Number System

MATHEMATICS Olympiad Comprehensive Book

QUESTIONS

1. **For $P \in N$, $3^{4P} - 2^{4P}$ is always divisible by ____**

(a) 15 (b) 5

(c) 13 (d) Both (b) and (c)

(e) None of these

2. **The greatest number of 5 digits exactly divisible by 15, 24 and 36 is ____**

(a) 99620 (b) 99720

(c) 99968 (d) 99960

(e) None of these

3. **The greatest number of 6 digits exactly divisible by all the numbers between 1 and 10 (both inclusive) is _____**

(a) 997920 (b) 999768

(c) 999660 (d) 999760

(e) None of these

4. **The smallest three digit number which leaves remainders 8 and 12 when divided by 28 and 32 respectively, is _____**

(a) 102 (b) 222

(c) 202 (d) 204

(e) None of these

5. **If $P = \sqrt{n-1} + \sqrt{n+1}$ where n is a positive integer then the value of P is**

(a) a rational number

(b) not a rational number

(c) an integer

(d) a natural number

(e) None of these

6. **The largest number that will divide 398, 606 and 474 leaving remainders 7, 11 and 15 respectively is _____**

(a) 52 (b) 26

(c) 17 (d) 18

(e) None of these

7. **Which one among the following statements is true?**

(a) The remainder when the square of any number is divided by 4 is 1 or 0.

(b) There is no natural number for which 4 ends with digit zero.

(c) A positive integer n is prime, if no prime p less than or equal to $\sqrt{n}$ divides n.

(d) All the above

(e) None of these

8. The unit value of $6^{100} - 5^{100}$ is _____

(a) 0 (b) 1

(c) 2 (d) 3

(e) None of these

9. For any odd natural number n, $(\sqrt{3})^{4n} + (\sqrt{2})^{4n}$ is always divisible by _____

(a) 5 (b) 7

(c) 17 (d) 13

(e) None of these

10. If I is a positive integer then $(I)^2$ will be in the form of ————

(a) 4m for some integer m

(b) 8m for some integer m

(c) 4m+1 for some integer m

(d) Both (a) and (c)

(e) None of these

11. Which among the following statements is not true?

(a) The square of any odd integer is of the form 4q + 1, for some integer q.

(b) For any odd integer p, $p^2 - 1$ is divisible by 8. (c) If p and q are both odd positive integers/ then $p^2 + q^2$ is even and divisible by 4.

(d) For any natural number n, 12^n cannot end with the digit 0 or 5.

(e) None of these

12. For any natural number n, $(2n+1)^2 - 1$ is always divisible by _____

(a) 2 (b) 4

(c) 8 (d) All the above

(e) None of these

13. Which of the following statements is always true?

(a) The sum or difference of a rational and an irrational number is rational.

(b) Every irrational number is a surd.

(c) The product or quotient of a non-zero rational number and an irrational number is irrational.

(d) All the above

(e) None of these

14. The value of $(27)^{3p} - (13)^{3p}$ ends in _____ (where p is a natural number)

(a) 0 (b) 4

(c) 6 (d) Either (b) or (c)

(e) None of these

15. **If $P = 1 \cdot 3 \cdot 5 \cdot 7 \ldots\ldots\ldots\ldots 21$ and $Q = 2 \cdot 4 \cdot 6 \cdot 8 \cdot 10 \ldots\ldots\ldots\ldots 22$ then HCF of P and Q is _____**

(a) 12375 (b) 14175

(c) 825 (d) 925

(e) None of these

16. **In a seminar, the numbers of participants in science, English and Mathematics are 144, 180 and 192 respectively. Find the minimum number of rooms required if in each room the same number of participants are to be seated and all of them being in the same subject.**

(a) 38 (b) 40

(c) 43 (d) 45

(e) None of these

17. **Without actually performing the Song division, choose which among the following rational numbers will not have a terminating decimal expansion.**

(a) $\frac{123}{16}$ (b) $\frac{351}{2^7 \times 5^8 \times 7^{18}}$

(c) $\frac{32}{2^8 \times 5^9}$ (d) $\frac{833}{49 \times 2^7}$

(e) None of these

18. **The largest number that divides 588, 1999 and 1650 leaving 3, 10 and 12 respectively is _____**

(a) 117 (b) 109

(c) 27 (d) 43

(e) None of these

19. **The decimal expansion of the rational number $\frac{12879}{1250}$ will terminate after:**

(a) One decimal places

(b) Two decimal places

(c) Three decimal places

(d) Four decimal places

(e) None of these

20. **Find the greatest prime factor in 527527.**

(a) 17 (b) 11

(c) 13 (d) 31

(e) None of these

21. **If p is a single digit natural number and the unit digits of p^4 and p are same, then how many possibilities p can assume?**

(a) 2 (b) 3

(c) 4 (d) 5

(e) None of these

22. **The sum of LCM and HCF of two numbers is 29610. If their LCM is 140 times v the HCF of the numbers then which among the following can be one of the numbers?**

(a) 330 (b) 1470

(c) 525 (d) 462

(e) None of these

23. **The value of $(22)^{3^m} + (28)^{3^m}$ ends in _____ $\{M \in N\}$.**

(a) 8 (b) 2

(c) 6 (d) 0

(e) None of these

24. **If LCM and HCF of two numbers are 324 and 18 respectively, then how many such pairs of numbers are possible?**

(a) 0 (b) 1

(c) 2 (d) 3

(e) None of these

25. **If $p = \sqrt{11} + \sqrt{5}$, $q = \sqrt{14} + \sqrt{2}$ and $r = \sqrt{13} + \sqrt{3}$ then which one of the following holds true?**

(a) p > q > r (b) p < q < r

(c) p > r > q (d) p < r < q

(e) None of these

26. **The number of ways, in which 360 can be resolved in two factors, is _____**

(a) 24 (b) 18

(c) 12 (d) 15

(e) None of these

27. **If $u = \sqrt[16]{7} + \sqrt[16]{5}$, $v = \sqrt{7} + \sqrt{5}$, $w = \sqrt[8]{7} + \sqrt[8]{5}$, $x = \sqrt[16]{7} - \sqrt[16]{5}$, and $y = \sqrt[4]{7} + \sqrt[4]{5}$, then which one of the following is a rational number?**

(a) uvxy (b) uvwxy

(c) uxwy (d) vwxy

(e) None of these

28. **A mason has to fit two bathrooms with square marble tiles of the largest possible size. The dimensions of each such bathroom are 12 fts and 10 fts. If the size of the tiles in inches has to be taken then number of such tiles required is ____**

(a) 15 (b) 30

(c) 60 (d) 80

(e) None of these

29. **If HCF of 374 and 255 is H and H = 255m + 374n then the value of m - n is equal to _____**

(a) 3 (b) 4

(c) 5 (d) 1

(e) None of these

30. Choose which one among the following statement is incorrect?

(a) HCF of two co-primes a and b is 1.

(b) LCM of two co-primes m and n is mn.

(c) By using Euclid's division lemma for two numbers 155 and 345, we get $345 = 155 \times 2 + 35$.

(d) The remainder, when the square of any prime number greater than 3 is divided by 6, is 1.

(e) None of these

31. If LCM and HCF of two numbers are 3003 and 21 respectively, then how many such numbers are possible?

(a) 0 (b) 1

(c) 2 (d) 3

(e) None of these

32. The largest number which divides 1288 and 2915 and leaves the remainders 1 and 8 respectively, is H and it satisfies the expression, H = 45m + 288n. Find the value of m + n.

(a) 11 (b) 15

(c) 13 (d) 10

(e) None of these

33. The smallest number, which when increased by 19 is exactly divisible by both 2079 and 1404, is _____

(a) 6200 (b) 625

(c) 6218 (d) 3208

(e) None of these

34. $\sqrt{\frac{7+4\sqrt{3}}{2}}$ equals to _____

(a) $\sqrt{2}+\sqrt{6}$ (b) $\frac{2\sqrt{2}+\sqrt{6}}{2}$

(c) $\frac{\sqrt{2}+\sqrt{6}}{2}$ (d) $\frac{\sqrt{3}+2}{4}$

(e) None of these

35. If HCF of the numbers (3600, x) = 20 then how many values are possible for x? (where it is assumed that x is a product of a power of 2 and a power of 5 only)

(a) One (b) Two

(c) Three (d) Four

(e) None of these

36. The number of ways, in which 576 can be resolved into two factors, is _____

(a) 8 (b) 9

(c) 10 (d) 11

(e) None of these

37. Four runners P, Q, R and S start running around a circular track simultaneously. If they complete one round in 16, 12, 24, 18 minutes respectively, after how much time they will meet next?

(a) 2 hours 20 minutes (b) 2 hours

(c) 3 hours 18 minutes (d) 2 hours 24 minutes

(e) None of these

38. If LCM and HCF of two numbers are equal, then the numbers will be _____

(a) Composite (b) Prime

(c) Equal (d) Co-prime

(e) None of these

39. If the product of two numbers is 149058 and HCF of these numbers is 21 then how many pairs of these numbers are possible?

(a) 1 (b) 2

(c) 3 (d) 4

(e) None of these

40. If $A = 14 + (1 \times 2 \times 3 \times 4 \times 5 \times \ldots\ldots\ldots\ldots 10 \times 14)$ **and** $B = 19 + (1 \times 2 \times 3 \times 4 \times 5 \ldots\ldots\ldots\ldots 10 \times 19)$ **then which one of the following is/are correct?**

(i) $B - A$ is a prime number.

(ii) $B + A$ is a composite number.

(iii) A is a composite number.

(iv) B is a prime number.

(a) Both (i) and (ii)

(b) Both (ii) and (iii)

(c) Both (iii) and (iv)

(d) All (i), (ii), (iii) and (iv)

(e) None of these

ANSWER - KEY				
1. (d)	**2.** (b)	**3.** (a)	**4.** (d)	**5.** (b)
6. (c)	**7.** (d)	**8.** (b)	**9.** (d)	**10.** (d)
11. (c)	**12.** (d)	**13.** (c)	**14.** (d)	**15.** (b)
16. (c)	**17.** (b)	**18.** (a)	**19.** (d)	**20.** (d)
21. (b)	**22.** (b)	**23.** (d)	**24.** (c)	**25.** (c)
26. (c)	**27.** (b)	**28.** (c)	**29.** (c)	**30.** (e)
31. (c)	**32.** (a)	**33.** (c)	**34.** (b)	**35.** (b)
36. (d)	**37.** (d)	**38.** (c)	**39.** (b)	**40.** (b)