



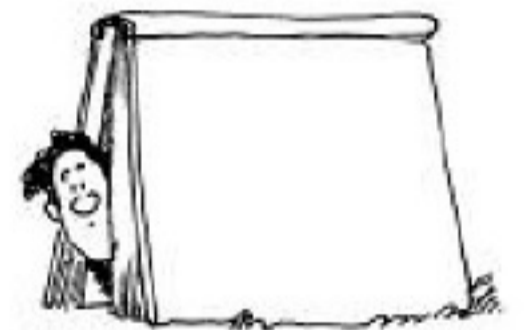
2017-2018 年度美国“大联盟” (Math League) 思维探索第一阶段活动  
(五年级)

(活动日期: 2017 年 11 月 26 日, 答题时间: 90 分钟, 总分 200 分)

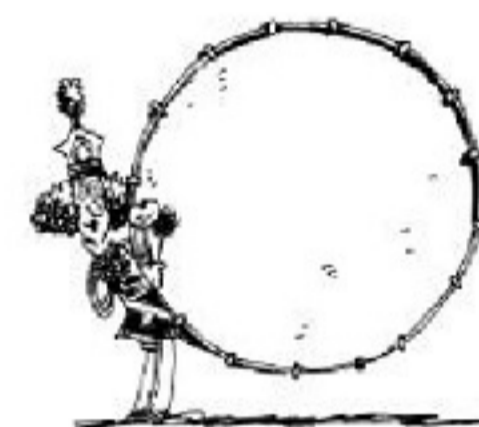
学生诚信协议: 答题期间, 我确定没有就所涉及的问题或结论, 与任何人、用任何方式交流或讨论, 我确定我所填写的答案均为我个人独立完成的成果, 否则愿接受本次成绩无效的处罚。

选择题: 每小题 5 分, 答对加 5 分, 答错不扣分, 共 200 分。

- The smallest possible sum of two different prime numbers is  
A) 3                      B) 4                      C) 5                      D) 6
- The greatest common factor of two numbers is 3. The product of these two numbers *must* be divisible by  
A) 6                      B) 9                      C) 12                      D) 18
- The sum of 5 consecutive one-digit integers is *at most*  
A) 15                      B) 25                      C) 35                      D) 45
- How many two-digit multiples of 10 are also multiples of 12?  
A) 4                      B) 3                      C) 2                      D) 1
- I have read exactly  $\frac{1}{3}$  of the total number of chapters in my 120-page book. If each chapter has the same whole number of pages, then the total number of chapters I have *left* could be  
A) 16                      B) 24                      C) 32                      D) 50
- What is the greatest odd factor of  $4^4 \times 5^5 \times 6^6$ ?  
A)  $3^6$                       B)  $5^5$                       C)  $3^5 \times 5^5$                       D)  $3^6 \times 5^5$
- What is the sum of the factors of the prime number 2017?  
A) 2016                      B) 2017                      C) 2018                      D) 2019
- Lynn ran in 6 times as many races as the number of races she won. How many of her 126 races did Lynn *not* win?  
A) 21                      B) 90                      C) 96                      D) 105
- The least common multiple of 8 and 12 is the greatest common factor of 120 and  
A) 80                      B) 124                      C) 144                      D) 180
- January has the greatest possible number of Saturdays when January 1 occurs on any of the following days of the week *except*  
A) Thursday                      B) Friday                      C) Saturday                      D) Sunday



11. The number that is 10% of 1000 is 10 more than 10% of  
 A) 90                      B) 100                      C) 900                      D) 990
12. The sum of 16 fours has the same value as the product of   ? fours.  
 A) 2                      B) 3                      C) 4                      D) 16
13. Of the following, which is the sum of two consecutive integers?  
 A) 111 111                      B) 222 222                      C) 444 444                      D) 888 888
14. Abe drove for 2 hours at 30 km/hr. and for 3 hours at 50 km/hr. What was Abe's average speed over the 5 hours?  
 A) 35 km/hr.                      B) 40 km/hr.                      C) 42 km/hr.                      D) 45 km/hr.
15. My broken watch runs twice as fast as it should. If my watch first broke at 6:15 P.M., what time was displayed on my watch 65 minutes later?  
 A) 7:20 P.M.                      B) 7:25 P.M.                      C) 8:20 P.M.                      D) 8:25 P.M.
16.  $(2018 \times 2017) + (2018 \times 1) =$   
 A)  $2017^2$                       B)  $2018^2$                       C)  $2018^3$                       D)  $(2018 + 2017)^2$
17. A prized bird lays 2, 3, or 4 eggs each day. If the bird laid 17 eggs in 1 week, on *at most* how many days that week did the bird lay exactly 2 eggs?  
 A) 2                      B) 3                      C) 4                      D) 5
18. Of the following, which could be the perimeter of a rectangle whose side-lengths, in cm, are prime numbers?  
 A) 10 cm                      B) 22 cm                      C) 34 cm                      D) 58 cm
19. The average of all possible total values of a 4-coin stack of nickels and dimes (containing *at least one* of each coin) is  
 A) 20¢                      B) 30¢                      C) 40¢                      D) 60¢
20. The diameter of Ann's drum is 40 cm more than the radius. What is half the circumference of the drum?  
 A)  $120\pi$  cm                      B)  $80\pi$  cm                      C)  $60\pi$  cm                      D)  $40\pi$  cm
21. Of the following, which expression has the greatest number of factors that are multiples of 2018?  
 A)  $2018 \times 12$                       B)  $2018^2$                       C)  $2019^2$                       D)  $2019^{2019}$
22. When the sum of the factors of a prime number is divided by that prime number, the remainder is  
 A) 0                      B) 1                      C) 2                      D) 3
23. What is the sum of the digits of the greatest integer that has a square root less than 100?  
 A) 18                      B) 36                      C) 99                      D) 100
24. My favorite number has 6 different factors. If the product of all 6 factors is  $12^3$ , what is the sum of the factors of my favorite number?  
 A) 24                      B) 28                      C) 32                      D) 36
25. For how many different pairs of unequal positive integers less than 10 is the least common multiple of the numbers less than their product?  
 A) 6                      B) 7                      C) 8                      D) 9



26. Exactly  $\frac{1}{2}$  of the students in my class have at least one brother, and  $\frac{1}{2}$  have at least one sister. If  $\frac{1}{3}$  have no siblings, what fraction of the students in my class have at least one brother *and* at least one sister?

- A)  $\frac{1}{6}$                       B)  $\frac{1}{5}$                       C)  $\frac{1}{4}$                       D)  $\frac{1}{3}$

27. Each day, Sal swims a lap 1 second faster than on the day before. If Sal swims a lap in 60 minutes on the 1st day, on what day does he swim a lap in 10% less time than the 1st day?

- A) 359th                      B) 360th                      C) 361st                      D) 362nd

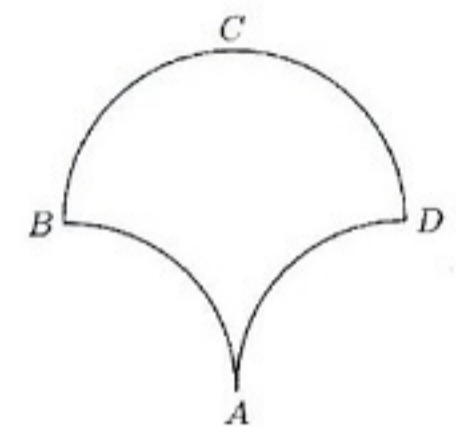


28.  $2017^{2018} \times 2017^{2019} = 2017^? \times 2017^{1009}$

- A) 1010                      B) 2010                      C) 3028                      D) 4038

29. Both arcs  $AB$  and  $AD$  are quarter circles of radius 5, figure on the right. Arc  $BCD$  is a semi-circle of radius 5. What is the area of the region  $ABCD$ ?

- A) 25                      B)  $10 + 5\pi$                       C) 50                      D)  $50 + 5\pi$

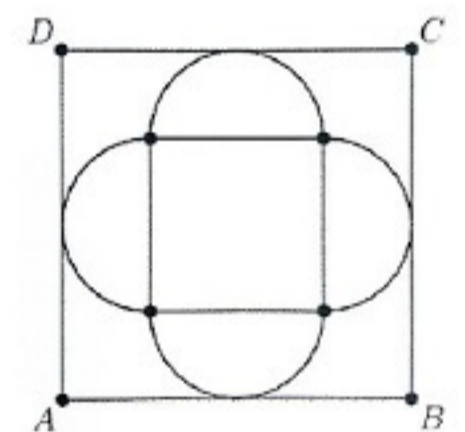


30. For every \$5 I earn from my job, I save \$2. For every \$4 I save from my job, I am given an additional \$1 from my parents to add to my savings. How much must I earn in order to have \$40 in savings?

- A) \$160                      B) \$120                      C) \$100                      D) \$80

31. In the figure on the right, the side-length of the smaller square is 4. The four arcs are four semi-circles. Each side of square  $ABCD$  is tangent to one of the semi-circles. The area of  $ABCD$  is

- A) 32                      B) 36                      C) 48                      D) 64



32. A million is a large number, a “1” followed by 6 zeros. A googol is a large number, a “1” followed by one hundred zeros. A googolplex is a large number, a “1” followed by a googol of zeros. A googolplexian is a large number, a “1” followed by a googolplex of zeros. A googolplexian is

- A)  $10^{100}$                       B)  $10^{10^{100}}$                       C)  $10^{10^{10^{100}}}$                       D) None of the above

33. An integral triangle is a triangle with positive integral side-lengths and a positive area. Such a triangle can have a perimeter as small as 3. What is the next smallest possible perimeter of an integral triangle?

- A) 4                      B) 5                      C) 6                      D) 7

34. 2 liter of 2% fat milk + 3 liter of 3% fat milk = 5 liter of ? fat milk

- A) 2.5%                      B) 2.6%                      C) 5%                      D) 6%

35. One day, a motorist came to a hill that was ten-mile drive up one side and a ten-mile drive down the other. He drove up the hill at an average speed of 30 miles per hour. How fast will he have to drive down the other side to average 60 miles per hour for the entire 20-mile distance?

- A) 30 miles per hour                      B) 60 miles per hour  
C) 90 miles per hour                      D) None of the above

36. What is the weight of a fish if it weighs ten pounds plus half its weight?

- A) 10                      B) 15                      C) 20                      D) 25

37. Without using pennies, how many different combinations of coins (nickels, dimes, quarters) will make 30 cents?

- A) 3                      B) 4                      C) 5                      D) 6

38. A man once bought a fine suit for which he paid \$30 more than  $\frac{1}{4}$  of its price. How much did he pay for the suit?
- A) \$30                      B) \$35                      C) \$40                      D) \$45
39. A father is five times as old as his son. In fifteen years he will be only twice as old. How old is the father at present?
- A) 40                      B) 35                      C) 30                      D) 25
40. It takes 30 minutes to completely fill a tank. If, however, a hole allows  $\frac{1}{3}$  of the water that is entering the tank to escape, how long will it then take to fill the tank?
- A) 40                      B) 45                      C) 60                      D) 90

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五年级试卷答案

题号	1	2	3	4	5	6	7	8	9	10
答案	C	B	C	D	A	D	C	D	C	D
题号	11	12	13	14	15	16	17	18	19	20
答案	C	B	A	C	D	B	D	A	B	D
题号	21	22	23	24	25	26	27	28	29	30
答案	A	B	B	B	D	D	C	C	C	D
题号	31	32	33	34	35	36	37	38	39	40
答案	D	C	B	B	D	C	C	C	D	B