1. The value of $10008^2 - 64$ is

(A) 9944 (B) 100160000 (C) 100080000 (D) 99440000 (E) 100640000

2. If Arjuna's birthday was on a Sunday last year and Murali's birthday was 300 days after Arjuna's, then Murali's birthday was on a

(A) Saturday (B) Sunday (C) Monday (D) Tuesday (E) Wednesday

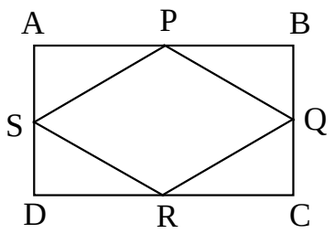
3. The remainder when 5^{2004} is divided by 100 is

(A) 75 (B) 50 (C) 25 (D) 5 (E) 10

4. Which is the smallest number in
$\{\sqrt{7}-\sqrt{6}, \sqrt{12}-\sqrt{11}, \sqrt{17}-\sqrt{16}, \sqrt{22}-\sqrt{21}, \sqrt{27}-\sqrt{26}\}$?

(A) $\sqrt{7}-\sqrt{6}$ (B) $\sqrt{12}-\sqrt{11}$ (C) $\sqrt{17}-\sqrt{16}$
(D) $\sqrt{22}-\sqrt{21}$ (E) $\sqrt{27}-\sqrt{26}$

5. ABCD is a rectangle and P,Q,R,S are the midpoints of AB, BC, CD, AD respectively. Then area of PQRS : area of ABCD is



(A) 1: 2 (B)1 : 4 (C) 1 : 6 (D)1 : 3 (E) 1 : 8

26. Which of the following is (are) true if
$f(n) =$ the number of distinct primes that divide n for $n > 1$

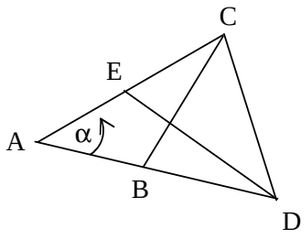
I $f(10) = f(12)$
II If $f(n) > 1$, then $f(f(n)) < f(n)$
III If $f(n) = 3$, then $n < 1000$

(A) All (B) I and II only (C) I only (D) I and III only (E) None

27. The number of ordered pairs (m, n) where m ,n are integers that satisfy $2^m 2^n = 2^{mn}$ is

(A) None (B) 1 (C) 2 (D) 3 (E) 4

28. In the triangle shown below (not drawn to scale) $AB = BC = CD = DE = EA$. The angle α is



(A) 72^0 (B) $36°$ (C) 18^0 (D) 45^0 (E) 60^0

29. In the correctly worked out addition problem below any letter can represent any digit but T, S, and L are non zero.

T H I N K
S R I
L A N K A N

The value of N is

(A) 1 (B) 0 (C) 2 (D) 3 (E) 4

30. If $x_1, x_2, x_3, y_1, y_2, y_3, z_1, z_2,$ and z_3 take only 1 and -1 , then the maximum value of $x_1(y_2z_3 - y_3z_2) + x_2(y_3z_1 - y_1z_3) + x_3(y_1z_2 - y_2z_1)$ is

(A) 5 (B) 6 (C) 4 (D) 3 (E) 2

21. If a,b,c,d are non negative integers and $a+b+c+d=4$,then the number of different values $a^2+b^2+c^2+d^2$ can take is

(A) 2 (B) 3 (C) 4 (D) 5 (E) 6

22. When the hour hand moves from 4 to 5 in an hour at what time do the minute hand and hour hand come together?

(A) $4:18\frac{1}{3}$ (B) $4:21\frac{9}{11}$ (C) 4:30 (D) 4:20 (E) 4:22

23. Which of the following is (are) true if *p* and *q* are primes, and $p>q$?

I p^2-q^2 could be a prime

II p^3-q^3 could be a prime

III p^4-q^4 could be a prime

(A) All (B) III only (C) I and III only (D) I and II only (E) None

24. If a sequence is given by $x_1,x_2,x_3,\ldots$ where $x_1=1,x_2=2$ and

$x_3=\frac{x_2}{x_1},x_4=\frac{x_3}{x_2},x_5=\frac{x_4}{x_3}$ etc., then x_{100} equals

(A) 1 (B) 2 (C) $\frac{1}{2}$ (D) $\frac{1}{4}$ (E) 4

25. In a sequence of numbers any 4 consecutive terms add up to 30. If the 1st term and the 12th term are 5 and 11 respectively, then the 100th term is

(A) 5 (B) 11 (C) 25 (D) 14 (E) 19

6. If $2x+3y+4z=120$ and $4x+3y+2z=60$ then the average of $x,y,$ and z is

(A) 90 (B) 60 (C) 10 (D) 18 (E) 9

7. The sum of eight consecutive integers is 2004. What is the largest of these integers?

(A) 400 (B) 224 (C) 129 (D) 500 (E) 2004

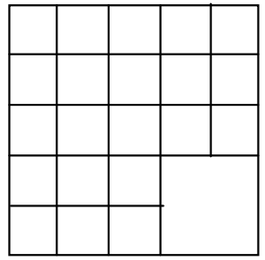
8. If a book is numbered starting with 1 and using 2004 digits, the number of pages in the book is

(A) 836 (B) 704 (C) 705 (D) 1002 (E) 501

9. If $a\otimes b=\frac{a+b}{1+(a-b)^2}$, then the value of $1\otimes(2\otimes3)$ is

(A) $\frac{15}{14}$ (B) $\frac{14}{13}$ (C) $\frac{13}{12}$ (D) $\frac{18}{12}$ (E) 5

10. What is the total number of squares of any size in the diagram (drawn to scale) shown?



(A) 27 (B) 34 (C) 39 (D) 40 (E) 42

11. Which of the following is (are) true for the sequence 11, 111, 1111, 11111, …?

I Every odd term is divisible by 11

II None of the terms is divisible by 7

III At least one term is a perfect square

(A) I only (B) II only (C) III only (D) II and III only (E) None

12. If a fair coin is tossed 2004 times what is the probability of getting exactly one head?

(A) $\left(\frac{1}{2}\right)^{2004}$ (B) $\left(\frac{1}{2}\right)^{2003}$ (C) $2004\left(\frac{1}{2}\right)^{2004}$

(D) $1002\left(\frac{1}{2}\right)^{2004}$ (E) $2003\left(\frac{1}{2}\right)^{2004}$

13. Which is the largest number in $\{\frac{123456}{234567}, \frac{123455}{234567}, \frac{123457}{234567}, \frac{123457}{234569}, \frac{123456}{234569}\}$?

(A) $\frac{123456}{234567}$ (B) $\frac{123455}{234567}$ (C) $\frac{123457}{234567}$ (D) $\frac{123457}{234569}$ (E) $\frac{123456}{234569}$

14. A rectangular box has dimensions all positive integers in meters and the volume of the box is 2004 m^3. The minimum possible sum in meters of the three dimensions is

(A) 173 (B) 174 (C) 175 (D) 180 (E) 181

15. Three distinct corners of a cube of volume 1 m^3 are P, Q and R. Which of the following could be the sum of the lengths PQ and QR in meters ?

I. 2 II. $\sqrt{2}+\sqrt{3}$ III. $\sqrt{3}+\sqrt{3}$

(A) I only (B) I and II only (C) All (D) None (E) III only

16. If $999 \times ABC = DEF273$ then the value of A is

(A) 6 (B) 7 (C) 8 (D) 9 (E) 0

17. The remainder when 2004^{2004} is divided by 10 is

(A) 2 (B) 3 (C) 4 (D) 5 (E) 6

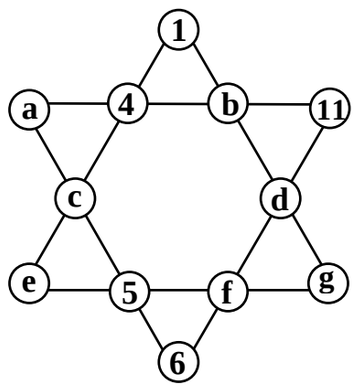
18. The maximum number of elements that can be drawn from $\{1,2,3,...,2001,2002,2003,2004\}$ such that no two of them add up to 2005 is

(A) 1002 (B) 1003 (C) 1004 (D) 1005 (E) 2004

19. The value of $(\log_2 3)(\log_3 4)(\log_4 5)(\log_5 6)(\log_6 7)(\log_7 8)$ equals

(A) 2 (B) 4 (C) $\log_7 8$ (D) $\log_2 7$ (E) 3

20. In the magic star shown on the right $a,b,c,d,e,f,$ and g takes distinct values in $\{2,3,7,8,9,10,12\}$ and the sum of any 4 numbers along any edge is 26. The value of g is



(A) 7 (B) 8 (C) 9 (D) 10 (E) 11

Answers

Question number	Answers
1	100160000
2	Saturday
3	25
4	$\sqrt{27}-\sqrt{26}$
5	1 : 2
6	10
7	254
8	704
9	$\frac{14}{13}$
10	42
11	I only
12	$2004\left(\frac{1}{2}\right)^{2004}$
13	$\frac{123457}{234567}$
14	174
15	I and II only
16	7
17	6
18	1002
19	3
20	10
21	5
22	$4:21\frac{9}{11}$
23	I and II only
24	1
25	11
26	I and II only
27	2
28	$36°$
29	0
30	4