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2023-2024 Math League Preliminary Round

(Grade 5)

(Unofficial version, for reference only)

1. Aya walked by 19 doors, knocking on every second door. Cayo walked by the same 19 doors, knocking on every third door. If they started from the same spot, they knocked on _?_ of the same doors.



A) 1 B) 3 C) 4 D) 5

2. How many of the 10 smallest positive integers are the sum of two different positive integers?

A) 5 B) 8 C) 9 D) 10

3. What is the greatest possible value of the greatest of 3 unequal positive integers whose sum is 39?

A) 36 B) 35 C) 15 D) 13

4. If the number that is one less than a positive prime number is also prime, the product of these two primes must be

A) 2 B) 3 C) 5 D) 6

5. How many common multiples of 12 and 18 are less than 12 × 18?

A) 5 B) 4 C) 3 D) 2

6. Together, Ed and Joe can milk 5 times as many cows in a day as Ed can milk by himself in a day. If Joe can milk 48 cows by himself in a day, how many cows can Ed milk by himself in 7 days?



A) 63 B) 70 C) 84 D) 96

7. What is the average of 23 consecutive integers if the greatest of the 23 integers is 2023?

A) 2001 B) 2011 C) 2012 D) 2013

8. If a square's perimeter is 45 cm more than its side-length, its area is

A) 135 cm^2 B) 165 cm^2 C) 180 cm^2 D) 225 cm^2

9. Eve ran half the total length of Trail 1 before turning onto Trail 2 and running half as far as she'd run on Trail 1. If Eve ran a total of 3 km, how long is Trail 1?



A) 6 km B) 5 km

C) 4 km D) 3 km

10. The number that is four hundredths less than four tenths is

A) 0.36 B) 0.44 C) 0.54 D) 0.96

11. I reversed the order of the 4 different digits of a positive 4-digit integer and added this new integer to the original integer. What is the greatest possible sum of the two integers?

A) 18 447 B) 18 537 C) 18 547 D) 19 998

12. The number that is 40% less than 400 is 20% more than

A) 160 B) 200 C) 240 D) 320

13. $2024^{2024} \div 2^{2024} =$

A) 1012 B) 2022 C) 1012^{2024} D) 2022^{2024}

14. The product $6 \times 6 \times 6$ has exactly __?__ different positive even factors.

A) 4 B) 6 C) 8 D) 12

15. The total value of Cy's quarters is 5 times the total value of his dimes. If Cy has 36 coins all together, how many of them are dimes?

A) 9 B) 12 C) 18 D) 24

16. An isosceles triangle with integer side-lengths has perimeter 2^{10} cm. The greatest possible length of a side is

A) 510 cm B) 511 cm C) 512 cm D) 1022 cm

17. Fern traveled 3^5 times as many km last year as Holly did. Ivy traveled 3^5 more km last year than Fern did. If Holly traveled 3^5 km last year, how many km did Ivy travel last year?



A) 3^{15} B) $3^5 + 6^5$

C) $3^{10} + 3^5$ D) $3^{10} + 3^{10}$

18. In a set of 15 tiles, each tile is numbered with a different integer from 1 to 15. I have 3 such sets of tiles. If I pick 25 tiles from these 3 sets, what is the least number of those I pick that must be odd-numbered?

A) 1 B) 2 C) 3 D) 4

19. How many factors of $1 \times 4 \times 9 \times 16$ are perfect squares?

A) 8 B) 7 C) 5 D) 4

20. I planted an oak tree between every 2 adjacent ash trees in a row of 15 ash trees. Then I planted a maple tree between every 2 adjacent ash and oak trees. How many more maple trees than oak trees did I plant?



A) 1 B) 14

C) 15 D) 29

21. What is the ones digit of the sum of the 100 consecutive integers whose least integer is 2024?

A) 0 B) 2 C) 3 D) 5

22. Dividing 10^3 by a 3-digit integer leaves a remainder of <u>at most</u>

A) 1 B) 250 C) 499 D) 501

23. The math team has 81 members. If $\frac{3}{4}$ of students in my grade comprise $\frac{2}{3}$ of the math team, how many students are in my grade?

A) 27 B) 41 C) 54 D) 72

24. If the total number of minutes I've played video games is the square of the number of months in 15 years, for how many total hours have I played video games?

A) 180 B) 225 C) 324 D) 540

25. The number of 2-digit prime numbers less than 50 that can be written as the sum of two different prime numbers is

A) 0 B) 4 C) 6 D) 8

26. How many positive 3-digit integers whose digits are consecutive and ordered least to greatest, from left to right, are multiples of 4?

A) 3 B) 2 C) 1 D) 0

27. I can divide my batch of cookies into plates of 6 cookies each or plates of 8 cookies each, with no cookies left over. If I have between 75 and 100 cookies, how many more cookies do I need so that I can divide all the cookies into plates of 7 cookies each?



A) 1 B) 2

C) 3 D) 4

28. Forty percent of the 10 coins, a combination of nickels and dimes, that I put in my pocket fell out. The value of the remaining coins is 50% less than the total value of the coins I put in my pocket. How many total nickels **could** I have left in my pocket?

A) 1 B) 2 C) 3 D) 4

29. I divided 2024^{2024} by 2, then divided that quotient by 2, and so on, dividing quotients by 2 until I got an odd quotient. How many times did I divide by 2?

A) 3×2024 B) 3^{2024}

C) 1012×2024 D) 1012^{2024}

30. Yesterday only 20 students were present because 20% of all students were absent. With all students present, there are __?__ students.

A) 16 B) 22 C) 24 D) 25

31. Halving the length of each edge of a cube divides its volume by

A) 2 B) 4 C) 8 D) 16

32. Just 1 in every 5 of the pets at the pet shop is a reptile. If 20% of the reptiles are snakes, and those are divided evenly among 8 species, each species of snake accounts for __?__% of the pets at the pet shop.



A) 0.25 B) 0.5

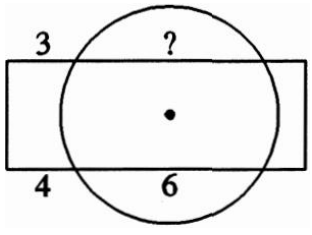
C) 2 D) 2.5

33. What is the only ordered quadruple of integers (a, b, c, d) for which $a + 2b + 3c + 4d = 30$ and $a^2 + b^2 + c^2 + d^2 = 30$?

Note: Please enter the sum of a, b, c, and d as your answer, that is entering the value of $a + b + c + d$.

34. What is the least positive integer n for which the sum of the digits of both n and $n + 1$ are even numbers?

35. As seen in the diagram (NOT drawn to scale), a rectangle and a circle intersect so that adjacent segments on one side of the rectangle have lengths 4 and 6, while, on the opposite side, one segment has length 3. How long is the chord of the circle that's labelled with a question mark?



Answers										
Question	1	2	3	4	5	6	7	8	9	10
Answer	**B**	**B**	**A**	**D**	**A**	**C**	**C**	**D**	**C**	**A**
Question	11	12	13	14	15	16	17	18	19	20
Answer	**A**	**B**	**C**	**D**	**B**	**B**	**C**	**D**	**A**	**B**
Question	21	22	23	24	25	26	27	28	29	30
Answer	**A**	**C**	**D**	**D**	**B**	**C**	**B**	**D**	**A**	**D**
Question	31	32	33	34	35					
Answer	**C**	**B**	**10**	**19**	**8**					