



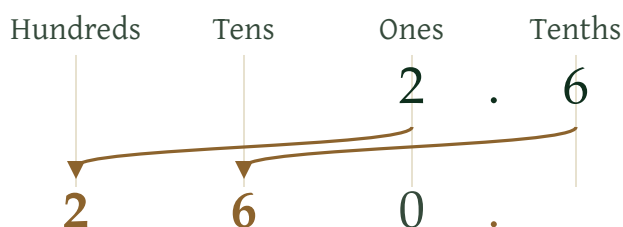
Stuck? Scan
for the anchor
chart

POWERS OF TEN • PRACTICE • GRADE 5

Powers of Ten Practice

Multiplying by ten does not add a zero. It moves every digit **one place left**.

1 The digits move, the point stays



One factor of ten, one place. Two factors, two places.

2 The exponent counts tens, not zeros

Power	Tens multiplied	Value
10^1	10	10
10^2	10×10	100
10^3	$10 \times 10 \times 10$	1,000

The zeros match the exponent only when the number starts at one.

3 Dividing runs the same move backwards

$$45 \div 10^2 = 0.45$$

Each digit slides two places right, and the zero holds the point in place.

Roots of Reason

Powers of Ten Practice · The shift

Name _____ Date _____

Digits Move, the Point Stays

Count the tens. Move each digit that many places.

1. Fill each box. Then write how many places the digits moved, and which way.

Work it out

Answer

Places moved, and which way

3.7×10

3.7×100

3.7×10^3

$3.7 \div 10$

$3.7 \div 100$

2. Two students worked 2.6×10 . Circle the one who is right, then say what the other one did.

Maya

$2.6 \times 10 = 2.60$

Devon

$2.6 \times 10 = 26$

The other student _____

3. **Think about it.** Which rule works on every number, whole or decimal? Circle one, then test it on 2.6×10 out loud.

☐ write a zero on the end

☐ move each digit one place left

☐ move the decimal point left

Roots of Reason

Powers of Ten Practice · Exponent notation

Name _____ Date _____

Exponents Count Tens

Ten to the fourth means four tens multiplied. It does not mean the number four.

1. Finish each row. The first one is done. Count the tens first, then the zeros.

Power	Tens multiplied	Value	Zeros
10^1	10	10	1
10^2	_____	_____	
10^4	_____	_____	
10^5	_____	_____	

2. Ivy says the exponent tells you how many zeros the answer has. It holds on the left and breaks on the right.

A power of ten alone

$$10^4 = 10,000$$

four tens, four zeros

A power of ten times 2.5

$$2.5 \times 10^4 = 25,000$$

four tens, three zeros

The exponent always counts _____

3. **Think about it.** Ten to the zero means no tens are multiplied. Circle what it equals, then check it by dividing 10 by 10.

☐ 0

☐ 1

☐ 10

Roots of Reason

Powers of Ten Practice · Decimals

Name _____ Date _____

Decimals Through the Powers

Multiplying moves the digits left. Dividing moves them right. Same move, opposite way.

1. Fill each box. Then write how many places the digits moved, and which way.

Work it out

Answer

Places moved, and which way

0.42×10^2

0.42×10^3

$6.5 \div 10$

$6.5 \div 10^2$

$7 \div 10^3$

2. Four tenths is multiplied by ten cubed. Write each digit of the answer in its new box.

Hundreds

Tens

Ones

Tenths

		0	.	4
			.	

Two boxes hold a place open. They hold _____

3. **Think about it.** Take 8.2 and multiply by ten cubed. Divide that answer by ten cubed. Write both steps, then say why you land back on 8.2.

$8.2 \times 10^3 = \underline{\hspace{2cm}}$ then $\div 10^3 = \underline{\hspace{2cm}}$

Roots of Reason

Powers of Ten Practice · One rule

Name _____ Date _____

One Rule for Every Power

Every step down the ladder is the same step. One place right, one tenth the value.

1. Finish the ladder. The top rung is done. Keep the same digit and watch where it lands.

Expression	Product	Places moved, and which way
3×10^2	300	2 places left
3×10^1		_____
3×10^0		_____
$3 \div 10^1$		_____
$3 \div 10^2$		_____

2. One rule covers every rung above. Circle the direction, then write the rule in your own words.

☐ one place left each step down

☐ one place right each step down

Going down the ladder, _____

3. **Think about it.** A number is multiplied by ten to the fifth, then divided by ten cubed. Write how far the digits ended up moving, and the one power that does the same job.

 Places moved in the end _____ Same as $\times 10$



POWERS OF TEN • PRACTICE • GRADE 5

Answer Key and Teacher Notes

Digits Move, the Point Stays (page 2)

1. *37* 1 left · *370* 2 left · *3,700* 3 left · *0.37* 1 right · *0.037* 2 right 2. *Devon*. Maya wrote a zero into a place that was already empty, so nothing grew. 3. *move each digit one place left*. A student who circles the decimal point answer is not wrong about the marks on the page, only about what moved.

Exponents Count Tens (page 3)

1. *10 × 10, 100, 2 · 10 × 10 × 10 × 10, 10,000, 4 · five tens, 100,000, 5* 2. *tens multiplied*, never zeros in the answer. 3. *1*, because 10 divided by 10 is 1. A student who writes 40 for ten to the fourth is reading the exponent as a factor, so send them back to the tens multiplied column.

Decimals Through the Powers (page 4)

1. *42* 2 left · *420* 3 left · *0.65* 1 right · *0.065* 2 right · *0.007* 3 right 2. boxes read *4, 0, 0* for 400, and the two zeros hold the tens and ones places open. 3. *8,200* then *8.2*. A missing placeholder zero, $0.42 \times 1,000$ written as 42, is the error to watch for here.

One Rule for Every Power (page 5)

1. *30* 1 left · *3* no move · *0.3* 1 right · *0.03* 2 right 2. *one place right each step down*, and each rung is worth one tenth of the rung above. 3. *2 places left*, the same as $\times 10$ squared. A student stuck on the third row has usually read ten to the zero as zero.

Every wrong answer in this set comes back to one question: what is each digit worth now. Ask it out loud before correcting anything. If a student keeps writing zeros onto the end of a decimal, put the place value strip from page 4 in front of them and have them read the digit in each column before and after, because the argument is settled by the columns and not by the rule.