
The Excel Math Competition



Aug 2025(Introductory Algebra/Geometry Exam)

1. This is a 60 minute individual exam.
2. No collaboration or external devices (like a calculator) are allowed.
3. The first 10 questions are worth [5] points each and are multiple choice.
4. The last 5 questions are worth [10] points each and are short response.
5. Each of the final 5 questions have answers which are positive integers between 000 and 999, inclusive.
6. The questions are arranged in roughly ascending difficulty.
7. If you believe a question is seriously flawed, or have an answer which is not one of the listed answers, there will be a 10-minute dispute period after the test, after which no disputes will be accepted.
8. In the event of a dispute, **leave the question blank** and let your proctor know after the testing time ends.
9. All disputes will be considered on an individual-by-individual basis, so no student will receive credit if they did not submit a dispute, except for in the case of a question being thrown out.

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1 [5]

Welcome back to the August Excel Introductory Algebra Test; we hope you all had a great summer! The test writers procrastinated a bit on writing this test, with this problem being written on August 10th, 2025 (also represented as 8/10/25). What is the sum of the factors of $8 \cdot 10 \cdot 25$?

- a) 4836 b) 2001 c) 8370 d) 4826 e) 2340

2 [5]

Ishaan has decided to prepare for the new school year by buying a variety pack of gum. The package comes with 50 sticks of gum in three flavors: strawberry, vanilla, and chocolate. Given that there are 6 more strawberry sticks of gum than vanilla, and three times more chocolate sticks of gum than vanilla, how many strawberry sticks of gum does Ishaan have in the pack?

- a) 9 b) 15 c) 21 d) 27 e) 36

3 [5]

It's time to schedule classes at Ridgeville High for the new school year, specifically the languages class. At RHS, there are three language classes a student can take: Chinese, Spanish, and Russian. Students have the option to take as many language classes as they want (0, 1, 2, or 3). Unfortunately, the secretary has lost the spreadsheet with the specific classes that each student chose, but she does have access to specific numbers about the classes. There are 70 students taking Chinese, 65 taking Spanish, 60 taking Russian, 25 taking Chinese and Spanish, 20 taking Chinese and Russian, 18 taking Spanish and Russian, and 10 students taking all three languages. Given that there are 154 students total at RHS, how many students are taking no language classes?

- a) 8 b) 11 c) 12 d) 15 e) 22

4 [5]

During the summer, David loves going to the beach, and especially loves playing with beach balls! One day, David decides to leave five perfectly spherical beach balls in a line for other beachgoers to enjoy, each with radius 16. When he comes back the next morning, however, he sees that someone has punctured four of the beach balls, such that in the line of five beach balls, each perfectly spherical ball has half the radius of the one before it. What is the total volume of air present in all five beach balls?

- a) $\frac{18688\pi}{3}$ b) $\frac{16384\pi}{3}$ c) $\frac{18734\pi}{3}$ d) $\frac{18744\pi}{3}$ e) $\frac{18724\pi}{3}$

5 [5]

Sonya's taking AP Lit, and she REALLY doesn't want to do her summer reading. One of the books on her summer reading list, *The Leavers*, is 338 pages! Assuming the book's pages are numbered, starting at page 2 and going up to page 338, how many total 3s will appear in the page numbers?

- a) 108 b) 110 c) 112 d) 115 e) 119

6 [5]

Kyle and his two brothers, Lyle and Miles, have decided to help RHS paint the entire school! Kyle and Lyle are both extremely experienced painters: Kyle can paint 4 schools in a day and Lyle can paint 2 in a day. However, Miles is new to the job, and no one knows his painting rate. Given that Kyle spends an initial hour working by himself, two hours working with Lyle, and one hour working with both Lyle and Miles, how many schools can Miles paint in a day?

- a) 1 b) 2 c) $\frac{3}{2}$ d) 3 e) 4

7 [5]

Toyesh has a set of the first six positive integers: 1, 2, 3, 4, 5, 6. Given that Toyesh randomly picks a subset of his original set, what is the probability that this subset will have at least one odd number? As a reminder, a subset is any set that only contains elements of the larger set that it is derived from; for this set, $\{2, 4, 6\}$ and $\{1, 2, 3\}$ are subsets, while $\{1, 1\}$ and $\{1, 3, 7\}$ are not.

- a) $\frac{7}{8}$ b) $\frac{1}{2}$ c) $\frac{3}{4}$ d) $\frac{13}{16}$ e) $\frac{29}{32}$

8 [5]

In rhombus $ZAPY$, $m\angle ZAP = 120^\circ$ and its perimeter is 24 units. What is the length of the longer diagonal of the rhombus?

- a) $4\sqrt{3}$ b) 6 c) $6\sqrt{3}$ d) 8 e) $8\sqrt{3}$

9 [5]

Joey's calculator is freaking out; it keeps spitting out random numbers in different bases: 6573 in base 9, 13221 in base 4, 3256 in base 7, and 100111001 in base 2. Find the sum of all these numbers, expressed in base 10.

- a) 6795 b) 6785 c) 6825 d) 6805 e) 6815

10 [5]

It's college application season for all the rising seniors! A lot of people's goals are to end up at a T20 (top 20) school, but Jemail has decided he wants to go beyond that, and be able to get into every Ivy League School! There are 8 Ivy League schools; assuming Jemail gets accepted into 10 schools out of the T20, what is the probability that he gets into all 8 Ivy League schools? Assume all Ivy League Schools are in the T20

- a) $\frac{66}{184756}$ b) $\frac{15}{22}$ c) $\frac{66}{125970}$ d) $\frac{132}{184756}$ e) $\frac{132}{125970}$

11 [10]

The test writers saw Fantastic Four: First Steps a week before writing this test; in that spirit, here's an easy question! Find how many different ways there are to arrange the letters in FANTASTIC (remember, identical letters are interchangeable), and multiply it by four; report the sum of the digits in the result.

12 [10]

Ken and Tony decide to finally go school shopping at the Pencil, Notebook, Eraser, and Puppy Store (there was a merger). Unfortunately, the prices in the store aren't available at the moment. Ken and Tony have to use some receipts they found on the floor to figure out the prices of everything: Pencil + Notebook + Eraser + Puppy = \$16

$$2 \text{ Pencils} + \text{Notebook} + \text{Eraser} + \text{Puppy} = \$19.50$$

$$\text{Pencil} + 2 \text{ Notebooks} + 3 \text{ Erasers} + \text{Puppy} = \$28$$

$$2 \text{ Pencils} + \text{Notebook} + \text{Eraser} + 2 \text{ Puppies} = \$25$$

After finding the price of each item, round them to the nearest integer and report the product of the rounded numbers.

13 [10]

Rishan has finally decided to get his driver's license! He's even set up a practice track to hone his driving skills. This track is made up of a sixth of a circle with radius 6, half of a hexagon with side length 4, and a right triangle with leg lengths 13 and 8. Find the sum of the areas of each section; this should be in the format $a + b \cdot \pi + c \cdot \sqrt{d}$. Find the least common multiple of a, b, c, and d.

14 [10]

Bhuv decides to get ahead this year and practice math competition tests during the summer. Unfortunately, his calculator seems to have broken, with the only two functions that work being x2 (multiply by two) and +1 (add one). Given that Bhuv starts with the number 1 already in his calculator, what is the fewest number of moves he can make to get to 1500? (A "move" consists of using one of the two functions).

15 [10]

To end off the summer, RHS is hosting its very own Summer Carnival! The most popular game run at the Carnival is archery, mainly because it is a completely FAIR game (meaning that the expected value of playing the game is 0). In Archery, each player gets one shot at a target, and depending on what section of the target they hit, they either win or lose points. The target is made of concentric circles (all of the circles share the same center, and smaller circles are inside the larger ones) ranging from radii 1, 3, 4, 7, and 10. The point total for landing it in the smallest circle is 10; landing it in the next smallest circle is 5, then 2. Landing it in the fourth largest space (the area in the circle of radius 7 but outside the circle of radius 4) loses the player 1 point. Assuming that every player hits a completely random point on the target, how many points should the player lose if they hit the outer ring of the target? The answer, when simplified, should be of the form a/b ; report the sum of $a + b$.