Math 5 Unit 1

Lesson 3

Estimation

Construction Costs

Building any type of structure can be a difficult process if you are not organized and well prepared. Important things to know before you begin building are:

- How much it is going to cost?
- How long will it take?

It is impossible to know exactly how much it will cost. Construction professionals create an estimate for the property owner. The contractor uses the floor plans of the structure to determine all of the materials needed. Then they decide how long it will take to actually build it. They can calculate the amount of materials needed fairly easily. It is much more difficult to estimate time. The schedules of all of the teams of workers and the weather can create delays. Here is an example of a contractor's planning sheet:

Site preparation	2 weeks
Foundation	1 week
Framing	3 weeks
Electrical	2 weeks
Plumbing	1 week
Roofing	2 weeks
Interior Finish Work	8 weeks
Exterior Finish Work	4 weeks
Total	**23 Weeks**

23 weeks is about 6 months.

Reflection

How do you estimate amounts?

Objectives for this Lesson

In this lesson you will explore the following concepts:

- Use estimation strategies that include front-end rounding in problem-solving contexts

- Use estimation strategies that include compensation in problem-solving contexts
- Use estimation strategies that include compatible numbers in problem-solving contexts

Go online to watch the Notepad Tutor: Estimating Quantities Using Referents of 10 and 100.

Front-End Rounding

Estimation is a really important tool in our world today. You may need to know approximately how much money you need at a store or about how long it will take to complete a task. When you estimate, you are finding an approximate answer. It is an answer that is close to the exact answer. One type of estimating is called **front-end rounding**. It is a way of estimating that uses the largest, or greatest, digits to find an approximate answer.

To estimate sums by front-end rounding:

1. Add the front digits (the largest place value) and write zeros for the other digits.
2. Adjust your estimate by estimating the back digits (the numbers in the smaller place values) and adjusting your answer.

Study the following example.

Example 1

Estimate the sum using front-end rounding.

3 271 + 850 + 2 983 + 1 125

Rough Estimate

3 271
850
2 983
+1 125
6 000

Rough estimate: 6 000
This estimate is found by adding the thousands only.

Adjusted Estimate

3 271 271 + 850 = about 1 000
850
2 983 983 + 125 = about 1 000
+1 125
1 000 + 1 000 = 2 000

Adjusted estimate: 6 000 + 2 000
Note that here we estimate the value of the hundreds and add it to the rough estimate of the thousands.

3 271 + 850 + 2 983 + 1 125 is about 8 000

The estimated sum is LESS THAN the actual sum would be. Why do you think this is true? Look at the adjusted estimate:

271 + 850 + 983 + 125

The ones and tens places have all been left off in the front-end estimation. Adding these numbers back would make the actual sum more than the adjusted estimate.

Estimating differences using front-end rounding is similar, but there is no adjusted estimate with the back digits.

To estimate differences using front-end rounding:

1. Subtract the front digits.
2. Write zeros for the other digits.

Example 2

Estimate the difference using front-end rounding.

9 354 – 3 691

Subtract the front digits:

$$\begin{array}{r} 9\,354 \\ -3\,691 \\ \hline 6 \end{array}$$

Write zeros for the other digits:

$$\begin{array}{r} 9\,354 \\ -3\,691 \\ \hline 6\,000 \end{array}$$

The estimated difference is: 6 000.

Now It's Your Turn

Estimate the sum in the following questions, using front-end rounding:

a.
$$\begin{array}{r} 3\,897 \\ -1\,625 \\ \hline 2\,941 \end{array}$$

b. 218 + 4 763 + 5 310

Estimate the difference in the following questions, using front-end rounding:

c.
$$\begin{array}{r} 6\,273 \\ -4\,861 \end{array}$$

d. 5 275 – 618

Solutions:

a. 6 000 + 2 000 = 8 000

b. 9 000 + 1 000 = 10 000

c. 2 000

d. 5 000

- In your Workbook go to Unit 1, Lesson 3 and complete 1 to 10.

Compensation

A second strategy that can be used for estimation is **compensation**. This is a process where you take part of the value of one number and give it to another number to help in solving the problem. It is usually performed mentally but you can also use pencil and paper to work it out.

Study the following example.

Example 3

Find the sum using compensation: 6 + 9

Borrow 1 from the 6 and add it to the 9.

(6 – 1 = 5 and 9 + 1 = 10)

The problem then becomes 5 + 10.

Solve the problem. This is simpler than the original problem.

5 + 10 = 15

6 + 9 = 15

Now It's Your Turn

Find the sum in the following questions, using compensation:

a. 19 + 6

b. 31 + 29

Solutions:

a. 20 + 5 = 25

b. 30 + 30 = 60

- In your Workbook go to Unit 1, Lesson 3 and complete 11 to 15.

Compatible Numbers

The third estimating strategy in this lesson is using **compatible numbers** to solve the problem. This is a way to estimate answers in division problems. These numbers are easy to compute mentally. Two numbers are compatible if one divides evenly into another.

To estimate answers to division problems using compatible numbers:

1. Choose a basic fact that relates to the problem.
2. Divide.

Study the following examples.

Example 4

Estimate the answer using compatible numbers.

3 175 ÷ 4

Think of a basic fact that relates to the problem: 32 ÷ 4 = 8

Divide: 3 200 ÷ 4 = 800

3 175 ÷ 4 is about 800

Example 5

Estimate the answer using compatible numbers.

16 793 ÷ 4

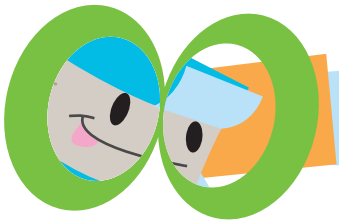
Think of a basic fact that relates to the problem: 16 ÷ 4 or 20 ÷ 4.
You may use different sets of numbers to estimate an answer.

Divide: 16 000 ÷ 4 = 4 000

20 000 ÷ 4 = 5 000

Both estimates are correct and the answer will be between 4 000 and 5 000.

16 793 ÷ 4 is between 4 000 and 5 000.



Let's Explore

Exploration 1: Let's Go on a Vacation!

Materials: Unit 1, Lesson 3, Exploration 1 page from your Workbook, Paper, Pencil, Internet connection

You are going to get to go on vacation for 3 nights to New York City! It is all up to you to make the plans on how to get there, where to stay, how to much to spend on eating, and what to see or do while you are there. Do the following to make your plans:

1. Choose the type of transportation you will use. Your choices are car, train, bus and airplane. Research how much it will cost to get to and from New York. Write your choice and the amount that it will cost on your Workbook page.

2. Choose which hotel that you will stay in. How much will it be for a three night stay? Write your hotel name and the cost on your Workbook page.

3. Choose how much you will spend each day on three meals. Write the total amount for 3 days on your Workbook page.

4. Choose three things you would like to do or go see while you are there. How much will each one cost? Write your three places or things on your Workbook page and the amount it will cost.

5. Once you have made all of your choices you will need to find the estimate of how much the trip will cost. You may use any of the types of estimation in this lesson. List what kind of estimation you are using and then show your work for finding the total amount. Are you surprised at how much it costs to go on vacation?

Now It's Your Turn

Estimate the answer to each division problem using compatible numbers.

a. 4 419 ÷ 4

b. 12 698 ÷ 6

c. 51 683 ÷ 5

d. 81 295 ÷ 9

Solutions:

a. 4 000 ÷ 4 = 1 000

b. 12 000 ÷ 6 = 2 000

c. 50 000 ÷ 5 = 10 000

d. 81 000 ÷ 9 = 9 000

- In your Workbook go to Unit 1, Lesson 3 and complete 16 to 21.