

Name: _____

Date: _____

1. $\boxed{41_6}$

2. $16 = 1 \cdot 4^2 + 0 \cdot 4^1 + 0 \cdot 4^0 = \boxed{100_4}$

3. (a) $310_8 = 3 \cdot 8^2 + 1 \cdot 8 = \boxed{200}$

(b) $11231_4 = 4^4 + 4^3 + 2 \cdot 4^2 + 3 \cdot 4^1 + 4^0 = \boxed{365}$

(c) $2143_5 = 2 \cdot 5^3 + 5^2 + 4 \cdot 5^1 + 3 \cdot 5^0 = \boxed{298}$

(d) In base 16, what is the number 10_{16} ? Is it 10, or 16? So if there is a confusing, we call the first confusing number A, the second B, the third C, and so on. So A in base 16 means 10. $AAA_{16} = 10 \cdot 16^2 + 10 \cdot 16 + 10 = \boxed{2730}$

4. $\boxed{1, 2, 3, 4, 5, 10, 11, 12, 13, 14, 15, 20, 21, 22, 23, 24}$

5. $\boxed{210_3}$

6. $\boxed{2104_5}$

7. $\boxed{210_7}$

8.

$$\begin{aligned} 120221_3 &= 1 \cdot 3^5 + 2 \cdot 3^4 + 0 \cdot 3^3 + 2 \cdot 3^2 + 2 \cdot 3^1 + 1 \cdot 3^0 \\ &= 3 \cdot (3^2)^2 + 2 \cdot (3^2)^2 + 2 \cdot (3^2) + 6 + 1 \\ &= 3 \cdot 9^2 + 2 \cdot 9^2 + 2 \cdot 9 + 7 \\ &= 5 \cdot 9^2 + 2 \cdot 9 + 7 \\ &= \boxed{527_9} \end{aligned}$$

9. $231_7 = 2 \cdot 7^2 + 3 \cdot 7 + 1 = 98 + 21 + 1 = 120.$

$120 = 64 + 56 = 8^2 + 7 \cdot 8 = \boxed{170_8}$

10. Numbers less than 10000_4 have four digits. We only use the digits 0, 1, and 2. So there are three possibilities for each digit. So our four digit number has $\underline{3} \underline{3} \underline{3} \underline{3}$ possibilities, or $3^4 = \boxed{81}$ such numbers.