2015-2016 年度美国“数学大联盟杯赛”（中国赛区）初赛

（六年级）

（初赛时间：2015 年 11 月 14 日，考试时间 90 分钟，总分 200 分）

学生诚信协议：考试期间，我确定没有就所涉及的问题或结论，与任何人、用任何方式交流或讨论，我确定以下的答案均为我个人独立完成的成果，否则愿接受本次成绩无效的处罚。

如果您同意遵守以上协议请在装订线内签名

选择题：每小题 5 分，答对加 5 分，答错不扣分，共 200 分，答案请填涂在答题卡上。

1. $(2 + 0 \times 1 + 6) - (2 + 0 \times 1 + 5) =$

   A) 0　　B) 1　　C) 9　　D) 11

2. Tim loves to work out in the gym! The gym charges him $100 for a one-time registration fee and then $4 for each day he works out. It costs him $_?_ to work out for 31 days.

   A) 100　　B) 124　　C) 224　　D) 3224

3. $4 \times 10^4 + 0 \times 10^3 + 3 \times 10^2 + 2 \times 10^1 = 2016 \times$ _?_

   A) 1　　B) 2　　C) 10　　D) 20

4. It took me twice as much time to do physics homework than to do calculus homework. I did my physics homework in 9000 seconds. How long, in hours, did it take me to do the calculus homework?

   A) 4500　　B) 75　　C) 7.5　　D) 1.25

5. I need to pack 112 books using large and small boxes. A large box costs $18 and can store 17 books. A small box costs $6 and can store 5 books. What is the least I must spend on boxes to pack all 112 books?

   A) 120　　B) 122　　C) 126　　D) 132

6. How many numbers have their reciprocals equal to themselves?

   A) 0　　B) 1　　C) 2　　D) 3

7. Which of the following is not a parallelogram?

   A) rectangle　　B) trapezoid　　C) rhombus　　D) square

8. Growman’s height is 100 cm today. He is 6 cm taller at the end of each day. At the end of one day he may be _?_ cm tall.

   A) 151　　B) 200　　C) 300　　D) 400

9. The areas of an isosceles right triangle and a rectangle are the same. The triangle has a leg of 6. The rectangle’s dimension can be 9 by _?_

   A) 1　　B) 2　　C) 4　　D) 8

10. When an integer is divided by 3, the remainder cannot be _?_.

    A) 0　　B) 1　　C) 2　　D) 3

11. $2^6 \times 5^6 \times 10^3 =$?

A) 10^5 B) 10^8 C) 10^9 D) 10^{18}

12. A perfect square *cannot* have exactly ? positive divisors.

A) 7 B) 9 C) 10 D) 23

13. The quotient of the square of the perimeter of square S divided by the area of square S is

A) 1 B) 2 C) 4 D) 16

14. Joe needed some money to support himself. He had his calculator for sale for \$50. He then increased the sale price by 25% since he was very greedy. When no one bought it at this new price, he decided to decrease the price back to \$50. He needed to decrease the price by ?.

A) 10% B) 20% C) 25% D) 30%

15. (2/3)(3/4)(4/5)(5/6)(6/7)(7/8) =

A) 1/4 B) 4 C) 1/8 D) 8

16. Of the following, which is closest to $(2^{2016})/(5^{2016})$?

A) 2/5 B) 4/25 C) 8/125 D) 0

17. $1008 \times 992 = 1000^2 -$?

A) 64 B) 32 C) 16 D) 8

18. Jack is the wealthiest person in the town! He has \$280 more than Jill. The money Jill has is only 60% of the money Jack has. Jack has \$?.

A) 280 B) 420 C) 700 D) 1120

19. Square A's perimeter is 9 times as large as that of Square B. If the length of a side of Square B is 1, what is the area of Square A?

A) 9 B) 81 C) 144 D) 1296

20. In a book fair, Elena buys 4 science books for every 9 math books she buys. If she buys 36 science books, she buys ? books total.

A) 16 B) 52 C) 81 D) 117

21. The digits of a *number* N are all 1s. If N is divisible by 3 and 11, N can have ? digits.

A) 12 B) 14 C) 15 D) 27

22. How many integers between 1 and 2500 are squares of primes?

A) 14 B) 15 C) 16 D) 17

23. The number N when rounded to the nearest hundredth is 20.16. When rounded to the nearest thousandth, N is at most

A) 20.159 B) 20.160 C) 20.164 D) 20.165

24. What is the smallest whole number that has exactly 8 positive divisors?

A) 12 B) 24 C) 30 D) 50

25. What fraction of the factors in $6^5 \times 10^5$ are odd?

A) 1/36 B) 1/11 C) 1/10 D) 25/36

26. Figure *A* is a circle with radius 6. Figure *B* is a bounded semicircle with radius 6. What is the ratio of the perimeter of *A* to the perimeter of *B*?

A) 1:2 B) 2:1 C) 2π: π+2 D) π+2:2π

27. Rotating a figure 225° clockwise and then 1170° counterclockwise is the same as rotating the figure ? clockwise.

A) 45° B) 75° C) 135° D) 225°

28. Three different lines and a square can have at most ? points of intersections. [Note: The vertices of the square do not count as intersections.]

A) 8 B) 9 C) 10 D) 11

29. On a number line, the King Tortoise stands at 17 and the Queen Hare stands at 1. They are both moving to the right. The tortoise's speed is 3 m/s and the hare's speed is 7 m/s. They meet at

A) 29 B) 28 C) 19 D) 18

30. If the sum of all the integers from 64 to 126 is 5985, what is the sum of the first 63 positive integers?

A) 2016 B) 2050 C) 2100 D) 2030

31. The possible scores one can get on the AIME test is an integer from 0 to 15. 100 students in my school took the test and the mode is 0. At least how many students got a 0? (Hint: The mode is the value that appears most frequently in a series of numbers.)

A) 5 B) 6 C) 7 D) 8

32. Which of the following numbers is *not* divisible by 4, 9, and 11?

A) 1584 B) 6336 C) 7056 D) 9900

33. Four pairs of twins enter a raffle event. There are 70 ways to pick 4 winners. There are ? ways to pick winners so that at least one pair of twins of twins are both winners.

A) 16 B) 36 C) 54 D) 56

34. *N* is a two-digit number. When *N* is divided by its ones digit, the quotient is 8 and the remainder is 1. When *N* is divided by its tens digit, the quotient is 11 and the remainder is 2. What is the value of *N*?

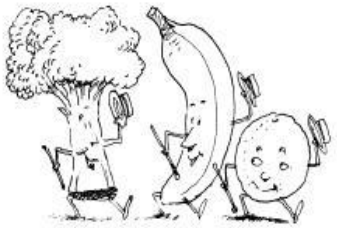
A) 46 B) 57 C) 68 D) 79

35. The age of Mike's grandfather, *N*, is a two-digit number. Switching the ones digit and tens digit of *N*, we get *M*, which is the age of Mike's father. If $N - M$ is five times Mike's age. How old is Mike?

A) 3 B) 6 C) 9 D) 18

36. It costs \$350 to buy 3 broccolo, 7 bananas, and 1 pear. It costs \$450 to buy 4 broccolo, 10 bananas, and 1 pear. How much does it cost to buy 1 broccoli, 1 banana and 1 pear?

A) 100 B) 120 C) 135 D) 150



37. Mike, Lucy, and Jerry visited some of cities X, Y, and Z.
Mike: "I visited more cities than Lucy. I haven't visited city Z."
Lucy: "I haven't visited city Y."
Jerry: "There is one city that all three of us visited."
Question: What city(cities) has Lucy visited?