Chapter 3
Lesson 1

Estimating Whole-Number Sums and Differences

You will need
- number lines

GOAL

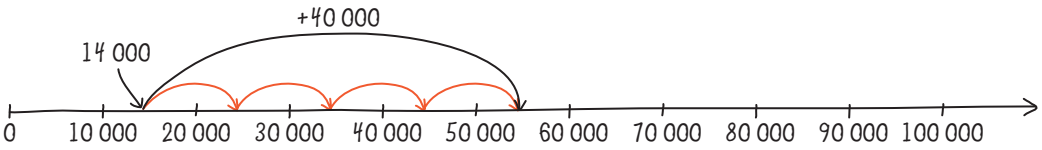
Estimate sums and differences to solve problems.

In 2004, a $10 million prize was offered to any rocket that could reach a height of 100 000 m on each of two flights. The rocket *SpaceShipOne* entered the competition. Maya described its first flight for her science presentation.

Did the rocket reach a height of 100 000 m?

Maya's Solution

I'll use a number line to estimate whether the rocket reached 100 000 m. At the end of Stage 1, the rocket was about 14 000 m high.
At the end of Stage 2, it was about 40 000 m higher.
My estimate will be less than the rocket's actual height at the end of Stage 2.



Reading Strategy

Visualizing

What distances can you estimate or measure to help you visualize how far 100 000 m is?

A. How might Maya use her number line to estimate the height of the rocket at the end of Stage 2?

B. At the end of Stage 1, about how much higher did the rocket have to go to reach 100 000 m? Explain your method.

C. At the end of Stage 2, about how much higher did the rocket have to go to reach 100 000 m? Explain your method.

D. Did the rocket reach a height greater than 100 000 m by the end of Stage 3?

Reflecting

E. How do you think Maya knew her estimate would be less than the rocket's actual height at the end of Stage 2?

F. Did you need to calculate an exact answer to figure out if the rocket reached a height of 100 000 m? Explain.

SpaceShipOne's Second Flight

Stage 1	A plane carried it to a height of 14 356 m and released it.
Stage 2	The rocket's engine raised it 50 566 m more.
Stage 3	The rocket soared upward for another 47 092 m.

Checking

1. Maya described the second flight of *SpaceShipOne*.
   - **a)** Estimate the rocket's height at the end of Stage 2. Show your work.
   - **b)** At the end of Stage 2, about how much higher did the rocket need to go to reach 100 000 m?
   - **c)** Did *SpaceShipOne* win the prize? Explain how you know.

Practising

2. Estimate. Show your work for two of your answers.
   - **a)** 5545 + 2498
   - **b)** 15 035 + 6986
   - **c)** 200 000 − 48 146
   - **d)** 149 900 − 50 078

3. How do you know that each statement is true?
   - **a)** The sum of 3867 and 2819 is between 5000 and 7000.
   - **b)** The difference between 15 987 and 11 015 is greater than 4000.

4. Read the problem below. Would you estimate $4.80 + $4.80 or $5 + $5 to solve this problem? Explain your choice.

Can you buy these two yo-yos with a $10 bill?

$4.88, including tax

$4.88, including tax

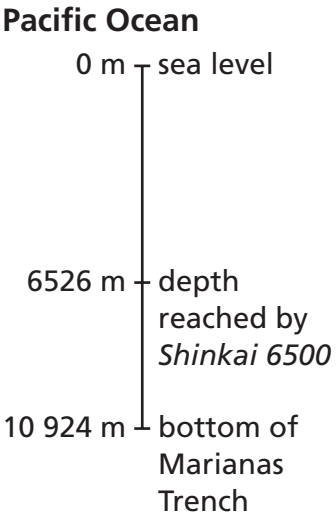
5. This chart shows the attendance at the Winnipeg Folk Festival. Estimate how many more people attended in 2006 than in 2000.

Attendance at Winnipeg Folk Festival

Year	2000	2006
Attendance	33 604	45 190

The *Shinkai 6500*

6. The bottom of the Marianas Trench is the deepest place in all the oceans. The Japanese research vehicle *Shinkai 6500* reached a depth of 6526 m. About how much deeper would it need to dive to reach the bottom of the Marianas Trench? Show your work.

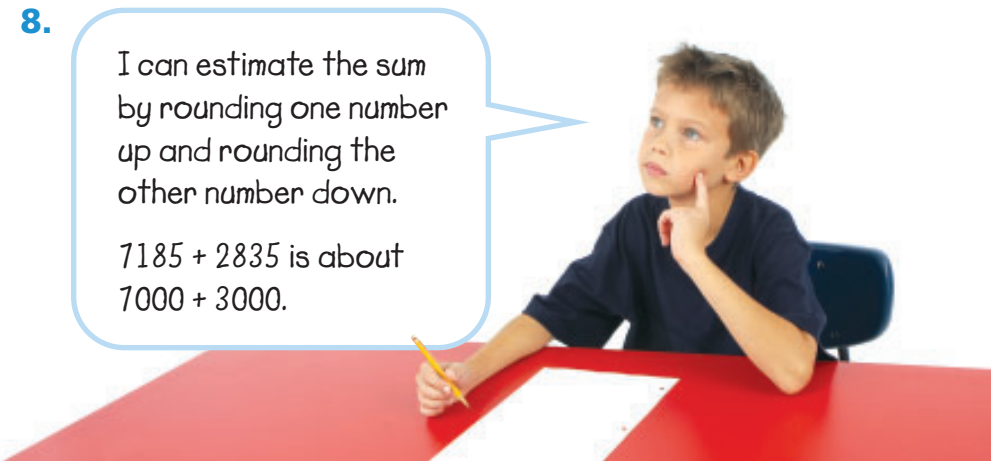


7. Estimate to select the correct answer for each calculation.

a) 51 345 + 49 056 = ▢ — 99 401 or 100 401

b) 275 039 − 74 987 = ▢ — 200 052 or 210 052

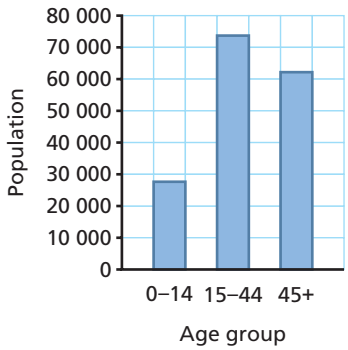
8.



a) Complete Brandon's estimate.

b) Estimate 4631 + 1367 using Brandon's method.

Richmond's Population by Age Group in 2001



9. The bar graph at the left shows the number of people in different age groups who live in Richmond, British Columbia. About how many people live in Richmond? Show your reasoning.

10. Describe more than one way to estimate the sum of 43 765 and 56 239 and the difference between 43 765 and 56 239.