STANDARD FORM FOR SMALL NUMBERS

BUILDING BLOCKS

NAME _____ CLASS _____ DATE _____

KEY IDEA

$0.1 = 10^{-1}$ $0.01 = 10^{-2}$ $0.001 = 10^{-3}$

So $0.03 = 3 \times 0.01 = 3 \times 10^{-2}$

1 Work out each calculation.

For example, × 0.1 is the same as ÷ 10, so 4 × 0.1 = 4 ÷ 10

a) 4 × 0.1 ☐ b) 7 × 0.01 ☐

c) 2 × 0.001 ☐ d) 6 × 0.0001 ☐

2 Write the missing index in each box.

a) $0.001 = 10^{\square}$ b) $0.000001 = 10^{\square}$ c) $0.0001 = 10^{\square}$

3 Fill in the missing decimals.

a) 0.06 = 6 × ☐

b) 0.009 = 9 × ☐

c) 0.5 = 5 × ☐

4 Work out each division.

a) 3.2 ÷ 10 ☐ b) 3.2 ÷ 100 ☐ c) 3.2 ÷ 1000 ☐

STANDARD FORM FOR SMALL NUMBERS

SUPPORT

NAME _____ CLASS _____ DATE _____

KEY IDEA

Number	Calculation	Standard form
0.4	4×0.1	4×10^{-1}
0.04	4×0.01	4×10^{-2}

A must be at least 1 and less than 10.

1 Complete the table.

Number	Calculation	Standard form
0.006		
	6×0.0001	
		6×10^{-5}

2 Write each number in standard form.

a) 0.7 b) 0.002

c) 0.035 d) 0.00081

3 Write each number as an ordinary number.

a) 9×10^{-2} b) 4.5×10^{-1}

c) 1.2×10^{-3} d) 3×10^{-4}

4 Circle the numbers that are written in standard form.

6×10^{-3} 0.6×10^{-2} 2.75×10^{-1} 47×10^{-4} 1×10^{-6} 10×10^{-2}

STANDARD FORM FOR SMALL NUMBERS

CORE

NAME _____ CLASS _____ DATE _____

KEY IDEA

Small numbers in standard form: $A \times 10^{-n}$ with $1 \leq A < 10$

$0.0068 = 6.8 \times 0.001 = 6.8 \times 10^{-3}$. Keep every digit after the first non-zero one: $0.07002 = 7.002 \times 10^{-2}$

FLUENCY

1 Write each number in standard form.

a) **0.0083** ____ b) **0.00002** ____

c) **0.0609** ____ d) **0.0007015** ____

2 Write each number as an ordinary number.

a) **5.6×10^{-4}** ____ b) **2.08×10^{-2}** ____

c) **7×10^{-6}** ____ d) **9.99×10^{-1}** ____

REASONING

3 Write <, > or = in each box.

a) **4×10^{-2}** ☐ **4×10^{-3}** b) **3.5×10^{-4}** ☐ **0.00035**

c) **9×10^{-5}** ☐ **1×10^{-4}** d) **2×10^{-1}** ☐ **0.02**

4 Read what Leo writes.

Leo writes $0.0039 = 0.39 \times 10^{-2}$

Explain why this is not in standard form and write 0.0039 correctly.

STANDARD FORM FOR SMALL NUMBERS

GREATER DEPTH

NAME _____ CLASS _____ DATE _____

REASONING

1 Is each statement always, sometimes or never true? Circle your answer.

If it is sometimes true, give an example of when it is true and when it is not.

a) $A \times 10^{-3}$ in standard form is less than 0.01 — ALWAYS / SOMETIMES / NEVER

b) A number with a negative index is a negative number. — ALWAYS / SOMETIMES / NEVER

c) $A \times 10^{-2} + B \times 10^{-2} = C \times 10^{-2}$ in standard form. — ALWAYS / SOMETIMES / NEVER

PROBLEM SOLVING

2 Write these numbers in ascending order.

6×10^{-3} | 0.0059 | 5.95×10^{-3} | 6.1×10^{-4}

_____ , _____ , _____ , _____

smallest greatest

3 Here are two widths.

pollen grain ≈ 2.5×10^{-5} m wide **bacterium ≈ 2×10^{-6} m wide**

a) Write the width of the pollen grain as a decimal. _____

b) Which is wider? _____

c) About how many bacteria side by side would stretch across the pollen grain? _____

★ CHALLENGE FOR ALL

4 These numbers are not in standard form. Write each one correctly in standard form.

a) 63×10^{-4} _____

b) 0.2×10^{-6} _____

c) 450×10^{-5} _____

d) Find the number halfway between 2×10^{-3} and 3×10^{-3} _____

STANDARD FORM FOR SMALL NUMBERS

ANSWERS

BUILDING BLOCKS

1 a) 0.4 · b) 0.07 · c) 0.002 · d) 0.0006

2 a) −3 · b) −6 · c) −4

3 a) 0.01 · b) 0.001 · c) 0.1

4 a) 0.32 · b) 0.032 · c) 0.0032

SUPPORT

1 0.006: 6×0.001, 6×10^{-3} · 0.0006: 6×10^{-4} · 0.00006: 6×0.00001

2 a) 7×10^{-1} · b) 2×10^{-3} · c) 3.5×10^{-2} · d) 8.1×10^{-4}

3 a) 0.09 · b) 0.45 · c) 0.0012 · d) 0.0003

4 6×10^{-3}, 2.75×10^{-1} and 1×10^{-6}

CORE

1 a) 8.3×10^{-3} · b) 2×10^{-5} · c) 6.09×10^{-2} · d) 7.015×10^{-4}

2 a) 0.00056 · b) 0.0208 · c) 0.000007 · d) 0.999

3 a) > · b) = · c) < · d) >

4 In standard form the first number must be at least 1 and less than 10, and 0.39 is less than 1. $0.0039 = 3.9 \times 0.001 = 3.9 \times 10^{-3}$

GREATER DEPTH

1 a) Always (A × 10^{-3} is from 0.001 up to, but not including, 0.01) · b) Never, e.g. $3 \times 10^{-2} = 0.03$ is positive · c) Sometimes, e.g. $2 \times 10^{-2} + 3 \times 10^{-2} = 5 \times 10^{-2}$, but $6 \times 10^{-2} + 7 \times 10^{-2} = 1.3 \times 10^{-1}$

2 6.1×10^{-4}, 0.0059, 5.95×10^{-3}, 6×10^{-3}

3 a) 0.000025 m · b) the pollen grain · c) about 12 (12.5)

★ a) 6.3×10^{-3} · b) 2×10^{-7} · c) 4.5×10^{-3} · d) 2.5×10^{-3}