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* * *

Write 1,000 as a product using 10 as a factor.

factors   exponent

$$1,000 = 10 \times 10 \times 10 = 10^3$$

base

> The **exponent** is the number that tells how many times a **base** number is used as a factor.

The exponent, 3, shows that the base number, 10, is multiplied 3 times.

So, 1,000 is written as 10^3 using exponents.

* * *

Tamara estimates that her horse will eat about 5,000 pounds of hay each year. How can you write 5,000 using exponents?

$$5 \times 10^1 = 5 \times 10 = 50$$

$$5 \times 10^2 = 5 \times 10 \times 10 = 500$$

$$5 \times 10^3 = 5 \times 10 \times 10 \times 10 = 5,000$$

The number of zeros in the product is the same as the exponent.

So, 5,000 is written as 5×10^3 using exponents.

1

Do You Understand?

1. Why are there three zeros in the product of 6×10^3?

3. $10^1 =$
$10^2 =$
$10^3 =$
$10^4 =$

2. Susan said that 10^5 is 50. What mistake did Susan make? What is the correct answer?

4.
$= 7 \times 10^1$
$= 7 \times 10^2$
$= 7 \times 10^3$
$= 7 \times 10^4$

In **5–15**, find each product. Use patterns to help.

5. $3 \times 10^1 =$
$3 \times 10^2 =$
$3 \times 10^3 =$
$3 \times 10^4 =$

6. $2 \times 10 =$
$2 \times 100 =$
$2 \times 1,000 =$
$2 \times 10,000 =$

7.
$= 9 \times 10^1$
$= 9 \times 10^2$
$= 9 \times 10^3$
$= 9 \times 10^4$

8. 8×10^4

9. $4 \times 1,000$

10. 5×10^2

11. $6 \times 10,000$

12. 4×10^1

13. 100×9

14. $10^3 \times 6$

15. 8×10^5

16. Write $10 \times 10 \times 10 \times 10 \times 10 \times 10$ with an exponent. Explain how you decided what exponent to write.

Look at the expanded form of 1,440,000. The value of the 4 in the hundred thousands place is 400,000. The value of the 4 in the ten thousands place is 40,000.

400,000 is 10 times as great as 40,000. 40,000 is $\frac{1}{10}$ of 400,000.

Standard form:
1,440,000

Expanded form:
$1 \times 1,000,000 + 4 \times 100,000 + 4 \times 10,000$

Using exponents, this can be written as:
$(1 \times 10^6) + (4 \times 10^5) + (4 \times 10^4)$

Number name:
one million, four hundred forty thousand

When two digits next to each other in a number are the same, the digit on the left has 10 times the value of the digit to its right.

When two digits next to each other are the same, the digit on the right has $\frac{1}{10}$ the value of the digit to its left.

5 5 5, 0 0 0
$\times 10 \quad \times \frac{1}{10}$

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1. In 9,290, is the value of the first 9 ten times as great as the value of the second 9? Explain.

2. Write 4,050 in expanded form.

In **3** and **4**, write the values of the given digits.

3. the 7s in 7,700   4. the 2s in 522

In **5–7**, write each number in standard form.

5. $8,000,000 + 300 + 9$

6. $(4 \times 10^4) + (6 \times 10^2)$

7. $10,000 + 20 + 3$

In **8–10**, write each number in expanded form.

8. 5,360

9. 102,200

10. 85,000,011

In **11–13**, write the values of the given digits.

11. the 7s in 6,778

12. the 9s in 990,250

13. the 1s in 2,011,168

The number name for $\frac{4}{1,000}$ is four **thousandths**. A decimal place-value chart can help you determine the decimal. Notice that the thousandths place is three places to the right of the decimal point.

ones		tenths	hundredths	thousandths
0	.	0	0	4

So, $\frac{4}{1,000}$ can be represented by the decimal 0.004.

How can $\frac{444}{1,000}$ be represented by a decimal? $\frac{444}{1,000}$ is read as *four hundred forty-four thousandths* and represented by the decimal 0.444.

ones		tenths	hundredths	thousandths
0	.	4	4	4

$\times 10 \qquad \times \frac{1}{10}$
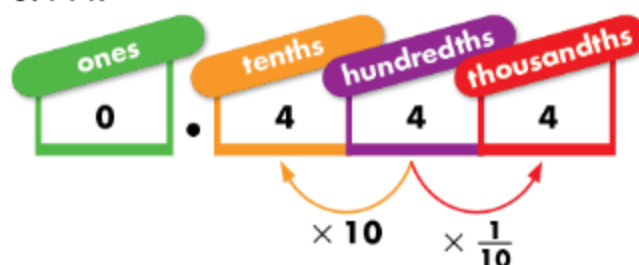
The value of the digit 4 in the hundredths place has 10 times the value of the digit 4 in the thousandths place and $\frac{1}{10}$ the value of the digit 4 in the tenths place.

In **3–6**, write each decimal as a fraction.

3. $0.001 =$

4. $0.05 =$

5. $0.512 =$

6. $0.309 =$

In **7–10**, write each fraction as a decimal.

7. $\frac{2}{1,000} =$

8. $\frac{34}{100} =$

9. $\frac{508}{1,000} =$

10. $\frac{99}{1,000} =$

In **11–18**, write each decimal as a fraction.

11. 0.007

12. 0.08

13. 0.065

14. 0.9

15. 0.832

16. 0.203

17. 0.78

18. 0.999

In **19–26**, write each fraction as a decimal.

19. $\dfrac{434}{1,000}$

20. $\dfrac{3}{10}$

21. $\dfrac{873}{1,000}$

22. $\dfrac{17}{1,000}$

23. $\dfrac{309}{1,000}$

24. $\dfrac{5}{1,000}$

25. $\dfrac{6}{100}$

26. $\dfrac{999}{1,000}$

27. The Palmers' property tax bill for the year is $3,513. In their first installment, they paid $1,757. How much do they still owe on their bill? Write an equation to model your work.
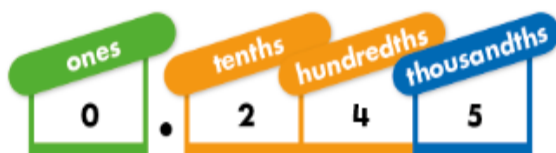
28. Simon scored 4×10^2 points in a game. Joe scored 2×10^3 points in the same game. Whose score is higher? How much higher?

ones	tenths	hundredths	thousandths
0	2	4	5

Standard Form: 0.245

└─ The 5 is in the thousandths place. Its value is 0.005.

Expanded Form:

$$\left(2 \times \frac{1}{10}\right) + \left(4 \times \frac{1}{100}\right) + \left(5 \times \frac{1}{1,000}\right)$$

Number Name: two hundred forty-five thousandths

Equivalent decimals name the same amount.

What are two other decimals equivalent to 1.4?

One and four tenths is the same as one and forty hundredths.

$$1.4 = 1.40$$

One and four tenths is the same as one and four hundred thousandths.

$$1.4 = 1.400$$

So, $1.4 = 1.40 = 1.400$.

1. The number 3.453 has two 3s. Why does each 3 have a different value?

In **2** and **3**, write each number in standard form.

2. $4 \times 100 + 7 \times 10 + 6 \times 1 + 6$
   $\times \left(\frac{1}{10}\right) + 3 \times \left(\frac{1}{100}\right) + 7 \times \left(\frac{1}{1,000}\right)$

3. four and sixty-eight thousandths

In **4–6**, write each number in standard form.

4. $(2 \times 1) + \left(6 \times \frac{1}{1,000}\right)$

5. $(3 \times 1) + \left(3 \times \frac{1}{10}\right) + \left(9 \times \frac{1}{1,000}\right)$

6. nine and twenty hundredths

In **7–10**, write two decimals that are equivalent to the given decimal.

7. 2.200

8. 8.1

9. 9.50

10. 4.200

11. Santiago has a rope that measures 205.95 centimeters. Write this number in expanded form.

12. In Justin's school, 0.825 of the students participate in a sport. If there are one thousand students in Justin's school, how many participate in a sport?

Order the cockroaches from least to greatest length.

Step 1

Write the numbers, lining up the decimal points. Start at the left. Compare digits of the same place value.

3.576
3.432
3.582

3.432 is the least.

Step 2

Write the remaining numbers, lining up the decimal points. Start at the left. Compare.

3.576
3.582

3.582 is greater than 3.576.

Step 3

Write the numbers from least to greatest.

3.432   3.576   3.582

From least to greatest lengths are the Oriental, the American, and the Australian.

1. Scientists measured a Madeira cockroach and found it to be 3.44 centimeters long. Toby says that the Madeira is shorter than the Oriental because 3.44 has fewer digits than 3.432. Is he correct? Explain.

In **2** and **3**, write >, <, or = for each ◯.

2. 3.692 ◯ 3.697   3. 7.216 ◯ 7.203

In **4** and **5**, order the decimals from least to greatest.

4. 5.540, 5.631, 5.625

5. 0.675, 1.529, 1.35, 0.693

In **6-8**, compare the two numbers. Write >, <, or = for each ◯.

6. 0.890 ◯ 0.890

7. 5.733 ◯ 5.693

8. 9.707 ◯ 9.717

In **9** and **10**, order the decimals from greatest to least.

9. 878.403, 887.304, 887.043

10. 435.566, 436.565, 435.665

11. Draw lines to match each decimal on the left to its **equivalent decimal** on the right.

0.75	0.750
1.50	0.075
1.05	1.500
0.075	1.050

Lesson 1-6
Round Decimals

Round 3.2 to the nearest whole number.
Is 3.2 closer to 3 or 4?

halfway

3.2
3   3.5   4

Step 1	**Step 2**	**Step 3**
Find the rounding place. Look at the digit to the right of the rounding place. 3.2	If the digit is 5 or greater, add 1 to the rounding digit. If the digit is less than 5, leave the rounding digit alone. Since 2 < 5, leave 3 the same.	Drop the digits to the right of the decimal point. Drop the decimal point. 3.2 rounds to 3.

1. To round 74.58 to the nearest tenth, which digit do you look at? What is 74.58 rounded to the nearest tenth?

2. A car-rental service charges customers for the number of miles they travel, rounded to the nearest whole mile. George travels 40.8 miles. For how many miles will he be charged? Explain.

In **3–10**, round each number to the place of the underlined digit.

3. 16.5

4. 56.1

5. 1.32

6. 42.78

7. 1.652

8. 582.04

9. 80,547.645

10. 135,701.949

In **11–14**, round each decimal to the nearest whole number.

11. 4.5

12. 57.3

13. 34.731

14. 215.39

In **15–18**, round each number to the place of the underlined digit.

15. 7.158

16. 0.758

17. 6.4382

18. 84.732

Date: ……………   Name: …………………

Mark: ……………   Test (1)-ch1   5th Grade

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1)

Find each product.

1. 9×10^1 2. $8 \times 1,000$

3. 5×10^2 4. 2×10^5

2)

Write each number in standard form.

2. eight and fifty-nine hundredths

3. seven and three thousandths

4. $3 + 2 \times \frac{1}{10} + 4 \times \frac{1}{1,000}$

3)

Write the number name and tell the value of the underlined digit.

1. 9,000,009

2. 485,002,000

3. 25,678

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4)

Compare. Write >, <, or =.

1. 0.584 ◯ 0.58
2. 9.327 ◯ 9.236
3. 5.2 ◯ 5.20
4. 5.643 ◯ 5.675
5. 0.07 ◯ 0.08

5)

| 40,449 | 342,005 | 41,806 | 41,986 |
| + 11,958 | − 258,819 | + 10,591 | − 32,047 |

6)

Draw a line from each number in Column A to the same number in Column B.

Column A	Column B
6. $7 \times 1,000 + 9 \times 10 + 2 \times 1$	4,000
7. 10^4	7,092
8. 4×10^3	10,000
9. 3.08	3.080

(2)