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Distribution of Resources

Arguably the greatest problem in the world today is an equitable distribution of wealth and resources. Mathematical apportionment is the study of distributing a fixed number of integral resources to competing groups based on some measurable group asset. The following two exercises illustrate that this is not a simple matter.

Problem A
The Emerald school district has three schools: Shamrock, Pine, and Forest. The school enrollments are Shamrock 41, Pine 106, and Forest 253. Each year the school board apportions teachers to the schools based on enrollment using the Hamilton quota method.

1. The county allocates 24 teachers to the Emerald school district. How does the district allocate the 24 teachers?

2. Just before announcing the results the county decides to give the district another teacher. How does the district allocate the 25 teachers?

3. Do you think that there is anything weird about the resulting apportionments? Explain.

Problem B
The small nation of Zebulon has four provinces: Azcula, Brinth, Crevan, and Darcon. The Zebulon constitution specifies a national assembly of 100 members to be distributed based on population as enumerated by a decennial census using the Hamilton quota method. The results of the 2000 and 2010 censuses are provided below.

Province	2000	2010
Azcula	5,525,381	5,657,564
Brinth	3,470,152	3,508,474
Crevon	3,864,226	3,885,049
Darcon	201,203	201,049

1. What is the distribution of seats in the Zebulon national assembly based on the 2000 census?

2. What is the distribution of seats in the Zebulon national assembly based on the 2010 census?

3. Do you think that there is anything weird about the resulting apportionments? Explain.