NUMBERS IN STANDARD FORM

BUILDING BLOCKS

NAME _____ CLASS _____ DATE _____

KEY IDEA

The power tells you how many 10s are multiplied together.

$10^3 = 10 \times 10 \times 10 = 1000$

Multiplying by 1000 moves every digit 3 places to the left.

Th	H	T	O
			4
4	0	0	0

× 1000

1 Complete the table of powers of 10.

Power of 10	Multiply	Ordinary number
10^2	10 × 10	100
10^3	10 × 10 × 10	
10^4		
$10^{\square}$		100 000

2 Use the place value chart. Write the digits of each answer in the empty rows.

	Th	H	T	O	t	h	th
3.7				3	7		
3.7 × 100							
3.7 ÷ 100							

× 100: 2 places left

÷ 100: 2 places right

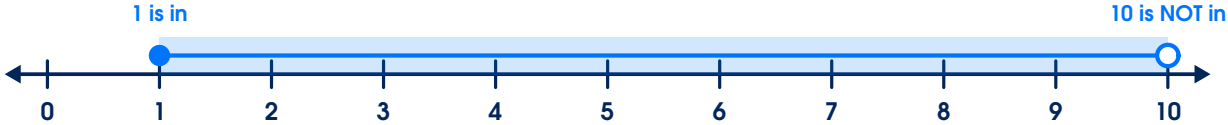
3 Change the power of 10 into an ordinary number first. Then multiply.

a) $6 \times 10^2 = 6 \times 100 =$ ☐

b) $3 \times 10^4 = 3 \times$ ☐ = ☐

c) $7.2 \times 10^3 = 7.2 \times$ ☐ = ☐

4 Circle the numbers that are at least 1 but less than 10 (the shaded part).



4.6 12 0.8 1 9.99 10 7 0.05

NUMBERS IN STANDARD FORM

SUPPORT

NAME _____ CLASS _____ DATE _____

KEY IDEA

4.5×10^3

4.5: at least 1, less than 10 — 10^3: a power of 10

$4500 = 4.5 \times 1000 = 4.5 \times 10^3$

$0.06 = 6 \times 0.01 = 6 \times 10^{-2}$

Small numbers have negative powers.

1 Is each number written in standard form? Write yes or no.

a) 3.1×10^5 ☐ b) 31×10^4 ☐ c) 0.9×10^6 ☐

d) 8×10^{-3} ☐ e) 4.25×10^2 ☐ f) 10×10^2 ☐

2 Write each number as an ordinary number.

a) $8 \times 10^4 = 8 \times$ ☐ $=$ ☐

b) $2.6 \times 10^3 = 2.6 \times$ ☐ $=$ ☐

c) $9 \times 10^{-2} = 9 \times$ ☐ $=$ ☐

d) $1.4 \times 10^{-3} = 1.4 \times$ ☐ $=$ ☐

REMEMBER

$10^1 = 10$

$10^2 = 100$

$10^{-1} = 0.1$

$10^{-2} = 0.01$

$10^{-3} = 0.001$

3 Write each number in standard form.

a) 70 000 $= 7 \times$ ☐ $= 7 \times 10^{\square}$

b) 5300 $= 5.3 \times$ ☐ $= 5.3 \times 10^{\square}$

c) 0.004 $= 4 \times$ ☐ $= 4 \times 10^{\square}$

d) 0.0029 $= 2.9 \times$ ☐ $= 2.9 \times 10^{\square}$

4 Write each number in standard form.

a) About 69 000 000 people live in the UK. ☐

b) A human hair is about 0.00008 m thick. ☐

NUMBERS IN STANDARD FORM

CORE

NAME _____ CLASS _____ DATE _____

KEY IDEA

Standard form is $A \times 10^n$, where $1 \leq A < 10$ and n is an integer.

The power is the number of places the digits move, not the number of zeros.

$57\,000 = 5.7 \times 10^4$ **$0.0031 = 3.1 \times 10^{-3}$**

FLUENCY

1 Write each number as an ordinary number.

a) $3.08 \times 10^5 =$ ____ b) $6.1 \times 10^{-4} =$ ____

c) $9.003 \times 10^6 =$ ____ d) $2 \times 10^{-1} =$ ____

2 Write each number in standard form.

a) 46 200 ____ b) 0.000 705 ____

c) 81.6 ____ d) 0.03 ____

e) seven billion ____ f) 0.4 million ____

REASONING

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

a) 54×10^6 ____ b) 0.72×10^{-3} ____

c) 309×10^2 ____ d) 0.6×10^5 ____

4 Sam has tried to write 68 000 in standard form.

"$68\,000 = 6.8 \times 10^3$, because 68 000 has three zeros."

a) Explain the mistake Sam has made.

.....

.....

b) Write 68 000 correctly in standard form. ____

NUMBERS IN STANDARD FORM

GREATER DEPTH

NAME _____ CLASS _____ DATE _____

REASONING

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

For one 'sometimes' statement, give an example of when it is true and when it is not.

a) A number in standard form with a negative power is less than 1. ALWAYS SOMETIMES NEVER

b) In standard form, the number A can be equal to 10. ALWAYS SOMETIMES NEVER

c) The power in standard form is the same as the number of zeros in the ordinary number. ALWAYS SOMETIMES NEVER

d) A number in standard form with a power of 0 is a whole number. ALWAYS SOMETIMES NEVER

PROBLEM SOLVING

2 Write each amount in standard form.

a) 4 billion ☐ **b)** 0.3 million ☐ **c)** 36 hundredths ☐

3 A bacterium is a tiny living thing.

Length of the bacterium = 2×10^{-6} m

a) Write the length as an ordinary number. ☐

b) How many of these bacteria fit end to end along a 1 cm line? (1 cm = 0.01 m)

Give your answer in standard form. ☐

★ CHALLENGE FOR ALL

4 A number in standard form is 3.6 times a power of 10. Find n. **3.6×10^n**

a) As an ordinary number, it is a whole number with 6 digits. n = ☐

b) As an ordinary number, it starts 0.000... n = ☐

c) Kai multiplies the number by 1000 and gets 0.036. n = ☐

NUMBERS IN STANDARD FORM – ANSWERS

ANSWERS

BUILDING BLOCKS

1) $10^3 = 1000$ · 10^4: $10 \times 10 \times 10 \times 10 = 10\,000$ · $10^5 = 100\,000$
2) 3.7×100: digits 3 7 0 (H T O) · $3.7 \div 100$: 0 . 0 3 7 a) 370 b) 0.037
3) a) 600 b) 10 000, 30 000 c) 1000, 7200
4) Circle 4.6, 1, 9.99 and 7 (not 12, 0.8, 10 or 0.05)

SUPPORT

1) a) yes b) no c) no d) yes e) yes f) no
2) a) 10 000, 80 000 b) 1000, 2600 c) 0.01, 0.09 d) 0.001, 0.0014
3) a) 10 000; 10^4 b) 1000; 10^3 c) 0.001; 10^{-3} d) 0.001; 10^{-3}
4) a) 6.9×10^7 b) 8×10^{-5} m

CORE

1) a) 308 000 b) 0.000 61 c) 9 003 000 d) 0.2
2) a) 4.62×10^4 b) 7.05×10^{-4} c) 8.16×10^1 d) 3×10^{-2} e) 7×10^9 f) 4×10^5
3) a) 5.4×10^7 b) 7.2×10^{-4} c) 3.09×10^4 d) 6×10^4
4) a) The digits move 4 places ($6.8 \times 10^3 = 6800$), not the number of zeros b) 6.8×10^4

GREATER DEPTH

1) a) always b) never c) sometimes ($60\,000 = 6 \times 10^4$; $64\,000 = 6.4 \times 10^4$) d) sometimes ($4 \times 10^0 = 4$; $4.5 \times 10^0 = 4.5$)
2) a) 4×10^9 b) 3×10^5 c) 3.6×10^{-1}
3) a) 0.000 002 m b) $0.01 \div 0.000\,002 = 5000 = 5 \times 10^3$
4) a) n = 5 (360 000) b) n = –4 (0.000 36) c) n = –5