

## Estimation Strategies

Sometimes you do not need to know the exact answer to a problem, or you may want to check the reasonableness of an answer. In those instances, you can use **estimation**. There are several different methods of estimation. A common method is to use **rounding**.

### EXAMPLES Estimate by Rounding

Estimate by rounding.

1  $189.2 \times 315.6$

Round each number to the nearest hundred. Then multiply.

$$\begin{array}{r} 189.2 \rightarrow 200 \\ \times 315.6 \rightarrow \times 300 \\ \hline 60,000 \end{array}$$

The product is about 60,000.

2  $453\frac{1}{5} + 68\frac{2}{3}$

Round each number to the nearest ten. Then add.

$$\begin{array}{r} 453\frac{1}{5} \rightarrow 450 \\ + 68\frac{2}{3} \rightarrow + 70 \\ \hline 520 \end{array}$$

The sum is about 520.

You can use clustering to estimate sums. **Clustering** works best with numbers that all round to approximately the same number.

### EXAMPLES Estimate by Clustering

Estimate by clustering.

3  $13\frac{1}{4} + 16\frac{2}{5} + 14\frac{5}{6} + 15\frac{3}{8}$

All of the numbers are close to 15. There are four numbers.

The sum is about  $4 \times 15$  or 60.

4  $99.6 + 97.83 + 102.18 + 100.101 + 99.90$

All of the numbers are close to 100.

There are five numbers.

The sum is about  $5 \times 100$  or 500.

**Compatible numbers** are numbers that are easy to compute with mentally.

### EXAMPLES Estimate by Using Compatible Numbers

Estimate by using compatible numbers.

5  $76.36 \div 24.73$

76.36 is close to 75, and 24.73 is close to 25.

$$24.73 \overline{)76.36} \rightarrow 25 \overline{)75}$$

The quotient is about 3.

6  $7\frac{3}{8} + 12 + 20\frac{2}{3}$

The fractions  $\frac{3}{8}$  and  $\frac{2}{3}$  are close to  $\frac{1}{2}$ .

$$\begin{aligned} 7\frac{1}{2} + 12 + 20\frac{1}{2} &= 7 + 12 + 20 + \left(\frac{1}{2} + \frac{1}{2}\right) \\ &= 39 + 1 \text{ or } 40 \end{aligned}$$

The sum is about 40.

A strategy that works well for some addition and subtraction problems is **front-end estimation**. This strategy involves adding or subtracting the left-most column of digits. Annex zeros for the remaining digits.

### EXAMPLES

### Use Front-End Estimation

Use front-end estimation to find an estimate.

**7**  $5,283 + 3,634$

$$\begin{array}{r} 5,283 \rightarrow 5,000 \\ + 3,634 \rightarrow + 3,000 \\ \hline 8 \qquad \qquad 8,000 \end{array}$$

The sum is about 8,800.

**8**  $118.1 - 57.5$

$$\begin{array}{r} 118.1 \rightarrow 110.0 \\ - 57.5 \rightarrow - 50.0 \\ \hline 6 \qquad \qquad 60.0 \end{array}$$

The difference is about 61.