



# OKLAHOMA SCHOOL of SCIENCE and MATHEMATICS

## 22<sup>nd</sup> Annual OSSM Middle School Math: An Awesome Contest—Round Two

6<sup>th</sup> Grade Test B

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.

♦ FILL BOX COMPLETELY

♦ CORRECT:



♦ ERASE COMPLETELY

TO CHANGE

♦ INCORRECT:



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**

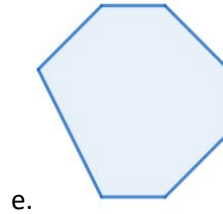
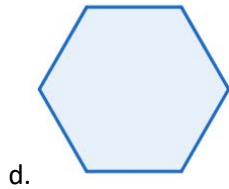
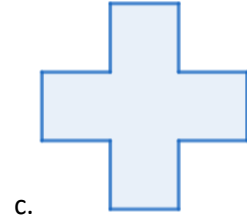
Fill in your answers ON THE ANSWER SHEET by filling in the corresponding bubble.

DO NOT MAKE ANY STRAY MARKS ON YOUR ANSWER SHEET!

You may use this space for scratch paper.

1.  $123 + 234 + 345 =$
- a. 602
  - b. 612
  - c. 692
  - d. 702
  - e. 792

2. Which of the following shapes is an octagon?



3. What is the remainder when you divide the smallest three-digit number by the largest one-digit number?
- a. 0
  - b. 1
  - c. 8
  - d. 9
  - e. 10
4. 120 OSSM students are being assigned to classes. Class sizes are between 4 and 18 students. What is the difference between the maximum number of classes required and the minimum?
- a. 6
  - b. 7
  - c. 23
  - d. 24
  - e. 30
5. Elijah has 108 M&Ms. He is willing to share with James, as long as James only takes whole M&Ms. Which fraction of Elijah's M&Ms can James **NOT** take?
- a.  $\frac{1}{6}$
  - b.  $\frac{1}{8}$
  - c.  $\frac{1}{9}$
  - d.  $\frac{1}{12}$
  - e.  $\frac{1}{27}$

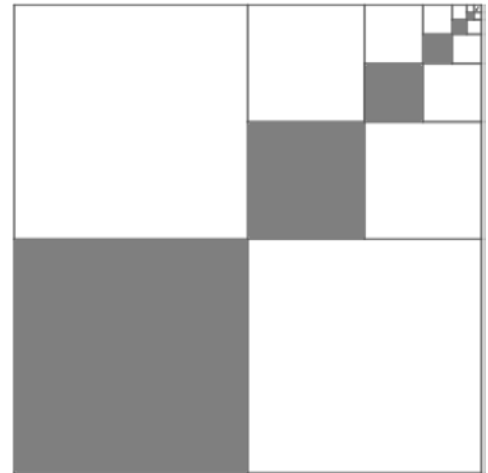
6. Anna, Robin, Danny, and Sydney are starting a company together. One of them will be the President, one will be Vice President, one will be Treasurer, and one will be Project Manager. How many possible ways are there to assign one of the jobs to each woman?
- 12
  - 16
  - 20
  - 24
  - 28
7. The three angles of my triangle have degree-measures  $3x^\circ$ ,  $4x^\circ$ , and  $5x^\circ$ . What is the value of  $x$ ?
- 3
  - 6
  - 12
  - 15
  - 18
8. If I pour out 8 cups of milk from my jug, I would have 3 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?
- 10
  - 11
  - 11.5
  - 12
  - 12.5
9. What is the greatest common factor of the numbers  $12 \times 12$  and  $4 \times 81$ ?
- 24
  - 36
  - 48
  - 54
  - 72
10. The numerical value of the area of a square is exactly equal to the numerical value of its perimeter. What is the length of the side of the square?
- 2
  - 4
  - 6
  - 8
  - 10
11. About how much less time does a trip of 70 miles take if you travel 75 miles per hour than if you travel 70 miles per hour?
- 3 minutes
  - 3.5 minutes
  - 4 minutes
  - 4.5 minutes
  - 5 minutes

12. Which of the following is **NOT** a whole number?

- a.  $\sqrt{4900}$
- b.  $\sqrt{6400}$
- c.  $\sqrt{9000}$
- d.  $\sqrt{12100}$
- e.  $\sqrt{40000}$

13. In this figure, the large square is divided into four equal smaller squares. The lower left sub-square is shaded, and then the entire subdivision/shading process is repeated (to infinity!) inside the upper right sub-square. What fraction of the largest square is shaded?

- a.  $1/4$
- b.  $8/27$
- c.  $8/25$
- d.  $1/3$
- e.  $5/12$



14. On the website scamazon.com, 15 yo-yos and 25 frisbees cost a total of \$600. What is the total cost of 21 yo-yos and 35 frisbees?

- a. Not enough information.
- b. \$750
- c. \$770
- d. \$800
- e. \$840

15. My favorite number is a two-digit number which is equal to nine times the sum of its digits. What is the product of its digits?

- a. 8
- b. 9
- c. 10
- d. 18
- e. 20

16. What digit comes just after the decimal point in the result of the multiplication  $2.5 \times 3.5$ ?

- a. 0
- b. 2
- c. 4
- d. 5
- e. 7

17. Which of the following cannot be the lengths of the sides of a right triangle?

- a. 3, 4, 5
- b. 5, 12, 13

- c. 6, 9, 12
- d. 8, 15, 17
- e. 7, 24, 25

18. 60% of 240 is equal to 20% of what number?

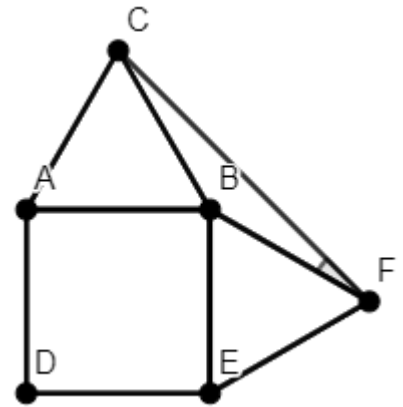
- a. 400
- b. 480
- c. 800
- d. 720
- e. 1200

19. Which, if any, is a true inequality?

- a.  $20 \times 24 < 6 \times 8 \times 10$
- b.  $20 \times 24 < 19 \times 25$
- c.  $20 \times 24 < 2 \times 120 + 12 \times 20$
- d.  $20 \times 24 < 3 \times 5 \times 5 \times 7$
- e. None of the above is a true inequality.

20. This diagram is made of a square ( $ABED$ ), two equilateral triangles ( $\triangle ABC$  and  $\triangle EBF$ ), and an isosceles triangle ( $\triangle BFC$ ). What is the measure of  $\angle BFC$ ?

- a.  $5^\circ$
- b.  $10^\circ$
- c.  $12^\circ$
- d.  $15^\circ$
- e.  $20^\circ$



21. Evaluate  $N \times N - N \times N \times N$ , if  $N = -2$ .

- a. -12
- b. -8
- c. -4
- d. 12
- e. 24

22. What is the sum of the first fifty odd positive whole numbers?

- a. 2000
- b. 2500
- c. 2525
- d. 4900
- e. 4950

23. How many different numbers are equal to their reciprocal?

- a. None
- b. One exactly
- c. Two exactly
- d. Three exactly
- e. Four exactly

24.  $\frac{\sqrt{2 \cdot 4 \cdot 6 \cdot 8 \cdot 10 \cdot 12}}{\sqrt{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 \cdot 6}} =$

- a.  $\sqrt{2}$
- b. 8
- c.  $6\sqrt{2}$
- d. 12
- e.  $6\sqrt{6}$

25. A parallelogram in the  $xy$ -plane has vertices at  $(2, -1)$ ,  $(7,1)$ ,  $(1,4)$ , and  $(-4,2)$ . What are the coordinates of the point where its two diagonals intersect?

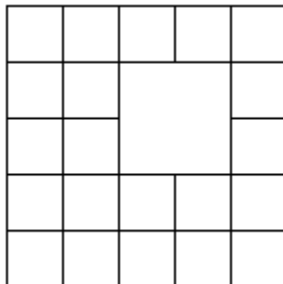
- a.  $(\frac{5}{4}, \frac{5}{4})$
- b.  $(\frac{5}{4}, \frac{7}{4})$
- c.  $(\frac{3}{2}, \frac{3}{2})$
- d.  $(\frac{7}{4}, \frac{5}{4})$
- e.  $(\frac{7}{4}, \frac{5}{4})$

26. One tablet of iodine makes 2 quarts 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. 28
- b. 35
- c. 70
- d. 140
- e. 280

27. How many squares appear in this figure?

- a. 34
- b. 35
- c. 36
- d. 37
- e. 38



28.  $6^6 \cdot 6^6 \cdot 6^6 \cdot 6^6 \cdot 6^6 \cdot 6^6 =$

- a.  $36^6$
- b.  $36^{12}$

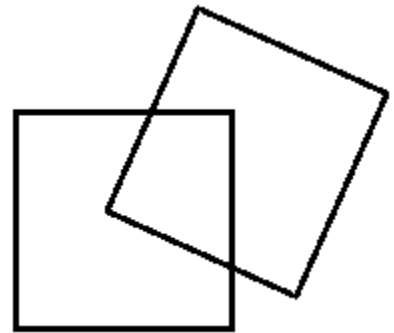
- c.  $36^{18}$
- d.  $36^{72}$
- e.  $36^{216}$

29. If  $2y - x = z$ , then  $2x + 2z =$

- a.  $-2y$
- b.  $3y$
- c.  $-3y$
- d.  $4y$
- e.  $-4y$

30. The two equal-size squares shown here intersect at exactly two different points. What is the largest (finite) number of intersection points two equal-size squares can have?

- a. 2
- b. 3
- c. 4
- d. 6
- e. 8



31. 2024 is a multiple of 2 and 11 and 23. (In fact,  $2024 = 2^3 \times 11 \times 23$ .) What is the next number that is a multiple of 2 and 11 and 23?

- a. 2025
- b. 2116
- c. 2530
- d. 4048
- e. 5566

32. If an ice cream scoop from Bug and Juney's is supposed to be 7 cm in diameter, about how much ice cream are you getting for free if you buy an ice cream scoop and the worker gives you an 8 cm diameter scoop? (The formula for volume of a sphere is  $\frac{4}{3}\pi r^3$ .)

- a. Less than  $5 \text{ cm}^3$
- b. Between  $5 \text{ cm}^3$  and  $25 \text{ cm}^3$
- c. Between  $25 \text{ cm}^3$  and  $50 \text{ cm}^3$
- d. Between  $50 \text{ cm}^3$  and  $75 \text{ cm}^3$
- e. More than  $75 \text{ cm}^3$

33. Zane will either order an entree, or he will order a soup-and-salad combo. There are six entrees he is considering, four different types of soup, and two types of salad. How many different meals could Zane order?

- a. 12
- b. 14
- c. 16
- d. 36
- e. 48

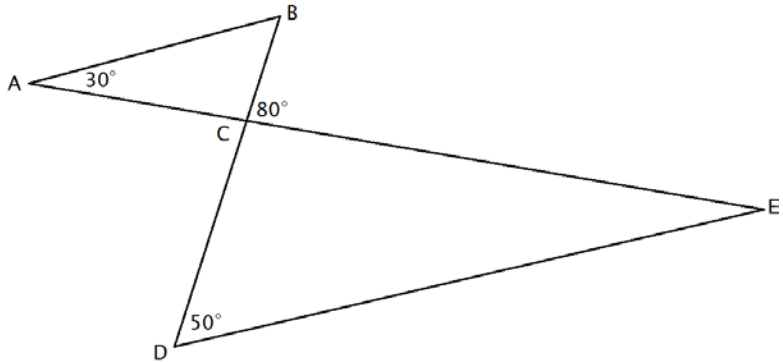


34. If a square has a perimeter of  $4 + 4x$ , which of the following is the square's area?
- $4(1 + x)$
  - $(4 + 4x)^2$
  - $4(1 + x)^2$
  - $1 + x^2$
  - $1 + 2x + x^2$

35. How many different four-letter "words" can be made from the letters A, B, C, and D if you can't have two of the same letter next to each other? For example, ABDB and BADB are both valid words, but ABBD is not since it has two Bs in a row.
- 96
  - 100
  - 108
  - 112
  - 120

36. In the diagram, which of the following **MUST** BE TRUE?

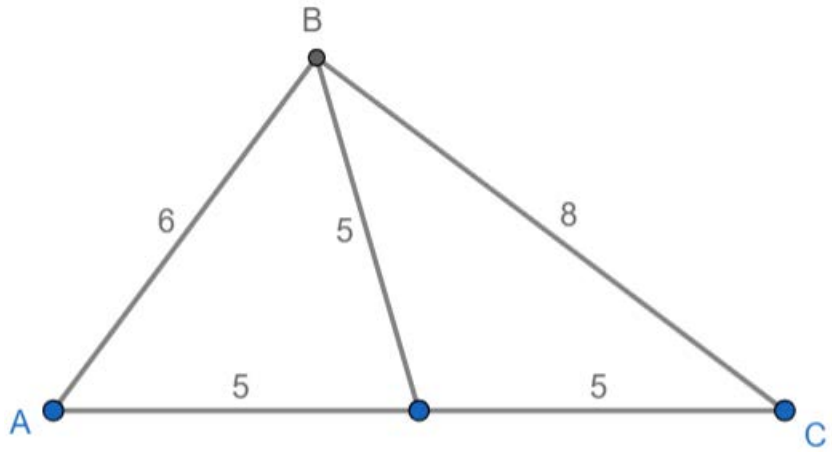
- $\angle ABC = \angle CED$
- $AB = CD$
- $DC^2 + CE^2 = DE^2$
- $\overline{AB}$  is parallel to  $\overline{DE}$
- The area of  $\triangle ABC$  is one-fourth the area of  $\triangle CDE$



37. The length of a rectangle is increased by 10% and the width of the same rectangle is decreased by 10%. How does the area of the new rectangle compare to the original rectangle?
- The area of the new rectangle is less than the area of the original rectangle.
  - The two rectangles have the exact same area.
  - The area of the new rectangle is greater than the area of the original rectangle.
  - No determination can be made unless the exact length and width of the original rectangle are given.

38. What is the area of  $\triangle ABC$ ?

- a. 18
- b. 20
- c. 24
- d. 25
- e. 30



39. In the time it takes Tajvir to knit twelve scarves, Yuehuan can knit fifteen scarves. If Tajvir starts knitting scarves at 8am, and Yuehuan starts at noon, then by 8pm Tajvir will have knitted exactly 1 more scarf than Yuehuan has. How long does it take Yuehuan to knit one scarf?

- a. 1 hour, 30 minutes
- b. 1 hour 36 minutes
- c. 1 hour, 45 minutes
- d. 1 hour, 48 minutes
- e. 2 hours

40. Two equal circles, each of radius 2, are positioned so that each one passes through the other one's center. What is the area of the shaded region where they overlap?

- a.  $\frac{8\pi}{3} - 2\sqrt{3}$
- b.  $\frac{8\pi}{3} - \sqrt{3}$
- c.  $4 - \frac{\pi}{3}$
- d.  $\frac{\pi}{3} + 2\sqrt{3}$
- e.  $\frac{2\pi}{3} + \sqrt{3}$

