

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) Can you explain how a Tripod would count from 11 to 201? Be sure to carefully explain what number comes after 22.

12, 20, 21 12, 20, 21 (22, 100, 101) (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.

- (a) What do the individual symbols O, A, B, C, D, E, and F mean?
 (b) Can you explain how they would count from DD to AOC? Be sure to carefully explain what number comes after FF.

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- (c) What number comes immediately before *AO*? *ABO*? *EOFFA*? Explain your reasoning.

Problem 4 Now, suppose that you meet a hermit who tallies by thirteens. Explain how he might count. Give some relevant and revealing examples.
