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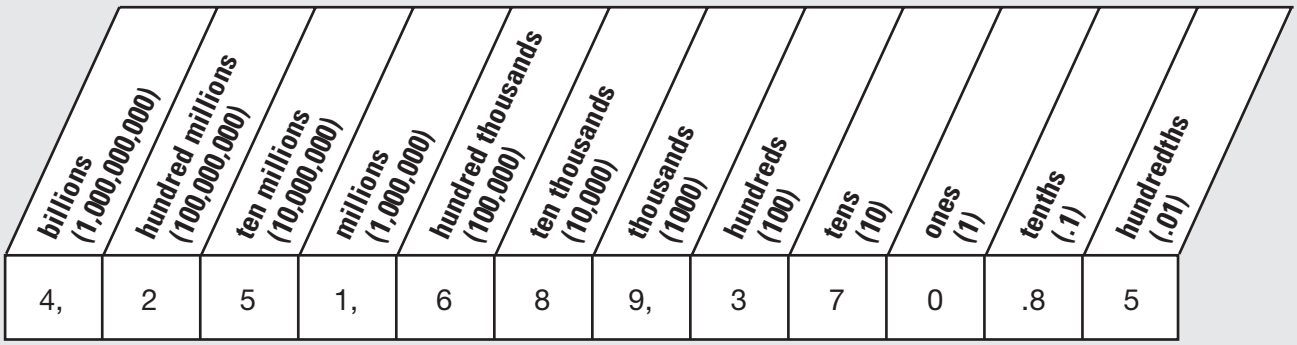
PART ONE: Learn about number sense

Study the place-value chart that Jacob's maths teacher made. As you study, consider how understanding place value can help you express numbers in various forms.



billions (1,000,000,000)	hundred millions (100,000,000)	ten millions (10,000,000)	millions (1,000,000)	hundred thousands (100,000)	ten thousands (10,000)	thousands (1000)	hundreds (100)	tens (10)	ones (1)	tenths (.1)	hundredths (.01)
4,	2	5	1,	6	8	9,	3	7	0	.8	5

The number 4,251,689,370.85 is written as four billion, two hundred and fifty-one million, six hundred and eighty-nine thousand, three hundred and seventy, and eighty-five hundredths.
The number can be shown as 4,000,000,000 + 200,000,000 + 50,000,000 + 1,000,000 + 600,000 + 80,000 + 9000 + 300 + 70 + $\frac{85}{100}$.
Look at some other numbers and how they can be written.
The number 26,000 = 26 thousands = 260 hundreds = 2600 tens. The number 26,000 can also be written with exponents, such as $2(10^4) + 6(10^3)$ or as $2.6(10^4)$.
The number 24,000,000,000 = 24 billions = 24,000 millions. The number 24,000,000,000 can also be written with exponents, such as $2(10^{10}) + 4(10^9)$ and as 2.4×10^{10}.

You use **number sense** when you think about the place value of each digit in a number.

- Each digit in a number has a place value, such as ones, tens, hundreds or thousands. The value of a digit depends on its place in the number.
- Whole numbers and decimals can be expressed in various forms.
- A number can be expressed in exponential form. An exponent tells how many times the base should be multiplied by itself.
- A number may be written in digits or in words.

Jacob made his own place-value chart. Study the number that Jacob wrote in his chart. Think about each digit and its place value. Then do numbers 1 to 4.

billions (1,000,000,000)	hundred millions (100,000,000)	ten millions (10,000,000)	millions (1,000,000)	hundred thousands (100,000)	ten thousands (10,000)	thousands (1000)	hundreds (100)	tens (10)	ones (1)	tenths (.1)	hundredths (.01)
8,	3	7	0,	9	5	1,	2	6	9	.3	4

1. What is the place value of the 4 in Jacob's number?

Ⓐ four
Ⓑ four tenths
Ⓒ four hundred
Ⓓ four hundredths

2. Which of these expresses the value of the 8 in Jacob's number in correct exponential form?

Ⓐ 8×10^8
Ⓑ 8×10^9
Ⓒ 8×10^7
Ⓓ 8×10^6

3. Which of these is equivalent to the value of the 7 in Jacob's number?

Ⓐ $(7 \times 1) + (10 \times 10)$
Ⓑ $(5 \times 10) \times (7 \times 10)$
Ⓒ 7×10^7
Ⓓ 10×7^2

4. Which of these has a greater value than the 5 in Jacob's number?

Ⓐ 6×10^3
Ⓑ $3.5(10^5)$
Ⓒ 4×10^2
Ⓓ $9.1(10^2)$

Talk about your answers to questions 1–4.
Explain why you chose the answers you did.

PART TWO: Check your understanding

Remember: You use number sense when you think about the place value of each digit in a number.

- Each digit in a number has a place value, such as ones, tens, hundreds or thousands. The value of a digit depends on its place in the number.
- Whole numbers and decimals can be expressed in various forms.
- A number can be expressed in exponential form. An exponent tells how many times the base should be multiplied by itself.
- A number may be written in digits or in words.

Solve this problem. As you work, ask yourself, 'How can understanding place value help me express a number in another form?'.

5. Jacob wrote sixty-nine million, fifty-eight thousand, two hundred and nineteen, and three hundredths in another form. Which of these shows a correct way to write the number?

Ⓐ 609,580,219.3
Ⓑ 6,958,219.3
Ⓒ 69,582.93
Ⓓ 69,058,219.03

Solve another problem. As you work, ask yourself, 'What does an exponent tell me about the value of a number?'.

6. Jacob learned another way to write 32 billion. Which of these is another form for the number?

Ⓐ 3.2×10^{10}
Ⓑ 3.2×10^{9}
Ⓒ 3.2×10^{8}
Ⓓ 3.2×10^{6}

Look at the answer choices for each question.
Read why each answer choice is correct or not correct.

5. Jacob wrote sixty-nine million, fifty-eight thousand, two hundred and nineteen, and three hundredths in another form. Which of these shows a correct way to write the number?

Ⓐ 609,580,219.3

This answer is not correct because it equals six hundred and nine million, five hundred and eighty thousand, two hundred and nineteen, and three tenths.

Ⓑ 6,958,219.3

This answer is not correct because it equals six million, nine hundred and fifty-eight thousand, two hundred and nineteen, and three tenths.

Ⓒ 69,582.93

This answer is not correct because it equals sixty-nine thousand, five hundred and eighty-two, and ninety-three hundredths.

● 69,058,219.03

This answer is correct because it equals 60,000,000 + 9,000,000 + 50,000 + 8,000 + 200 + 10 + 9 + $\frac{3}{100}$.

6. Jacob learned another way to write 32 billion. Which of these is another form for the number?

● 3.2×10^{10}

This answer is correct because it equals 3.2(10 × 10 × 10 × 10 × 10 × 10 × 10 × 10 × 10 × 10), or 3.2 × 10,000,000,000.

Ⓑ 3.2×10^{9}

This answer is not correct because it equals 3,200,000,000; or 3 billion, 200 million.

Ⓒ 3.2×10^{8}

This answer is not correct because it equals 320,000,000, or 320 million.

Ⓓ 3.2×10^{6}

This answer is not correct because it equals 3,200,000; or 3 million, 200 thousand.

PART THREE: Learn more about number sense

You use number sense to understand the relationship between fractions, decimals and percentages. You also use number sense to understand square roots and symbols.

- To convert a fraction to a decimal, divide the numerator by the denominator. To change a decimal to a percentage, move the decimal point two places to the right and add the per cent sign. The numbers in the chart below are all equal to the same amount.

Fraction	Decimal	Percentage
$\frac{3}{5}$	0.6 or 0.60	60%

- An **exponent** tells how many times the base should be multiplied by itself.

$$6^4 = 6 \times 6 \times 6 \times 6 = 1296$$

In 6^4, 6 is the base and 4 is the exponent.

- The **square root** of a number is one of its two equal factors.

$\sqrt{81} = 9$ When 9, the square root of 81, is multiplied by itself, the product is 81.	$\sqrt{0.49} = 0.7$ When 0.7, the square root of 0.49, is multiplied by itself, the product is 0.49.

Jacob enjoys snowboarding. Last year, he entered a snowboarding competition. Do numbers 7 to 10.

7. Jacob's new snowboard is 152 cm long. Which of these is equivalent to 152 cm?

Ⓐ 6^3 cm
Ⓑ 5^5 cm
Ⓒ 5^2 cm $\times$ 2^3 cm
Ⓓ 3^3 cm + 5^3 cm

8. The competition ramp is $\frac{1}{4}$ the length of Jacob's practice ramp. Which of these shows that same relationship?

Ⓐ $\frac{16}{4}$
Ⓑ 25%
Ⓒ 25
Ⓓ 40%

9. A crowd of 2401 people watched the competition. Which of these is equivalent to 2401?

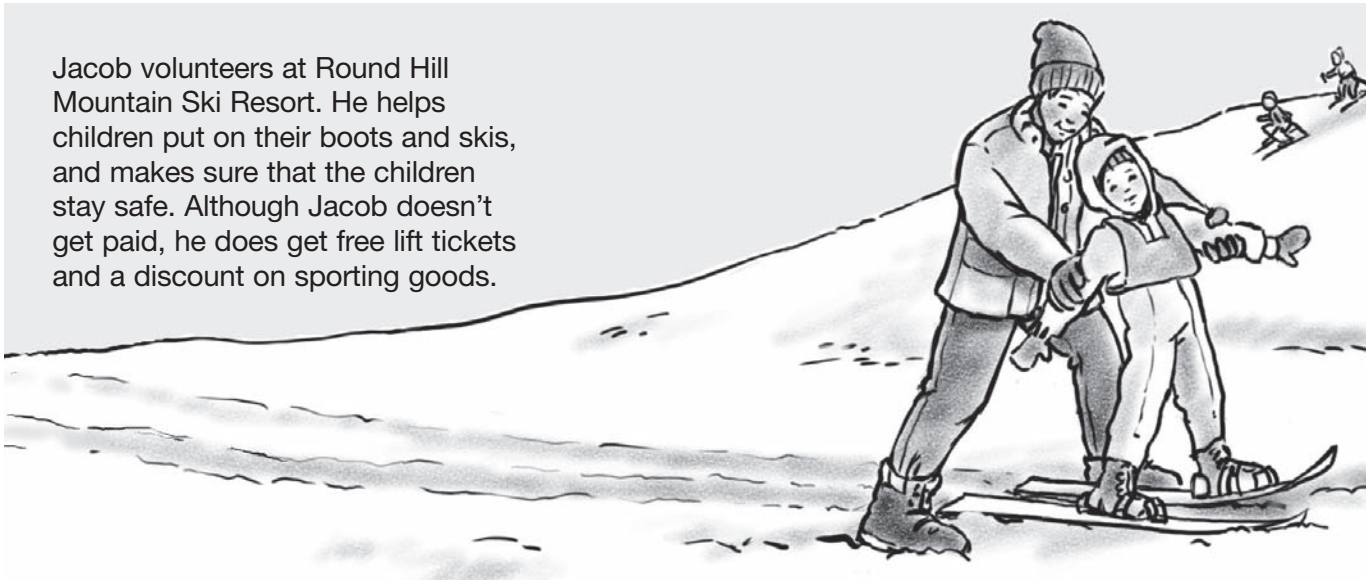
Ⓐ 8^3
Ⓑ 7^4
Ⓒ 6^5
Ⓓ 4^8

10. Jacob wrote his competition score as $\sqrt{1681}$. What was Jacob's score?

Ⓐ 41
Ⓑ 840.5
Ⓒ 421
Ⓓ 49

Read how Jacob found a way to afford his favourite winter activities. Then do numbers 11 to 14.

Jacob volunteers at Round Hill Mountain Ski Resort. He helps children put on their boots and skis, and makes sure that the children stay safe. Although Jacob doesn't get paid, he does get free lift tickets and a discount on sporting goods.



11. A total of 512 children take ski lessons at Round Hill Mountain Ski Resort. Which of these expresses 512 in exponential form?

Ⓐ 9^6

Ⓑ 14^3

Ⓒ $2^3 \times 8^2$

Ⓓ $5^2 + 6^2$

12. While Jacob waits for children to arrive for their lessons, he does his maths homework. Which of these is his correct response to a square-root problem?

Ⓐ $\sqrt{121} = 0.11$

Ⓑ $\sqrt{0.025} = 5$

Ⓒ $\sqrt{1.44} = 1.2$

Ⓓ $\sqrt{6} = 36$

13. Jacob used his 16% discount to buy a parka. Which of these shows the part that Jacob paid?

Ⓐ 0.84

Ⓑ $\frac{3}{4}$

Ⓒ $\frac{8}{25}$

Ⓓ 90%

14. The price of a lift ticket at Round Hill Mountain Ski Resort is now 33% more than the price last year. Which of these does *not* show that same relationship?

Ⓐ 0.33

Ⓑ 66%

Ⓒ $\frac{2}{6}$

Ⓓ $\frac{1}{3}$