Student Name: _____	**Grade**: _____
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1 Year 7 Term 1 Week 1 Homework Answers

1.1 Beginnings in Number

1.1.1 Egyptian numerals:

Number	*Symbol*	*Meaning*
1		a vertical staff
10		a heel bone
100		a coiled rope
1000		a lotus flower
10 000		a bent reed or pointing finger
100 000		a burbot fish or tadpole
1 000 000		an amazed man or God of infinity
10 000 000		a religious symbol

- About 3000 years before the birth of Jesus Christ, the Egyptians had developed a tally system based on ten. Ten of one symbol can be replaced by one of another.
- The order of symbols does not affect the value of the numeral.
- The value of a numeral can be found by adding the values of the symbols used.

Example 1.1.1

Solution:

1 $364 =$

or

2 $11\,321\,143 =$

3 $= 1\,070\,101$

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	*centum* = hundred
500	D	half an ↀ: ↀ
1000	M	ↀ

- LX means 50 and 10.
- XL means 50 less 10.
- Larger numerals are formed by placing a stroke above the symbol:

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

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

IV means 5 - 1 = 4
XL means 50 - 10 = 40

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

VI means 5 + 1 = 6
LX means 50 + 10 = 60

- By repeating a numeral, its value is repeated.

XX = 10 + 10 = 20
XXX = 10 + 10 + 10 = 30

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

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

Example 1.1.2

Solution:

1. *Change the Roman numerals into our own numerals:*
   (a) XXXIV = 10 + 10 + 10 + 4 = 34 *(b) CXXVII = 100 + 10 + 10 + 7 = 127*

2. *Change these Hindu-Arabic numerals into Roman numerals:*
   (a) 1256 = MCCLVI *(b) 214 = CCXIV* *(c) 2008 = MMVIII*

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

I 1	II 2	III 3	IV 4	V 5	VI 6	VII 7	VIII 8	IX 9
X 10	XX 20	XXX 30	XL 40	L 50	LX 60	LXX 70	LXXX 80	XC 90
C 100	CC 200	CCC 300	CD 400	D 500	DC 600	DCC 700	DCCC 800	CM 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 s 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* ***947***
2. *CCCXVI* ***316***
3. *LXXXIV* ***84***
4. *CDXCIX* ***499***
5. *DLXVI* ***566***
6. *DCCCVII* ***807***
7. *CDXCVI* ***496***
8. $\bar{V}DCCXXI$ ***5,721***
9. *DCCXCIII* ***793***
10. *MMXXVII* ***2027***

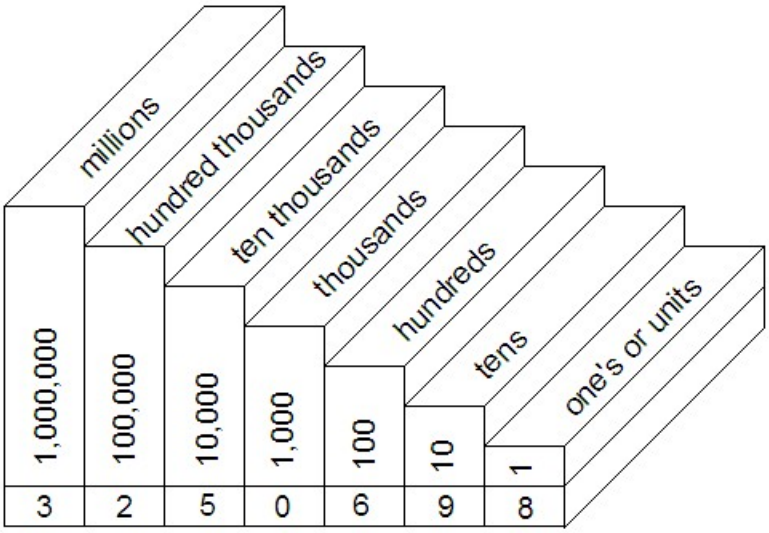
Exercise 1.1.2 Change the Hindu-Arabic numerals to Roman numerals:

1. *212* ***CCXII***
2. *649* ***DCXLIX***
3. *444* ***CDXLIV***
4. *369* ***CCCLXIX***
5. *1,452* ***MCDLII***
6. *2008* ***MMVIII***
7. *542,637* $\bar{D}\bar{X}\bar{L}MMDCXXXVII$
8. *4,304* $M\bar{V}CCCIV$

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* ***5 tens***
2. *520002* ***5 hundred thousands***
3. *125038* ***5 thousands***
4. *946532* ***5 hundreds***

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* $9 \times 1,000 + 3 \times 100 + 4$
2. *50,073* $5 \times 10,000 + 7 \times 10 + 3$
3. *300,273* $3 \times 100,000 + 2 \times 100 + 7 \times 10 + 3$
4. *480,034* $4 \times 100,000 + 8 \times 10,000 + 3 \times 10 + 4$
5. *200,020* $\times 100,000 + 2 \times 10$
6. *6,304,922* $6 \times 1,000,000 + 3 \times 100,000 + 4 \times 1,000 + 9 \times 100 + 2 \times 10 + 2$
7. *4,003,006* $4 \times 1,000,000 + 3 \times 1,000 + 6$

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* $4 \times 10^3 + 2 \times 10^1 + 9 \times 10^o$
2. *23,072* $2 \times 10^4 + 3 \times 10^3 + 7 \times 10^1 + 2 \times 10^o$
3. *20,238* $2 \times 10^4 + 2 \times 10^2 + 3 \times 10^1 + 8 \times 10^o$
4. *200,100* $2 \times 10^5 + 1 \times 10^2$
5. *500,830* $5 \times 10^5 + 8 \times 10^2 + 3 \times 10^1$
6. *3,472,408* $3 \times 10^6 + 4 \times 10^5 + 7 \times 10^4 + 2 \times 10^3 + 4 \times 10^2 + 8 \times 10^o$
7. *8,002,500* $8 \times 10^6 + 2 \times 10^3 + 5 \times 10^2$

1.1.8 The Four Operations

Exercise 1.1.6 Additions

1. $1239 + 8761 =$ ***10,000***
2. $515 + 307 + 93 + 982 =$ ***1,897***
3. $19028 + 2908 + 1047 =$ ***22,983***
4. $198235 + 29047 + 30009 =$ ***257,291***

Exercise 1.1.7 Subtractions

1. $56213 - 17296 =$ ***38,917***
2. $10002 - 8909 =$ ***1,093***
3. $491625 - 38043 =$ ***453,582***
4. $30074 - 13876 =$ ***16,198***

Exercise 1.1.8 Multiplications

1. $2048 \times 23 =$ ***47,104***
2. $1308 \times 70 =$ ***91,560***
3. $1003 \times 303 =$ ***303,909***
4. $645 \times 508 =$ ***327,660***

Exercise 1.1.9 Divisions

1. $8950 \div 20 =$ ***447.5***
2. $9630 \div 90 =$ ***107***
3. $4212 \div 18 =$ ***234***
4. $14950 \div 46 =$ ***325***

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?*

Solution: $\begin{cases} A+M+K=1980 \\ A=2M \\ K=3A \end{cases}$ $2M+M+6M=1980\ 9M=1980$

$M=\$220\ A=2\times 220=\$440,\ K=3\times 440=\$1320\ K-A=1320-440=\$880.$

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?*

Solution: *100 trees on each side interval* $=396\div 99=4\,m$

The ditance between the first and fifteenth $4\times 14=56\,m$

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?*

Solution: *Let the price before the sale be* $P\ \Rightarrow\ 16\times P-(8\times 14+8\times 12)=160$

$16P-208=160\ \Rightarrow\ 16P=368\ \Rightarrow\ P=368\div 16=\$23.$

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?*

Solution: *For every 10 question, 2 incorrect,* $\Rightarrow\ 8\times 8-2\times 2=60$

$360\div 60=6$ *sets,* $\Rightarrow\ 6\times 10=60$ *questions in total.*

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

Solution: *12 incorrect questions,* $12\times 10=120$ *points.*

1.3 Diagnostic Test

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

   (a) 253 [3]

   (a) **CCLIII**

   (b) 2678 [3]

   (b) **MMDCLXXVIII**

   (c) 944 [3]

   (c) **CMXLIV**

   (d) 24,605 [3]

   (d) $\bar{X}\bar{X}M\bar{V}DCV$

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

   (a) $XXVI$ [3]

   (a) **26**

   (b) $DXXXVII$ [3]

   (b) **537**

   (c) $MMDCCXXXIII$ [3]

   (c) **2,733**

   (d) $\bar{C}\bar{C}\bar{L}\bar{X}M\bar{X}XL$ [3]

   (d) **269,040**

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

Solution: Two million four hundred and fifty thousand and thirty nine.

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

4. **1,082**

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

5. **9,387**

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. **10,000 times**

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

Solution: $1, 2, 3, 4, 6, 8, 12, 16, 24, 48;$ Total of 10 factors.

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]

Solution: Total stamps $= 46 \times 4 \times 36 = 6,624$ stamps

9. Evaluate each of these following expressions:

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

Solution: $12 \times [8 \times 7 \div (25 - 18)] = 96$

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

Solution: $\dfrac{4 \times 6 \div 3}{40 - (23 + 13)} = 2$

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

Solution: $10^2 \div 5^2 + 2 \times 3^3 \times 6^2 = 1,948$

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

10. $2^3 \times 3^2$

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

11. $3^2 \times 5^2$

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

Solution: $2 \times 10^4 + 5 \times 10^3 + 7 \times 10^2 + 6 \times 10^1 + 9 \times 10^o$

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]

Solution: $(5 \times 10^6) + (3 \times 10^4) + (6 \times 10^3) + (2 \times 10^2) + (9 \times 10^0) = 5,036,209$

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

Solution:
$1 - \frac{2}{7} = \frac{5}{7} \Rightarrow \frac{5}{7}$ of his salary is $= 130 + 80 + 4445 = \$4655$

$\frac{1}{5}$ of his saraly is $= 4655 \div 5 = \$931$

So $\frac{2}{5}$ of his saraly is $931 \times 2 = \$1,862$

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

Solution:
Mr Parker's money is $2 \times (75 + 125) = \$400$

Bob received $= \frac{125}{400} = \frac{5}{16}$.