

1.2 Place Value

Activity: Review Our Number System

In the decimal system, the value of a digit in a number depends on its place in the number.

The digit 3 has a **different value** in each of the following numbers.

1348	731	613	7.3	0.83
3 hundreds	3 tens	3 ones	3 tenths	3 hundredths
or 300	or 30	or 3	or 0.3	or 0.03

Inquire

- How many times greater than 0.03 is 3?
- How many times smaller than 300 is 0.3?

Suppose that you could walk to the moon. You would take about 548 570 000 steps. The walk would take about 8.59 years non-stop. A *place value table* can help you read and write numbers like these.

Trillions			Billions			Millions			Thousands			Ones					
Hundred	Ten	One	Hundred	Ten	One	Hundred	Ten	One	Hundred	Ten	One	Hundred	Ten	One	Tenths	Hundredths	Thousandths
						5	4	8	5	7	0	0	0	0			
															8	5	9

We would read 548 570 000 as:

five hundred forty-eight million five hundred seventy thousand

We would read 8.59 as:

eight and fifty-nine hundredths

The digits for large numbers, such as 548 570 000, are separated into groups of three by spaces. The groups of three are called **periods**.

The number 548 570 000 is in **standard form**. The **expanded form** of this number shows the total value of each digit.

$$500\,000\,000 + 40\,000\,000 + 8\,000\,000 + 500\,000 + 70\,000$$

$$= 5 \times 100\,000\,000 + 4 \times 10\,000\,000 + 8 \times 1\,000\,000 + 5 \times 100\,000 + 7 \times 10\,000$$

The number 8.59 is in standard form. In expanded form, it is:

$$8 + 0.5 + 0.09$$

$$= 8 \times 1 + 5 \times 0.1 + 9 \times 0.01$$

Practice

Read each number to a classmate. Have your classmate write down the number. Switch roles and repeat.

- 2340
- 769
- 25.6
- 300.45
- 2 000 000 000
- 203 203
- 1 230 000
- 45.796

A calculator display does not show the spaces between periods. Write each number using spaces.

- 3156920
- 4563152
- 573182463
- 74810000
- 84333.33
- 383469.101

Write the total value of the underlined digit in each number.

- 2374.56
- 120581
- 567.29
- 34678900
- 5612
- 0.234

Write each number in standard form.

- six thousand one hundred twelve
- thirty-one and fifty-seven hundredths
- four hundred thirty-three thousand
- seven and forty-one hundredths
- two hundred eighteen thousandths
- seventy-three billion

Write in standard form.

- $3000 + 200 + 70 + 6$
- $40\,000 + 5000 + 800 + 50 + 2$
- $8 \times 1 + 6 \times 0.1 + 9 \times 0.01$
- $4 \times 1000 + 7 \times 100 + 9 \times 10 + 1 \times 1$
- $3 \times 10 + 4 \times 0.01 + 2 \times 0.001$

Write in expanded form.

- 4567
- 7.021
- 12 400
- 3407.5
- 762 010
- 450.27

Problems and Applications

In questions 38–42, write each number in words.

38. Asteroids are small planets between the orbits of Mars and Jupiter. Asteroid 2917 is named after Canadian astronomer Helen Sawyer Hogg. The asteroids named after the Beatles are 4147 (Lennon), 4148 (McCartney), 4149 (Harrison), and 4150 (Starr).

39. The oldest known rocks were found in the Northwest Territories near Yellowknife. Their age was estimated at 3 962 000 000 years.

40. There are 0.002 police officers for every person in Canada.

41. The painting *Sunflowers* by Vincent van Gogh sold for \$39 921 750.

42. The Helena's hummingbird has a mass of 1.985 g.

43. Why might a magazine article about baseball use "4 million fans" instead of "4 000 000 fans"?

44. On a cheque for thirty thousand dollars, would you write the number as 30000 or 30 000? Explain. Find out how large numbers are written on cheques.

45. Form a group with 2 or 3 of your classmates. Create a short story using 6 of the following numbers.

0.5, 3, 5.67, 13.72, 123, 287, 600, 8001, 45 600, 999 999

Read your story to the rest of the class.

NUMBER POWER

The final score in a soccer game was 3–3. How many possible half-time scores were there?