Home Base

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**

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.*

11, 12, 20, 21, 22, 100, 101, 102, 110, 111, 112, 120, 121, 122, 200, 201

(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.)*

(a) *What do the individual symbols O, A, B, C, D, E, and F mean? (Note O is not 0.)*

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

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(b) *Demonstrate how to count from DD to AOC? (Note: Case matters.)*

$DD,$ $\boxed{DE}$, $\boxed{DF}$, $\boxed{EO}$, $\boxed{EA}$, $\boxed{EB}$, $\boxed{EC}$, $\boxed{ED}$, $\boxed{EF}$, $\boxed{FO}$, $\boxed{FA}$, $\boxed{FB}$, $\boxed{FC}$, $\boxed{FD}$, $\boxed{FE}$, $\boxed{FF}$, $\boxed{AOO}$

(c) *What number comes immediately before AO?* $\boxed{F}$

(d) *Before ABO?* $\boxed{AAF}$

(e) *Before EOFFA?* $\boxed{EOFFO}$

Problem 4 *Now, suppose that you meet a hermit who tallies by thirteens. Demonstrate the hermit's counting below.* $8, 9,$ $\boxed{A}$, $\boxed{B}$, $\boxed{C}$, $\boxed{10}$, $\boxed{11}$, $\boxed{12}$, $\ldots, 18,$ $\boxed{19}$, $\boxed{1A}$, $\boxed{1B}$, $\boxed{1C}$, $\boxed{20}$, $\boxed{2}$