

Chapter 2
Lesson 2

Using Expanded Form

You will need

- a place value chart
- counters

GOAL

Represent, describe, and compare numbers to one million.

The distance from Earth to the Moon, in kilometres, is the greatest number you can make with the following digits, starting with the 3.



What is the distance from Earth to the Moon?



Stefan's Solution

The problem says the first digit is 3. To make the greatest number, I'll put the 0s in the places with the least value. I'll put them in the tens place and the ones place.

348 400 and 384 400 are possible numbers. I need to find out which is greater.

To make sure that I'm comparing the correct digits, I'll use the **expanded form** of the numbers.

$$\begin{array}{r} 348\ 400 = 3 \text{ hundred thousands} + 4 \text{ ten thousands} + 8 \text{ thousands} + 4 \text{ hundreds} \\ = 300\ 000 \qquad \qquad \qquad + 40\ 000 \qquad \qquad \qquad + 8\ 000 \qquad \qquad \qquad + 400 \\ 384\ 400 = 3 \text{ hundred thousands} + 8 \text{ ten thousands} + 4 \text{ thousands} + 4 \text{ hundreds} \\ = 300\ 000 \qquad \qquad \qquad + 80\ 000 \qquad \qquad \qquad + 4\ 000 \qquad \qquad \qquad + 400 \end{array}$$

expanded form

A way to write a number that shows the value of each digit

For example, 236 891 in expanded form is 2 hundred thousands + 3 ten thousands + 6 thousands + 8 hundreds + 9 tens + 1 one, or 200 000 + 30 000 + 6000 + 800 + 90 + 1.

The number of hundred thousands is the same, so I need to compare the number in the next place, which is the ten thousands.

384 400 has 8 ten thousands and 348 400 has only 4 ten thousands.

So, 384 400 is greater.

The distance between Earth and the Moon is 384 400 km.

Reflecting

- Look at the expanded form of each number in Stefan's solution. Why do they have only four values added together, even though the distance is a six-digit number?
- In the number 384 400, how do you know that the 3 has a greater value than the 8?

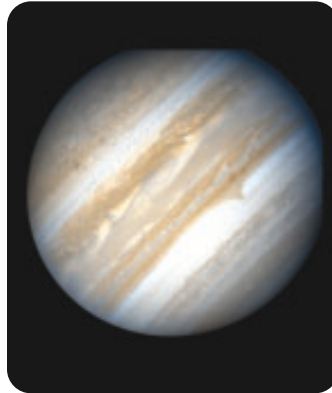
Reading Strategy

Finding Important Information

What are you asked to find out? What information is important to answer this question?

Checking

1. A year is how long a planet takes to go around the Sun. Jupiter's year is one hundred three thousand nine hundred forty-four hours long. Saturn's year is $200\ 000 + 50\ 000 + 8\ 000 + 100 + 40 + 4$ hours long.
 - a) Write the length of each planet's year in standard form.
 - b) Which planet has a longer year? How do you know?



Practising

2. a) Use eight counters to model three different six-digit numbers on a place value chart. Sketch your models.

Thousands			Ones		
Hundreds	Tens	Ones	Hundreds	Tens	Ones

- b) Write each number in standard form and in expanded form.
3. Silas wrote three numbers in expanded form:
 $700\ 000 + 90\ 000 + 8$
 $700\ 000 + 80\ 000 + 800 + 7$
 $700\ 000 + 80\ 000 + 1\ 000 + 100 + 20 + 2$

Write these numbers in order from least to greatest in standard form.

4. Mario researched the total attendance at the home games of the Canadian NHL teams in the 2006–2007 season.

National Hockey League 2006–2007 Attendance

Team	Montreal Canadiens	Ottawa Senators	Toronto Maple Leafs	Edmonton Oilers	Calgary Flames	Vancouver Canucks
Attendance	872 193	794 271	798 981	690 399	790 849	763 830

- Which teams had attendance between 700 000 and 800 000? Explain how you know.
- In expanded form, which teams would have fewer than six values added together? Explain.
- Does the 3 in the Oilers' attendance represent the same amount as the 3 in the Canadiens' attendance?
- Which team's attendance was greater than the Flames' but less than the Maple Leafs'?

Area of Islands

Island	Area (km ²)
Ireland	84 426
Cuba	114 525
Baffin Island	476 068
Great Britain	229 883
Newfoundland	110 681

- Christopher researched the area of some very large islands.
 - In expanded form, which three areas have fewer than six values added together? Explain why.
 - The first digit in Ireland's area is 8 and the first digit in Cuba's area is 1, but Ireland's area is less. Explain.
- The expanded form of a six-digit number does not require any addition. What could the number be?
- For each set of digits, create 2 six-digit numbers that are about 200 000 apart.
 - 8, 2, 1, 3, 0, 7
 - 3, 9, 9, 7, 6, 2
- What is the greatest six-digit even number that matches all of the following clues?
 - The ten thousands digit is twice the tens digit.
 - The hundred thousands digit is more than 6.
 - The thousands digit can be divided by the ones digit.
 - No digit is used more than once.
- Can two numbers have the same digits but different values? Explain with an example.