19GET275 – VQAR 1

UNIT -1 QUANTITATIVE ABILITY I

Number System

Number System	Examples
Whole Number	0, 1, 2, 3, 4, 5…
Natural Number	1, 2, 3, 4, 5, 6…
Integers	…-3, -2, -1, 0, 1, 2, 3, 4, 5,…
Prime Number	3, 5, 7, 11, 13, 17…..
Co-Prime Number	HCF = 1
Composite Number	4, 6, 8, 9, 12, 14, 15…..
Even Number	2, 4, 6, 7, 8, 10…
Odd Number	1, 3, 5, 7, 9….

Formulas of Number System:

1. $1 + 2 + 3 + 4 + 5 + \ldots + n = n(n + 1)/2$

2. $(1^2 + 2^2 + 3^2 + \ldots.. + n^2) = n (n + 1) (2n + 1)/6$

3. $(1^3 + 2^3 + 3^3 + \ldots.. + n^3) = (n(n + 1)/2)^2$

4. Entirety of first n odd numbers = n^2

5. Entirety of first n even numbers = $n(n + 1)$

Mathematical Formulas to solve questions

1. $(a + b)(a – b) = (a^2 – b^2)$

2. $(a + b)^2 = (a^2 + b^2 + 2ab)$

3. $(a – b)^2 = (a^2 + b^2 – 2ab)$

4. $(a + b + c)^2 = a^2 + b^2 + c^2 + 2(ab + bc + ca)$

5. $(a^3 + b^3) = (a + b)(a^2 – ab + b^2)$

6.$(a^3 – b^3) = (a – b)(a^2 + ab + b^2)$

7. $(a^3 + b^3 + c^3 – 3abc) = (a + b + c)(a^2 + b^2 + c^2 – ab – bc – ac)$

8. when $a + b + c = 0$, then $a^3 + b^3 + c^3 = 3abc$

Types of Number System:

- **Natural Numbers**
  - All positive integers are called natural numbers. All counting numbers from 1 to infinity are natural numbers. **N = {1, 2, 3, 4, 5, 6…….∞}**

- **Whole Numbers**
  - The set of numbers that includes all natural numbers and the number zero are called whole numbers. They are also called as Non-negative integers. **W = { 0,1,2,3,4,5,6,7,8,……..∞}**

- **Integers**
  - All numbers that do not have the decimal places in them are called integers. **Z = {∞…….-3, -2, -1, 0, 1, 2,** 3……∞}
  - a. Positive Integers: 1, 2, 3, 4….. is the set of all positive integers.
  - b. Negative Integers: −1, −2, −3….. is the set of all negative integers.
  - c. Non-Positive and Non-Negative Integers: 0 is neither positive nor negative.

- **Real Numbers**

- All numbers that can be represented on the number line are called real numbers.

- **Rational Numbers**
  - A rational number is defined as a number of the form a/b where 'a' and 'b' are integers and b ≠ 0. The rational numbers that are not integers will have decimal values. These values can be of two types
  - a. Terminating decimal fractions: For example: KaTeX parse error: KaTeX doesn't work in quirks mode. = 0.5,KaTeX parse error: KaTeX doesn't work in quirks mode. = 31.25
  -
  - b. Non-Terminating decimal fractions: For example:KaTeX parse error: KaTeX doesn't work in quirks mode. = 3.1666666, KaTeX parse error: KaTeX doesn't work in quirks mode. = 2.33333

- **Irrational Numbers**
  - It is a number that cannot be written as a ratio KaTeX parse error: KaTeX doesn't work in quirks mode. form (or fraction). An Irrational numbers are non-terminating and non-periodic fractions. For example: KaTeX parse error: KaTeX doesn't work in quirks mode. = 1.414

- **Complex Numbers**
  - The complex numbers are the set {a+bi}, where, a and b are real numbers and 'i' is the imaginary unit.

- **Imaginary Numbers**

- A number does not exist on the number line is called imaginary number. For example square root of negative numbers are imaginary numbers. It is denoted by ‘i’ or ‘j.

- **Even Numbers**
  - A number divisible by 2 is called an even number.
  - For example: 2, 6, 8, 14, 18, 246, etc.

- **Odd Numbers**
  - A number not divisible by 2 is called an odd number.
  - For example: 3, 7, 9, 15, 17, 373, etc.

- **Prime numbers**
  - A number greater than 1 is called a prime number, if it has exactly two factors, namely 1 and the number itself.
  - For example: 2, 3, 5, 7, 11, 13, 17, etc.

- **Composite numbers**
  - Numbers greater than 1 which are not prime, are known as composite numbers. For example: 4, 6, 8, 10, etc.

Formulas for finding the Squares of a number.

Squares of numbers between 91-100:

- 97^2

Step 1: 97 can be written as (100-3)

Step 2: KaTeX parse error: KaTeX doesn't work in quirks mode.

KaTeX parse error: KaTeX doesn't work in quirks mode.

= 10000 + 9 – 6000

= 10009 -600 = 9409

- 91^2

Step 1: 91 can be written as (100-9)

Step 2: KaTeX parse error: KaTeX doesn't work in quirks mode.

KaTeX parse error: KaTeX doesn't work in quirks mode.

10000 + 81 – 1800 = 8281

Final Result: From step 2 and step 3 => 91^2 = 8281

Squares of numbers between 100-109:

- 102^2

Step 1: 102 can be written as (100+2)

Step 2: KaTeX parse error: KaTeX doesn't work in quirks mode.

[/latex](100+2)^2 = 100^2 + 2^2 + 2*100*2[/latex]

10000 + 4 + 400 = 10404

- 107^2

Step 1: 107 can be written as (100+7)

Step 2: KaTeX parse error: KaTeX doesn't work in quirks mode.

KaTeX parse error: KaTeX doesn't work in quirks mode.

10000 + 49 + 1400 = 11449

Squares of numbers between 51-60

- 53^2

Step 1: 53-50 = 3

Step 2: 25+3 = 28

Step 3: 3^2 = 09

Final result: From step 2 and step 3 => 53^2 = 2809.

- 42^2

Step 1: 50-42 = 8

Step 2: 25-8 = 17

Step 3: 8^2 = 1764

Final Result From step 2 and step 3 => 42^2 = 1764

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UNIT -1 QUANTITATIVE ABILITY I