## Home Base, Part A

Beginning problems about numbers in various bases.

If you haven't already practiced, take an opportunity now.

Geogebra link: https://tube.geogebra.org/m/1529377

Geogebra link: https://tube.geogebra.org/m/1527705

For the "free response" questions below, type your own answer before revealing the hint.

**Problem 1** Explain why the following "joke" is "funny:" There are 10 types of people in the world. Those who understand base two and those who don't.

Free Response: Hint: In base two, 10 is actually two. So people who do not understand base two will not get the joke.

**Problem 2** You meet some Tripod aliens, they tally by threes. Thankfully for everyone involved, they use the symbols 0, 1, and 2.

(a) Demonstrate how a Tripod would count from beginning at 11.

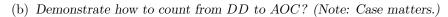
- (b) What number comes immediately before 10? 2
- (c) Before 210? 202
- (d) Before 20110? 20102 Explain your reasoning.

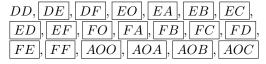
**Problem 3** You meet some people who tally by sevens. They use the symbols O, A, B, C, D, E, and F, in that order. (Note: Although it is common to use the letters A through F for digits greater than ten, these people are doing something different.)

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(a)	What do	the	individual	symbols	Ο,	A,	B,	C,	D,	E,	and	F	mean?	(Note
	O is not (	).)												

Free Response: Hint: 0, 1, 2, 3, 4, 5, and 6, respectively.





- (c) What number comes immediately before AO? F
- (d) Before ABO? AAF
- (e) Before EOFFA? EOFFO

**Problem 4** Now, suppose that you meet a hermit who tallies by thirteens. Demonstrate the hermit's counting below.  $8, 9, \boxed{A}, \boxed{B}, \boxed{C}, \boxed{10}, \boxed{11}, \boxed{12}, \dots, 18, \boxed{19}, \boxed{1A}, \boxed{1B}, \boxed{1C}, \boxed{20}, \boxed{10}, \boxed{11}, \boxed{12}, \dots, \boxed{10}, \boxed{11}, \boxed{12}, \dots, \boxed{10}, \boxed{$