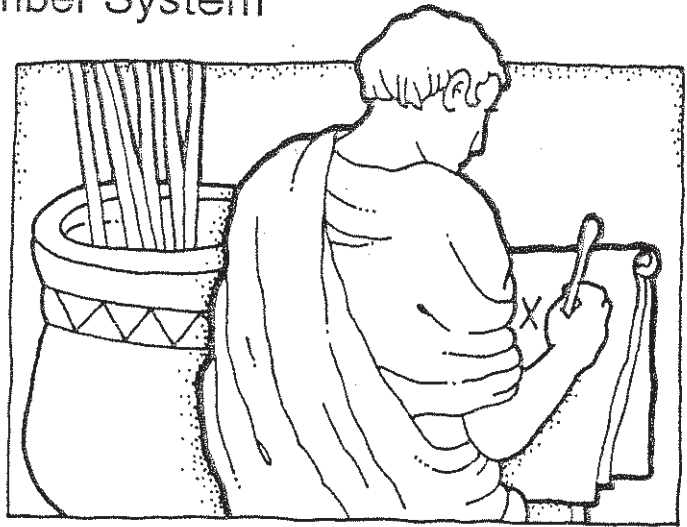


Roman Number System

About 3,000 years ago the Romans developed a number system that used **letters as numerals**. Around 250 B.C. Rome began to gain control of the whole Mediterranean, and in time the Romans conquered and ruled an empire that included most of southern Europe, France, Britain and parts of northern Africa. During the days of the mighty Roman Empire, the Roman civilization spread and their number system was used throughout much of Europe. We still use Roman numerals today.



The Romans used the following letter symbols for numerals. The numerals from 1 to 39 can be written using these three symbols.

$$I = 1 \qquad V = 5 \qquad X = 10$$

The Roman system of numeration was an additive system. This means that a numeral is the sum of the numbers represented by each symbol. They did not have place value. However, the **order** of the number symbols was important. These Roman numerals show how the repetitive use of the symbols was used to write numerals.

$$III = 3 \qquad VII = 7 \qquad XIII = 13 \qquad XVI = 16 \qquad XXXVII = 37$$

In all of the numerals above you should notice these things:

1. Symbols for the same numeral are grouped together.
2. Smaller numerals are placed to the right of larger numerals.
3. You add the value of the symbols to find the numeral represented.

The Subtraction Rule

The subtraction rule stated that when a smaller numeral was placed to the left of a larger numeral, the smaller numeral was subtracted from the larger numeral. This meant that a symbol would *never be repeated more than three times* in a numeral. For example, to write thirty-four you would write **XXXIV** ($30 + 5 - 1$) instead of XXXIIII. This principle was used only a little during ancient and medieval times but is used consistently in modern times. Here are some examples.

$$IV = 4 \qquad XIV = 14 \qquad IX = 9 \qquad XXIX = 29 \qquad XXXIV = 34$$

Write these Roman numerals in our number system.

- a) VI = _____ b) IV = _____ c) XI = _____ d) IX = _____
e) XVI = _____ f) XXXIV = _____ g) XXXIII = _____ h) XIX = _____

More Roman Numerals

As we learned previously, the Romans used the following symbols for the numbers one, five, and ten.

$$I = 1 \qquad V = 5 \qquad X = 10$$

In addition to these symbols, they had other symbols to represent numbers larger than ten. These were:

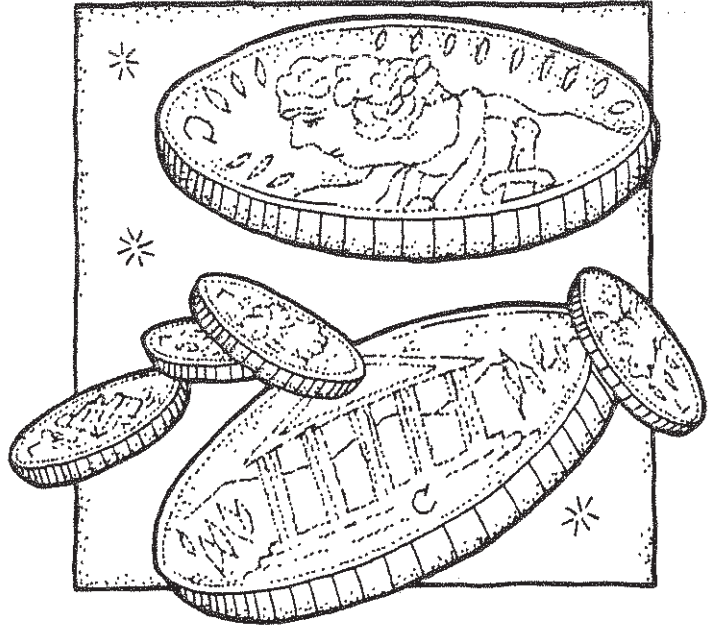
$$L = 50 \qquad C = 100$$

The same rules that were used for smaller numerals applied to these larger numerals. Larger numerals were written like the following.

$$CLXXI = 171 \quad (100 + 50 + 20 + 1)$$

$$CCCLXXXVII = 387 \quad (300 + 50 + 30 + 5 + 2)$$

$$XLVII = 47 \quad (50 - 10) + (5 + 2) \qquad CCLXXIX = 279 \quad (200 + 50 + 20 + 10 - 1)$$

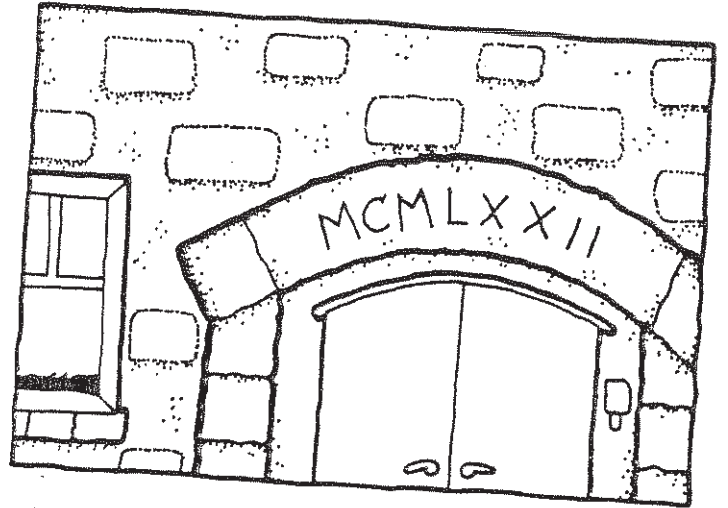


Write the Roman numerals below in our number system. Remember to add the symbols, unless a symbol with a smaller value appears before a larger symbol (then you subtract it).

- | | | |
|-------------------|--------------------|-------------------|
| 1. LXII _____ | 2. LXXV _____ | 3. LIX _____ |
| 4. XLVIII _____ | 5. CL _____ | 6. CLXXI _____ |
| 7. CLXIV _____ | 8. CXXXIX _____ | 9. CXLI _____ |
| 10. CIX _____ | 11. CVI _____ | 12. XLIX _____ |
| 13. XC _____ | 14. CCLV _____ | 15. CCCXXX _____ |
| 16. CLXXVII _____ | 17. CXLIV _____ | 18. CCXIX _____ |
| 19. CXC _____ | 20. LXXXVIII _____ | 21. CCXLIII _____ |
| 22. CCCLXIV _____ | 23. CCXCVI _____ | 24. CCXLIV _____ |

Larger Roman Numerals

The largest numeral the Romans wrote using I, V, X, L and C was 399. To write larger numerals they needed more symbols. The other two symbols they used for writing larger numerals were D for 500 and M for 1000. The same rules applied for these larger numerals. That is, symbols were added to get the value of the numeral. If a symbol with a smaller value appeared before one with a larger value, it was subtracted. These symbols were used in the following ways to represent larger numerals.



DC = 600
DCCC = 800

CD = 400
CM = 900

DCC = 700
MDCC = 1700

Write the following Roman numerals in our number system.

1. DC _____
2. MD _____
3. DCCXL _____
4. MCCXXIV _____
5. CDXXXIX _____
6. MMCCCX _____
7. CMLXXV _____
8. MCDXII _____
9. CMXLIV _____
10. MCM _____
11. MCDXCII _____
12. DCLV _____
13. MDCCC _____
14. DCCCX _____
15. MDLV _____
16. MCDV _____
17. MMMXL _____
18. CDXL _____
19. MDCCLXXVI _____
20. MMMDCIX _____
21. MMCMLII _____
22. CMXCIX _____

Roman Rules Review

If you look back at the Roman numerals on the preceding pages, you will see that they followed these rules when writing numerals.

1. Don't use more than three symbols in a row.

wrong	right
VIII = 9	IX = 9
XXXX = 40	XL = 40

2. Don't use more than one V, L, or D successively in a numeral.

wrong	right
VV = 10	X = 10
DD = 1000	M = 1,000

3. Do not subtract V, L, or D.

wrong	right
VL = 45	XLV = 45
LD = 450	CDL = 450

4. The I may only be subtracted from V and X. X may only be subtracted from L and C. C may only be subtracted from D and M. Generally, this means that the subtraction rule is only used to designate the numerals for 4, 9, 40, 90, 400, and 900.

wrong	right
IL = 49	XLIX = 49
XD = 490	CDXC = 490

Use the rules above to choose the right way to write each numeral below in Roman numerals. Circle the correct notation.

- | | | | |
|--------|----------|----------|----------|
| 1. 19 | XVIII | XIX | IXX |
| 2. 44 | XXXIV | XLIII | XLIV |
| 3. 95 | LXXXXV | VC | XCV |
| 4. 105 | LXXXXVVV | CV | CIIII |
| 5. 49 | XLIX | XXXIX | XLVIII |
| 6. 75 | LXXIIII | LXXV | LXVVV |
| 7. 449 | CDXXXXIX | CCCCXLIX | CDXLIX |
| 8. 495 | VD | CDXCV | CDLXXXXV |
| 9. 900 | DCCCLL | CM | DCCCC |

Writing Roman Numerals

Test your knowledge of Roman numerals by writing the numerals below in the Roman number system. Use the following symbols.

I = 1

V = 5

X = 10

L = 50

C = 100

D = 500

M = 1000

1. 14 _____
2. 27 _____
3. 39 _____
4. 53 _____
5. 74 _____
6. 48 _____
7. 112 _____
8. 159 _____
9. 95 _____
10. 243 _____
11. 364 _____
12. 206 _____
13. 197 _____
14. 515 _____
15. 750 _____
16. 400 _____
17. 475 _____
18. 654 _____
19. 1,111 _____
20. 2,500 _____
21. 2,356 _____
22. 1,740 _____
23. 930 _____
24. 3,224 _____

