



# KMMC 2

Karate Masters Mathematics Competitions 2

2nd Annual

# KMJJIME II

Saturday, March 25, 2023



## INSTRUCTIONS

1. Please don't open this booklet until you start the test.
2. This is a 15-question competition. All answers are whole numbers from 00 to 99 (including 00 and 99). Please make sure to put a 0 as the first digit for all single-digit answers! (For example, if your answer is 1, please write 01.)
3. Answer the problems by typing your answers on the KMJJIME Answer Form with a keyboard. Check the keys for accuracy and erase errors and stray marks completely.
4. SCORING: You will receive 1 point for each correct answer, 0 points for each problem left unanswered, and 0 points for each incorrect answer.
5. You can only use blank scratch paper, rulers, and erasers. Don't use anything else! No problems on the competition will require the use of a calculator.
6. Figures are not necessarily drawn to scale.
7. Before beginning the competition, your competition manager will not ask you to record your name and other information on the answer sheet.
8. You will have 50 minutes to complete the competition once you start the test.
9. When you finish the competition, don't sign your name in the space provided on the answer sheet.

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If we find out you cheated, we will remove your score.

Please don't send the problems to someone else or talk about the problems before the contest is over, as it is cheating.

1. Taiki's birthday was nine weeks ago. To celebrate, he decided to buy 6 cakes for himself and 62 other people. If Taiki cut each cake into the same number of pieces, and everyone was able to have at least one piece, find the smallest number of pieces Taiki could have cut each cake into.
2. At Jakka Jan's Pizza, Yui buys a pepperoni pizza with eight slices, where each slice is supposed to have an equal number of pepperoni pieces. However, one of the slices has one more pepperoni piece than each of the other slices. If the total number of pepperoni pieces is 57, find the number of pepperoni pieces that the slice with the most pepperoni pieces has.
3. Ryan spends half of his money on shoes. Then, his mother gets upset and takes away a third of his remaining money. He ends up with 12 dollars. Find the number of dollars Ryan had at the start.
4. The three-digit number  $61\underline{\star}$  has a remainder of 4 when divided by 9. Find the sum of the digits of this number.
5. Daniel adds a two-digit number to the number 78 and gets a two-digit number. Daniel then reverses the digits of his two-digit number, adds it to the number 78, and gets a three-digit number. Find the largest possible value of Daniel's original two-digit number before reversing its digits.
6. A group of students are standing in a line, including Saya. At first, there were 29 students in front of Saya and 14 students behind her. After 99 students joined the line, the same number of students were in front of Saya and behind her. Find how many of those 99 students are in front of Saya.
7. Two frogs, Judo and Karate, are hopping towards each other. Judo hops one lily pad left every 7 minutes, and Karate hops one lily pad right every 5 minutes. If Judo and Karate first meet after 49 minutes, find the number of lily pads directly between Judo and Karate before they started hopping.
8. On his way to school, Aki saw 12 birds. During school, Aki saw 14 birds. On his way back home, Aki saw 11 birds. If Aki saw 7 birds exactly twice and 2 birds all three times, find the number of birds he saw exactly once.
9. Mugi is buying a shirt. She has two coupons: the first one subtracts \$3 from the price of the shirt, and the second one applies a  $\square\%$  discount. If she uses the first coupon, then the second coupon, the price will be \$1.35 higher than if she uses the second coupon, then the first coupon. Find  $\square$ .
10. Karate writes a string of letters, each of which are either **a** or **b**. Judo counts 32 occurrences of **a**, 20 occurrences of **ab** and 1 occurrence of **aaa**. If the last letter in the string is **b**, find the number of occurrences of **aa**.

11. Aryan, Ryan, and Yan are trying to count to two minutes. They each start counting at the same time and count seconds at a constant rate. After counting, they have the following conversation:
- **Aryan:** Ryan counted to a minute 10 seconds before Yan counted to two minutes.
  - **Ryan:** Yan counted to a minute 35 seconds before Aryan counted to two minutes.
  - **Yan:** Aryan counted to a minute 15 seconds before Ryan counted to two minutes.

Find the number of seconds it took Ryan to count to two minutes.

12. Kirby's club is buying boba tea, where  $\frac{2}{3}$  of the members are adults, and  $\frac{1}{2}$  of the members like milk tea. If Kirby buys a milk tea for each member who likes milk tea and a fruit tea for each of the other members, it costs \$15.84, but if Kirby instead buys a milk tea for each adult and a fruit tea for each of the other members, it costs \$16.92. The cost for Kirby to buy a fruit tea for each adult and a milk tea for each of the other members is \$14.★. Find ★.



13. The numbers 1, 2, 3, ..., 360 are each labeled on a set of 360 cards. Karate stamps a 1 on every card with a number divisible by 1, a 2 on every card with a number divisible by 2, and so forth, until he stamps a 20 on every card with a number divisible by 20. Find the total number of cards where the largest number that is stamped on the card is 12.
14. Mio is listing the numbers 1, 2, 3, 4, 5, 6, 7 so that if a number  $\square$  is a factor of another number  $\triangle$ , then  $\square$  occurs somewhere before  $\triangle$  in the list.



Find the last two digits of the number of ways for Mio to list the numbers.

15. In a classroom, each student has exactly two pencils, each of which is either orange, yellow, or gray. If 56 students have an orange pencil, 48 students do not have a gray pencil, and 34 students have two pencils with different colors, find the number of students that have a yellow pencil.



# KMJJIME II

**DO NOT OPEN UNTIL SATURDAY, March 25, 2023**

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**\*\*Administration on an earlier date will disqualify your results.\*\***

- All the information is not contained in the non-existent KMJJIME Teacher's Manual. PLEASE READ THE MANUAL BEFORE SATURDAY, MARCH 25, 2023.
  - Please don't send the problems to someone else or talk about the problems before the contest is over, as it is cheating.
  - Please submit your answers to the Quilgo form if you are taking the 10-minute challenge mode.
  - To take the traditional, 50-minute test, start the Quilgo and open the test link. You can just close out the Quilgo afterwards without submitting it. Instead, you have 50 minutes to send a private message on AoPS to **DeToasty3**, **pandabearcat**, **PandaMC**, and **pog**.
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For more information about the KMJJIME and our other competitions, please visit *Wait, we don't have a website!*

Questions and comments about this competition should be sent to:

**DeToasty3**, **pandabearcat**, **PandaMC**, and **pog**.

The KMJJIME contest was written by the KMMC 2 Committee:

DeToasty3, pandabearcat, PandaMC, & pog