

**CIE 2016 Math Comp Math Fun
Answer Key**

Name: _____

ID: _____

Grade: 7

Room: _____

Start Time: _____

Finish Time: _____

No.	Answer
1	C
2	B
3	E
4	C
5	E
6	B
7	A
8	B
9	E
10	D
11	C
12	B
13	D
14	C
15	E
16	B
17	B
18	D
19	D
20	D
21	E
22	C
23	E
24	E
25	D

No.	Answer
26	D
27	B
28	C
29	D
30	A
31	D
32	A
33	C
34	C
35	A
36	D
37	E
38	D
39	E
40	C
41	C
42	C
43	
44	
45	
46	
47	
48	
49	
50	

CIE-USA/DFW

Math Competition 2016

Grade 7

40 questions

1 hour

Notes:

1. Make sure to write all your answers on the answer sheet. Only the answer sheet will be graded.
2. Each of the 40 questions carries the same weight, so if you get stuck on one question, move on and work on the easier problems first.
3. Bonus questions will be counted only when there is a tie using common questions.

Name (please print) _____

Room (please print) _____

1. If $\sqrt{169} = \sqrt{16} + \sqrt{x}$, then $x = \underline{\hspace{1cm}}$.

- A. 49 B. 64 C. 81 D. 100 E. 153

2. What is the units digit of 7^{2016} ?

- A. 0 B. 1 C. 3 D. 7 E. 9

3. What is the largest odd factor of 243?

- A. 1 B. 3 C. 27 D. 81 E. 243

4. What is the largest number of students that can sit in a row of 33 chairs if there has to be an empty seat between each pair of adjacent students?

- A. 11 B. 16 C. 17 D. 32 E. 33

5. If $x\#y = \frac{x+y}{x-y}$, then $(5\#3)\#4 = \underline{\hspace{1cm}}$.

- A. 0 B. 1 C. 2 D. 8 E. undefined

6. A fast food restaurant specializes in ham sandwiches and offers the Ham Special, where a customer may choose to add any and as many of the following: mayonnaise, lettuce, tomato, and cheese (for example, mayo and lettuce, or nothing, or all four). How many different ham sandwich combinations are there?

- A. 8 B. 16 C. 20 D. 24 E. 32

7. The students of Class 1 are lining up in rows for P.E., but they're having some issues. They have 1 student left over if they line up in 3 rows, 2 students left if in 4 rows, and 3 students left if in 5 rows. What is the smallest possible number of students in Class 1?

- A. 58 B. 69 C. 72 D. 83 E. 95

8. What is the units digit of $1^{2016} + 5^{2016} + 6^{2016} + 10^{2016}$?

- A. 0 B. 2 C. 5 D. 7 E. 9

9. A palindrome is a number, like 20302, that reads the same forwards and backwards. The numbers n and $n+32$ are three-digit and four-digit palindromes, respectively. What is the units digit of n ?

- A. 2 B. 3 C. 7 D. 8 E. 9

10. If the sum of two integers is 36 more than their difference, then one of the integers must be:

- A. 9 B. 12 C. 15 D. 18 E. 24

11. Nondegenerate $\triangle ABC$ has integer side lengths. D lies on AC such that BD is an angle bisector. If $AD=4$ and $DC=9$, then what is the smallest possible perimeter of $\triangle ABC$?

- A. 28 B. 38 C. 39 D. 45 E. 84

12. For how many integers b does the base- b representation of 13 end in 3?

- A. 1 B. 2 C. 3 D. 4 E. 13

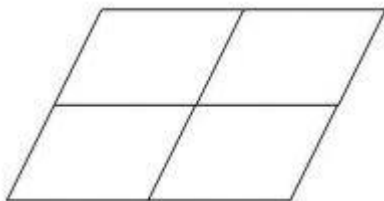
13. If my friend's birthday is on the 251st day of 2016, then what month is it in?

- A. June B. July C. August D. September E. October

14. Which of the following numbers is one-sixteenth of its reciprocal?

- A. -16 B. 0 C. $\frac{1}{4}$ D. 4 E. none of above

15. How many parallelograms of any size are in the figure below?



- A. 4 B. 5 C. 6 D. 8 E. 9

16. The sum of three consecutive even integers is 2016. What is the positive difference between the largest and smallest of the three integers?

- A. 2 B. 4 C. 672 D. 1344 E. 1346

17. A large pump can fill a swimming pool in 5 hours, and a small pump in 6. At 10 o'clock the smaller pump starts to fill an empty pool, and at 10:30, the larger one is turned on as well. At what time will the swimming pool be full?

- A. 12:30 B. 1:00 C. 2:00 D. 3:30 E. 4:00

18. Two fair coins are tossed simultaneously. What is the probability that exactly 1 coin shows heads when they land?

- A. $1/4$ B. $1/3$ C. $3/8$ D. $1/2$ E. $5/8$

19. If $\frac{31}{37}$ is expressed as a decimal, what digit occupies the 2016th digit to the right of the decimal point?

- A. 1 B. 3 C. 5 D. 7 E. 8

20. The product of two consecutive positive integers is 342. What is their sum?

- A. 31 B. 33 C. 35 D. 37 E. 39

21. The quotient of two consecutive positive integers is 1.02. What is the product of the two integers?

- A. 102 B. 210 C. 2450 D. 2500 E. 2550

22. All the odd integers from 0 and 2016 are multiplied together. What is the units digit of the product?

- A. 0 B. 4 C. 5 D. 8 E. 9

23. In my personalized cuckoo clock, every time any of the three hands-- the hour, minute, and second hands-- passes directly over the 1 (just the 1, not 10 or 11 or 12), an inspirational cuckoo pops out and shouts, "You're #1!". How many times does the cuckoo say its message in 24 hours?

- A. 720 B. 732 C. 733 D. 1464 E. 1466

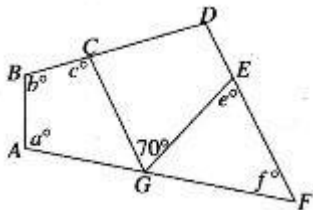
24. The letters of the alphabet, starting with A, are assigned increasing consecutive integer values. If $B + K + Y = 2015$, then the average of all 26 of the assigned values is:

- A. 650 B. 655.5 C. 663 D. 670 E. 672.5

25. 8 rooks are placed on a standard 8x8 chessboard such that none are in position to attack another (rooks can attack the row and column they are in). How many ways is this possible?

- A. 8 B. 64 C. 7! D. 8! E. 9!

26. In the figure below, what is the value of $a + b + c + e + f$?



- A. 130 B. 230 C. 330 D. 430 E. 530

27. $(101 + 103 + \dots + 149) - (90 + 92 + \dots + 138) = \underline{\hspace{2cm}}$.

- A. 250 B. 275 C. 550 D. 750 E. 2750

28. $\frac{1}{1 \times 2} + \frac{1}{2 \times 3} + \frac{1}{3 \times 4} + \dots + \frac{1}{10 \times 11} = \underline{\hspace{2cm}}$.

- A. 1/2 B. 7/8 C. 10/11 D. 21/22 E. 1

29. Solve $-\frac{s+5}{3} > \frac{2-3s}{6}$.

- A. $s > -8$ B. $s > -\frac{8}{5}$ C. $s < -12$ D. $s > 12$ E. $s < -\frac{5}{8}$

30. $x^3 + 2x^2 - x - 2 = \underline{\hspace{2cm}}$.

- A. $(x-1)(x+1)(x+2)$ B. $(x+1)^2(x-2)$ C. $(x-1)(x+1)^2$ D. $(x-2)^3$ E. $(x+1)^2(x+2)$

31. Of the whole numbers 1, 2, 3... 98, 99, how many are greater than the sum of their digits?

- A. 87 B. 88 C. 89 D. 90 E. 91

32. Arrange these numbers from smallest to largest:

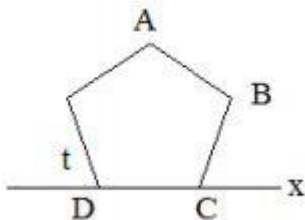
$\frac{8}{7}$ $\pi - 2$ $\sqrt{2}$ 1.1415

- A. 1.1415, $\pi - 2$, $\frac{8}{7}$, $\sqrt{2}$
 B. $\sqrt{2}$, $\frac{8}{7}$, 1.1415, $\pi - 2$
 C. $\pi - 2$, $\frac{8}{7}$, 1.1415, $\sqrt{2}$
 D. $\pi - 2$, 1.1415, $\sqrt{2}$, $\frac{8}{7}$
 E. $\frac{8}{7}$, $\sqrt{2}$, $\pi - 2$, 1.1415

33. The area of a triangle is $45a^9b^8c^{10}$ square units. If the height of the triangle is $9a^3b^2c^5$ units, how long is the width?

- A. $5a^6b^4c^2$ B. $10a^6b^{10}c^5$ C. $10a^6b^6c^5$ D. $10a^3b^4c^2$ E. $5a^6b^6c^5$

34. Figure ABCDE below is a regular pentagon with line x passing through side CD. What is the measure of angle t ?



- A. 52° B. 62° C. 72° D. 108° E. 144°

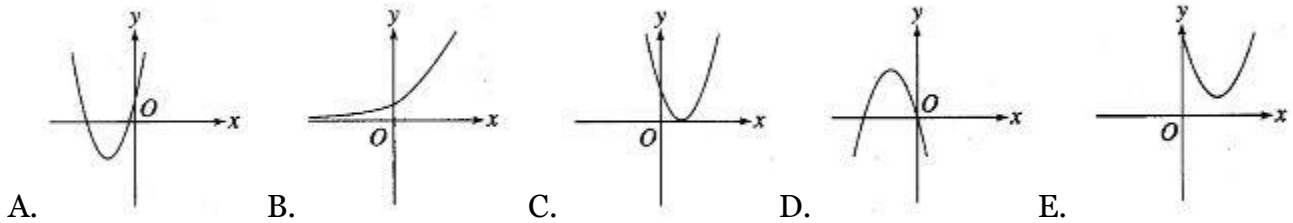
35. Let $S = 1^3 + 2^3 + 3^3 + \dots + 99^3$. What is the remainder when S is divided by 3?

- A. 0 B. 1 C. 2 D. 10 E. 100

36. Matt and Mallory are two siblings. Three years ago, Matt’s age was four times that of Mallory, while three years from now, Matt’s age will be only two times that of Mallory. What is the sum of their ages today?

- A. 6 B. 9 C. 15 D. 21 E. 24

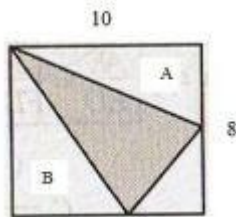
37. If the function $p(x)$ is defined by $p(x) = ax^2 + bx + c$, where $ac > 4$, $b < 3$. Which of the following could be the graph of $y = p(x)$?



38. An unfair coin is made so that the probability of flipping a head is $\frac{2}{3}$ while that of flipping a tail is $\frac{1}{3}$. If the unfair coin is flipped 3 times, what’s the probability of flipping more heads than tails?

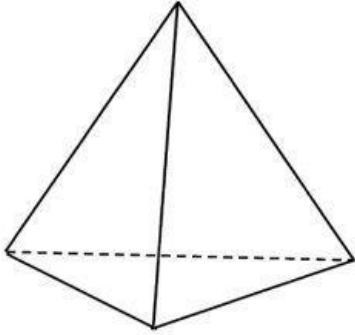
- A. $\frac{1}{2}$ B. $\frac{14}{27}$ C. $\frac{2}{3}$ D. $\frac{20}{27}$ E. $\frac{26}{27}$

39. Triangles A and B have the same area, each a quarter of the area of the rectangle. What is the area of the shaded triangle?



- A. 15 B. 20 C. 25 D. 28 E. 30

40. A fair 4-sided die in the shape of a tetrahedron is numbered 1, 2, 3, and 4, with one number on each face. The die is rolled 3 times, and the sum of the three numbers on the bottom face of each roll is calculated. What is the probability that the sum is at least 8?



- A. $1/3$ B. $2/5$ C. $1/2$ D. $3/5$ E. $2/3$

BONUS QUESTIONS:

41. Jessie and James are professional bricklayers. When alone, Jessie can lay 40 bricks every hour and James can lay 60 bricks every hour, but when they work together, they argue so much that they each lay 10 less bricks every hour. How many bricks are in a fireplace that takes 4 hours longer to lay if they worked together than if they worked separately?

- A. 600 B. 800 C. 1600 D. 2400 E. 3200

42. If it took me 2 days to write each of the first 41 questions of this test and 3072 hours to write this one, then what is the average amount of time in days I took to write each question from the entire test?

- A. 2 B. 3 C. 5 D. 65 E. 1538