



KMMC 2

Karate Masters Mathematics Competitions 2

3rd Annual

KMMC 2 A

Saturday, May 11, 2024



INSTRUCTIONS

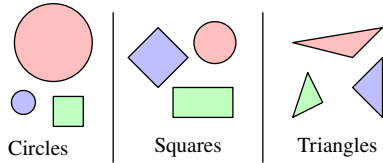
1. Please don't open this booklet until you start the test.
2. This is a twenty-five question multiple choice test. For each question, only one answer choice is correct.
3. Answer the problems by typing your answers on the KMMC 2 Answer Form with a keyboard. Check the keys for accuracy and erase errors 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 25 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.

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. Judo has 5 rocks. On Monday, Aki gives Judo 7 rocks. On Tuesday, Hana takes away 3 of Judo's rocks. How many rocks does Judo have now?
(A) 6 (B) 7 (C) 8 (D) 9 (E) 10
2. How many letters in the word *KARATE* are consonants?
(A) 0 (B) 1 (C) 2 (D) 3 (E) 4
3. Taiki has a goal to run at least 5 miles a day. If Taiki runs 4 miles on Monday, 3 miles on Tuesday, 7 miles on Wednesday, and 6 miles on Thursday, on how many days did Taiki reach his goal?
(A) 0 (B) 1 (C) 2 (D) 3 (E) 4
4. Ritsu is writing a book. She has to write at least 80 words, and she has 46 words so far. At least how many more words does Ritsu have to write?
(A) 33 (B) 34 (C) 35 (D) 44 (E) 45
5. Which of the following values is even?
(A) $4 + 8$ (B) $5 - 2$ (C) $3 + 4$ (D) $7 + 4$ (E) $9 - 4$
6. Yui and Mio are collecting shells. At the start, Yui has 5 more shells than Mio. After Yui gives some of her shells to Mio, Yui now has 3 fewer shells than Mio. How many shells did Yui give to Mio?
(A) 1 (B) 4 (C) 5 (D) 8 (E) 10
7. What is the smallest two-digit number whose units digit is greater than its tens digit?
(A) 10 (B) 11 (C) 12 (D) 22 (E) 23
8. Masaru is skip-counting. If the numbers he says are 8, \square , 14, and 17, in that order, what is \square ?
(A) 9 (B) 10 (C) 11 (D) 12 (E) 13

9. How many shapes are not in the right category?

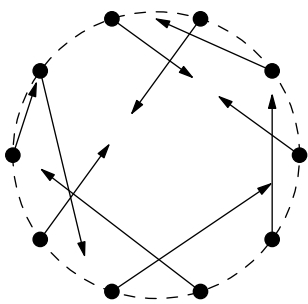


- (A) 2 (B) 3 (C) 4 (D) 5 (E) 6

10. Azusa recorded the temperature in degrees Celsius over 5 days. Each day, the number of degrees is 5 higher than the day before. If she recorded 19 degrees on the first day, how many degrees did she record on the last day?

- (A) 34 (B) 39 (C) 44 (D) 49 (E) 54

11. How many of the 10 arrows are pointing directly towards each other?



- (A) 0 (B) 2 (C) 4 (D) 6 (E) 8

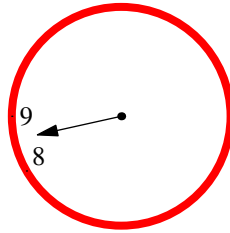
12. Yui writes a number on a slip of paper. Ui takes Yui's number, subtracts it from 12, and writes that number on the slip of paper. If Ui wrote the number 4, what number did Yui write?

- (A) 4 (B) 6 (C) 8 (D) 12 (E) 16

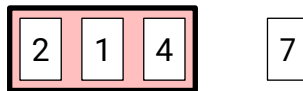
13. Keisuke has 5 friends. The sum of his friends' ages is 24. In how many years will the sum of his friends' ages be 49?

- (A) 1 (B) 2 (C) 3 (D) 4 (E) 5

14. The minute hand of Karate's clock fell off. If the hour hand is halfway between the 8 and 9, where should Karate put the minute hand?



- (A) at the 12 (B) between 12 and 3 (C) at the 3
(D) between 3 and 6 (E) at the 6
15. There are two numbers \square and \triangle . If $9 + \square = \triangle$, which of the following must be equal to $9 - \square$?
- (A) $9 - \triangle$ (B) $\triangle - \square - \square$ (C) \square (D) $\square + \triangle$ (E) 18
16. In August, Heizou was 1 year older in age than Kazuha. By the end of the same year, the two were the same age. Which of the following months could Heizou's birthday be in? (A person's age increases by 1 on their birthday.)
- (A) July (B) September (C) October
(D) November (E) December
17. Karate has 4 cards. He wants the 3 cards in the rectangle to have the largest possible sum.



- If he switches two of the cards, what is the largest possible sum?
- (A) 7 (B) 10 (C) 12 (D) 13 (E) 14
18. Kazuha measures a maple leaf in different ways. When he lines up 5 identical coins, they have the same length as the leaf. When he measures the leaf with a ruler, he finds that the leaf is 15 centimeters long. If he were to measure a coin with the ruler, how many centimeters long would 1 coin be?
- (A) 2 (B) 3 (C) 4 (D) 5 (E) 6

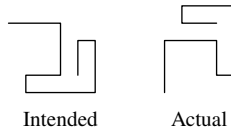
19. On the number line, Δ is exactly halfway between 0 and \square .



The number exactly halfway between Δ and \square is 6. What is \square ?

- (A) 8 (B) 9 (C) 10 (D) 11 (E) 12

20. Ryan is walking along a path in a video game. He walks along the path that he sees on the screen. However, he is holding his controller the wrong way, so he actually walks along the path shown on the right. If the wire is at the top of the controller, which way is his controller faced?



- (A) (B) (C) (D) (E)

21. Yui is taking a test. Of the first ten questions, she answers six of them, and of the last ten questions, she answers six of them. If Yui answered eight questions in total, at most how many questions could be on the test in total?

- (A) 12 (B) 14 (C) 16 (D) 18 (E) 20

22. How many ways are there to arrange 1, 2, 3, and 4 so that the sum of any two numbers next to each other is odd?

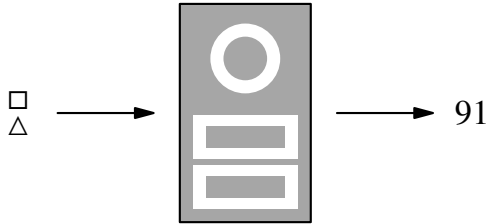
- (A) 2 (B) 4 (C) 6 (D) 8 (E) 12

23. Judo has a drawer with 10 socks, of which there is at least one red, one blue, and one green. He peeks into the drawer and sees seven of the socks – three blue and four red. How many of the following facts must be true?

- There are more red socks than blue socks in the drawer.
- There are fewer green socks than red socks in the drawer.
- At least five of the socks in the drawer are not blue.
- At most five of the socks in the drawer are not red.

- (A) 0 (B) 1 (C) 2 (D) 3 (E) 4

24. A machine reads the digits of a number and removes all of the even digits. (For example, putting the number 7163 into the machine would output the number 713.) When inputted into the machine, the largest 4-digit number that would output the number 91 is \square , and the smallest 4-digit number that would output the number 91 is \triangle . What is $\square - \triangle$?



- (A) 7590 (B) 7790 (C) 7990 (D) 8190 (E) 8390
25. Katherine has two piles of marbles, each with 20 marbles. Every 10 seconds, she takes a marble from the right pile and moves it to the left pile, and every 6 seconds, she takes a marble from the left pile and moves it to the right pile. After how many seconds will all the marbles first be in one pile?
- (A) 282 (B) 288 (C) 290 (D) 294 (E) 300



KMMC 2 A

DO NOT OPEN UNTIL SATURDAY, May 11, 2024

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

- All the information is not contained in the non-existent KMMC 2 Teacher's Manual. PLEASE READ THE MANUAL BEFORE SATURDAY, MAY 11, 2024.
 - 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 five-minute challenge mode.
 - To take the traditional, 25-minute test, start the Quilgo and open the test link. You can just close out the Quilgo afterwards without submitting it. Instead, you have 25 minutes to send a private message on AoPS to **DeToasty3**, **pandabearcat**, and **pog**.
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For more information about the KMMC 2 and our other competitions, please visit <https://pogyou.github.io>.

Questions and comments about this competition should be sent to:

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

The KMMC 2 contest was written by the KMMC 2 Committee:

DeToasty3, pandabearcat, PandaMC, & pog