

1. Convert the decimal number 394 to each of the following systems.

(a) Roman

CCCXCIV

(b) Base 12

$$\begin{aligned} 394 &= 2(12)^2 + 8(12)^1 + 10(12)^0 \\ &= 28T_{\text{Twelve}} \end{aligned}$$

(c) Mayan

\cdot
 \cdot
 \dots

2. Convert each of the following to a decimal number.

(a) 312_{five}

$$\begin{aligned} 312_{\text{five}} &= 3(5)^2 + 1(5)^1 + 2(5)^0 \\ &= 75 + 5 + 2 \\ &= 82 \end{aligned}$$

(b) 100101_{two}

$$\begin{aligned} 100101_{\text{two}} &= 1(2)^5 + 0(2)^4 + 0(2)^3 + 1(2)^2 + 0(2)^1 + 1(2)^0 \\ &= 32 + 4 + 1 \\ &= 37 \end{aligned}$$

(c) $< \blacktriangledown$ $<< \blacktriangledown$

$$\begin{aligned} < \blacktriangledown & << \blacktriangledown &= (11)(60) + 21 \\ & &= 660 + 21 \\ & &= 681 \end{aligned}$$

3. Perform each of the following calculations.

(a) $28002 - 3675$

$$\begin{array}{r} 28002 \\ - 3675 \\ \hline 24327 \end{array}$$

(b) $142 \cdot 509$

$$\begin{array}{r} 142 \\ \times 509 \\ \hline 1278 \\ 0000 \\ 71000 \\ \hline 72278 \end{array}$$

4. Perform each of the following calculations.

(a) $1023_{\text{five}} + 34133_{\text{five}}$

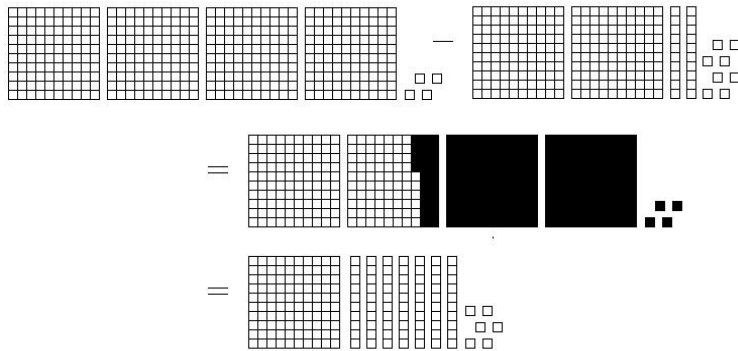
$$\begin{array}{r} 1023_{\text{five}} \\ + 34133_{\text{five}} \\ \hline 40211_{\text{five}} \end{array}$$

(b) $6342_{\text{seven}} - 2651_{\text{seven}}$

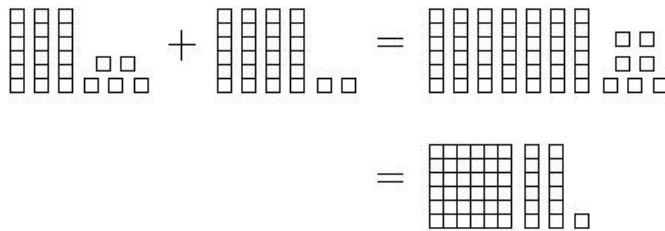
$$\begin{array}{r} 6342_{\text{seven}} \\ - 2651_{\text{seven}} \\ \hline 3361_{\text{seven}} \end{array}$$

5. Demonstrate each process below using blocks.

(a) $404 - 228$



(b) $35_{\text{six}} + 42_{\text{six}}$



6. Simplify each of the following as much as possible.

(a) $21 - 7 \cdot 4$

$$\begin{aligned} 21 - 7 \cdot 4 &= 21 - 28 \\ &= -7 \end{aligned}$$

(b) $(-2)^3$

$$\begin{aligned} (-2)^3 &= (-2)(-2)(-2) \\ &= -8 \end{aligned}$$

(c) $12 \div 2 + 4$

$$\begin{aligned} 12 \div 2 + 4 &= 6 + 4 \\ &= 10 \end{aligned}$$

7. Find all integers that make the statement true or explain why no such integer exists.

(a) $-x < 4$

$$x > -4$$

(b) $|x + 2| = 6$

$$x + 2 = 6 \text{ or } x + 2 = -6$$

$$x = 4 \text{ or } x = -8$$

(c) $2x = 5$

Since 2 does not divide 5, there is no integer that satisfies this equation.

8. Suppose you know only the following information about a particular 9-digit number:

- (a) i. The last 4 digits are 2360.
ii. The sum of all 9 digits is 24.

Determine which of the numbers 2, 3, 4, 5, 6, 8, 9, and 10 divide this 9-digit number.

2 divides the number, because the last digit of the number is 0.

3 divides the number, because sum of the digits is 24 and 3 divides 24.

4 divides the number, because the 2-digit number at the end of the number is 60,
and 4 divides 60.

5 divides the number, because the last digit of the number is 0.

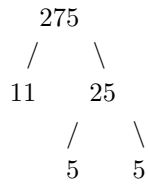
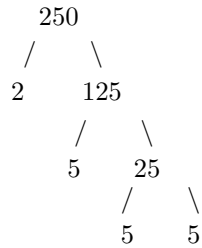
6 divides the number, because 2 and 3 both divide the number.

8 divides the number, because the 3-digit number at the end of the number is 360,
and 8 divides 60.

9 does not divide the number, because the sum of the digits is 24,
and 9 does not divide 24.

10 divides the number, because the last digit of the number is 0.

9. Find GCD(250, 275) and LCM(250, 275).



$$250 = 2 \cdot 5^3$$

$$275 = 5^2 \cdot 11$$

$$\text{GCD}(250, 275) = 5^2 = 25$$

$$\text{LCM}(250, 275) = 2 \cdot 5^3 \cdot 11 = 2750$$

Roman System
System

<i>I</i>	1
<i>V</i>	5
<i>X</i>	10
<i>L</i>	50
<i>C</i>	100
<i>D</i>	500
<i>M</i>	1000

Babylonian System

▼	1
<	10

Mayan

•	1
—	5
☉	0