



OKLAHOMA SCHOOL of SCIENCE and MATHEMATICS

**20th Annual OSSM Middle School Math:
An Awesome Contest—Round Two
6th Grade Test
Spring 2022**

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:

1. Use the scratch paper provided to do your work.
2. 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.

WRITE YOUR ANSWERS ON THE ANSWER SHEET. DO NOT MAKE ANY STRAY MARKS ON YOUR ANSWER SHEET!

1. If $a = 17$ and $b = 31$, what is the value of $42a - 81b - 40(a - 2b)$?

- a. 1 **b. 3** c. 5 d. 7 e. 9

2. What digit appears in the one-tenths place of $\frac{8}{5} - \sqrt{0.04}$?

- a. 4** b. 5 c. 6 d. 7 e. 8

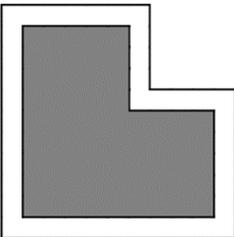
3. $\frac{1}{2} \times \frac{4}{3} \times \frac{9}{4} \times \frac{16}{5} \times \frac{25}{6} =$

- a. 6 b. 15 **c. 20** d. 36 e. 50

4. Solve the equation for x .

$$2x - \frac{3}{4}(4x + 5) = 5x - 2$$

- a. $-\frac{23}{24}$ b. $-\frac{7}{16}$ **c. $-\frac{7}{24}$** d. $\frac{23}{24}$ e. $\frac{23}{16}$



5. A small park consists of a grassy area surrounded by a 2-meter-wide footpath, as seen here. (All angles are right angles.) How much longer is the outer perimeter of the footpath, than the perimeter of the grassy area?

- a. 4 meters b. 8 meters c. 12 meters
d. 16 meters e. 20 meters

6. $50 \div \sqrt{50}$ is closest to which of these?

- a. 5 b. 6 **c. 7** d. 8 e. 9

7. Which of the following is **not** equal to the other four?

- a. $\frac{n}{2}(2a - bc)$ **b. $\frac{bcn}{2} - an$** c. $-\frac{n}{2}(cb - 2a)$ d. $an - \frac{1}{2}bcn$ e. $n\left(a - \frac{bc}{2}\right)$

8. A forest's deer population increased by 150% in one year, and then the following year decreased by 50%. Which of the following best describes the overall population change for this entire two-year period?

- a. 25% decrease **b. 25% increase** c. 50% increase d. 100% increase e. No change

9. Three fourths of one half of a number is 33. What is the number?

- a. $\frac{99}{8}$ b. $\frac{132}{5}$ c. $\frac{155}{4}$ d. 80 **e. 88**

10. Which of the following is **NOT** a factor of $100^2 - 1$?

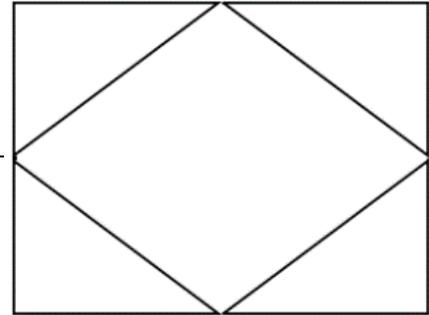
- a. 9 b. 11 c. 101 **d. 333** e. 1111

11. In a dataset consisting of five positive whole numbers, the median is 3 and the mode is 4. What is the mean of this dataset?

- a. 2.8 b. 3 c. 3.2 d. 3.5 e. 3.8

12. The midpoints of the sides of a 6x8 rectangle are joined to form a rhombus. What is the area of the rhombus?

- a. 20 b. 24 c. 25
d. 27 e. 30



13. The midpoints of the sides of a 6x8 rectangle are joined to form a rhombus. What is the perimeter of the rhombus?

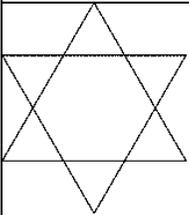
- a. 20 b. 24 c. 25
d. 27 e. 30

14. A triangle has smallest angle 35° . What is the average of its other two angles?

- a. 70° b. 72.5° c. 75° d. 77.5° e. 80°

15. Two numbers, x and y , multiply to be 2022, and add up to 343. What is the sum of the digits of the two numbers?

- a. 10 b. 16 c. 18 d. 19 e. 29



16. Two large overlapping equilateral triangles form a geometric figure consisting of a regular hexagon and six small equilateral triangles, as shown. If the area of one of the two large triangles is 30, what is the area of the entire figure?

- a. 36 b. 39 c. 40
d. 42 e. 45

17. Express $\left(\frac{4}{9}\right)^{-\frac{3}{2}}$ as simple fraction.

- a. $-\frac{8}{27}$ b. $\frac{12}{27}$ c. $\frac{3\sqrt{6}}{4}$ d. $\frac{9\sqrt{6}}{8}$ e. $\frac{27}{8}$

18. What is the units digit of 22^{22} ?

- a. 0 b. 2 c. 4 d. 6 e. 8

19. A double factorial ($n!!$) is the multiplication of alternate positive integer starting with n and going down.

For example, $5!! = 5 * 3 * 1$, and $4!! = 4 * 2$. Evaluate: $\frac{32!!}{30!!6!!}$

- a. $\frac{8}{45}$ b. $\frac{2}{3}$ c. $\frac{3}{2}$ d. $\frac{248}{45}$ e. $\frac{124}{15}$

20. If $(3x + 5)^3$ is the volume of a cube, what is its surface area?

- a. $4(3x + 5)^2$ b. $6(3x + 5)^2$ c. $(18x + 30)^2$ d. $(12x + 20)^2$ e. $(36x + 60)$

21. Simplify $\frac{2+\frac{1}{3}}{2-\frac{2}{5}}$

a. $-\frac{2}{15}$

b. $-\frac{5}{6}$

c. $\frac{35}{24}$

d. $\frac{71}{24}$

e. 35

22. $1111 + 2222 + 3333 + 4444 =$

a. 10000

b. 11000

c. 11100

d. 11110

e. 11111

23. Which of the following absolute-value inequalities means the same thing as $0 < x < 1$?

a. $|x| < 0.5$

b. $|x| < 1$

c. $|x - 0.5| < 0.5$

d. $|x - 0.5| < 1$

e. $|x - 1| < 0$

24. Kateri's average for the first 4 calculus tests was exactly 88%. What must she make on the 5th exam to earn a 90% average for all 5 tests.?

a. 90%

b. 92%

c. 94%

d. 98%

e. 102%

25. How many square centimeters are there in 10 square meters?

a. 100

b. 1,000

c. 10,000

d. 100,000

e. 1,000,000

26. The small rectangular box shown below has two of its edge lengths marked. If the surface area of the entire box is 72 cm^2 , then what is its volume?

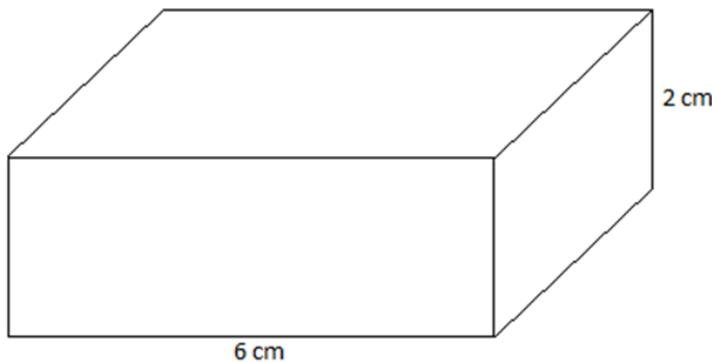
a. 24 cm^3

b. 30 cm^3

c. 36 cm^3

d. 42 cm^3

e. 48 cm^3



27. What is the sum of the two solutions for x in the following equation?

$$|x - 5| + |x - 7| = 22$$

a. 5

b. 10

c. 12

d. 17

e. 22

28. Which of these values is $\frac{2}{3}$ of the way from 15 to 28?

a. $22\frac{2}{3}$

b. $23\frac{1}{3}$

c. $23\frac{2}{3}$

d. $24\frac{1}{3}$

e. $24\frac{2}{3}$

29. \otimes is a new arithmetic operator, such that the following are true:

$$5 \otimes 4 = \frac{5}{16}$$

$$2 \otimes 10 = \frac{1}{50}$$

$$5 \otimes 10 = \frac{1}{20}$$

What is the value of $2 \otimes 4$?

a. $\frac{1}{25}$

b. $\frac{1}{16}$

c. $\frac{1}{8}$

d. $\frac{1}{4}$

e. $\frac{5}{8}$

30. Five students are running a race. In how many ways can three of the five students place 1st, 2nd, and 3rd place?

a. 20

b. 30

c. 60

d. 66

e. 120

31. Expand $(2x - 3)^2$

- a. $4x^2 - 9$ b. $4x^2 + 9$ c. $4x^2 - 12x - 9$ d. $4x^2 - 6x + 9$ e. $4x^2 - 12x + 9$

32. If an ice cream scoop is a perfect sphere, and is intended to have a diameter of 3 inches, how much extra ice cream do you get if the diameter is 4 inches? The volume of a sphere is $\frac{4}{3}\pi r^3$.

- a. $\frac{9\pi}{2}in^3$ b. $\frac{37\pi}{6}in^3$ c. $\frac{32\pi}{3}in^3$ d. $36\pi in^3$ e. $\frac{148\pi}{3}in^3$

33. A regular tetrahedron, also known as a triangular pyramid, is a solid object with 4 faces and 4 vertices. How many distinct line segments make up the edges of a tetrahedron?

- a. 4 b. 5 c. 6 d. 7 e. 8

34. If $(60 - 3x) \times (40 + 4x) = 0$, what is the sum of all possible values of x ?

- a. 10 b. 20 c. 30 d. 40 e. 50

35. If $(\sqrt{37})(\sqrt[3]{37}) = \sqrt[6]{37^n}$, what is the value of n ?

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

36. The hands of a common clock point in the exact same direction at noon and at midnight. How many other times during a day do the hands of a clock point in the same direction?

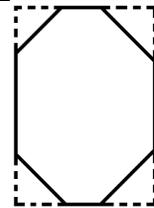
- a. 19 b. 20 c. 21 d. 22 e. 23

37. How many ways are there to form a four-letter "word" using each of the letters A, B, C, D exactly once, if A has to be somewhere to the left of B, and also C has to be somewhere to the left of D?

- a. 6 b. 8 c. 10 d. 12 e. 14

38. A (non-regular) octagon is created from an $8.5'' \times 11''$ sheet of paper by slicing off an isosceles right triangle, of leg length $2''$, from each of its four corners. What is the area of this octagon?

- a. $77.5 in^2$ b. $81.5 in^2$ c. $85.5 in^2$ d. $89.5 in^2$ e. $93.5 in^2$



39. Gopika is thinking of a positive whole number N . When you divide N by 27, the remainder is 14. When you divide N by 64, the remainder is 51. What is the remainder when you divide N by 12?

- a. 2 b. 3 c. 5 d. 7 e. 11

40. The ages of Ashlyn, Brian, and Clara add up to 38 today. Ten years ago, Clara was five times older than Ashlyn. Nine years ago, Clara was twice as old as Brian. What is Brian's age today?

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

You may use this space for scratch paper,



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