OKLAHOMA SCHOOL of SCIENCE and MATHEMATICS

23nd Annual OSSM Middle School Math: An Awesome Contest—Round Two

7th and 8th Grade Test A

Spring 2025

Before you begin:

1. Please write your name on your answer sheet.
2. On your name tag you have been given a three-digit OSSM student ID number. On the answer sheet, in the lower right-hand corner, there is a place to fill in the three-digit student ID number (use the first three boxes, leaving the rest blank).
3. Fill in the appropriate bubbles for your OSSM student ID.

Directions:

Use the scratch paper provided to do your work.

Choose the appropriate answer, and then fill in the corresponding bubble ON THE ANSWER SHEET.
DO NOT MAKE ANY STRAY MARKS ON YOUR ANSWER SHEET; it may cause the machine to misread your answer sheet and may disqualify your score.

This is a 40-question, 1-hour contest. All questions are multiple-choice. Figures are not to scale. Each question is worth one point. Your score will be the number of correct answers. There is no partial credit or penalty for wrong answers. Please continue working or reworking problems until time is called.

Do Not Open or Turn Over Until Instructed To Do So

Fill in your answers ON THE ANSWER SHEET by filling in the corresponding bubble.

DO NOT MAKE ANY STRAY MARKS ON YOUR ANSWER SHEET!

You may use this space for scratch paper.

1. When the number n + 1 is divided by n, where n is an integer greater than 1, what is the remainder?
    a. 1 ***
    b. 2
    c. 3
    d. 4
    e. You cannot tell for sure.

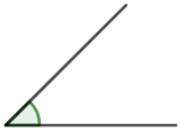
2. How much greater is the sum of the first five positive even numbers than the sum of the first five positive odd numbers?
    a. 1
    b. 2
    c. 3
    d. 4
    e. 5 ***

3. An ant walking on a coordinate plane begins at point $(3,5)$. He walks one unit in the positive x-direction, then turns right and walks 3 units. He then turns right again and walks 5 units, right again and walks 7 units, right one more time and walks 9 units. Where is he?
    a. (-1,9)
    b. (7,10)
    c. (8,9) ***
    d. (9,8)
    e. (10,7)

4. Jonah brought 100 pieces of candy on the 100th day of school. 44 pieces of candy were Reese's pieces. 32 pieces of candy were brown. 12 pieces of candy were brown Reese's pieces. How many pieces of candy were non-brown Reese's pieces?
    a. 12
    b. 20
    c. 24
    d. 32 ***
    e. 36

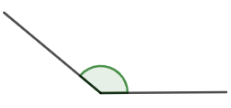
5. ΔABC is a triangle and $\angle B = 40°$. Which angle below is equal to the **<u>average</u>** of $\angle A$ and $\angle C$?

a. 

b. 

c.  ***

d. 

e. 

6. If today is Saturday, what day of the week was it 50 days ago?
    a. Saturday
    b. Sunday
    c. Monday
    d. Thursday
    e. Friday ***

7. A serving of 5 Ritz crackers has 80 calories. A serving of 6 Triscuit crackers has 120 calories. A serving of 16 Wheat Thins crackers has 140 calories. Arrange these brands in order from the brand with the <u>fewest</u> calories per cracker, to the brand with the <u>most</u> calories per cracker.
    a. Ritz < Triscuits < Wheat Thins
    b. Triscuits < Ritz < Wheat Thins
    c. Triscuits < Wheat Thins < Ritz
    d. Wheat Thins < Ritz < Triscuits ***
    e. Wheat Thins < Triscuits < Ritz

8. A woodchuck can chuck 20 pieces of wood every 6 minutes. Assuming that the woodchuck chucks wood at a constant rate, how much wood would the woodchuck chuck in 21 minutes?
    a. 60
    b. 65
    c. 70 ***
    d. 75
    e. 100

9. There's a 40% chance of rain tomorrow. If it rains tomorrow, there's a 25% chance the dam will overflow (and if it doesn't rain, the dam will definitely not overflow). What is the overall chance the dam will overflow?
    a. 8%
    b. 10% ***
    c. 12%
    d. 15%
    e. 25%

10. It takes an average 6^{th} grader 40 minutes to do 30 middle school math competition problems and it takes the average 8^{th} grader 10 minutes to do 15 middle school math competition problems. How much faster is the average 8^{th} grader than the average 6^{th} grader in solving middle school math competition problems?
    a. Twice as fast ***
    b. Two-and-a-half times as fast
    c. Three times as fast
    d. Four times as fast
    e. Five times as fast

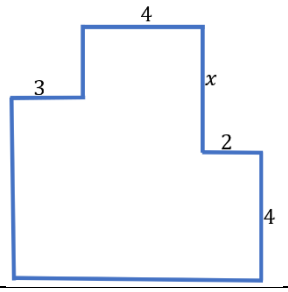
11. Carrie, Gary, Larry, Mary, and Steve are seated in five seats in the front row at the movies. If Mary and Steve do not want to sit next to each other, how many ways can the group be arranged?
    a. 60
    b. 72 ***
    c. 84
    d. 96
    e. 120

12. Which expression gives the same number when evaluated with both $x = 3$ and $x = -3$?
    a. $2x - 3$
    b. $x^2 - x^4$ ***
    c. $x^2 - 14x + 2$
    d. $x^3 - x$
    e. 2^x

13. What is the sum of the lowest five positive factors of 2025?
    a. 18
    b. 25
    c. 29
    d. 33 ***
    e. 43

14. On Saturday, I jogged at a slow and steady speed from my house to the park, and then immediately turned around and jogged back home at the same speed. On Sunday, I jogged to the park as usual, but when I got there, I sat and watched the ducks for 20 minutes. After that, I hurried back home at a quicker rate, twice my usual jogging speed. It turned out the amount of time I spent away from home on both days was the same. How long was I away from home each day?
    a. 40 minutes
    b. 50 minutes
    c. 60 minutes
    d. 80 minutes ***
    e. 100 minutes

15. If x is a natural number, which of these is not a possible perimeter for the shape shown? (Note: Figure not drawn to scale.)
    a. 26 ***
    b. 28
    c. 30
    d. 32
    e. 34

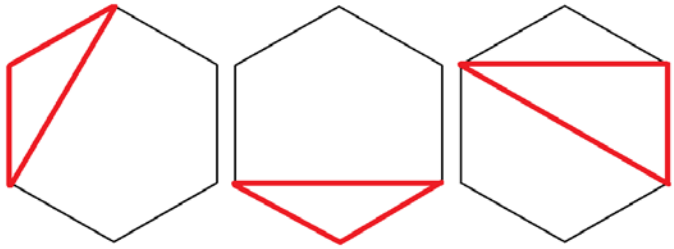


16. Suppose you are told, “If a person is a student at the Oklahoma School of Science and Math (OSSM), then they love the OSSM school food.” If that is true, then which of the following must also be true?
    a. If a person loves the OSSM school food, then the person must be a student at OSSM.
    b. If a person does not love the OSSM school food, then the person is not an OSSM student. ***
    c. If a person is not a student at OSSM, then the person does not love the OSSM school food.
    d. If a person is not a student at OSSM, then the person loves the OSSM school food.
    e. None of the above statements has to be true.

17. Which of the following is the best estimate for the weight of a toothbrush?
    a. 2 grams
    b. 20 grams ***
    c. 200 grams
    d. 2,000 grams
    e. 20,000 grams

18. If x and y are real numbers, and $x > y > 0$, then what must be true?
    a. $\frac{1}{x} < \frac{1}{y}$ ***
    b. $\frac{1}{x} > \frac{1}{y}$
    c. $-x > -y$
    d. $x < y$
    e. $x + 1 < y + 1$

19. Seen here are three different triangles that can be formed from three of the vertices of a regular hexagon. In total, how many triangles can be formed in this way?



    a. 12
    b. 14
    c. 16
    d. 18
    e. 20 ***

20. What is the area of a triangle whose three vertices are located at the (x, y) coordinates $(-2, -3)$, $(-2, 7)$, and $(8, 1)$?
    a. 40
    b. 42
    c. 45
    d. 48
    e. 50 ***

21. At the flower shop, you can buy one azalea, two begonias, and three chrysanthemums for $56. Or you can buy three azaleas, two begonias, and one chrysanthemum for $80. How much more does an azalea cost than a chrysanthemum?
    a. $6
    b. $12 ***
    c. $18
    d. $20
    e. $24

22. On a recent birthday, Frank's age was part of a twin prime (two prime numbers that are two units apart, like 17 and 19). The last birthday when his age was part of a twin prime, was 16 years ago. Which of these could be the birthday Frank just recently celebrated?
    a. 43
    b. 47
    c. 53
    d. 59 ***
    e. 61

23. A, B, and C are points on a plane, with $AB = 12$ and $BC = 20$. How many different positive whole numbers are possible values for the length of the segment AC?
    a. 1
    b. 2
    c. 9
    d. 13
    e. 25 ***

24. After getting a 40% discount on a tent, Saint Throckmorton III negotiates a $20 off discount on top of the 40%. After finding out that he would get a better deal by asking for a 15% discount on top of the 40% discount, he asks for the 15% discount instead. If the original price before any discount is $230, how much **more** did he save with the 15% off discount, than with the $20 off discount?
    a. 60 cents
    b. 70 cents ***
    c. 80 cents
    d. 90 cents
    e. 95 cents

25. There are 10 members of photography club. Which of the following **cannot** be the exact average number of photographs taken so far this year by club members?
    a. 0.5
    b. 2
    c. 4.3
    d. 8.75 ***
    e. 20

26. There are exactly N four-digit numbers that are multiples of 6. What is the sum of digits of N?
    a. 6 ***
    b. 7
    c. 19
    d. 20
    e. 23

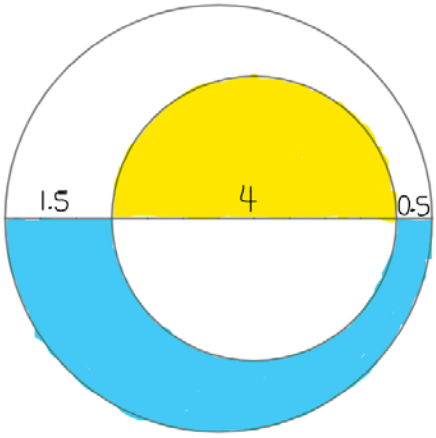
27. Start with a square with area 25. Join the midpoints of its sides to form a new, smaller square. What is the perimeter of the new square, rounded to the nearest whole number?
    a. 12
    b. 14 ***
    c. 16
    d. 18
    e. 20

28. A point inside a geometric shape is called a “starpoint” if, for **every other** point inside the shape, the line segment joining it to the starpoint lies entirely inside the shape. Of the four block-letter shapes below, how many have at least one starpoint somewhere inside them?
    a. 0
    b. 1
    c. 2 ***
    d. 3
    e. 4

29. 2025 is the sum of the first 9 cubes $(1^3 + 2^3 + 3^3 \ldots . + 9^3)$. What number is the sum of the first 18 squares?
    a. 1887
    b. 1965
    c. 2109 ***
    d. 2326
    e. 29241

30. What is the area of a regular hexagon, each of whose sides has length 6?
    a. 60
    b. $9\sqrt{3}$
    c. 36
    d. $45\sqrt{3}$
    e. $54\sqrt{3}$ ***

31. Two circles have diameters along a common line, as shown in the figure. The smaller circle lies inside the larger circle and cuts the larger diameter into segments of length 1.5, 4, and 0.5. What is the ratio of the area of the upper, semicircular shaded region to the area of the lower, irregularly-shaped shaded region?
    a. $2:3$
    b. $3:4$
    c. $3:5$
    d. $4:5$ ***
    e. $4:9$

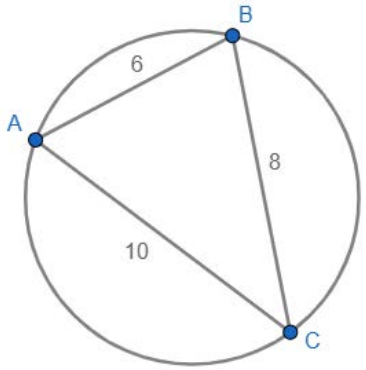


32. Let N be the number of fractions in the interval $0 < x < 1$ that are written in lowest terms, and whose numerator and denominator are **both** single-digit whole numbers. Which of the following is true about N?
    a. N is a prime number
    b. N is the square of a prime
    c. N is the cube of a prime ***
    d. N is divisible by exactly two different primes
    e. N is divisible by three or more different primes

33. What is the remainder when 2^{10} is divided by 17?
    a. 1
    b. 2
    c. 3
    d. 4 ***
    e. 5

34. Fatima the Frogbot is on the number line at 0. She can hop in either direction, and she has three different hop-length settings: a short hop of 20 units, a medium hop of 25 units, or a long hop of 36 units. What is the smallest positive whole number Fatima can reach?
    a. 1 ***
    b. 2
    c. 3
    d. 4
    e. 5

35. A triangle has sides of length 6, 8, and 10, and a circle is drawn that passes through all three vertices of the triangle, as shown. What is the circumference of the circle? (Note: Figure not drawn to scale.)



    a. 10π ***
    b. 14π
    c. 20π
    d. 24π
    e. 25π

36. What is the units digit of 23^{2025}?
    a. 1
    b. 3 ***
    c. 5
    d. 7
    e. 9

37. It is noon and the hands of the clock are pointing in exactly the same direction. In how many minutes will the hands of the clock be pointing in exactly opposite directions?
    a. 30 minutes
    b. 31 and 8/11 minutes
    c. 32 and 5/11 minutes
    d. 32 and 8/11 minutes ***
    e. 33 minutes

38. If you pick two different corners of a cube at random, what is the probability that they are next to each other along an edge of the cube?
    a. $1/3$
    b. $1/6$
    c. $3/7$ ***
    d. $3/14$
    e. $3/16$

39. A 2-cup container of coffee is mixed together with 1/2 cup of milk. Then 1 cup of that mixture is added into a blue cup that started out with 1.5 cups of coffee. What percentage of the mixture in the blue cup is now milk?
    a. 4%
    b. 5%
    c. 6%
    d. 8% ***
    e. 10%

40. In square $ABCD$, the points P, Q, R, S are the midpoints of sides AB, BC, CD, and DA respectively. The points W, X, Y, Z are the midpoints of segments PB, QC, RD, and SA respectively. If the area of $ABCD$ is 16, what is the area of $WXYZ$?
    a. 6
    b. 8
    c. 9
    d. 10 ***
    e. 12

You may use this space for scratch paper.