


Worksheet on Tally or Semi-Tally Numeration Systems

1. Complete the table:


Decimal System	Roman System	Egyptian System	Babylonian System	Mayan System
10	X	∩	<	≡
11	XI	∩	<▼	· ≡
12	XII	∩	<▼▼	· · ≡
13	XIII	∩	<▼▼▼	· · · ≡
14	XIV	∩	<▼▼▼▼	· · · · ≡
15	XV	∩	<▼▼▼▼▼	≡
16	XVI	∩	<▼▼▼▼▼▼	· ≡
17	XVII	∩	<▼▼▼▼▼▼▼	· · ≡
18	XVIII	∩	<▼▼▼▼▼▼▼▼	· · · ≡
19	XIX	∩	<▼▼▼▼▼▼▼▼▼	· · · · ≡
20	XX	∩∩	<<	· 
21	XXI	∩∩	<<▼	· ·

2. Write each of the following decimal numbers using the Roman, Egyptian, Babylonian, and Mayan systems.


(a) 64

Roman : LXIV
 Egyptian : ∩∩∩∩∩∩ ||||
 Babylonian : ▼ ▼▼▼▼
 Mayan : ···
 ····

(b) 200

Roman : CC
 Egyptian : ∅∅
 Babylonian : ▼▼▼ <<
 Mayan : ≡


(c) 360

Roman : CCCLX
 Egyptian : $\vartheta\vartheta\vartheta \cap\cap\cap\cap\cap\cap$
 Babylonian : $\blacktriangledown\blacktriangledown\blacktriangledown\blacktriangledown\blacktriangledown\blacktriangledown$ 0
 Mayan : \cdot



(d) 1,521

Roman : MDXXI
 Egyptian : Too hard to do on computer.
 Babylonian : $\ll\blacktriangledown\blacktriangledown\blacktriangledown\blacktriangledown\blacktriangledown\blacktriangledown$ $\ll\blacktriangledown$
 Mayan : \dots
 \dots
 \cdot

3. Write each of the following using decimal numbers.

(a) MLDVIII (Roman)
 $1000 - 50 + 500 + 5 + 3 = 1458$

(b) $\ll\blacktriangledown$ \blacktriangledown $\blacktriangledown\blacktriangledown\blacktriangledown\blacktriangledown\blacktriangledown\blacktriangledown\blacktriangledown\blacktriangledown$ \blacktriangledown (Babylonian)
 $(21)(60)^3 + (11)(60)^2 + (7)(60) + 10 = 4,576,030$

(c) \dots

 $=$
 $(13)(360) + (0)(20) + (10)(1) = 4,690$

4. Represent each part of your birthday (i.e., day, month, year) in each of the 5 systems.

Your answer depends on your birthday.

Worksheet on Base Systems

1. Complete the table:

Decimal System	Base 2	Base 5	Base 8	Base 12	Base 16
10	1010	20	12	T	A
11	1011	21	13	E	B
12	1100	22	14	10	C
13	1101	23	15	11	D
14	1110	24	16	12	E
15	1111	30	17	13	F
16	10000	31	20	14	10
17	10001	32	21	15	11
18	10010	33	22	16	12
19	10011	34	23	17	13
20	10100	40	24	18	14
21	10101	41	25	19	15

2. Write each of the following decimal numbers using bases 2, 5, 8, 12, and 16.

(a) 64

base 2 : 1000000
base 5 : 224
base 8 : 100
base 12 : 54
base 16 : 40

(b) 200

base 2 : 11001000
base 5 : 1300
base 8 : 310
base 12 : 148
base 16 : C8

(c) 360

base 2 : 101101000
base 5 : 2420
base 8 : 550
base 12 : 260
base 16 : 168

(d) 1,521

base 2 : 10111110001

base 5 : 22041

base 8 : 2761

base 12 : $T69$

base 16 : $5F1$

3. Write each of the following using decimal numbers.

(a) 110011001_{two}

$$(1)(2)^8 + (1)(2)^7 + (1)(2)^4 + (1)(2)^3 + (1)(2)^0 = 409$$

(b) 2403_{five}

$$(2)(5)^3 + (4)(5)^2 + (3)(5)^0 = 353$$

(c) 7001_{eight}

$$(7)(8)^3 + (1)(8)^0 = 3,585$$

(d) $10E0T_{\text{twelve}}$

$$(1)(12)^4 + (11)(12)^2 + (10)(12)^0 = 22,330$$

(e) AE_{sixteen}

$$(10)(16)^1 + (14)(16)^0 = 174$$

4. Suppose that you see 11001 written on a piece of paper, and you are not sure if it is in base 2, 5, 8, 10, 12, or 16. Write all of the different decimal numbers this could be.

If the number is in base 2, it is 25 in decimal.

If the number is in base 5, it is 751 in decimal.

If the number is in base 8, it is 4,609 in decimal.

If the number is in base 10, it is 11,001 in decimal.

If the number is in base 12, it is 22,465 in decimal.

If the number is in base 16, it is 69,633 in decimal.