

1. From the following choices, choose the one that is equal to $\frac{1}{\sqrt{6}-\sqrt{5}} + \frac{1}{\sqrt{6}+\sqrt{5}}$.

A) $\sqrt{12}$
B) $\sqrt{6}$
C) $\sqrt{24}$
D) $\sqrt{5}$

(Correct +3, Wrong 0, Blank 0)

2. The number **A12B** is a four digit number less than **2024** divisible by 9.

Then **A + B** equals to ____.

A) 9
B) 6
C) 3
D) 15

(Correct +3, Wrong 0, Blank 0)

3. A function has the following two properties.

1. $f(2024) = 253$

2. $f(xy) = x \cdot f(y)$, for any real number x and y .

The value for $f(8)$ is ____.

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

(Correct +3, Wrong 0, Blank 0)

4. How many integers can be a solution to the inequality $|x - 1012| + |x + 1012| \leq 2024$?

A) 2024
B) 1
C) 2025
D) 2

(Correct +3, Wrong 0, Blank 0)

5. How many positive integers that can divide 2024?

- A) 4
- B) 16
- C) 3
- D) 8

(Correct +3, Wrong 0, Blank 0)

6. There are 20 ways to choose a team from 6 students.

The team contains ____ students.

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

(Correct +3, Wrong 0, Blank 0)

7. The sum of the solution to the equation $8x^2 - 2024x + 122400 = 0$ is ____.

- A) 2024
- B) 506
- C) 1012
- D) 253

(Correct +3, Wrong 0, Blank 0)

8. If n and m are both integers, which of the following cannot be a square number?

- A) $6n + 2m + 3$
- B) $2n + 3m$
- C) $3n + 2m + 6$
- D) $6n + 3m + 2$

(Correct +3, Wrong 0, Blank 0)

9. In a cartesian coordinate, a point is in position $(7, 1)$. This point is then reflected with respect to the line $x = y$ and again mirrored to the line $x = 0$.

The distance between initial point and the final image is ____ units.

- A) 4
- B) 10
- C) 8
- D) 6

(Correct +3, Wrong 0, Blank 0)

10. A train is 200 meter long. It's about to pass through a 400-meter long tunnel. The time between the moment when it first enters the tunnel and the moment it completely emerges from it is 20 second.

The train's speed is ____ meter per second.

- A) 10
- B) 20
- C) 40
- D) 30

(Correct +3, Wrong 0, Blank 0)

11. A closed cuboid have length, width, and height ratio of 4:2:8. It's surface area is 448 square units.

It's volume is ____ unit cubed.

- A) 64
- B) 512
- C) 256
- D) 128

(Correct +3, Wrong 0, Blank 0)

12. Ben has five jars, three of them are blue, and the rest are red. Each blue jar contains 3 black pebbles and 2 white pebbles, while each red jar contains 2 black pebbles and 3 white pebbles. Jon chooses one of the jar randomly and from that jar he chooses two of the pebble randomly.

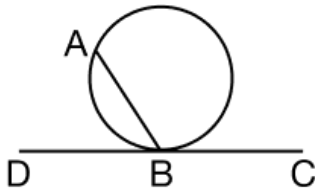
If the probability of him having two black pebbles is

$\frac{p}{100}$, what is p ?

- A) 26
- B) 18
- C) 4
- D) 22

(Correct +3, Wrong 0, Blank 0)

13. In the following diagram, DC is tangent to the circle and AB divides the circle's perimeter into two arcs with length of 4 and 8 units.



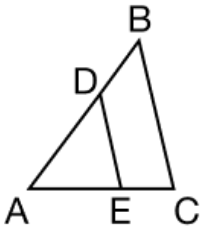
The angle ABC is ____ degrees.

- A) 30
- B) 240
- C) 60
- D) 120

(Correct +3, Wrong 0, Blank 0)

14. In the following diagram,

$AD = AE$, $BD = EC$, and $BC = 6$ units.



If the ratio of area of the triangle ABC and triangle ADE is $9 : 4$, then $DE =$ ____ units.

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

(Correct +3, Wrong 0, Blank 0)

15. The sum of all prime numbers that can divide 2024 is ____.

- A) 44
- B) 40
- C) 56
- D) 36

(Correct +3, Wrong 0, Blank 0)

16. The following diagram shows two semicircles contained in a square.



If the black area is $\pi - 2$ units squared, the area of the square is ____ units squared.

- A) 8
- B) 4
- C) 2
- D) 1

(Correct +3, Wrong 0, Blank 0)

17. In a school, there are only two sportclubs and each student is required to join exactly one of them. The number of female students who join basketball club is 150. The number of male students who join soccer club is 200. The total number of students in the school is 510 and the number of female students who join soccer club is equal to the number of male students who join basketball club.

Total number of students who join soccer club is ____ students.

- A) 240
- B) 80
- C) 360
- D) 280

(Correct +3, Wrong 0, Blank 0)

18. Because of system error, Ben got a wrong point on his last math exam, he should get 80 but he got 40 instead. The teacher then fixed the issue and the classroom average rose by 5 points.

The number of students in the classroom is ____ students.

- A) 4
- B) 8
- C) 10
- D) 20

(Correct +3, Wrong 0, Blank 0)

19. Consider a geometric sequence: $a_1, a_2, a_3, \dots$

The sum of the first five terms is 45, and the sum of the twelfth, thirteenth, up to the eighteenth terms ($a_{12} + a_{13} + a_{14} + a_{15} + a_{16} + a_{17} + a_{18}$) is 315.

The first term is ____.

- A) 5
- B) 1
- C) 2
- D) 3

(Correct +3, Wrong 0, Blank 0)

20. Consider the following equation.

$$\frac{\sin q}{\cos 5q} = \frac{\cos q}{\sin 5q}$$

If $0^\circ < q < 90^\circ$, then the smallest possible value for q is ____°.

- A) 15
- B) 60
- C) 30
- D) 45

(Correct +3, Wrong 0, Blank 0)

21. A function f satisfies the property $f(x + y) = f(x) - f(y) + 1$.

Then $f(2024) = \underline{\hspace{2cm}}$. (Write your answer only in numbers.)

(Correct +4, Wrong 0, Blank 0)

22. There are 2024 persons that come to a party. Each of the person knows exactly one other person in the party other than him/herself.

The maximum number of persons who are unknown to others in the party is $\underline{\hspace{2cm}}$ person. (Write your answer only in numbers.)

(Correct +4, Wrong 0, Blank 0)

23. A perfect solid sphere is cut into eight identical parts. The ratio of the sum of the surface area of the eight parts with the initial sphere is $p : q$ where p and q are relatively prime.

Then $p + q$ equals to $\underline{\hspace{2cm}}$. (Write your answer only in numbers)

(Correct +4, Wrong 0, Blank 0)

24. The sum of all the internal angle in a regular n -gon is 3600 degrees.

Then $n = \underline{\hspace{2cm}}$. (Write your answer only in numbers.)

(Correct +4, Wrong 0, Blank 0)

25. A pair of positive integers (x, y) satisfies the inequality $16x^2 + 9y^2 \leq 24xy$.
Find the minimum value of $x + y$? (Write your answer only in numbers.)
(Correct +4, Wrong 0, Blank 0)
26. Palindromic numbers are those who don't change when all their digits are reversed, such as 121 or 87678.
Find how many four-digit palindromic numbers divisible by 5. (Write your answer only in numbers)
(Correct +4, Wrong 0, Blank 0)
27. How many integers between 0 and 90 that have odd numbers of positive factors? (Write your answer only in numbers)
(Correct +4, Wrong 0, Blank 0)

28. What is the smallest positive integers that has remainder of 2 when divided by 4 and remainder of 7 when divided by 9? (Write your answer only in numbers.)

(Correct +4, Wrong 0, Blank 0)

29. A school manages a seven-day science exhibition. The average of visitors that visited on the first five days is 120 persons per day. But on the last two days, the number of visitors dropped so that the overall average of visitors is 100 persons per day.

The average visitors on the last two days is ____ persons per day. (Write your answer only in numbers.)

(Correct +4, Wrong 0, Blank 0)

30. Three numbers x , y , and z satisfies the following equations.

$$\frac{2}{x} + \frac{4}{y} + \frac{3}{z} = 2$$

$$\frac{5}{x} + \frac{2}{y} - \frac{12}{z} = 6$$

$$\frac{9}{x} - \frac{2}{y} - \frac{6}{z} = -2$$

Then $y =$ _____. (Write only in numbers.)

(Correct +4, Wrong 0, Blank 0)

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Answer Keys

No	Key	Code
1	C	KMF/3381/OU MRQ
2	B	KMF/3392/QLRUS
3	B	KMF/3383/TQEA6
4	C	KMF/3382/RN1U3
5	B	KMF/3386/WHYLJ
6	B	KMF/3387/4MZAV
7	D	KMF/3380/6I8ZE
8	D	KMF/3390/ZBK6I
9	B	KMF/3404/TNI4C
10	D	KMF/3379/ZHALX
11	B	KMF/3399/ZSFCV
12	D	KMF/3385/59IBL
13	D	KMF/3393/6UFQQ
14	C	KMF/3395/MM9R8
15	D	KMF/3391/OXGDG
16	A	KMF/3394/1WD SG
17	D	KMF/3388/EBC9D
18	B	KMF/3389/EUFUO
19	D	KMF/3384/IPLYV
20	A	KMF/3396/FQINC