



Mission Math Utah

Winter Competition

Division Two: Grades 3-5

December 27, 2019

Name: _____

School: _____

Grade: _____

General Information

- Do not open the test until you are instructed to do so by the proctor.
- This test contains **35 free response problems**. You will have exactly **60 minutes** to answer them.
- Electronic devices, including calculators, must be turned off and **can not** be used during the test.

Grading

- Each correct answer is worth 1 point.
- Incorrect or blank answers are worth 0 points. Partial credit will not be given.

Answers

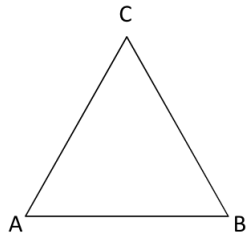
- Answers must be written clearly in the allotted space. Please write legibly.
- All answers must be expressed in the appropriate form as specified in the question.
- Your answer will be marked incorrect if the graders are unable to read it.

1. What is the value of $19 - 12 + 5$?

1. _____

2. Equilateral triangle ABC has side length 2 inches. What is its perimeter?

2. _____ inches



3. Jennifer reads a book with 145 pages. If she reads 7 pages a day, how many days will it take her to finish it?

3. _____ days

4. Aiden has 7 triangles and 4 squares. How many sides does he have?

4. _____ sides

5. What is the average of the numbers 2, 3, 4, and 7?

5. _____

6. What is the value of $7x + 1$ if $x = 9$?

6. _____

7. What is the sum of the numbers 13, 21, 27, and 39?

7. _____

8. The sum of two consecutive integers is 24691. What is the difference between these integers?

8. _____

9. After Halloween, Sally has 48 pieces of candy. Her parents allow her to have two pieces per day, and an extra piece per day on the weekends (Saturday and Sunday). How many weeks does it take Sally to eat the candy?

9. _____ weeks

10. Carla runs at a constant rate of 8 meters per second. How long will it take her to run 136 meters?

10. _____ seconds

11. It takes Annie 12 minutes to bike to work. Audrie walks to work at half the speed that Annie bikes, and Audrie's work is twice as far away as Annie's. How many minutes does it take Audrie to get to work?

11. _____ minutes

12. Evaluate: $3 - 5 + 7 - 9 + 11 - 13$

12. _____

13. What is the value of $\frac{2019+2020}{2019-2020}$?

13. _____

14. 14 people attend a meeting. If each person at the meeting shakes hands with every other person at the meeting, how many handshakes take place?

14. _____ handshakes

15. A square with area 36 has the same perimeter as a rectangle. If the length of the rectangle is 8, what is its width?

15. _____

16. 32 people compete in a chess tournament. After each match, the loser is eliminated, and the winner advances to play another player until one winner is left. If no draws occur, how many matches are played?

16. _____ matches

17. What is the sum of the factors of 6?

17. _____

18. Point A is $(2,-3)$, and point B is $(2, 2)$. What is the area of a square with side AB ?

18. _____

19. Kelsey has 10 watermelons. Each watermelon weighs 20 pounds. If 95 percent of each watermelon consists of water, how many pounds of water does she have? 19. _____ pounds

20. What is the value of $1 + 2 + \dots + 25$? 20. _____

21. Circle A is circumscribed around an equilateral triangle. Circle B is inscribed in the same equilateral triangle. What proportion of the area inside circle A is also outside circle B? Express your answer as a common fraction. 21. _____

22. How many ordered pairs of positive integers (x, y) satisfy the equation $x + 2y = 15$? 22. _____ pairs

23. How many positive integers n satisfy the following inequality? 23. _____ integers

$$\frac{2019!}{((n!)!)!} > 1$$

24. A figure is created by gluing equilateral triangles onto the four sides of a square. How many edges does the figure have? 24. _____ edges
25. How many three-digit positive integers are divisible by both 10 and 12? 25. _____ integers
26. Sophie is thinking of an integer between 1 and 1000, inclusive. She tells you:
- It is one greater than a *palindromic number*, a number that reads the same forwards and backwards
 - It is one greater than a square number
 - Exactly two of its digits are odd
- What is Sophie's number? 26. _____
27. How many ways are there to pick a president, vice president, and three officers from a group of 6 people if each person can hold at most one position? 27. _____ ways
28. Alex chooses a random integer between 1 and 20, inclusive. What is the probability that the integer is prime? Express your answer as a common fraction. 28. _____

29. How many integers between 1 and 100, inclusive, are either a perfect square or a perfect cube?

29. _____ integers

30. The decimal $0.201\bar{9}$ has an infinite string of 9's after the third decimal place. It can be expressed as a fraction $\frac{a}{b}$ where a and b are coprime positive integers. What is $a + b$?

30. _____

31. What is the units digit of $1^{2019} + 2019^1$?

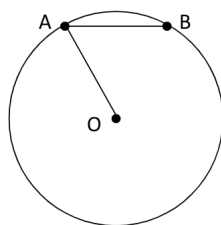
31. _____

32. Two points are chosen at random on a circle, and the line segment connecting them is drawn. What is the probability that the length of this segment is less than or equal to the length of the radius of the circle? Express your answer as a common fraction.

32. _____

33. Points A and B lie on circle O , and $\overline{AB} \cong \overline{AO}$. If \widehat{AB} has a length of 2π , what is the area enclosed by \overline{AB} and \widehat{AB} ? Express your answer in terms of π and in simplest radical form.

33. _____



34. How many positive factors does 2^{10} have?

34. _____ factors

35. If Gabriel and Jenna work together, they can finish a jigsaw puzzle in 1 hour. If Gabriel works alone, he can finish the puzzle in 3 hours. How many hours would it take for Jenna to finish the puzzle on her own? Express your answer as a common fraction.

35. _____ hours