Joe Holbrook Memorial Math Competition

4th Grade

October 11, 2025

General Rules

- You will have **75 minutes** to solve **40 questions**. Your score is the number of correct answers.
- Only answers recorded on the answer sheet will be graded.
- This is an individual test. Anyone caught communicating with another student will be removed from the exam and their score will be disqualified.
- Scores will be posted on the website. Please do not forget your ID number, as that will be the sole means of identification for the scores.
- You may use the following aids:
  - Pencil or other writing utensil
  - Eraser
  - Blank scrap paper
- You may not use the following aids:
  - The Internet
  - Books or other written sources
  - Other people
  - Calculator or other computing device
  - Compass
  - Protractor
  - Ruler or straightedge

Other Notes

- All answers are either integers or strings of letters. Make sure you do not make any mistakes when writing your answers, as you will not be given credit if you do so.
- You do not need to write units in your answers.
- Ties will be broken by the number of correct responses to questions 31 through 40. Further ties will be broken by the number of correct responses in the last five questions.

1. Compute $2 - 3 \times 0 + 4 \times 5$.
2. Maddie eats 24 chocolate chip muffins and 35 blueberry muffins. How many muffins does she eat in total?
3. A fruit store has a patch of 5 grape vines, each containing 7 grapes. How many grapes does the fruit store have in total?
4. A bush has 43 leaves. After 17 fall off, how many leaves are left on the bush?
5. Michael said all letters in the alphabet 200 times. How many times did he say a vowel (a, e, i, o, or u)?
6. Devin is so excited to play his favorite video game today! In the morning, he is not allowed to play video games, so he will study for two hours. In the afternoon, he will play his favorite video game for half an hour. In the evening, he will play his favorite video game for another half an hour. In total, how many minutes will Devin play his favorite video game for?
7. What is the perimeter of a regular pentagon with side length 3?
8. I love eating Hershey's chocolate, and I can eat 2 pieces every 5 minutes. How many pieces will I have eaten in an hour?
9. What is 50% of 20% of 670?
10. John can run at an average pace of 6 minutes and 30 seconds per mile. Given that he will never get tired, how many minutes will it take for John to run 4 miles?
11. What is the third letter of the third prime number?
12. There are 30 people in a line, and Bob is the 22nd person in the line. What is the difference between the number of people in front of Bob and the number of people behind Bob?
13. Michael needs 1800 experience points (XP) to level up his weapon! Each book of wisdom grants 400 XP, and an entire book must be used at a time (you cannot use part of a book). What is the minimum number of whole books he must use to level up his weapon?
14. A number is an *octave* above another if it is twice the other. Compute the number that is 3 octaves above 55.
15. A rectangle has side lengths of 4 feet and 10 feet. In square inches, what is the area of this rectangle (given that a foot equals 12 inches)?
16. I have 20 diamonds. I want to give some away! What is the minimum number of diamonds I need to give away such that I end up with a prime number of diamonds, and I have less than half of what I started with?
17. Jack eats $\frac{1}{4}$ of a circular pizza with radius 5. Jill eats $\frac{1}{24}$ of a different circular pizza with radius $5\sqrt{2}$. How many times more pizza did Jack eat than Jill?
18. Alice and Bob are walking from one corner of a 5ft $\times$ 12ft rectangle to the opposite corner. Alice walks along the diagonal connecting the two corners while Bob walks along the sides of the rectangle. How many more feet does Bob walk compared to Alice?
19. Robert the lumberjack cuts wood! A cut splits a single piece of wood into two. After he has made 46 cuts, he finds he has 84 pieces of wood. How many pieces of wood did he start with?
20. Josh the Otter does 8 push-ups in 10 seconds, and for every 6th push-up, he does a clap push-up. How many clap push-ups does he do in 55 seconds?
21. What is the units digit of $9^{512^{2025}}$?
22. Saitama does 2000 push-ups every day. He wants to divide them into sets so that each set consists of at least 5 push-ups and each set has the same number of push-ups. How many ways can he do this?
23. What is the hundreds digit of the product of 2025 and 2026?
24. A rectangular garden has a length that is 3 meters longer than twice its width. If the perimeter of the garden is 54 meters, find the width of the garden.

25. Evan plays ten games in a bowling match and must average a score of 220 per game to win. Given Evan bowls a score of 150 in each of his first three games, what must Evan average in his next seven games to win his match?

26. A rectangle has integer side lengths, area 36, and perimeter 26. What is the length of the longer side?

27. Every contestant in Ridgewood's yearly cornwalk has to travel in a distinct path on lattice points from the bottom left corner to the top right corner of a rectangular cornfield grid. Their path cannot be the exact same as any other contestant, and they can only move right and up by one unit. The cornfield is 48 units long and 2 units wide. How many contestants can compete in the cornwalk?

28. An equilateral triangle, square, pentagon, and hexagon all have the same perimeter. Given that their side lengths have to be integers, what is the minimum possible side length of the triangle?

29. Adam X., Andrew Y., Bobert W., Carol X., and David Z. are to be seated in a line of 5 seats. Those whose first names start with the same letter must be seated next to each other, and those whose last names begin with the same letter must also be seated next to each other. Given these conditions, how many ways can the five be seated?

30. Hannah rolls two fair dice. The probability that the product of the numbers on the two dice is divisible by 6 can be written as $\frac{p}{q}$ in simplest form. Find $p+q$.

31. One day, a single mushroom spawns on BCA's field. Every day, each already existing mushroom creates a spore; each existing spore becomes a mushroom and ceases being a spore. For example, on the 2nd day, there is 1 mushroom and 1 spore, and on the 3rd day, there are 2 mushrooms and 1 spore. How many mushrooms are there on the 10th day?

32. Jimothy has a bookshelf and is organizing his books: the 7-book long Harry Potter series, 3 math textbooks, and 2 notebooks. Given that he wants to keep all categories of books together (i.e., all Harry Potter books together, all math textbooks together, and all notebooks together) and the Harry Potter books must stay in order, how many ways can he order his books?

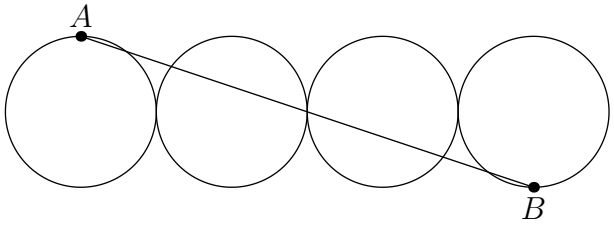
33. Aalok is just beginning to learn the alphabet, and is training by reciting it repeatedly. However, on his n-th repetition, he forgets the n-th letter of the alphabet (on the 27th cycle, he skips A again, and the cycle repeats). He recites: "B, C, ..., Y, Z, A, C, ..." If he continues in this fashion, what is the 651st letter he recites?

34. A line with slope 1 and a line with slope 2 intersect at the point $P(1,6)$ in the xy-plane. The lines also intersect the x-axis at points Q and R, respectively. Find the area of $\triangle PQR$.

35. Jerry and Vaishnavi each hold a distinct number from 1 to 12 and are trying to guess each other's number, and both are telling the truth. Jerry says, "My number is composite." Next, Vaishnavi replies, "If that's true, then our numbers are not relatively prime." Jerry then says, "Now I know your number." What is the sum of their numbers?

36. Find the maximum number of integers you can take from the set $\{1, 2, 3, \ldots, 30\}$ such that any two selected integers are relatively prime. (Two integers are relatively prime if they have no common factors other than 1.)

37. In the diagram below, 4 distinct circles of radii 10 are aligned horizontally. Let A be the point on the leftmost circle directly above its center, and let B be the point on the rightmost circle directly below its center. Let ℓ be the length of segment AB contained within the 2nd circle from the left. Compute ℓ^2.



38. If today is a clear day, then tomorrow has an 80% chance of being a clear day, and a 20% chance of being a rainy day. If today is a rainy day, then tomorrow has a 70% chance of being a rainy day, and a 30% chance of being a clear day. Today is Monday and it is rainy. The probability that the weather will be rainy on Thursday can be written as $\frac{m}{n}$ in simplest form. What is $m+n$?

39. Suppose a, b are real numbers such that

$$\frac{1}{a(b+1)} + \frac{1}{b(a+1)} = \frac{1}{(a+1)(b+1)}.$$

Compute $\frac{1}{a} + \frac{1}{b}$.

40. Aalok has a monic quartic polynomial $p(x)$ whose roots are a, b, c, d. He knows that $a + b = 1$, $ab = 2$, $c + d = 3$, and $cd = 4$. Find $p(2)$.