OKLAHOMA SCHOOL of SCIENCE and MATHEMATICS

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

## 7th and 8th Grade Test B

## 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. If the unique mode for this set of integers is 5, and is equal to the mean, what is $x$?

$$2, 3, 5, 5, 7, x$$

   a. 6
   b. 7
   c. 8
   d. 9
   e. 10

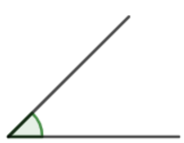
2. Which of the following values is the largest?
   a. 30% of 70
   b. 40% of 60
   c. 50% of 50
   d. 60% of 40
   e. 70% of 30

3. You can buy 6 frizzles for a cost of 8 blargs. How many frizzles can you buy with 232 blargs?
   a. 172
   b. 174
   c. 176
   d. 178
   e. 180

4. If $\angle A$ and $\angle B$ are acute angles, then which of answer choices a-d **<u>CANNOT POSSIBLY</u>** be true?
   a. $\angle A + \angle B$ is an acute angle
   b. $\angle A + \angle B$ is a right angle
   c. $\angle A + \angle B$ is an obtuse angle
   d. $\angle A = \angle B$
   e. Each of the above statements **<u>COULD</u>** be true

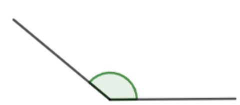
5. $\Delta ABC$ is a triangle and $\angle B = 40°$. Which angle below is closest to the **<u>sum</u>** of $\angle A$ and $\angle C$?

   a. 

   b. 

   c. 

   d. 

   e. 

6. If $|30 + X| = 40$, which of the following could be the value of $X$?
   a. $-70$
   b. $-50$
   c. $-30$
   d. $-10$
   e. None of the above

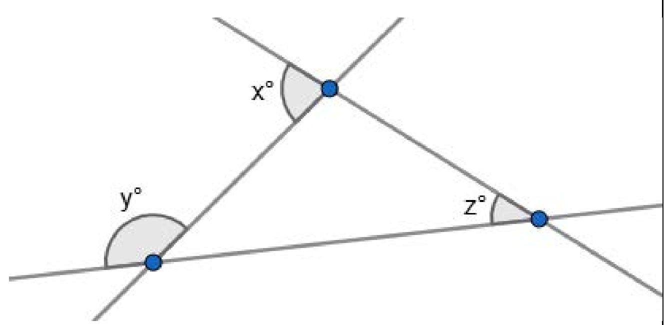
7. A ruler costs \$2.50 and a compass costs \$5.50. If you buy three rulers and two compasses and pay with a \$20 bill, how much change should you receive?
   a. Less than \$1
   b. Between \$1 and \$2
   c. Between \$2 and \$3
   d. Between \$3 and \$4
   e. More than \$4

8. It took Peter 20 minutes to pick 6 pecks of pickled peppers. Assuming that Peter picks pickled peppers at a constant rate, how long would it take him to pick 27 pecks of pickled peppers?
   a. 60 minutes
   b. 70 minutes
   c. 75 minutes
   d. 80 minutes
   e. 90 minutes

9. The reciprocal of $\pi$ can be written as an infinite decimal $0.\_183098$ ... What is the missing tenths digit?
   a. 0
   b. 1
   c. 2
   d. 3
   e. 4

10. What is the smallest whole number that satisfies the inequality $100x > 99x + 98$?
   a. 97
   b. 98
   c. 99
   d. 100
   e. 101

11. $x$, $y$, and $z$ represent degree measures of angles as marked in the diagram. Which of the following is equal to $z$?




   a. $y - x$
   b. $180 - x - y$
   c. $x + y - 180$
   d. $360 - x - y$
   e. $x + y - 360$

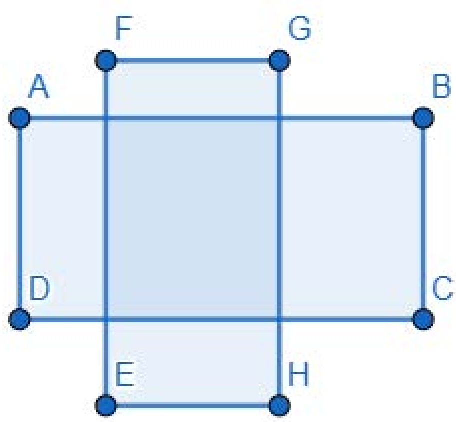
12. $83 \times 83 - 73 \times 73 =$
   a. $1560$
   b. $5329$
   c. $6889$
   d. $60590$
   e. $497568$

13. There are $10^6$ bytes in a megabyte and $10^{12}$ bytes in a terabyte. How many megabytes are in a terabyte?
   a. $10^2$
   b. $10^6$
   c. $10^9$
   d. $10^{18}$
   e. $10^{72}$

14. A horse and rider travel 24 miles per hour for 30 minutes and 3 miles per hour for 1 hour. What is their average speed for the entire trip?
    a. 6.8 miles per hour
    b. 9.0 miles per hour
    c. 10.0 miles per hour
    d. 13.2 miles per hour
    e. 18.0 miles per hour

15. Quadrilateral $WXYZ$ has $\angle X = \angle Y = 90°$, and side $\overline{WX}$ is shorter than side $\overline{YZ}$. Which of the following is the most specific word that accurately describes this quadrilateral?
    a. Square
    b. Rectangle
    c. Rhombus
    d. Parallelogram
    e. Trapezoid

16. The $7 \times 14$ rectangle $ABCD$ overlaps the $12 \times 6$ rectangle $EFGH$, as shown. What is the area of the region covered by **<u>one or both</u>** of these rectangles?




    a. 86
    b. 120
    c. 128
    d. 144
    e. 170

17. If $b \times b \times b = 25$, which of the following is true?
    a. $2 < b < 2.5$
    b. $2.5 < b < 3$
    c. $3 < b < 3.5$
    d. $3.5 < b < 4$
    e. $4 < b < 4.5$

18. If Josh has 4 five-foot pipes and 8 three-foot pipes, what is the largest area he can enclose completely if they must join either with straight joints or $90°$ joints?
    a. 108
    b. 120
    c. 121
    d. 124
    e. 125

19. The formula for the volume $V$ of a cone is $V = \frac{1}{3}\pi r^2 h$. Which answer is closest to the amount of time it would take to fill a cone of height $h = 6$ cm and radius $r = 2$ cm with water that's coming out of a faucet at a rate of 4 $\text{cm}^3$ per second?
    a. 2 seconds
    b. 6 seconds
    c. 10 seconds
    d. 14 seconds
    e. 18 seconds

20. How many different real numbers are equal to their own cube?
    a. None
    b. One
    c. Two
    d. Three
    e. Four or more

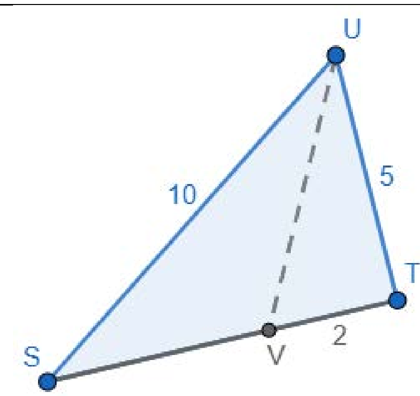
21. On Monday, I buy a box of chocolates and eat half of them. On Tuesday, I buy another (identical) box of chocolates and then eat half of ALL the chocolates I have. On Wednesday, I buy yet another box of chocolates and eat half of ALL available chocolates.

    On Thursday, I have a tummyache so I stay home and don't eat any of the 7 remaining chocolates. How many chocolates come in a box?

    a. 6
    b. 8
    c. 12
    d. 14
    e. 16

22. If $x - y = 2x$, which of the following relationships **must** be true?
    a. $x < y$
    b. $x > y$
    c. $x = y$
    d. $x + y = 0$
    e. $xy = 1$

23. In $\Delta STU$ (pictured, not to scale) $\overline{UV}$ is an angle bisector of $\angle U$, and the lengths $SU = 10$, $UT = 5$, and $TV = 2$ are given. What is the perimeter of $\Delta STU$?
    a. 20
    b. 21
    c. 22
    d. 23
    e. 24



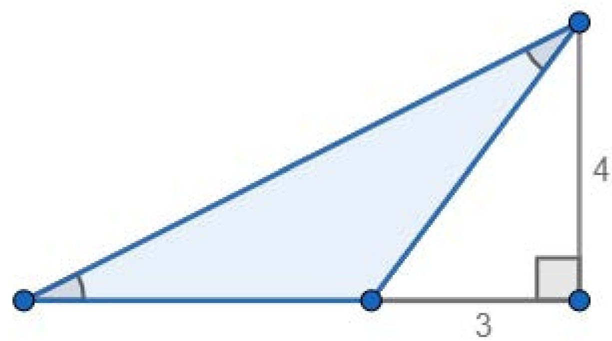

24. If $m$ is the number of minutes in 10 days, then $\sqrt{m} =$
    a. $2 \cdot 3^2 \cdot 5^2$
    b. $2^2 \cdot 3 \cdot 5$
    c. $2^2 \cdot 3^2 \cdot 5$
    d. $2^2 \cdot 3^2 \cdot 5^2$
    e. $2^3 \cdot 3 \cdot 5$

25. What is the remainder when $2^{10}$ is divided by 13?
    a. 0
    b. 2
    c. 4
    d. 8
    e. 10

26. 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

27. A cylinder with radius 20 and height 8 will hold a certain amount of lemonade. How much lemonade could be held by a cylinder with radius 10 and height 8?
    a. One-eighth as much
    b. One-sixth as much
    c. One-fourth as much
    d. One-third as much
    e. One-half as much

28. A right triangle with legs of length 3 and 4 shares a side, as shown, with a shaded triangle whose two marked angles are equal. What is the area of the shaded triangle?




    a. 6
    b. 8
    c. 9
    d. 10
    e. 12

29. Start with a square with area 100. 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. 20
    b. 28
    c. 32
    d. 34
    e. 40

30. If $N = 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10$, what is the digit in the tens place of the number $(N - 1) \times (N - 1)$?
    a. 0
    b. 1
    c. 7
    d. 8
    e. 9

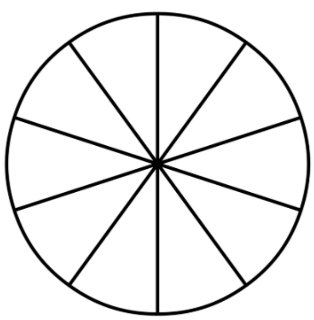
31. If you pick two different corners of a cube at random, what is the probability that they are **not** next to each other along an edge of the cube?
    a. $2/3$
    b. $5/6$
    c. $4/7$
    d. $11/14$
    e. $13/16$

32. $\left(\sqrt{27}-\sqrt{3}\right)^2 =$
   a. 3
   b. 6
   c. 9
   d. 12
   e. 24

33. If $(9^9) \times (27^{27}) \times (81^{81}) = 3^N$, what is the sum of digits of $N$?
   a. $9$
   b. $12$
   c. $15$
   d. $18$
   e. $21$

34. The number 10 has four factors—1, 2, 5, and 10. How many factors does the number 1,000,000 have?
   a. 45
   b. 46
   c. 48
   d. 49
   e. 50

35. A round pie is sliced into 10 equal wedges. If the perimeter around one of these slices is 26 cm, which of these is closest to the area of the slice?



   a. 15 cm$^2$
   b. 20 cm$^2$
   c. 25 cm$^2$
   d. 30 cm$^2$
   e. 35 cm$^2$

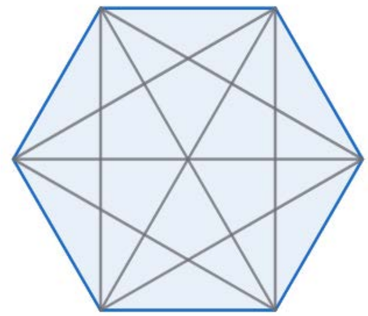
36. Some people are hosting a party. All four of the following statements are true:

   * If they don't serve chips, then they will serve popcorn.
   * It is **<u>not</u>** the case that both popcorn and lemonade will be served.
   * If they don't serve fruit punch, then they will serve lemonade.
   * They will not serve chips.

   Which of the following is a logical conclusion?
   a. They will serve fruit punch.
   b. They will not serve fruit punch.
   c. They will serve lemonade.
   d. They will not serve popcorn.
   e. They will serve chips.

37. 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 length of side $AB$ is 8, what is the area of $WXYZ$?
    a. 32
    b. 40
    c. 42
    d. 48
    e. 64

38. A regular hexagon has 9 diagonals (as shown), and $9 = 3 \times 3$ is a perfect square. Which of the following shapes also has a number of diagonals that is a perfect square?



    a. a regular 25-sided polygon
    b. a regular 27-sided polygon
    c. a regular 28-sided polygon
    d. a regular 30-sided polygon
    e. a regular 32-sided polygon

39. 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 the same direction again?
    a. 60 minutes
    b. 62 and 5/11 minutes
    c. 64 and 10/11 minutes
    d. 65 and 5/11 minutes
    e. 66 minutes

40. A container with 1.5 cups of coffee is mixed together with 1 cup of milk. Then 1 cup of that mixture is added into a blue cup that started out with 3 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%

You may use this space for scratch paper.