Roman Numerals



In this chapter, we will describe a primitive system of numeration i.e. Roman system of numeration or Roman Numerals". Romans had its own method to represent the numbers. Let us understand the way of Roman Numeration.

Roman Numerals

Roman system of numeration is a way of representing the numbers using alphabetical symbols. The seven alphabetical symbols, which are used to write any Roman Numerals, and their value are given below.

I = 1, V = 5, X = 10, L = 50, C = 100, D = 500 and M = 1000

Rules for Using Symbols

Rule 1: When a symbol is repeated, its value is multiplied as many times as the symbol repeated.



 $II = 1 \times 2 = 2$, $III = 1 \times 3 = 3$, $XX = 10 \times 2 = 20$, $XXX = 10 \times 3 = 30$.

Note: A symbol cannot be repeated more than 3 times.

50 cannot be written as XXXXX.

Rule 2: The symbols whose value are power of 10 can be repeated. In other word the symbols, I, X, C, M can be repeated.



XXX = 30, MM = 2000

Rule 3: The symbols whose value are either 5 or product of 5 and a power of 10 cannot be repeated. In other words V, L, and D cannot be repeated.



It is wrong to write LL for 100.

Rule 4: If a symbol of smaller value is right to the symbol of greater value, their values are added.



VI = 5 + 1 = 6, XV = 15, LX = 50 + 10 = 60.

Rule 5: If a symbol of smaller value is left to the symbol of greater value, their difference is the resulting value.



Rule 6: The symbols whose value are either 5 or product of 5 and a power of 10 never subtracted. In other word V, L, and D are never written left to the symbol of greater value.



V cannot be written immediately left to X, L, C, D, and M; L can be written immediately left to the C, D, and M; D cannot be written left to the M.

Rule 7: If a symbol of smaller value comes between two symbols of larger value, its value is subtracted from the value of the symbol which is right to it.



XIX = 10+(10-1) = 19, L1V = 50 + (5-1).

Rule 8: A symbol of smaller value cannot be repeated two or more than two times left to a symbol of larger value.



30 cannot be written as XXL, similarly 8 cannot be written as IIX.

Rule 9: When a bar (horizontal line) is placed over a Roman symbol, the value of the symbol is increased by 1000 times.

Example

 $\bar{I} = 1000, \ \bar{v} = 5000.$

Look at the following table:

1	1	XXI	21	XLI	41	LXI	61
II	2	XXII	22	XLII	42	LXII	62
Ш	3	XXIII	23	XLIII	43	LXIII	63
IV	4	XXIV	24	XLIV	44	LXIV	64
V	5	XXV	25	XLV	45	LXV	65
VI	6	XXVI	26	XLVI	46	LXVI	66
VII	7	XXVII	27	XLVII	47	LXVII	67
VIII	8	XXVII	28	XLVIII	48	LXVIII	68
IX	9	XXIX	29	XLVIII	49	LXIX	69
Χ	10	XXX	30	XLIX	50	LXX	70
XI	11	XXXI	31	LI	51	LXXI	71
XII	12	XXXII	32	LII	52	LXXII	72
XIII	13	XXXIII	33	LIII	53	LXXIII	73
XIV	14	XXXIV	34	LIV	54	LXXIV	74
XV	15	XXXV	35	LV	55	LXXV	75
XVI	16	XXXVI	36	LVI	56	LXXVI	76
XVII	17	XXXVII	37	LVII	57	LXXVII	77
XVIII	18	XXXVIII	38	LVIII	58	LXXVIII	78
XIX	19	XXXIX	39	LIX	59	LXXIX	79
XX	20	XL	40	LX	60	LXXX	80

LXXXI	81
LXXXII	82
LXXXIII	83
LXXXIV	84
LXXXV	85
LXXXVI	86
LXXXVII	87
LXXXVIII	88
LXXXIX	89
XC	90
XCI	91
XCII	92
XCIII	93
XCIV	94
XCV	95
XCVI	96
XCVII	97
XCVIII	98
XCIX	99
С	100
D	500
M	1000



Write the Roman numeral for 317.

Explanation

317 = 300 + 10 +7 And 300 = CCC, 10 = X, 7 = VII Thus 317 = CCCXVII.



Write the Roman numeral for 548.

Explanation

548 = 500 + 40 + 8.

And 500 = D, 40 = XL(XXXX can not be written for 40), <math>8 = VIII.



Find the value of $\overline{\text{XIV}}$. Explanation

XIV =24, XIV = 24000.



Arrange the following in ascending order:

LXIX, XXIX, XLVII, CLIV, XCIX

Explanation

LXIX = 69, XXIX =29, XLVII = 47, CLIV = 154, XCIX = 99 Thus XXIX, XLVII, LXIX, XCIX, CLIV



- MDCLXVI is the smallest Roman numeral in which each of the symbols occurs.
- MDCLXVI is the largest Roman numeral in which each of symbols occurs.

SUMMARY



- I, X, L, C, D, and M are seven symbols which are used to write any Roman numeral.
- No symbols can be repeated more than 3 times.
- Symbols like I, X, C and M can be repeated.
- Symbols like V, L and D cannot be repeated.
- If a symbol of smaller value is right to the symbol of greater value, their values are added.
- If a symbol of smaller value is left to the symbol of greater value, their difference is the resulting value.

Commonly Asked UESTIONS



Which one of the following Roman numerals is correct for 745?

(a) CCCMLXV

(b) DCCLXV

(c) DCCXLV

(d) DMXLV

(e) None of these Answer: (c)



Amelia made a mistake while writing Roman numeral for 445. She wrote CDXIV. How will you correct the mistake

(a) C should be replaced by L

(b) I should be replaced by L

(c) I should be replaced by M

(d) X should be replaced by C

(e) None of these

Answer: (b)



For which one of the following numbers, each Roman symbol used exactly once?

(a) 1666

(b) 1999

(c) 1990

(d) 1000

(e) None of these

Answer: (a)



XL represents a number. If place of the symbols is interchanged, the number will increased by:

(a) 1

(b) 5

(c) 10

(d) 20

(e) None of these

Answer: (d)



Smallest 3 digit number is subtracted from smallest 4 digit number. Write the result in Roman numeral.

(a) DM

(b) CM

(c) DCM

(d) MC

(e) None of these

Answer: (b)

Self Evaluation TEST



1.	Which one	of the follo	owing staten	nents is not true?
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- (a) M is a symbol for 1000 in Roman numeral
- (b) Roman numeral system does not include 0
- (c) In Roman numeral X is written right to the L for 40
- (d) Only symbols I, V, X are used to write first 10 Roman numeral
- (d) None of these

2	Where should Cha	placed in the Roman	numeral CMYIY	so that it will i	conrecent 9992
۷.	Wilele Siloulu C be	piaceu iii tile noillali	HUHHEL AL CIVINIA,	, 50 tilat it Will i	epresent 333:

- (a) Left to the M
- (b) Right to the M
- (c) Left to the I
- (d) Right to the I
- (e) None of these

3. For which one of the following numbers each symbol of Roman numeral is used to write?

(a) 111

(b) 525

(c) 1111

- (d) 1444
- (e) None of these

4. Using the symbols I, V, X, L write the smallest Roman numeral. Symbol should not be repeated.

(a) IVXL

(b) LXIV

(c) XLVI

- (d) XLIV
- (e) None of these

5. Using the letters 0,1, 5 make the greatest 3 digit number without repeating the digits and write it in Roman numeral.

(a) CX

(b) DX

(c) CM

- (d) DM
- (e) None of these

6. "The Roman numeral DLCXVI is not valid". Give the most appropriate explanation for this statement.

- (a) The order of the symbols is not correct, therefore, the numeral is invalid
- (b) The symbols of greater value cannot lie left to the symbols of smaller value, therefore, the numeral is invalid
- (c) According to the rules of Roman system of numeration, L cart not lies left to the C. Therefore, the numeral is invalid.
- (d) The given numeral does not exist in the table of Roman numeral that is why it is invalid
- (e) None of these

7.	(a) The above relation is(b) The above relation is(c) Values of the given no	DCCCVI = CCMVI, which one of the following option is correct for given relation? (a) The above relation is invalid because the numeral DCCVI does not make any sense (b) The above relation is invalid because the numeral CCMVI does not make any sense (c) Values of the given numerals are not equal, therefore, the relation is invalid (d) The relation is not valid because C in the numeral DCCCVI has been repeated three times left to the V (d) None of these						
8.	Convert 100 into Roman	numeral.						
	(a) L	(b) X						
	(c) D	(d) C						
	(e) None of these							
9.	If a bar is placed over C, the value of C becomestimes of the value of M.							
	(a) 100 times	(b) 10 times						
	(c) 1000 times	(d) 10000 times						
	(e) None of-these							
10.	P is a natural number w	which is equal to difference between 3 digits greatest and smallest number. Write						
	the Roman numeral for	· · · · · · · · · · · · · · · · · · ·						
	(a) DCCCXCIX	(b) DCCCLCIX						
	(c) CCMXCIX	(d) CMCXCIX						
	(e) None of these							

Self Evaluation Test **SOLUTIONS**

1. In Roman numeral X is written left to the L for 40. 2. Correct roman numeral for 999= CMXCIX Thus C should be placed left to the I. 3. MCDXLIV = 1444 The smallest roman numeral which can be written using I, V, X, L is XLIV. 4. The greatest number which can be written using 0, 1, and 5 = 510 Roman Numeral for 510 = DX 5. C=100 8. 9. C=100 When a bar is placed over a roman symbol, the value of the symbol is increased by 1000 times Thus $\overline{C} = 100 \times 1000$ =100000 Thus after placing a bar over C, the value of C becomes 100 times than that of M.