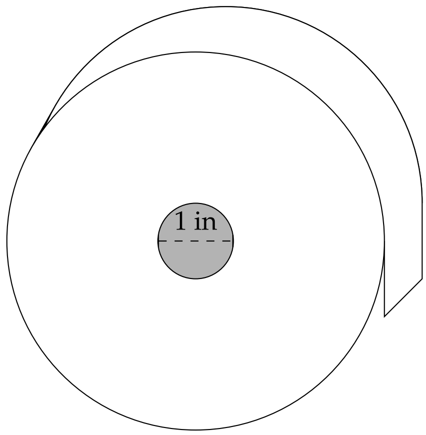


Figure 2

16. What is the smallest positive integer whose number of composite divisors is itself a composite number?

17. Let N be the number of ordered triples (a, b, c) of non-negative integers such that
$$a \cdot b + b \cdot c = 360.$$
What are the rightmost two digits of N?

18. When $\sqrt{10001}$ is written as a decimal, what are the first two nonzero digits to the right of the decimal point? For example, the first two nonzero digits to the right of the decimal point in the number 3.01065 are 16.

19. Lothar writes the number 1023 on a blackboard. On each step, he does the following: if the number n on the blackboard is odd, he erases it and writes the number $3n + 1$. Otherwise, if n is even, he erases it and writes the number $\frac{n}{2}$. For example, after 2 steps, Lothar will have written the number 3070, then the number 1535. What are the last two digits of the number that will be on the blackboard after 20 steps, starting with the number 1023?

20. Call a positive integer a *phoenix* if its last two digits are unchanged when the integer is cubed. What is the largest phoenix less than 99?

21. Chris the chameleon starts at $(0, 0)$ and wants to reach his house at $(6, 4)$. Each step moves him either 1 unit right or 1 unit up. The points $(2, 2)$ and $(5, 3)$ are burned and cannot be visited. In how many such paths can Chris reach his house?

22. Harry and Ted are playing a game. Harry constantly flips a fair coin until he gets two heads in a row, in which case he wins, or he gets three tails in a row, in which case Ted wins. The probability that Harry wins is $\frac{m}{n}$, where m and n are relatively prime positive integers. Find $m + n$.

23. What are the first (leftmost) two digits of 99^{20} when written in decimal notation?

24. Real numbers x and y satisfy

$$2x^2 + 5y^2 + 2xy + 13 = 2x + 16y.$$

Find the value of $2x^2 + y^2$.

25. A rectangular box has dimensions that are distinct positive integers. Its volume is numerically equal to twice its surface area. The sum of its three dimensions is 56. Find the length of the box's space diagonal, rounded to the nearest whole number.