

2015-2016 年度美国“数学大联盟杯赛”(中国赛区)初赛
(五年级)

(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

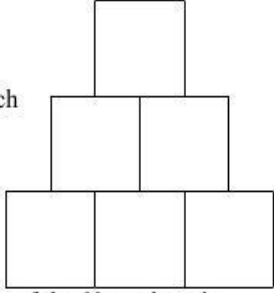
选择题: 每小题 5 分, 答对加 5 分, 答错不扣分, 共 200 分, 答案请填涂在答题卡上。

1. A 6 by 6 square has the same area as a 4 by ? rectangle.
A) 3 B) 6 C) 8 D) 9
2. Every prime has exactly ? positive divisors.
A) 1 B) 2 C) 3 D) 4 or more
3. If I answered 34 out of 40 questions on my math test correctly, I answered ?% of the questions correctly.
A) 75 B) 80 C) 85 D) 90
4. $120 \div 3 \div 4 \times 12 =$
A) 1 B) 10 C) 12 D) 120
5. $10 \times 20 \times 30 \times 40 = 24 \times$?
A) 1000 B) 10 000 C) 100 000 D) 1000 000
6. One of my boxes contains 1 pencil and the others each contain 5 pencils. If there are 101 pencils in my boxes, how many boxes do I have?
A) 19 B) 20 C) 21 D) 22
7. An electrical company imports 2016 light bulbs. Unfortunately, 25% of those are damaged. How many light bulbs are **not** damaged?
A) 25 B) 504 C) 1512 D) 2016
8. $50 \times (16 + 2^4)$ is the square of
A) -40 B) -4 C) 4 D) 80
9. Which of the following numbers has exactly 3 positive divisors?
A) 49 B) 56 C) 69 D) 100
10. Ten people stand in a line. Counting from the left, Jerry stands at the 5th position. Counting from the right, which position is he at?
A) 4 B) 5 C) 6 D) 7
11. On a teamwork project, Jack contributed $\frac{2}{7}$ of the total amount of work, Jill contributed $\frac{1}{4}$ of the work, Pat contributed $\frac{1}{5}$ of the work, and Matt contributed the rest. Who contributed the most toward this project?
A) Jack B) Jill C) Pat D) Matt
12. Which of the following numbers is a factor of 2016?
A) 5 B) 11 C) 48 D) 99



13. $2 \times 4 \times 8 \times 16 \times 32 \times 64 =$
 A) 2^{10} B) 2^{15} C) 2^{21} D) 2^{120}
14. On a game show, Al won four times as much as Bob, and Bob won four times as much as Cy. If Al won \$1536, how much did Al, Bob, and Cy win together?
 A) \$96 B) \$384 C) \$1920 D) \$2016
15. The sum of two composites *cannot* be
 A) odd B) even C) 11 D) 17
16. If a and b are positive integers such that $a/b = 5/7$, then $a + b$ is
 A) 12 B) 24 C) 36 D) not able to be determined
17. What is the greatest odd factor of the number of hours in all the days of the year 2015?
 A) 3 B) 365 C) 1095 D) 3285
18. If the current month is February, what month will it be 1 999 999 months from now?
 A) January B) February C) March D) April
19. Two angles are complementary. One of these angles is 36° less than the other. What is the measure of the larger angle?
 A) 36° B) 54° C) 63° D) 72°
20. (The square root of 16) + (the cube root of 64) + (the 4th root of 256) =
 A) 12 B) 24 C) 32 D) 64
21. In $\triangle ABC$, $m\angle A - m\angle B = m\angle B - m\angle C$. What is the degree measure of $\angle B$?
 A) 30 B) 60 C) 90 D) 120
22. For every 3 math books I bought, I bought 2 biology books. I bought 55 books in all. How many of those are math books?
 A) 11 B) 22 C) 33 D) 44
23. John wrote a number whose digits consists entirely of 1s. This number was a composite number. He number could contain exactly ? 1s.
 A) 17 B) 19 C) 29 D) 32
24. Weird Town uses three types of currencies: Cons, Flegs, and Sels. If 3 Sels = 9 Cons and 2 Cons = 4 Flegs, then 5 Sels = ? Flegs.
 A) 12 B) 24 C) 30 D) 36
25. If the length of a rectangular prism with volume V is doubled while the width and the height are halved, the volume of the new prism will be
 A) $4V$ B) $V/2$ C) V D) $2V$
26. Rick and Roy each stands at different ends of a straight road that is 64 m long. They run toward each other. Rick's speed is 3 m/s and Roy's speed is 5 m/s. They will meet in ? seconds.
 A) 1 B) 2 C) 4 D) 8
27. If the area of a certain circle is 2016, its radius is
 A) $\sqrt{2016/\pi}$ B) $\sqrt{4032/\pi}$
 C) $2016/\pi$ D) $1008/\pi$



28. In a toy shop, the cost of a Teddy Bear is 200% as much as that of a toy train. The cost of a toy train is $\frac{6}{5}$ the cost of a pack of the wooden blocks. The cost of a pack of wooden blocks is \$50. What is the cost, in dollars, of the Teddy Bear?
- A) 60 B) 100 C) 120 D) 200
29. In the sequence 2016, 225, 141, 66, 432, 99, 1458 ..., each term after the first term is the sum of the cubes of the digits of the previous term. What is the 100th term of this sequence?
- A) 153 B) 351 C) 370 D) 371
30. What is the sum of all the positive divisors of 2^{10} ?
- A) $2^{10} - 1$ B) $2^{11} - 1$ C) $2^{12} - 1$ D) $2^{13} - 1$
31. It takes 4 hours for Mike and Lucy to finish a task. It takes Lucy and Jerry 5 hours to finish the same task. And it takes 6 hours for Mike and Jerry to finish the same task. Lucy and Jerry first work on the task for 1 hour and 45 minutes. Then Mike takes over the task on his own. How many more hours does it take for Mike to finish the task?
- A) 3 B) 4 C) 5 D) 6
32. If you sell a cloth at its current price, you get \$40 profit. The total profit you get selling 10 clothes at 70% of its current price is equal to the total profit you get selling 20 clothes at \$82 per cloth. What is the current price of a cloth?
- A) 80 B) 100 C) 120 D) 125
33. There are 6 identical squares in the figure on the right. The side length of each square is 1. Of all the triangles constructed by connecting three of the 18 vertices in the figure, how many of them are triangles whose area is 2 and which has at least one vertical or horizontal side?
- A) 12 B) 16 C) 24 D) 28
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34. Pick up N numbers from 1 to 2015 inclusively, such that the sum of any three of the N numbers is divisible by 24. What is the maximum value of N ?
- A) 83 B) 84 C) 168 D) 252
35. 汤姆有一件花了 64 美金买来的衬衫, 他打算以比原价高出 25% 的价格出售, 他会卖出多少钱?
- A) \$16 B) \$32 C) \$48 D) \$80
36. 满足以下条件的最小整数是多少: “除以 3 余 2, 除以 5 余 4, 除以 7 余 6。”
- A) 59 B) 61 C) 104 D) 106
37. 飞人以每小时 360 千米的速度飞行, 这相当于每秒多少米?
- A) 10 B) 36 C) 64 D) 100
38. 设 A 为一个可整除 11 但不可整除 10 的正整数, 若 B 为一个颠倒 A 数位的整数, 那么 B 必须被几整除?
- A) 11 B) 22 C) 33 D) A, B, C 都不选
39. 珍妮花 50 美金买了一条围巾。她一开始准备以 60 美金卖出, 然后把价格增加 25%, 再把新的价格减少 20% 并且出售。在这笔交易之中, 她 ?
- A) 赚了 7 美金 B) 赚了 10 美金
 C) 亏了 7 美金 D) 亏了 10 美金