Pi Math Contest Euler Division

2025

INSTRUCTIONS

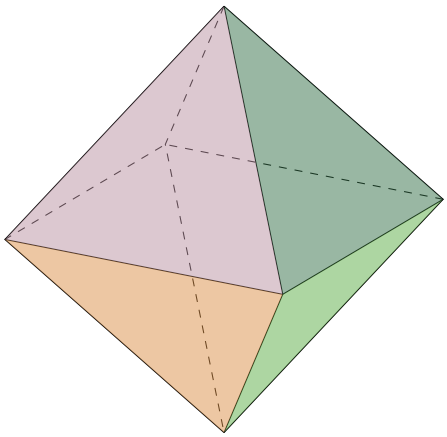
1. DO **NOT** OPEN THIS BOOKLET UNTIL YOUR PROCTOR TELLS YOU!
2. This is a 25 question test. Each question has a *single digit* answer: 0, 1, 2, 3, 4, 5, 6, 7, 8, or 9.
3. Mark your answer to each question on the Answer Form with a #2 pencil. Check the blackened circles for accuracy and erase errors and stray marks completely. Only answers properly marked on the answer form will be graded.
4. SCORING: You will receive 10 points for each correct answer, 1 point for each problem left unanswered, and 0 points for each incorrect answer.
5. Only pencils, pencil sharpeners, erasers, and blank scratch papers are allowed. All other aids, including but not limited to calculators and notes, are not allowed.
6. Figures are not necessarily drawn to scale.
7. When your proctor gives the signal, begin working on the problems. You will have **40 minutes** to complete the test.
8. After the exam, return your **Answer Form, Test Booklet and scratch papers** to your proctor.
9. Do NOT discuss any exam questions until **March 24, 2025**, after which problems and solutions will be available on the contest website.

1. What is the value of $\dfrac{1}{\frac{2}{3}-\frac{1}{2}}$?

2. Apples are regularly priced at \$1 each, but are 30% off today. How many dollars will Amelia spend for ten apples, with the discount applied?

3. Jamie has three shirts and three pairs of pants. How many ways can he choose one shirt and one pair of pants to wear today?

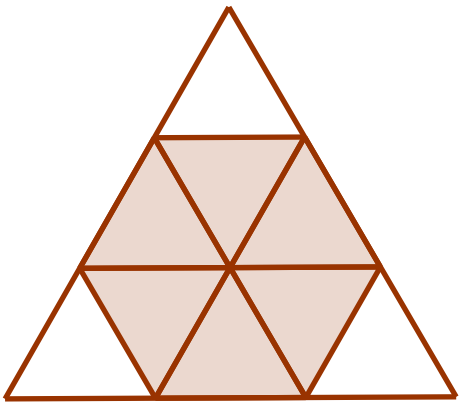
4. In the 3-dimensional shape below, what is the result when the number of faces and the number of vertices are added, and the number of edges is subtracted from this sum?



5. Samantha bakes cookies to raise funds for a charity event. She can bake 12 cookies with 1 cup of flour. She plans to bake 108 cookies today. If Samantha already has 3 cups of flour, how many more cups of flour does she need in order to bake all 108 cookies?

6. Jessica is tidying up her toy collection. She places $\frac{3}{4}$ of her toys into a colorful toy chest. She then uses $\frac{2}{5}$ of the remaining toys to create a play scene, and places the remaining toys in a basket. If Jessica has 60 toys altogether, how many toys are placed in the basket?

7. The triangle shown below has area 12, and is divided into smaller, identical triangles. What is the area of the shaded region?



8. A jar filled with peanut butter weighs 12 pounds. When one third of the peanut butter is removed, the jar and the remaining peanut butter weigh $9\frac{2}{3}$ pounds. How many pounds does the empty jar weigh?

9. Given the 10-digit number 1024687935, Sam erases a digit to create the smallest 9-digit number possible. Given that this 9-digit number cannot begin with "0," what digit does Sam remove?

10. Thirty-eight students went on a field trip. On the way there, 20 students traveled in a large bus, while the remaining students traveled in cars, with 3 students per car. For the return trip, the same vehicles were used, and all students returned, but each car carried 5 students instead. How many students rode the bus on the way back?

11. Omar has an appointment scheduled for 2:00 PM, which is located 48 miles away from his house. Omar departs his house at 12:30 PM and maintains an average speed of 30 miles per hour. How many minutes late will he be for his appointment?

12. The table below gives the price per pound (lb) for four different types of nuts:

Nuts	**Price/lb**
Pistachio	\$9
Cashews	\$5
Almond	\$3
Peanut	\$1

Alice creates a mix using 7 lb of pistachios, 2 lb of cashews, 6 lb of almonds, and 4 lb of peanuts. In dollars, what is the price per pound of Alice's mix?

13. A total of 525 tomato plants were planted in a garden over a period of 21 days. If an equal number of tomato plants were planted each day for the first 20 days, what is the fewest number of tomato plants that could have been planted on the 21^{st} day?

14. The 5-digit number $53,00A$ is divisible by 11. What is the value of the digit A?

15. In how many ways can 5 be written as a sum of one or more positive integers, where the order of the integers does not matter? For example, $3+1+1$ is the same as $1+3+1$.

16. A farmer is constructing a rectangular horse pen with dimensions 12 feet by 18 feet. He plans to place a fence post at every corner of the pen, and additional fence posts every 3 feet along each side. If the farmer has 22 fence posts, how many fence posts will be remaining once he finishes the pen?

17. In the addition below, each letter represents a different nonzero digit:

$$\begin{array}{cccccc} & A & A & A & A \\ & & B & B & B \\ & & & C & C \\ + & & & & D \\ \hline & 2 & 0 & 2 & 5 \end{array}$$

What is the value of D?

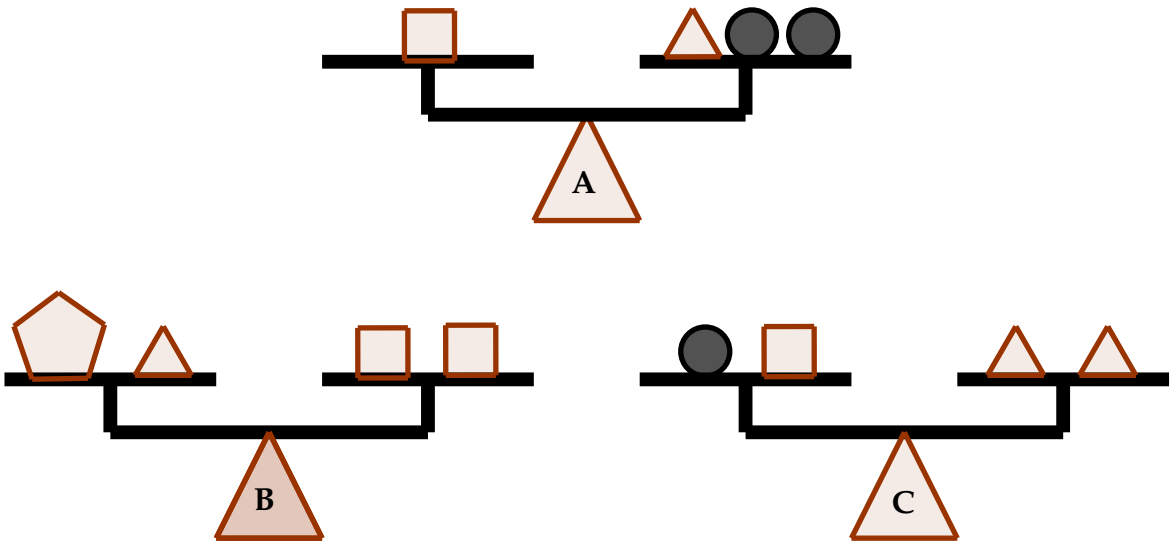
18. A teacher wishes to arrange 18 drama students and 24 choir students into equal-sized rows. Every row will contain the same number of drama students, and every row will contain the same number of choir students. Note that there will be more choir students than drama students in each row. Given that the teacher maximizes the number of rows, how many students will be in each row?

19. The length and width of a rectangle each measure a positive whole number of inches, and the area of the rectangle is 135 square inches. How many different values are possible for the perimeter of the rectangle?

20. A classroom has 23 girls and 12 boys. The teacher divides the students into groups, ensuring that each group has no more than 3 more girls than boys. What is the minimum number of groups needed?

21. Twenty-four students participated in a math contest. Adam placed 19^{th}, and Mary outperformed three times as many students as Adam did. Given that no ties occurred, how many students performed better than Mary?

22. Three balance scales (A, B, and C) are given below:



How many circles are needed to balance one pentagon?

23. Eleven coins lie on a table, all showing heads. In each move, you select any three coins (not necessarily consecutive) and flip them. What is the minimum number of moves needed to turn all 11 coins to tails?

24. A valid credit card number consists of 16 digits 0-9, where the leftmost digit is the 1^{st} digit. The first 15 digits are considered random, while the 16^{th} digit is a "check digit," calculated using the following steps:

    I. Add all the digits in the odd-numbered positions.

    II. Double the result from step I.

    III. Add all the digits in the even-numbered positions (excluding the check digit).

    IV. Count the number of odd-positioned digits that are greater than 4.

    V. Sum the resulting numbers obtained from steps II, III, and IV.

    VI. Determine the digit needed to add to the result from step V to reach the next multiple of 10. This digit is the check digit.

    What digit should replace the blank in the credit card number below so that the resulting number is valid?

    4783 1980 2569 290_

25. Asha has 20 indistinguishable coins. 19 of them have the same weight, while the remaining coin is slightly heavier. Using a two-pan balance scale, what is the fewest number of measurements Asha needs to do in order to guarantee that she will identify the heavier coin? (A *measurement* consists of placing some coins on both ends of the scale, and recording the heavier or that both sides have the same weight.)