

1. Convert the decimal number 410 to each of the following systems.

(a) Roman

*CDX*

(b) Base 12

$$\begin{aligned} 410 &= 2(12)^2 + 10(12)^1 + 2(12)^0 \\ &= 2T2_{\text{Twelve}} \end{aligned}$$

(c) Mayan

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

(a)  $312_{\text{four}}$

$$\begin{aligned} 312_{\text{four}} &= 3(4)^2 + 1(4)^1 + 2(4)^0 \\ &= 48 + 4 + 2 \\ &= 54 \end{aligned}$$

(b)  $100101_{\text{two}}$

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

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

$$\begin{aligned} < \blacktriangledown \quad << &= (11)(60) + (20)(1) \\ &= 660 + 20 \\ &= 680 \end{aligned}$$

3. Perform each of the following calculations.

(a)  $19002 - 3674$

$$\begin{array}{r} 19002 \\ -3674 \\ \hline 15328 \end{array}$$

(b)  $149 \cdot 502$

$$\begin{array}{r} 149 \\ \times 502 \\ \hline 298 \\ 0000 \\ +74500 \\ \hline 74798 \end{array}$$

4. Perform each of the following calculations.

(a)  $1023_{\text{five}} + 23133_{\text{five}}$

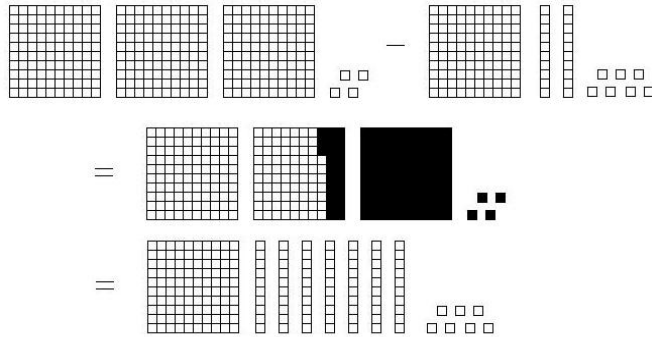
$$\begin{array}{r} 1023_{\text{five}} \\ +23133_{\text{five}} \\ \hline 24211_{\text{five}} \end{array}$$

(b)  $7342_{\text{eight}} - 2751_{\text{eight}}$

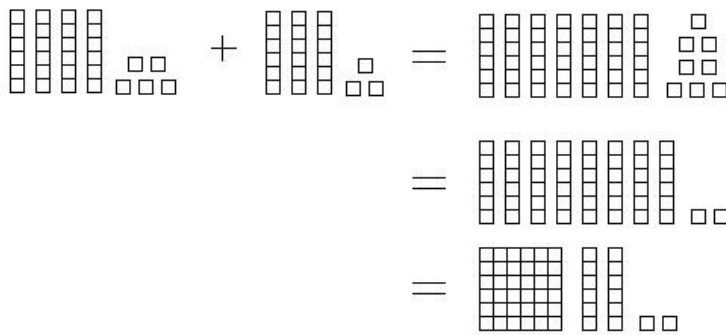
$$\begin{array}{r} 7342_{\text{eight}} \\ -2751_{\text{eight}} \\ \hline 4371_{\text{eight}} \end{array}$$

5. Demonstrate each process below using blocks.

(a)  $304 - 127$



(b)  $45_{\text{six}} + 33_{\text{six}}$



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

(a)  $20 - 7 \cdot 4$

$$20 - 7 \cdot 4 = 20 - 28 = -8$$

(b)  $(-2)^3$

$$(-2)^3 = (-2)(-2)(-2) = -8$$

(c)  $14 \div 2 + 5$

$$14 \div 2 + 5 = 7 + 5 = 12$$

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

(a)  $-x < 3$

$$x > -3$$

(b)  $|x + 1| = 6$

$$x + 1 = 6 \text{ or } x + 1 = -6$$
$$x = 5 \text{ or } x = -7$$

(c)  $2x = 3$

Since  $2 \nmid 3$ , there is no integer  $x$  that satisfies this equation.

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

- 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.

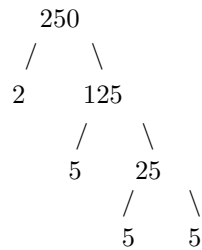
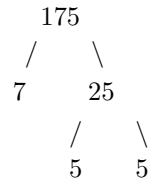
6 divides the number, because 2 and 3 both divide the number.

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(175, 250) and LCM(175, 250).



$$175 = 5^2 \cdot 7$$

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

$$\text{GCD}(175, 250) = 5^2 = 25$$

$$\text{LCM}(175, 250) = 2 \cdot 5^3 \cdot 7 = 1750$$

**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