www.mathleague.world

# 2024-2025 Math League Preliminary Round

(Grade 6)

**(Unofficial version, for reference only)**

1. My phone number has 7 digits. Their product is an even perfect square. The greatest possible value of their sum is

   A) 28 B) 58 C) 61 D) 63

2. Lance sells 60 bikes each month. If $\frac{1}{3}$ of the racing bikes he sells each month equals $\frac{1}{12}$ of all the bikes he sells each month, how many racing bikes does Lance sell each month?

   A) 20 B) 15 C) 12 D) 5

3. In a 36-minute gym period, 24 boys want to play basketball. If only 10 can play at the same time, and each boy plays the same amount of time, how many minutes does each boy play?

   A) 12 B) 15 C) 18 D) 20

4. Two different diameters of the same circle *cannot*

   A) be perpendicular B) be parallel

   C) be equal in length D) have a point in common

5. Of the following, which is closest to $\sqrt{999\,999\,999\,999\,999\,999}$ ?

   A) 999 999 999 B) 99 999 999 C) 9 999 999 D) 999 999

6. A triangle with perimeter 8 and integer side-lengths must be

   A) isosceles B) right C) obtuse D) equilateral

7. $1997^{1998} \div 1997^{1997} =$

   A) 1 B) 1997 C) 1998 D) $1997^2$

8. If $\left(\frac{1}{10}\right)^{100}$ = 0.00 . . . 1, then the total number of times that a 0 appears to the right of the decimal point and left of the 1 is

A) 98 B) 99 C) 100 D) 101

9. A whole number is called an *increasing number* if each digit in the number is greater than the digit to its left. For example, 2359 is an increasing number. How many increasing numbers are there between 5000 and 10 000?

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

10. Robinson Crusoe found a bottle whose only message listed all the prime numbers between 100 and 110. How many numbers were on the message?



A) 1 B) 2

C) 3 D) 4

11. The length of one side of a triangle is between 9 and 11. The perimeter of the triangle could be

A) 11 B) 16 C) 18 D) 38

12. If $xy + 2x + 3y + 4 = 5$, then $y =$

A) $\frac{1-2x}{3}$ B) $\frac{1-2x}{x}$ C) $\frac{1-2x}{x+3}$ D) $\frac{1-3x}{xy+3}$

13. $2 \times 3 \times \left(\frac{1}{2} + \frac{1}{3}\right) =$

A) 1 B) 2 C) 5 D) 6

14. Increasing the length of a certain rectangle by 12.5 has the same effect on its area as increasing its width by 12. If the area of the rectangle is 600, what is its perimeter?

A) 49 B) 52 C) 98 D) 104

15. In a certain circle, the length of a radius is equal to the reciprocal of the length of a diameter. What is the area of this circle?

A) $\frac{1}{2}\pi$ B) $\pi$ C) $2\pi$ D) $\sqrt{2}\pi$

16. The radius of a circle is 2. When the radius is doubled, by how much is the area increased?

A) $16\pi$ B) $12\pi$ C) $8\pi$ D) $4\pi$

17. What percent of 60 is 20% of 30?

A) 1% B) 10% C) 40% D) 100%

18. Patty placed four 3 × 5 photos on a page in her photo album, without overlapping. If a page measures 8 × 12, what is the area of that part of the page not covered by photos?

A) 27 B) 35 C) 36 D) 81

19. A ferris wheel ride costs 3 tickets. A carousel ride costs 2 tickets. If I actually spend 30 tickets and go on the two rides at least once each, at *most* how many times can I ride the carousel?



A) 15 B) 14

C) 13 D) 12

20. Which of the following numbers is *not* a solution of $(x-1)(x-2)(x-3) + (x-1)(x-2)(x-4) + (x-1)(x-2)(x+10) = 0$?

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

21. The symbol $n!$ means the product of all the natural numbers from 1 through $n$. For example, $4! = 4 \times 3 \times 2 \times 1 = 24$. The units' digit of $11! + 10! + 9! + 8! + 7! + 6! + 5! + 4! + 3! + 2!$ is

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

22. The length of a radius of a circle is decreased by 10%. This causes the area to be decreased by

A) 19% B) 20% C) 21% D) 25%

23. When 18 is divided by $4\frac{1}{2}$, the quotient is

A) $\frac{1}{81}$ B) $\frac{1}{4}$ C) 4 D) 81

24. 10 m + 10 cm =

A) 11 m B) 10.1 m C) 10.01 m D) 10.001 m

25. Add all 100 roots of $(x+1)(x-2)(x+3) \times \ldots \times (x-98)(x+99)(x-100) = 0$.

A) 100 B) 50 C) -50 D) -100

26. Pat's current age will triple in 18 years. Twice Pat's current age is

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

27. If $x + \pi = 2$, then $x^2 + 3\pi x + 2\pi^2 =$

A) $2 + 2\pi$ B) $4 + \pi$ C) $2 + \pi$ D) $4 + 2\pi$

28. In my piggy bank, 70% of the coins were dimes. Your piggy bank had three times as many coins as mine, and 75% of them were dimes. When the contents were combined, __?__% of the coins were dimes.



A) 72.5 B) 73.25

C) 73.75 D) 74

29. I quadrupled the area of a 1 × 6 rectangular APPLAUSE sign, but left the ratio of its side-lengths unchanged. The perimeter of the new sign is




A) 24 B) 28

C) 48 D) 56

30. A circle and a square have equal areas. The ratio of the length of a side of the square to the length of a diameter of the circle is

A) $\sqrt{\pi} : 1$ B) $2\sqrt{\pi} : 1$ C) $\sqrt{\pi} : 2$ D) $1 : \sqrt{\pi}$

31. The circle circumscribed about regular heptagon $ABCDEFG$ has an area of $196\pi$. If the bisectors of angles $A$ and $D$ intersect at $P$, what is the length of $\overline{AP}$?

A) less than 16 B) between 16 and 32, inclusive

C) between 33 and 64, inclusive D) greater than 64

32. The squares of the lengths of the sides of a certain right triangle are consecutive integers. What is their sum?



A) less than 5 B) between 5 and 10, inclusive

C) between 11 and 20, inclusive D) greater than 20

33. In a circle, chords $\overline{AB}$ and $\overline{CD}$ divide the circle into 4 congruent sectors. If $AB = 10$, what is the square of $AC$?

A) less than 25 B) between 25 and 45, inclusive

C) between 46 and 65, inclusive D) greater than 65

34. What is the least possible perimeter of a triangle whose side-lengths are consecutive perfect squares?

A) less than 64 B) between 64 and 81, inclusive

C) between 82 and 100, inclusive D) greater than 100

35. What are the three ordered pairs of numbers $(x, y)$ for which the four vertices of a parellelogram are (0, 0), (3, 0), (4, 4), and $(x, y)$?

Note: This is how to enter your answer. If your answer is $(x_1, y_1)$, $(x_2, y_2)$, and $(x_3, y_3)$, please enter the value of $(x_1)(y_1) + (x_2)(y_2) + (x_3)(y_3)$.

A) less than 16 B) between 16 and 32, inclusive

C) between 33 and 48, inclusive D) greater than 48

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