**Solution**

Referring to Figure 3-5, we see that the sample data are already sorted, so we can proceed to compute the value of the locator $L$. In this computation, we use $k = 25$ because we are attempting to find the value of the 25th percentile, and we use $n = 40$ because there are 40 data values.

$$L = \frac{k}{100} \cdot n = \frac{25}{100} \cdot 40 = 10$$

Since $L = 10$ is a whole number, we proceed to the box located at the right. We now see that the value of the 10th percentile is midway between the $L$th (10th) value and the next value in the original set of data. That is, the value of the 10th percentile is midway between the 10th value and the 11th value. The 10th value in Table 3-4 is 22 and the 11th value is 23, so the value midway between them is 22.5 chocolate chips. We conclude that the 25th percentile is $P_{25} = 22.5$ chocolate chips.

## Quartiles

Just as there are 99 percentiles that divide the data into 100 groups, there are three quartiles that divide the data into four groups.

**DEFINITION** **Quartiles** are measures of location, denoted $Q_1$, $Q_2$, and $Q_3$, which divide a set of data into four groups with about 25% of the values in each group.

Here are descriptions of quartiles that are more accurate than those given in the preceding definition:

**$Q_1$ (First quartile):** Same value as $P_{25}$. It separates the bottom 25% of the sorted values from the top 75%. (To be more precise, at least 25% of the sorted values are less than or equal to $Q_1$, and at least 75% of the values are greater than or equal to $Q_1$.)

**$Q_2$ (Second quartile):** Same as $P_{50}$ and same as the median. It separates the bottom 50% of the sorted values from the top 50%.

**$Q_3$ (Third quartile):** Same as $P_{75}$. It separates the bottom 75% of the sorted values from the top 25%. (To be more precise, at least 75% of the sorted values are less than or equal to $Q_3$, and at least 25% of the values are greater than or equal to $Q_3$.)

Finding values of quartiles can be accomplished with the same procedure used for finding percentiles. Simply use the relationships shown in the margin.

$Q_1 = P_{25}$
$Q_2 = P_{50}$
$Q_3 = P_{75}$

### Example 6 Finding a Quartile

Refer to the chocolate chip counts listed in Table 3-4. Find the value of the first quartile $Q_1$.

**Solution**

Finding $Q_1$ is really the same as finding $P_{25}$. See Example 5 above for the procedure used to find this result: $P_{25} = 22.5$ chocolate chips.