# Picking Representatives

Let's think about fair representation.

## 12.1 Computers for Kids

A program gives computers to families with school-aged children. Each month they have a number of computers and need to decide how many computers each family will get.

1. One month the program has 8 computers and 16 children from 5 families who request computers.

   a. Let $P$ be the number of children per computer. What is the value of $P$?

   b. Fill in the third column of the table. Decide how many computers to give to each family if we use $P$ as the basis for distributing the computers.

| family | number of children | number of computers, using $P$ |
|---|---|---|
| Baum | 4 | |
| Chu | 2 | |
| Davila | 6 | |
| Eno | 2 | |
| Farouz | 2 | |

   c. Were all 8 computers given out?

2. The next month they again have 8 computers but now there are 20 children from 6 families.

   a. Let $B$ be the number of children per computer. What is the value of $B$?

   b. Does it make sense that $B$ is not a whole number? Why?

   c. Fill in the third column of the table. Decide how many computers to give to each family if we use $B$ as the basis for giving the computers.

| family | number of children | number of computers, using $B$ | number of computers, your way | children per computer, your way |
|---|---|---|---|---|
| Gray | 3 | | | |
| Hernandez | 1 | | | |
| Ito | 2 | | | |
| Jones | 5 | | | |
| Krantz | 1 | | | |
| Lo | 8 | | | |

   d. Were all 8 computers given out?

   e. Does it make sense that the number of computers for a family is not a whole number? Explain your reasoning.

   f. Find and describe a way to give computers to the families so that each family gets a whole number of computers. Fill in the fourth column of the table.

g. Compute the number of children per computer in each family and fill in the last column of the table.

h. Do you think your way of giving the computers is fair? Explain your reasoning.

## 12.2 School Mascot (Part 1)

A school is deciding on a school mascot. They have narrowed the choices down to a Banana Slug or a Sea Lion.



The principal decided that each class gets one vote. Each class held an election, and the winning choice was the one vote for the whole class. The table shows how three classes voted.

| | banana slugs | sea lions | class vote |
|---|---|---|---|
| **class A** | 9 | 3 | banana slug |
| **class B** | 14 | 10 | |
| **class C** | 6 | 30 | |

1. Which mascot won, according to the principal's plan? What percentage of the votes did the winner get under this plan?

2. Which mascot received the most student votes in all? What percentage of the votes did this mascot receive?

3. The students thought this plan was not very fair. They suggested that bigger classes should have more votes to send to the principal. Create a proposal for the principal where there are as few votes as possible, but the votes proportionally represent the number of students in each class.

4. Decide how to assign the votes for the results in the class. (Do they all go to the winner? Or should the loser still get some votes?)

5. In your system, which mascot is the winner?

6. In your system, how many representative votes are there? How many students does each vote represent?

# 12.3 Advising the School Board

1. In a very small school district with 120 students, there are four schools, D, E, F, and G. The district wants a total of 10 advisors for the students. Each school should have at least one advisor.

   a. If the advisors were equally split between all of the students, how many students per advisor should there be? Call this number $P$.

   b. Using $P$ students per advisor, how many advisors should each school have? Complete the table with this information for schools D, E, F, and G.

| school | number of students | number of advisors, using $P$ |
|---|---|---|
| D | 48 | |
| E | 12 | |
| F | 24 | |
| G | 36 | |

2. Another district has 850 students across four schools. Some of the schools are large, and others are small. The district wants 10 advisors in all. Each school should have at least one advisor.

| school | number of students | number of advisors, using $B$ | number of advisors, your way | students per advisor, your way |
|---|---|---|---|---|
| Dr. King School | 500 | | | |
| O'Connor School | 200 | | | |
| Science Magnet School | 140 | | | |
| Trombone Academy | 10 | | | |

a. If the advisors were equally split between all of the students, how many students per advisor should there be? Call this number $B$.

b. Using $B$ students per advisor, how many advisors should each school have? Give your quotients to the tenths place. Fill in the first "number of advisors" column of the table. Does it make sense to have a tenth of an advisor?

c. Decide on a consistent way to assign advisors to schools so that there are only whole numbers of advisors for each school, and there is a total of 10 advisors among the schools. Fill in the "your way" column of the table.

d. How many students per advisor are there at each school? Fill in the last column of the table.

e. Do you think this is a fair way to assign advisors? Explain your reasoning.