



OKLAHOMA SCHOOL of SCIENCE and MATHEMATICS

22nd Annual OSSM Middle School Math: An Awesome Contest—Round Two

7th-8th Grade Test A

Spring 2024

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. What is the sum of the first ten odd numbers (beginning with the number 1)?
- a. 50
 - b. 99
 - c. 100 ***
 - d. 101
 - e. 110

2. Which of the following letters of the alphabet has no lines of symmetry?

- a. 
- b. 
- c.  ***
- d. 
- e. 

3. What digit appears in the tens place of $5 \times 5 \times 5$?

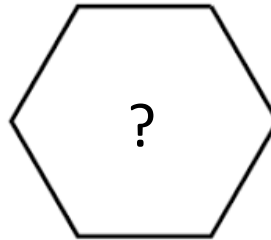
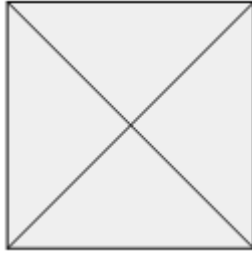
- a. 0
- b. 1
- c. 2 ***
- d. 4
- e. 5

4. Elijah is thinking of a fraction whose numerator and denominator are whole numbers. The fraction is written in lowest terms and its value is strictly between 0 and 1. Also, the denominator is less than or equal to 6. How many different fractions could Elijah be thinking of?

- a. 11 ***
- b. 12
- c. 13
- d. 14
- e. 15

5. Currently, a father is three times as old as his son. In 15 years, he will be twice as old as his son. What is the sum of the father's and son's ages now?
- a. 50
 - b. 60 ***
 - c. 70
 - d. 80
 - e. 90

6. Pictured here is a square with its two diagonals drawn. How many diagonals does a regular hexagon have?



- a. 7
 - b. 8
 - c. 9 ***
 - d. 10
 - e. 12
7. If I pour out 5 cups of milk from my jug, I would have 2 cups less remaining in the jug than I would have if I had poured out half of the milk instead. How many cups of milk are in the jug before I pour anything out?
- a. 1
 - b. 3
 - c. 5
 - d. 6***
 - e. 14
8. If $30 \times N + 80 = 100$, then $N =$
- a. $1/3$
 - b. $2/3$ ***
 - c. 6
 - d. 10
 - e. -10
9. When I jog along the wilderness loop trail, it takes 24 minutes to complete. When I walk, it takes 60 minutes. Today I walk for the first 20 minutes, and then decide to jog the rest of the way. How much more time will it take to finish the trail, once I start jogging?
- a. 4 minutes
 - b. 12 minutes
 - c. 16 minutes ***
 - d. 18 minutes
 - e. 20 minutes

10. $(-3)(-3) - (-3)(-3)(-3) =$

- a. -36
- b. -24
- c. -18
- d. 18
- e. 36 ***

11. I start with zero rocks in my rock collection. On Day 1, I add 1 rock to my collection and then remove my least favorite rock (leaving me with zero rocks again). On Day 2, I add 2 rocks to my collection, and then remove my least favorite rock. The pattern continues: on Day N , I add N new rocks to my collection, then remove my least favorite rock. How many rocks will be in my collection at the end of Day 15?

- a. 100
- b. 105 ***
- c. 110
- d. 115
- e. 120

12. Pick a whole number. Multiply that number and the next higher number together, and look at the final digit of the result. (For example, $6 \times 7 = 42$ and the final digit is 2, or $10 \times 11 = 110$ and the final digit is 0.) What is the highest possible digit you can get this way?

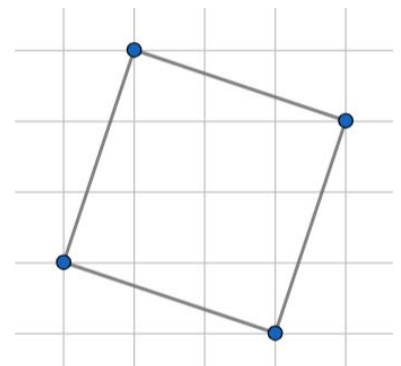
- a. 4
- b. 5
- c. 6 ***
- d. 8
- e. 9

13. Which of the following equations has no solutions?

- a. $|x| = x + 20$
- b. $20x = x + 20$
- c. $x^2 = x + 20$
- d. $x - 20 = x + 20$ ***
- e. $x + 20 = x + 20$

14. Which of the following is closest to the area of the off-kilter square pictured on the grid of 1×1 squares?

- a. 8
- b. 8.5
- c. 9
- d. 9.5
- e. 10 ***



15. Which of the following could not be the three side lengths of a triangle?

- a. 0.9, 1.5, 2.2
- b. 10, 400, 400
- c. $\sqrt{5}$, $\sqrt{6}$, $\sqrt{7}$
- d. 1, 2, π ***
- e. $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{2}$

16. Twice my number is less than half of my number. Which of the following must be true about my number?

- a. It is negative ***
- b. It is positive
- c. It is even
- d. It is odd
- e. It is zero

17. Which of the following is closest in value to 150% of 75?

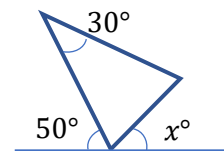
- a. 100
- b. 110 ***
- c. 120
- d. 130
- e. 140

18. Which of the following is equivalent to $|x - 2| < |x - 3|$?

- a. $-3 < x < 2$
- b. $-2 < x < 2$
- c. $x < 2$
- d. $x < 2.5$ ***
- e. $x < 3$

19. Consider the isosceles triangle shown whose two congruent sides enclose a 30° angle. What is the value of x ?

- a. 30
- b. 50
- c. 55 ***
- d. 75
- e. Not enough information.



20. If the area and the circumference of a circle are numerically equal, what is that circle's diameter?

- a. 2
- b. 2π
- c. $\frac{2}{\pi}$
- d. 4 ***
- e. $\frac{4}{\pi}$

21. How many two-digit numbers have digits that add up to a multiple of 9?

- a. 8
- b. 9
- c. 10 ***
- d. 11
- e. 12

22. On a visit to the pet store, you notice that a goldfish and three guppies cost a total of \$12, while three goldfish and a guppy cost a total of \$8. What is the total cost to buy one goldfish and one guppy?

- a. \$1.50
- b. \$3.50
- c. \$4
- d. \$4.50
- e. \$5 ***

23. How many two-digit numbers are not prime, and also not a multiple of 2, 3, or 5?

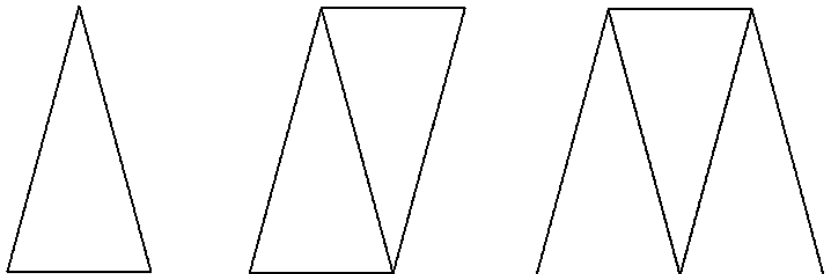
- a. Zero
- b. One
- c. Two
- d. Three ***
- e. Four or more

24. $\sqrt{77 \times 21 \times 33} =$

- a. 229
- b. 231 ***
- c. 237
- d. 239
- e. 241

25. Here are three shapes made out of copies of an isosceles triangle: the triangle itself, a parallelogram, and a trapezoid. The perimeter of the triangle is 50 and the perimeter of the parallelogram is 60. What is the perimeter of the trapezoid?

- a. 70 ***
- b. 75
- c. 80
- d. 85
- e. 90



26. One tablet of iodine makes 1 quart of water drinkable. If you have 5 people who need one gallon of water each per day for 7 days, how many iodine tablets do you need? ($4 \text{ quarts} = 1 \text{ gallon}$).

- a. 20
- b. 28
- c. 35
- d. 70
- e. 140 ***

27. A rectangular box has dimensions $a \times b \times 3$. If each edge length is increased by one unit, then by what amount will the volume of the box increase?

- a. $ab + 3(a + b)$
- b. $ab + 3(a + b) + 1$
- c. $ab + 3(a + b) + a + b + 3$
- d. $ab + 3(a + b) + a + b + 4$ ***
- e. $ab + 5(a + b) + 7$

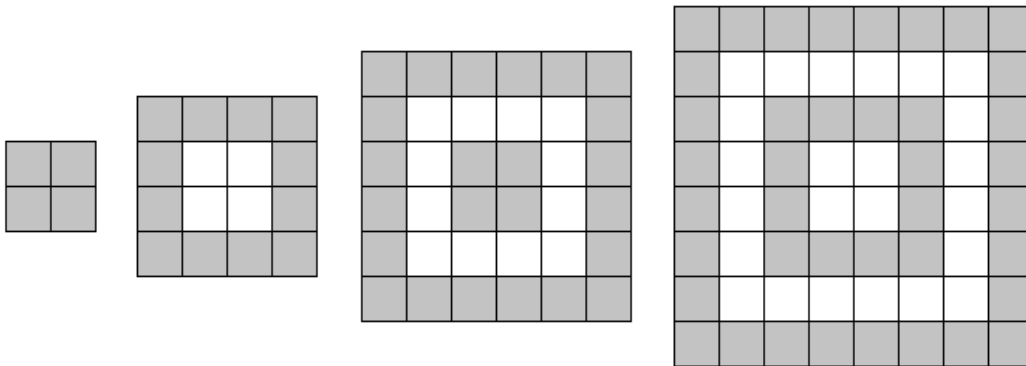
28. $8^8 =$

- a. 2^{16}
- b. 2^{24} ***
- c. 2^{32}
- d. 2^{48}
- e. 2^{64}

29. If $a \times b = 6$ and $a \times a = 3$, what is $b \times b$?

- a. 6
- b. 8
- c. 9
- d. 12 ***
- e. 18

30. A pattern of four designs is shown below. The first design contains 4 small gray squares, the second design contains 12 small gray squares, the third design contains 24, and the fourth design contains 40. If two more designs were drawn to continue this pattern, how many small gray squares would be contained in the final, sixth design?



- a. 60
- b. 72
- c. 76
- d. 80
- e. 84 ***

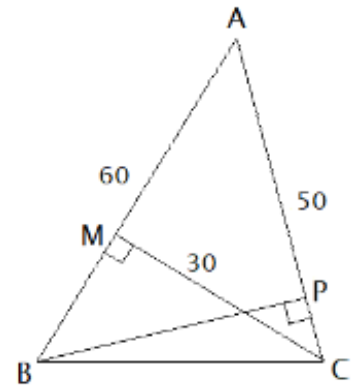
31. American coins are 1¢, 5¢, 10¢, or 25¢. How many different ways can I make 27 cents using American coins?

- a. 10
- b. 11
- c. 12
- d. 13 ***
- e. 14

32. If you divide X by 80, you get a remainder of 45. If you divide X by 20, what is the remainder?
- 5 ***
 - 15
 - 25
 - 35
 - 45
33. Assume that the statement "If a person is a student at the Oklahoma School of Science and Mathematics (OSSM), then the person must love the food served by the OSSM dining services" is true. Which, if any, of the following statements must also be true?
- If a person loves the food served by the OSSM dining services, then the person must be an OSSM student.
 - If a person is not a student at OSSM, then the person does not love the food served by OSSM dining services.
 - If a person does not love the food served by OSSM dining services, then the person is not a student at OSSM. ***
 - All of the above statements are guaranteed to be true.
 - None of the above statements are guaranteed to be true.
34. Mia will either wear a dress, or she will wear jeans and a T-shirt. In her closet she has four dresses, two pairs of jeans, and six T-shirts. How many different outfits can she make?
- 12
 - 16 ***
 - 20
 - 32
 - 48
35. What is the infinite repeating decimal representation of the fraction $6/11$?
- $0.\overline{54}$ ***
 - $0.\overline{5}$
 - $0.\overline{56}$
 - $0.\overline{59}$
 - $0.\overline{61}$
36. If the different letters in $OSSM$ represent digits, then $M + SSM + OSSM = 3552$. (This equation represents adding together a 1-digit, 3-digit, and 4-digit number.) What is the value of $O + S + S + M$?
- 10
 - 11
 - 15
 - 19
 - 20 ***

37. In $\triangle ABC$, side \overline{AB} has length 60, side \overline{AC} has length 50, and altitude \overline{CM} has length 30. What is the length of altitude \overline{BP} ?

- a. 25
- b. 27
- c. 32
- d. 36 ***
- e. 40



38. What is the value of x ?

$$1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{x}}} = 6$$

- a. -5
- b. -5/4
- c. -1/2
- d. -4/9 ***
- e. 6

39. At the Intergalactic Party, there are three types of aliens: Woots, Yeets, and Zonks. There is at least one Woot who is taller than every Yeet, and there is at least one Zonk who is shorter than every Yeet. Which, if any, of the following statements (a-d) CANNOT possibly be true?

- a. The shortest Woot is shorter than the shortest Zonk.
- b. The shortest Zonk is shorter than the shortest Woot.
- c. The shortest Woot is taller than the tallest Zonk.
- d. The shortest Zonk is taller than the tallest Woot. ***
- e. Each of the above statements could be true.

40. You roll two fair 6-sided dice and get the two numbers A and B . What is the probability that the positive difference between A and B is at least 2?

- a. 1/3
- b. 4/9
- c. 1/2
- d. 5/9 ***
- e. 2/3