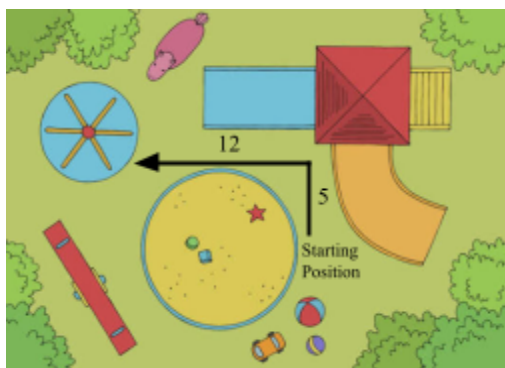
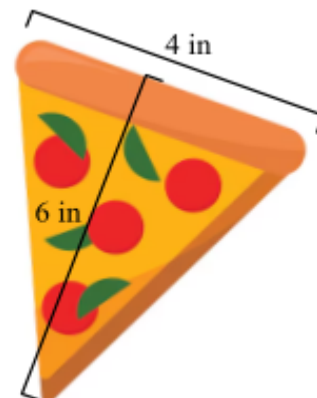


2026 Project Noether Middle School Math Competition For Girls Problems

1. Your cat loves fish treats, and they cost \$2 each. You have \$20 at the store, and you also need to buy a \$4 cat treat (your cat broke the last one). What is the maximum number of fish treats you can buy?
2. Michelle's pizza is triangle shaped. She measures the base to be 4 inches and the height to be 6 inches. How many square inches of pizza does Michelle have?

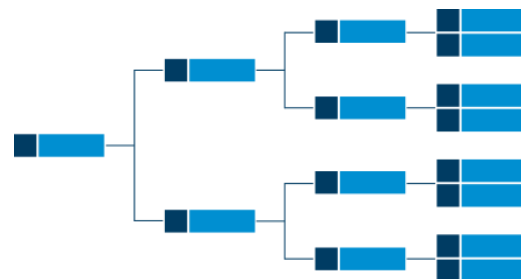


3. Lily is walking in the park. She walks 5 feet north and 12 feet west to get to the roundabout. How far is Lily from her starting position?

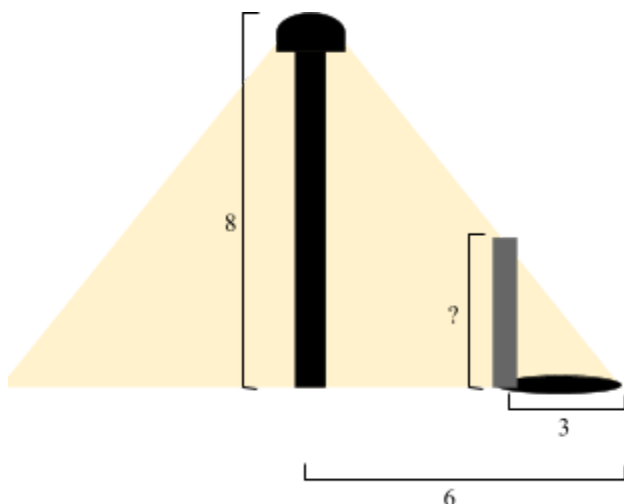
4. What is the largest possible area of a rectangle with a perimeter of 40 cm?

5. A movie theater charges \$12 for adult tickets and \$8 for child tickets. If a group of 15 people paid a total of \$148, how many adult tickets were purchased?

6. In a single-elimination tournament, each game is between two players. Only the winner of each game advances to the next round. In a particular such tournament there are 512 players. How many individual games must be played to determine the champion?



7. In triangle ABC, two of the sides are 6 and 17. What is the difference between the greatest and least possible integer side lengths of the third side?

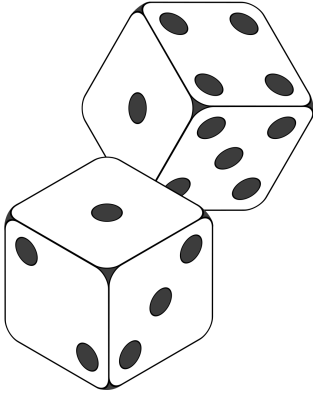


8. Sequence a_n satisfies $a_1 = 3$ and $a_{n+1} = a_n^2 - 2$. Compute a_3 .

9. A lamp sits atop an 8-foot pole. A shorter pole standing nearby casts a 3-foot shadow from the lamp's light. If the shadow of the shorter pole ends 6 feet from the base of the lamp, how tall is the shorter pole?

10. Two distinct vertices of a decagon (10-sided polygon) are chosen at random. The probability that they are adjacent is a/b , where a and b are relatively prime. What is $a+b$.

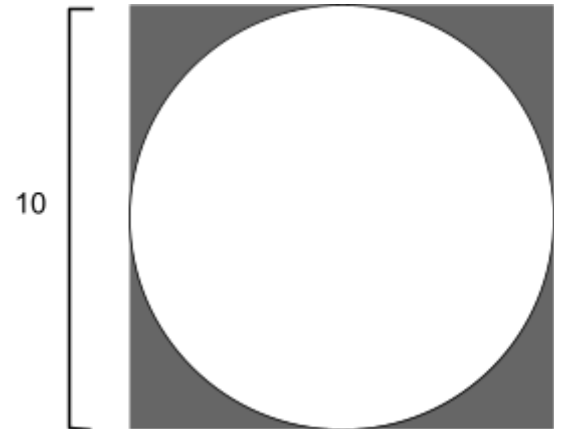
11. A recent study found that 20% of men and 60% of women surveyed support increased funding for particular medical research. The study surveyed 100 men and 900 women. What was the overall percent of the people surveyed who supported increased funding?



12. The line $y = 3x + 4$ intersects the quadratic $y = ax^2 - bx + c$ twice. They intersect at points $(-2, -2)$ and $(2, 10)$. The point $(1, -5)$ is also on the quadratic. What is $a+b-c$?

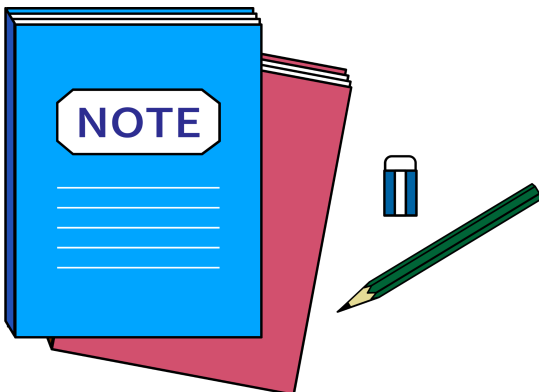
13. Two fair 6-sided dice are rolled. The probability that the sum of the numbers showing is equal to 9 can be expressed in the form a/b , where a and b are positive, relatively prime integers. What is $100a + b$?

14. A square has a side length of 10 centimeters. A circle is drawn inside the square such that it perfectly touches all 4 edges of the square. The area of the region inside the square that is not covered by the circle can be expressed by $a-b\pi$. What is $a+b$?



15. Four consecutive positive integers have a product of 1680. What is the largest of the four integers?

16. Jonny has a bin of socks. When he splits the group of socks amongst him and his brother, he has 1 set leftover. When he splits his socks with his parents (2 more people) in addition to his brother, there are 3 sets leftover, and when his grandparents (2 more people) also come over, there are 5 sets leftover. What is the smallest number of socks in the bin?



17. At a store, 3 notebooks, 7 pencils, and 1 eraser cost a total of \$11.00. At the same store, 4 notebooks, 10 pencils, and 1 eraser cost a total of \$14.30. Based on this information, the exact total cost of buying 1 notebook, 1 pencil, and 1 eraser is n . What is $100n$?

18. A True/False test has N questions. Amy got questions 1–3 wrong and all others right. Scott got exactly two wrong: the very last question and the question 27th from the end (i.e., the one just before a run of 26 correct answers). Amy and Scott share exactly one wrong answer. What is the greatest possible percentage Amy could have scored?



19. How many positive integers less than or equal to 300 are divisible by neither 3 nor 5?

20. How many distinct permutations of the word DILLYDALLY are there?

21. What is the remainder when 7^{2026} is divided by 100?



22. A fair coin is flipped 8 times. What is the probability that there are no two consecutive heads? Express the probability in simplest form a/b and evaluate $100a + b$.

23. In the triangle ABC , $AB = 7$, $BC = 8$, and $CA = 9$. Point M is the midpoint of side BC . Find the square of the length of median AM (i.e., AM^2).

24. An ordered pair of digits (a, b) is such that the six-digit number $2a8b24$ is a multiple of 88. Find the value of $a+b$.

25. Two people go to a party between 5:00 and 6:00. Each waits 20 minutes before leaving. The probability they meet is a/b , where a and b are relatively prime. What is $10a+b$?



26. Five same-size circles each overlap pairwise, with no circle exactly on another. What is the greatest possible total number of intersection points?

27. Find the smallest positive integer n such that $140n$ is a perfect square and $150n$ is a perfect cube.

28. A math club has 8 boys and 6 girls. A team of 5 must have at least 2 boys and 2 girls. Alex (a boy) and Betty (a girl) refuse to travel together. How many valid teams can be formed?

29. What is the sum of the possible lengths of the diagonals of a box whose side lengths are the roots of the polynomial $x^3 - 5x^2 + 8x - 67$?
30. In the valid triangle ABC, the angle bisector to side BC meets BC at D, splitting it into segments of length 3 mm and 4 mm. The angle bisector to AC meets AC at G, splitting it into segments of length 2 mm and 3 mm. The two bisectors meet at P. The ratio AP:PD in simplest form is a:b. What is $100a+b$?

Tiebreaking

The following questions reward more points for complete explanations in addition to the correct answers. Please optimize your time accordingly

31. Rosa and Wade each command a squad of duelists. Rosa's duelists have skill levels $p_1, p_2, \dots, p_n$, and Wade's have skill levels $v_1, v_2, \dots, v_n$. Duelists compete in single combat until one is eliminated. When a duelist of skill x faces a duelist of skill y , the first prevails with probability $x/(x+y)$, and the second with probability $y/(x+y)$. Furthermore, victory is emboldening: the winner absorbs the loser's skill, so a winning duelist of skill x sees their skill rise to $x+y$, while a winning duelist of skill y sees theirs rise to $x+y$.



After each round, Rosa sends out a duelist (from those on her squad still remaining), and Wade must select one of his to oppose her choice. A squad wins when it is the only one with at least one surviving member.

What is Wade's optimal strategy? For instance, if Rosa leads with her strongest duelist, should Wade answer with strength or with weakness?

32. Once again Rosa and Wei meet in the arena, but this time emboldening plays no role: when a duelist wins, their skill remains exactly what it was beforehand. As before, Rosa commits her entry first each round.

What is Wei's optimal strategy? Whom should he send in if Rosa opens with her best duelist?