(Olympiad Excellence Notes)

NOTES

FUNDAMENTALS

✓ The system of Numeration, developed by Romans is called the Roman numerals system. In Roman numerals system there are seven distinct symbols. viz I, V, X, L, C, D and M.

Roman symbols and their corresponding Hindu-Arabic numbers

Roman Numerals	Ι	v	X	L	С	D	M
Hindu-Arabic Numerals	1	5	10	50	100	500	1000

Roman numerals formation rules

 \checkmark If a symbol in roman numeral system is repeated, its value is added as many times as it appears.

Example: II = 1 + 1 = 2XXX = 10 + 10 + 10 = 30

CC = 100 + 100 = 200

MMM = 1000 + 1000 + 1000 = 3000

It may be noted that no numerals can be repeated more than 3 times. Repetition is allowed only for symbols I, X and C.

V, L and D are never repeated

 \checkmark A symbols of small value is placed to the right of larger value and its value is added to the larger value.

Example:

XII = 10 + 1 + 1 = 12XV = 10 + 5 = 15LV = 50 + 5 = 55CX = 100 + 10 = 110

A symbol of smaller value is placed to the left of larger value and its value is subtracted from the larger value.

Example:

√

IV = 5 - 1 = 4 IX = 9 - 1 = 8 VL = 50 - 5 = 45 VC = 100 - 5 = 95XC = 100 - 10 = 90

- ✓ The symbol V (5), L (50) and D (500) can't be placed to the left of larger value. i.e. V, L and D are never subtracted.
- A symbol of smaller value is placed between two symbols of larger value. It is always subtracted from the immediately following symbol of larger value.

Example: XIV = 10 + (5-1) = 14

XXIV = 10 + 10 + (5 - 1) = 24

CXL = 100 + (50 - 10) = 140

If a bar is placed over a symbol in a Roman numeral system, its value is multiplied by 1000.

Example: $\overline{V} = 5000$

 $\bar{L} = 50000$

 $\overline{C} = 100000$

- \checkmark A symbol can be repeated up to a maximum of three times only.
- \checkmark I can be subtracted from V and X only.
- \checkmark X can be subtracted from L and C only.
- \checkmark C can be subtracted from D and M only.