

Sarasota Math Immersion Monthly Tournament (SMIMT)

Grade 8 and under

First Name _____ Last Name _____ Grade _____

Instruction: The examination has **6** pages and **20** questions. You will be given **50 minutes** to complete the examination. All the questions are single choice questions. **Please circle the correct answer on the paper.**

1. Which of the following is the least number that should be subtracted from 2022 to get a number exactly divisible by 11?
A) 0
B) 2
C) 5
D) 7
E) 9

2. Which of the following is exactly divisible by 99?
A) 2002
B) 9090
C) 12375
D) 13579
E) 13589

3. How many outcomes are possible when you toss 6 fair coins at the same time?
Note that the order in which the coins come up heads or tails does not matter.
A) 5
B) 7
C) 8
D) 15
E) None of the above

4. How many terms are in the expansion of $(a+b+c+d)^5$?
- A) 40
 - B) 48
 - C) 56
 - D) 64
 - E) 72
5. Joy runs 800 meters at a speed of 160 meters per minute. How many additional meters will she have to run at a speed of 225 meters per minute to average 200 meters per minute for the entire running training?
- A) 1000
 - B) 1200
 - C) 1600
 - D) 1800
 - E) 2000
6. A car from Sarasota to Tallahassee departs at 8:00 am, driving at a constant rate of 60 miles per hour for the 300-mile trip. A second car departs from Tallahassee towards Sarasota at 8:20 am and drives at a rate of 80 miles per hour. At what time do they meet?
- A) 10:20 am
 - B) 10:45 am
 - C) 11:00 am
 - D) 11:10 am
 - E) 11:30 am
7. Anna, Bob, and Carol all volunteer at the same animal shelter. Anna volunteers every two days. Bob volunteers every four days. Carol volunteers every five days. Suppose they all volunteer together on a Monday. On what day of the week do they all volunteer together next time?
- A) Monday

- B)** Tuesday
 - C)** Wednesday
 - D)** Friday
 - E)** Saturday
8. Express the sum $623_8 + 164_8$ in base 8.
- A)** 787
 - B)** 1007
 - C)** 777
 - D)** 1017
 - E)** 1027
9. What is the sum of the roots of $x^3 - 6x^2 + 2x + 8$?
- A)** 4
 - B)** 5
 - C)** 6
 - D)** 7
 - E)** 8
10. In how many ways can the letters in “deepfreeze” be arranged such that two e’s do not appear together?
- A)** 1200
 - B)** 120
 - C)** 240
 - D)** 720
 - E)** 10!
11. If $\cos(2x) = 1/4$, find $\cos^4(x) - \sin^4(x)$?
- A)** $1/32$
 - B)** $1/16$
 - C)** $1/8$

D) $\frac{1}{4}$

E) $\frac{1}{2}$

12. If $x + \frac{1}{x} = 4$, what is the value of $x^3 + \frac{1}{x^3}$?

A) 44

B) 48

C) 52

D) 56

E) 60

13. James can paint a house in 8 hours and John can paint a house in 4.8 hours, but they're only $\frac{3}{4}$ as efficient when they work together. How many hours does it take them to paint a house together?

A) 3

B) 4

C) 5

D) 6

E) 8

14. What is the remainder when $(-29)^{76}$ is divided by 6?

A) 1

B) 2

C) 3

D) 4

E) 5

15. How many numbers less than or equal to 2000 are divisible by 3 or 4 but not 5?

A) 200

B) 400

C) 600

- D) 800
- E) 1000

16. What is the value of $A \times B$ if 1B112A5 is divisible by 99?

- A) 15
- B) 20
- C) 25
- D) 30
- E) 35

17. What is the median to the side of length 8 of a triangle with side lengths 7, 8, 9?

- A) 5
- B) 6
- C) 7
- D) 8
- E) 9

18. What is the volume of the cone formed by aligning the straight sides of a circular sector with radius 30 and angle 288 degrees?

- A) 640π
- B) 1920π
- C) 3456π
- D) 4032π
- E) 5760π

19. How many 4-digit numbers are there such that at least 1 digit is repeated?

- A) 3464
- B) 4464
- C) 5464
- D) 6464
- E) 7464

20. A person has 30 apples. How many ways can he distribute the apples between himself and 3 other people if each person must get at least 3 apples?

- A)** 30
- B)** 210
- C)** 630
- D)** 1330
- E)** 4^{21}

SMIMT Nov 2022 Answer Keys Grades 8 & under

1. E) 9
2. C) 12375
3. B) 7
4. C) 56
5. D) 1800
6. A) 10:20 am
7. E) Saturday
8. B) 1007
9. C) 6
10. D) 720
11. D) $\frac{1}{4}$
12. C) 52
13. B) 4
14. A) 1
15. D) 800
16. A) 15
17. C) 7
18. C) 3456π
19. B) 4464
20. D) 1330