

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>

Problem 1 *Note: The “free response” answers are not checked for accuracy. To optimize your learning, we recommend you submit your own answer before revealing the hint.*

Complete the following sentence:

To (optimize ✓/ minimize) my learning, I plan to my own answer (before ✓/ after) revealing the .

Problem 2 *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 3 *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, beginning at 11.*

11, , , , , , , ,
, , , , , , ,

(b) *What number comes immediately before 10?*

(c) *Before 210?*

(d) *Before 20110?* *Explain your reasoning.*

Learning outcomes:

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Problem 4 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.

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

$DD, DE, DF, EO, EA, EB,$
 $EC, ED, EE, EF, FO,$
 $FA, FB, FC, FD, FE,$
 FF, AOO, AOA, AOB, AOC

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

Problem 5 Now, suppose that you meet a hermit who tallies by thirteens. Demonstrate the hermit's counting below.

8, 9, $A, B, C, 10, 11, 12, \dots,$
 18, $19, 1A, 1B, 1C, 20, 21$