

Student Name: _____	Grade: _____
Date: _____	Score: _____

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1.1.2 Roman numerals

Roman numerals were very popular about 2000 years ago. The Roman number system is based on the idea of **addition** and **subtraction**.

Number	Symbol	Meaning
1	I	one finger
5	V	one hand 
10	X	two Vs: 
50	L	half a C 
100	C	<i>centum</i> = hundred
500	D	half an ∞ : ∞
1000	M	∞

- LX means 50 and 10.
- XL means 50 less 10.
- Larger numerals are formed by placing a stroke above the symbol:
 \bar{V} = 5000
 \bar{X} = 10 000
 \bar{L} = 50 000
 \bar{C} = 100 000
 \bar{D} = 500 000
 \bar{M} = 1 000 000



- When a smaller numeral appears before a large one, it is **subtracted** from the large one:

$$\text{IV means } 5 - 1 = 4$$

$$\text{XL means } 50 - 10 = 40$$

- When a smaller numeral appears after the larger one, it is **added** to the large one.

$$\text{VI means } 5 + 1 = 6$$

$$\text{LX means } 50 + 10 = 60$$

- By repeating a numeral, its value is repeated.

$$\text{XX} = 10 + 10 = 20$$

$$\text{XXX} = 10 + 10 + 10 = 30$$

- By placing a bar over the numeral, its value is increased by 1000 times (M = 1000).

\bar{V} = 5000	\bar{X} = 10,000
\bar{L} = 50,000	\bar{C} = 100,000
\bar{D} = 500,000	\bar{M} = 1,000,000

Example 1.1.2

Solution:

1. Change the Roman numerals into our own numerals:

(a) $\text{XXXIV} = 10 + 10 + 10 + 4 = 34$ (b) $\text{CXXVII} = 100 + 10 + 10 + 7 = 127$

2. Change these Hindu-Arabic numerals into Roman numerals:

(a) $1256 = \text{MCCLVI}$ (b) $214 = \text{CCXIV}$ (c) $2008 = \text{MMVIII}$

The table below gives more details of the Roman numeral system:

I	II	III	IV	V	VI	VII	VIII	IX
1	2	3	4	5	6	7	8	9
X	XX	XXX	XL	L	LX	LXX	LXXX	XC
10	20	30	40	50	60	70	80	90
C	CC	CCC	CD	D	DC	DCC	DCCC	CM
100	200	300	400	500	600	700	800	900
M								
1000								

1.1.3 Hindu-Arabic numerals

- These numerals, which we used today were invented by Hindus in India around 300 BC and were carried to Europe by Arabs who had invaded Spain in the eighth century.
- The position of a symbol is very important.
- The system has place value, based on ten.
- The invention of a symbol for zero was a significant step, as an empty space for zero could be misunderstood.

Exercise 1.1.1 Change these Roman numerals into our own numerals:

1. *CMXLVII* _____
2. *CCCXVI* _____
3. *LXXXIV* _____
4. *CDXCIX* _____
5. *DLXVI* _____
6. *DCCCVII* _____
7. *CDXCVI* _____
8. *V̄DCCXXI* _____
9. *DCCXCIII* _____
10. *MMXXVII* _____

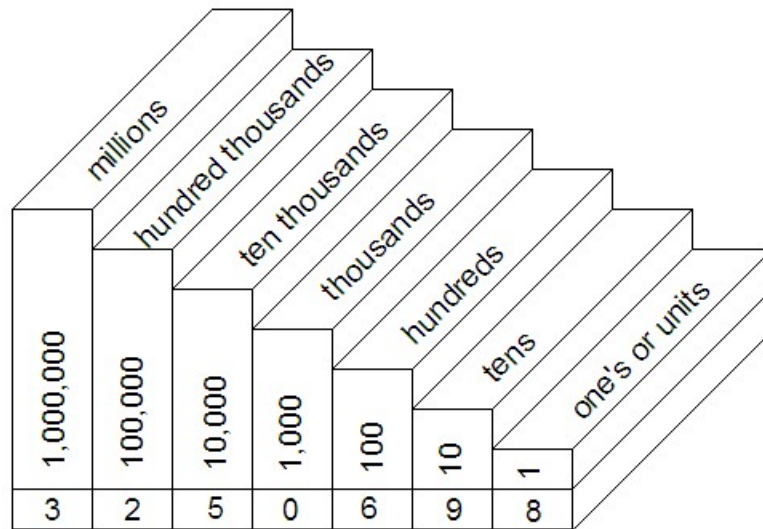
Exercise 1.1.2 Change the Hindu-Arabic numerals to Roman numerals:

1. 212 _____
2. 649 _____
3. 444 _____
4. 369 _____
5. 1,452 _____
6. 2008 _____
7. 542,637 _____
8. 4,304 _____

1.1.4 Place Value

Our number system today is based on the Hindu-Arabic system where the value of a number is determined by its place in a particular column as shown in the example below.

Example 1.1.3 What is the value of 2 and 6 in the numeral 3,250,698?



- The place value of 2 is 200 000 or two hundred thousand.
- The place value of 6 is 600 or six hundred.

Exercise 1.1.3 State the place value of 5 the following numerals:

1. 123450 _____
2. 520002 _____
3. 125038 _____
4. 946532 _____

1.1.5 Powers of Numbers

Example 1.1.4

Solution:

- $6 \times 6 \times 6 = 6^3 = 216$
- $10 \times 10 \times 10 \times 10 \times 10 = 10^5 = 100000$
- $6 \times 10^3 = 6 \times 1000 = 6000$

1.1.6 Expanded Notation**Example 1.1.5****Solution:**

$$502,390 = 500,000 + 2,000 + 300 + 90$$

or $502,390 = (5 \times 100,000) + (2 \times 1,000) + (3 \times 100) + (9 \times 10)$

Exercise 1.1.4 Write each of the following numbers in expanded notation:

1. 9,304 _____
2. 50,073 _____
3. 300,273 _____
4. 480,034 _____
5. 200,020 _____
6. 6,304,922 _____
7. 4,003,006 _____

1.1.7 Exponential Notation**Example 1.1.6****Solution:**

$$3,102,364 = 3 \times 10^6 + 1 \times 10^5 + 2 \times 10^3 + 3 \times 10^2 + 6 \times 10^1 + 4 \times 10^0$$

Exercise 1.1.5 Write each of the following numbers in exponential notation:

1. 4,029 _____
2. 23,072 _____
3. 20,238 _____
4. 200,100 _____
5. 500,830 _____
6. 3,472,408 _____
7. 8,002,500 _____

1.1.8 The Four Operations**Exercise 1.1.6 Additions**

1. $1239 + 8761 =$ _____

2. $515 + 307 + 93 + 982 =$ _____

3. $19028 + 2908 + 1047 =$ _____

4. $198235 + 29047 + 30009 =$ _____

Exercise 1.1.7 Subtractions

1. $56213 - 17296 =$ _____

2. $10002 - 8909 =$ _____

3. $491625 - 38043 =$ _____

4. $30074 - 13876 =$ _____

Exercise 1.1.8 Multiplications

1. $2048 \times 23 =$ _____

2. $1308 \times 70 =$ _____

3. $1003 \times 303 =$ _____

4. $645 \times 508 =$ _____

Exercise 1.1.9 Divisions

1. $8950 \div 20 =$ _____

2. $9630 \div 90 =$ _____

3. $4212 \div 18 =$ _____

4. $14950 \div 46 =$ _____

1.2 Problem Solving

Exercise 1.2.1

1. Anna, Mark and Ken have a total savings of \$1980. Anna's savings is twice that of Mark's and Ken's Savings is thrice that of Anna's. How much more saving has Ken than Anna?

2. 200 trees were planted at equal distance apart along the sides of a straight expressway. The distance between the first and the last tree is 396 m. What is the distance between the first and the fifteenth tree?

3. During a sale, Shop A and Shop B were selling similar T-shirts at \$14 and \$12 respectively. Before the sale, the price of T-shirts was the same in both shops. A sum of \$160 could be saved by buying 8 T-shirts from each shop during the sale. How much was the price of a T-shirt from each shop before the discount?

4. For every question Jane answered correctly in a quiz, she scored 8 points. 2 points were deducted for each incorrect answer. For every 10 questions Jane answered, 2 were incorrect. She scored a total 360 points in the quiz.

(a) How many questions did Jane answer altogether?

(b) How many point less did she score because of the incorrect answers?

1.3 Diagnostic Test

1. Write the Roman numeral for each of the following:

(a) 253 [3]

(a) _____

(b) 2678 [3]

(b) _____

(c) 944 [3]

(c) _____

(d) 24,605 [3]

(d) _____

2. Write each of these in Hindu-Arabic numerals:

(a) *XXVI* [3]

(a) _____

(b) *DXXXVII* [3]

(b) _____

(c) *MMDCCXXXIII* [3]

(c) _____

(d) *C̄C̄L̄X̄M̄X̄XL* [3]

(d) _____

3. Write the numeral 2,450,039 in words. [4]

4. Write the smallest 4 digit number with 8 in tens place in which no numeral is repeated. [4]

4. _____

5. Write the largest 4 digit number with 3 in hundreds place in which no numeral is repeated. [4]

5. _____

6. How many times greater is the value of the first 5 than the value of the second 5 in the numeral 3500350? [4]

6. _____

7. List all the factors of 48. [4]

8. Jane is able to stick 46 stamps on each page of her stamp albums. How many stamps can she stick into 4 albums if each album has 36 pages? [4]

9. Evaluate each of these following expressions:

(a) $12 \times [8 \times 7 \div (25 - 18)]$ [4]

(b) $\frac{4 \times 6 \div 3}{40 - (23 + 13)}$ [4]

(c) $10^2 \div 5^2 + 2 \times 3^3 \times 6^2$ [4]

10. Express 72 as the product of a power of 2 and a power of 3 in index form. [5]

10. _____

11. Express 225 as the product of a power of 3 and a power of 5 in index form. [5]

11. _____

12. Express 25769 in the expanded form using index notation (Exponential Notation). [5]

13. Write the basic numeral for $(5 \times 10^6) + (3 \times 10^4) + (6 \times 10^3) + (2 \times 10^2) + (9 \times 10^0)$ [5]

14. After given $\frac{2}{7}$ of his salary to his mother David spent \$130 on food and \$80 on clothes and has [10]
\$4445 left. How much did he give to his mother?

15. Mr Parker gave $\frac{1}{2}$ of his money to his two sons. John received \$75 and Bob received \$125. What [10]
fraction of Mr Parker's money did Bob receive?

