

# Whole Numbers

# 2

## At the Apiary

### Learning Goals

- read and write whole numbers in standard, expanded, and written forms
- use place value to represent and read whole numbers
- compare and order whole numbers
- identify and describe multiples and factors to 100
- identify and describe composite and prime numbers to 100
- use order of operations
- estimate sums, differences, products, and quotients
- use mental math to add, subtract, multiply, and divide
- add four 3-digit numbers and subtract from a 5-digit number
- multiply and divide by a 2-digit number
- pose and solve multistep problems



## Key Words

million

period

billion

trillion

common multiples

prime number

prime factor

composite number

expressions

Honeybees have been producing honey for more than 150 million years. Honeybees gather nectar from flowers. They convert the nectar to honey and store it as food in the beehive. A colony of honeybees produces more honey than it needs. For 6000 years, beekeepers have harvested honey for people to eat.

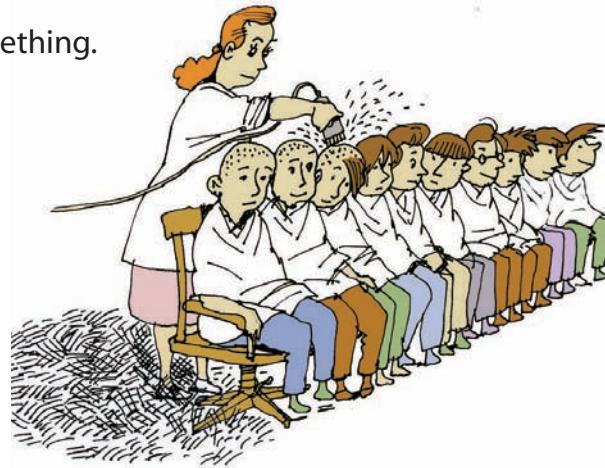


- Lesley Haynes has 20 hives.  
Each hive has about 75 000 honeybees.  
How could you find out how many honeybees Lesley has?
- A honeybee travels about 195 km in about 50 round trips to collect enough nectar to make 1 g of honey.  
About what distance does a honeybee travel in one round trip?  
How do you know?
- What else do you know about Lesley's honeybees?

# Exploring One Million

Think about collecting 1 million of something.

Brown-haired people have about  
100 000 hairs on their heads.  
So, to collect 1 million hairs,  
you would need the hair from  
about 10 brown-haired people.



## Explore



Here are some questions about 1 million.

How long do you think it would take to make a calculator count by ones to 1 million?



How many dictionary pages would it take to list 1 million words and their definitions?

How long would a line of 1 million children standing side by side be?

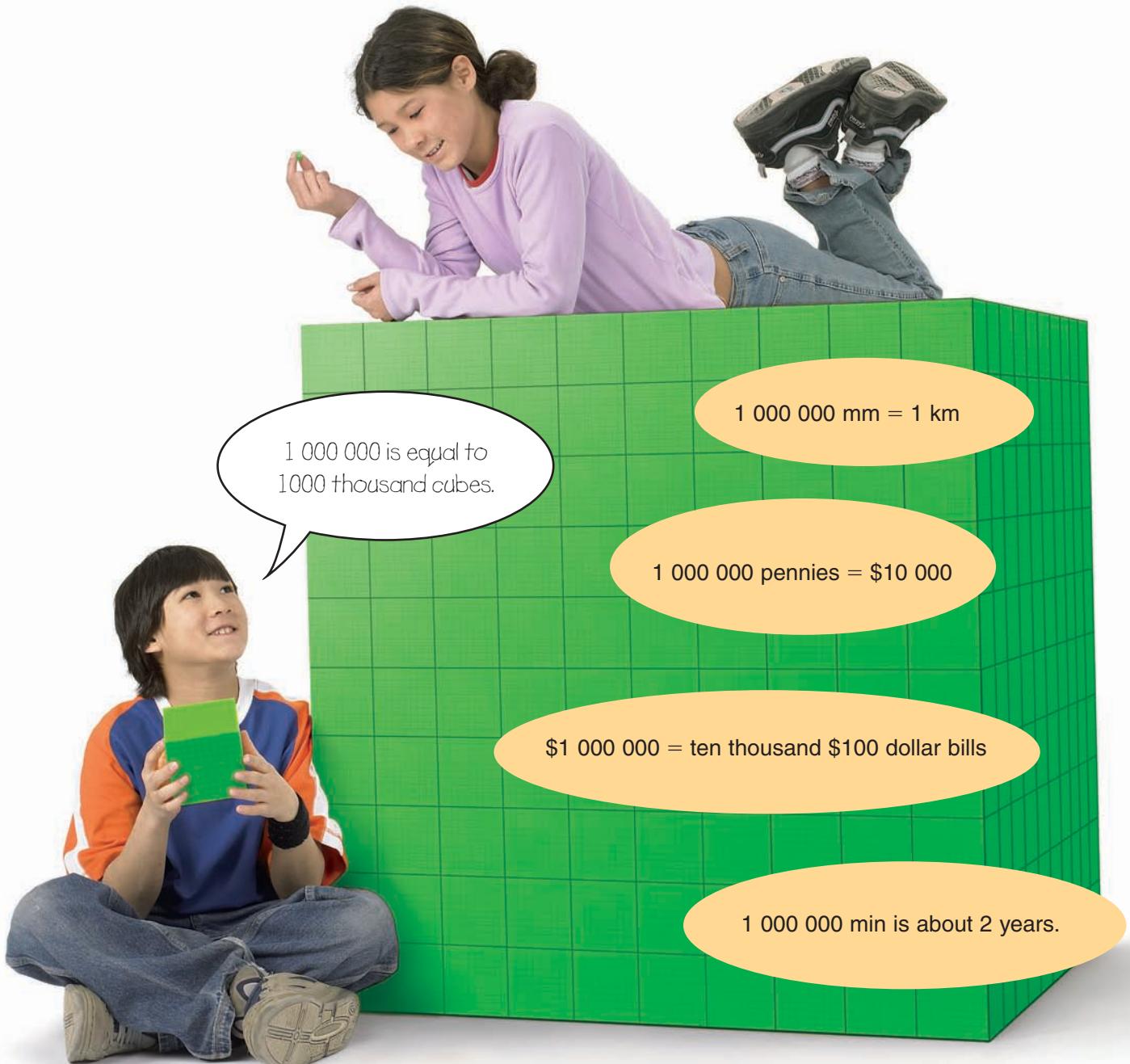
- Choose one of these questions to explore, or think of a question of your own.
- Gather any materials you will need.
- Estimate an answer to your question. Then develop and carry out a strategy to find the answer.

## Show and Share

Share your question, estimate, and answer with another pair of students.  
Describe the strategy you used to find your answer.  
Is your answer exact or is it approximate? Explain.

### Connect

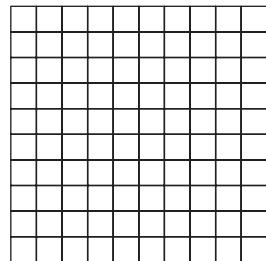
One **million** is 1000 thousands. It is a very large number!  
Here are some benchmarks to help you think about 1 million.





## Practice

1. a) How many small squares are there on this grid?  
b) How many small squares would be on 10 grids?  
On 100 grids?  
What strategy did you use to find your answers?  
c) Suppose you need 1 million small squares.  
Estimate the number of these grids you need.  
Find the number of grids needed to make 1 million.



2. How long would a line of 1 million centimetre cubes be?  
Give your answer in as many different standard units  
of measure as you can. Show your work.
3. a) Suppose you use a calculator to count by 100 000s to 1 000 000.  
How many times will you press  $=$ ? Use a calculator to check.  
b) How many times would you have to press  $=$   
to count by 10 000s to 1 000 000? Use a calculator to check.

4. How many days will it take you to spend \$1 000 000,  
if each day you spend each amount?  
a) \$100 000    b) \$10 000    c) \$1000  
d) \$100    e) \$10  
Show your work.



5. Estimate the length of 1 million straws arranged end to end.  
Find the answer. Show your work.  
Was your estimate high or low? Explain.
6. Write your own problem about 1 million.  
Trade problems with a classmate.  
Solve your classmate's problem.
7. Suppose your heart beats 70 times a minute.  
How long would it take to beat 1 million times?

## Reflect

Explain how you could figure out about  
how many days there are in 1 million seconds.

## Numbers Every Day

### Mental Math

Write an equivalent decimal for each number.

- 0.5
- 2.90
- 31.70
- 694.3

# 2

## Understanding Large Numbers

The world's all-time best selling copyright book is *Guinness World Records*. From October 1955 to June 2002, 94 767 083 copies were sold.

You can extend the place-value chart to represent 94 767 083.



Hundred Millions	Ten Millions	Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
	9	4	7	6	7	0	8	3

### Explore

Here are some of the world records reported in the *Guinness World Records 2004*.

- The largest bag of cookies was made in London, Ontario. It contained 100 152 chocolate chip cookies.
  - The greatest attendance at an Olympic Games was 5 797 923. The games took place in Los Angeles in 1984.
  - The most dominoes toppled by a group was 3 847 295, out of a possible 4 000 000. This took place at Domino Day "Expressions for Millions" in Leeuwarden, Netherlands.
  - The most common name in the world is Li. China alone has 87 000 000 people with this name.
- Take turns reading the records aloud.
- Each of you chooses 2 numbers from the records. Represent each number in as many ways as you can.



## Show and Share

Share your work with another pair of students.

Talk about the different ways you represented your numbers.

### Connect

- These facts may help you read and write large whole numbers.

- From right to left, each group of 3 place values is called a **period**.
- Within each period, the digits of a number are read as hundreds, tens, and ones.

This place-value chart shows the number of items in the world's largest collection of matchbook covers, 3 159 119.

Millions Period			Thousands Period			Units Period		
Hundreds	Tens	Ones	Hundreds	Tens	Ones	Hundreds	Tens	Ones
		3	1	5	9	1	1	9

3 000 000      100 000      50 000      9000      100      10      9

We read this number as:

three *million* one hundred fifty-nine *thousand* one hundred nineteen

When we read large numbers, we say the period name after each period except the units period.

We can write this number in:

- standard form: 3 159 119
- expanded form:  $3\,000\,000 + 100\,000 + 50\,000 + 9000 + 100 + 10 + 9$
- number-word form: three million one hundred fifty-nine thousand one hundred nineteen

We leave a space between the periods when we write a number with 5 or more digits.

One thousand million is one **billion**.  
One thousand billion is one **trillion**.

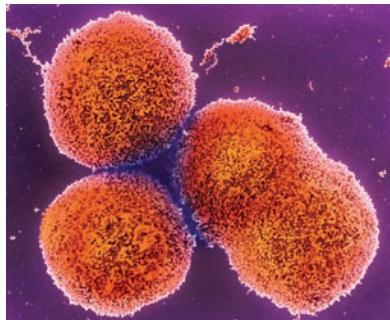
- The place-value chart can be extended to the left to show greater whole numbers.

This place-value chart shows the approximate number of cells in the human body.

Trillions			Billions			Millions			Thousands			Units		
H	T	O	H	T	O	H	T	O	H	T	O	H	T	O
	5	0	0	0	0	1	0	0	0	0	0	0	0	0

We write: 50 000 100 000 000

We say: fifty trillion one hundred million



## Practice

- Write each number in standard form.
    - 6 million 276 thousand 89
    - $20\,000\,000 + 4\,000\,000 + 300\,000 + 40\,000 + 2000 + 500 + 80 + 4$
    - two billion four hundred sixty million sixty-nine thousand eighteen
  - How does a million compare to a thousand? To ten thousand?  
Use a calculator to check your answer.
  - Write each number in expanded form.
    - 75 308 403
    - 64 308 470 204
    - 99 300 327
  - Write the value of each underlined digit.
    - 627 384
    - 54 286 473
    - 41 962 014
    - 25 041 304 000
  - Write the number that is:
    - 10 000 more than 881 462
    - 100 000 less than 2 183 486
    - 1 000 000 more than 746 000
    - 1 000 000 less than 624 327 207
- Tell how you know.

## Numbers Every Day

### Number Strategies

Round each number to the nearest hundred, the nearest thousand, and the nearest ten thousand.

- 475 498
- 3 045 349
- 40 469
- 16 944 500

6. China is the most populated country in the world.  
In 2001, it had an estimated population of one billion  
two hundred seventy-four million nine hundred fifteen thousand.  
Write this number in standard form and in expanded form.
7. The largest known prehistoric insect is a species of dragonfly.  
It lived about 280 000 000 years ago.  
Write this number in words.



8. The world's largest shopping centre is in Edmonton, Alberta.  
It covers an area of  $492\ 386\ m^2$  and cost  
about \$1 200 000 000 to build.  
Write these numbers in a place-value chart.
9. A student read 3 000 146 as "three thousand one hundred forty-six."  
How would you explain the student's error?

10. I am a number between 7 000 000 and 8 000 000.  
All my digits are odd.  
All the digits in my thousands period are the same.  
All the digits in my units period are the same.  
The sum of my digits is 31.  
What number am I?  
Give as many answers as you can.  
What strategies did you use to find the  
mystery number?



### Reflect

Explain how you know the value of each digit in the number 5 487 302.

### At Home

Look through newspapers and magazines.  
Find large numbers.  
How are the numbers written?



# 3

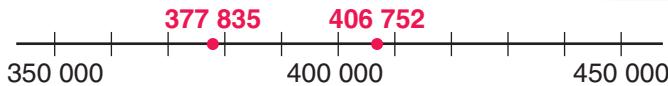
## Comparing and Ordering Numbers

The area of Paraguay is  $406\ 752 \text{ km}^2$ .

The area of Japan is  $377\ 835 \text{ km}^2$ .

You can show these numbers on a number line.

Which country has the greater area? How do you know?



### Explore

Use this table that shows the areas of 10 countries. Draw a place-value chart you can use to record each number.

- Partner A finds the greatest number in the table and reads it aloud. Partner B records the number in a place-value chart.
- Partner B finds the next greatest number and reads it aloud. Partner A records the number in the place-value chart.
- Continue until the numbers are in order from greatest to least. Order the countries from greatest area to least area.

Country	Area ( $\text{km}^2$ )
Argentina	2 766 890
Australia	7 686 850
Brazil	8 511 970
Canada	9 984 670
China	9 596 960
Egypt	1 001 450
Greenland	2 175 600
India	3 287 590
Russian Federation	17 075 200
United States	9 629 090