

Name:

Math Olympiad Exploration! – Problem Due: – May 13, 2004

## There’s Math in My Food!

When you buy food products at the grocery store, they come with a UPC. (Except for fruits and vegetables) UPC stands for Universal Product Code, but you may know it better as a bar code. This code is used to label food products and make it easier for electronic scanners to know what product you want to buy. The most common code has twelve numbers in the format 1-00001-99998-0. Because it is so easy to make mistakes when typing these numbers into a computer, this code has a check digit. It “checks” to see if you wrote the letters in the right order!

The last of the twelve numbers is mathematically determined by the first eleven numbers! Your mission is to see this in action.

Collect three (or more!) different food products with a UPC. Write down the item name and first eleven digits of the UPC number in the following table. Then follow the directions.

| Product Name | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | Add Shaded Columns | Multiply by 3 | Add Other Columns | Total Sum | Last Digit | 12 | Sum |   |   |   |    |
|--------------|---|---|---|---|---|---|---|---|---|----|----|--------------------|---------------|-------------------|-----------|------------|----|-----|---|---|---|----|
| Yoplait      | 0 | 7 | 0 | 4 | 7 | 0 | 0 | 0 | 1 | 2  | 8  | 16                 | $\times 3$ 48 | +                 | 13        | =          | 61 | 1   | + | 9 | = | 10 |

Books also have a code. It is called the ISBN, or International Standard Book Number, and it also has a check digit – Take the example 0 – 345 – 51682–? – Add  $1 \times 0 + 2 \times 3 + 3 \times 4 + 4 \times 5 + 5 \times 5 + 6 \times 1 + 7 \times 6 + 8 \times 8 + 9 \times 2$ , and find what the **remainder** is when you divide by eleven. Try it out on some of your favorites!