MULTIPLY AND DIVIDE NUMBERS IN STANDARD FORM

BUILDING BLOCKS

NAME _____ CLASS _____ DATE _____

KEY IDEA

To multiply powers of 10, count all the 10s. So add the powers.

$10^2 \times 10^3 = \boxed{10}\boxed{10} \times \boxed{10}\boxed{10}\boxed{10} = 10^5$

2 tens and 3 tens make 5 tens multiplied together.

1 Count the 10s. Write each answer as a power of 10.

a) $10^2 \times 10^4 = \boxed{10}\boxed{10} \times \boxed{10}\boxed{10}\boxed{10}\boxed{10} = 10^{\square}$

b) $10^1 \times 10^3 = \boxed{10} \times \boxed{10}\boxed{10}\boxed{10} = 10^{\square}$

c) $10^5 \div 10^2 = \boxed{10}\boxed{10}\boxed{10}\boxed{\cancel{10}}\boxed{\cancel{10}} = 10^{\square}$

Dividing? Cross out the 10s you take away.

2 Write each answer as a single power of 10.

a) $10^4 \times 10^3 = 10^{\square}$

b) $10^6 \div 10^2 = 10^{\square}$

c) $10^5 \times 10 = 10^{\square}$

d) $10^7 \div 10^4 = 10^{\square}$

$10 = 10^1$
× add
÷ subtract

3 Multiply the numbers first. Then multiply by the power of 10.

a) $3 \times 1000 \times 2 = 3 \times 2 \times 1000 = \square \times 1000 = \square$

b) $5 \times 100 \times 4 = 5 \times 4 \times 100 = \square \times 100 = \square$

c) $6 \times 10^2 \times 3 = 6 \times 3 \times 10^2 = \square \times 10^2$

Any order:
4 × 7
= 7 × 4

4 Divide the number first. The power of 10 stays the same.





8 thousands shared into 2 groups

a) $8000 \div 2 = (8 \div 2) \times 1000 = \square \times 1000 = \square$

b) $6 \times 10^3 \div 3 = (6 \div 3) \times 10^3 = \square \times 10^3$

MULTIPLY AND DIVIDE NUMBERS IN STANDARD FORM

SUPPORT

NAME _____ CLASS _____ DATE _____

KEY IDEA

Multiply the numbers. Add the powers.

$(4 \times 10^5) \times (2 \times 10^3)$

$= (4 \times 2) \times (10^5 \times 10^3)$

$= 8 \times 10^8$

Divide the numbers. Subtract the powers.

$(8 \times 10^6) \div (2 \times 10^2)$

$= (8 \div 2) \times (10^6 \div 10^2)$

$= 4 \times 10^4$

1 Work out each multiplication. Give your answer in standard form.

a) $(3 \times 10^5) \times (2 \times 10^2) = (3 \times 2) \times (10^5 \times 10^2) =$ ☐ $\times 10^{\square}$

b) $(1.5 \times 10^4) \times (3 \times 10^2) = (1.5 \times 3) \times (10^4 \times 10^2) =$ ☐ $\times 10^{\square}$

c) $(2 \times 10^{-3}) \times (4 \times 10^6) = (2 \times 4) \times (10^{-3} \times 10^6) =$ ☐ $\times 10^{\square}$

2 Work out each division. Give your answer in standard form.

a) $(8 \times 10^7) \div (2 \times 10^3) = (8 \div 2) \times (10^7 \div 10^3) =$ ☐ $\times 10^{\square}$

b) $(9 \times 10^6) \div (3 \times 10^4) = (9 \div 3) \times (10^6 \div 10^4) =$ ☐ $\times 10^{\square}$

c) $(6.4 \times 10^5) \div (2 \times 10^2) = (6.4 \div 2) \times (10^5 \div 10^2) =$ ☐ $\times 10^{\square}$

3 Write each number in standard form. Do the opposite to the power of 10.

a) 15×10^4

$15 \xrightarrow{\div 10}$ ☐ $\times$

$10^4 \xrightarrow{\times 10}$ $10^{\square}$

b) 24×10^3

$24 \xrightarrow{\div 10}$ ☐ $\times$

$10^3 \xrightarrow{\square}$ $10^{\square}$

c) 0.5×10^6

$0.5 \xrightarrow{\square}$ ☐ $\times$

$10^6 \xrightarrow{\square}$ $10^{\square}$

4 Work out. Then adjust each answer so it is in standard form.

a) $(5 \times 10^3) \times (4 \times 10^2) =$ ☐ $\times 10^{\square} =$ ☐ $\times 10^{\square}$

b) $(7 \times 10^4) \times (4 \times 10^5) =$ ☐ $\times 10^{\square} =$ ☐ $\times 10^{\square}$

Check: is the first number at least 1 and less than 10?

MULTIPLY AND DIVIDE NUMBERS IN STANDARD FORM

CORE

NAME _____ CLASS _____ DATE _____

KEY IDEA

$(A \times 10^m) \times (B \times 10^n) = (A \times B) \times 10^{m+n}$

$(A \times 10^m) \div (B \times 10^n) = (A \div B) \times 10^{m-n}$

If $A \times B$ or $A \div B$ is not between 1 and 10, adjust: $32 \times 10^4 = 3.2 \times 10^5$

FLUENCY

1 Work out. Give each answer in standard form.

a) $(7 \times 10^5) \times (3 \times 10^4) =$ ____

b) $(2.5 \times 10^{-3}) \times (4 \times 10^8) =$ ____

c) $(9.6 \times 10^8) \div (3 \times 10^2) =$ ____

d) $(2 \times 10^5) \div (8 \times 10^{-2}) =$ ____

2 Give each answer in standard form.

a) A rectangle is 4×10^3 cm by 3×10^{-2} cm. Area = ____ cm^2

b) How many times greater is 6×10^9 than 2×10^3? ____

REASONING

3 Each answer is wrong. Write the correct answer in standard form.

a) $(3 \times 10^6) \times (2 \times 10^4) = 6 \times 10^{24}$ Correct answer: ____

b) $(6 \times 10^8) \div (3 \times 10^{-2}) = 2 \times 10^6$ Correct answer: ____

c) $(5 \times 10^4) \times (6 \times 10^3) = 30 \times 10^7$ Correct answer: ____

4 Kai says these two calculations give the same answer. Is he correct? Work out both to explain.

$4 \times 10^6 \div 2 \times 10^3$ and $(4 \times 10^6) \div (2 \times 10^3)$

MULTIPLY AND DIVIDE NUMBERS IN STANDARD FORM

GREATER DEPTH

NAME _____ CLASS _____ DATE _____

REASONING

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

Give an example for one 'sometimes' statement.

a) Multiplying: the answer's power is the sum of the powers. ALWAYS SOMETIMES NEVER

b) Dividing gives a smaller power than the first number has. ALWAYS SOMETIMES NEVER

c) Squaring a number in standard form doubles its power. ALWAYS SOMETIMES NEVER

d) Multiplying by 10^{5}, then by 10^{-5}, changes nothing. ALWAYS SOMETIMES NEVER

PROBLEM SOLVING

2 Use the values of a and b. Give each answer in standard form.

$a = 6 \times 10^{5}$ $b = 3 \times 10^{-2}$

a) $ab =$ ☐ b) $a \div b =$ ☐ c) $b^{2} =$ ☐

3 A computer is doing calculations. Give each answer in standard form.

It does 4×10^{9} calculations every second. **1 hour = 3.6×10^{3} seconds**

a) How many calculations does it do in one hour? ☐

b) How many seconds does it take to do 2×10^{12} calculations? ☐

★ CHALLENGE FOR ALL

4 Every number below is in standard form. Fill in the missing numbers.

a) $(\square \times 10^{4}) \times (5 \times 10^{\square}) = 4 \times 10^{9}$

b) $(6 \times 10^{\square}) \div (\square \times 10^{-3}) = 2.4 \times 10^{7}$

c) $(\square \times 10^{\square})^{2} = 4.9 \times 10^{11}$

MULTIPLY AND DIVIDE NUMBERS IN STANDARD FORM – ANSWERS

ANSWERS

BUILDING BLOCKS

1) a) 10^6 b) 10^4 c) 10^3
2) a) 10^7 b) 10^4 c) 10^6 d) 10^3
3) a) 6, 6000 b) 20, 2000 c) 18, so 18×10^2 (= 1800)
4) a) 4, 4000 b) 2, so 2×10^3

SUPPORT

1) a) 6×10^7 b) 4.5×10^6 c) 8×10^3
2) a) 4×10^4 b) 3×10^2 c) 3.2×10^3
3) a) 1.5×10^5 b) 2.4×10^4 c) 5×10^5 (× 10 on the left, ÷ 10 on the right)
4) a) $20 \times 10^5 = 2 \times 10^6$ b) $28 \times 10^9 = 2.8 \times 10^{10}$

CORE

1) a) 2.1×10^{10} b) 1×10^6 c) 3.2×10^6 d) 2.5×10^6
2) a) 1.2×10^2 cm^2 b) 3×10^6 times
3) a) 6×10^{10} b) 2×10^{10} c) 3×10^8 d) The powers were multiplied; they should be added
4) No. $4 \times 10^6 \div 2 \times 10^3 = 2 \times 10^9$, but $(4 \times 10^6) \div (2 \times 10^3) = 2 \times 10^3$. Brackets are needed.

GREATER DEPTH

1) a) sometimes ($5 \times 10^3 \times 4 \times 10^2 = 2 \times 10^6$) b) sometimes ($(8 \times 10^3) \div (2 \times 10^{-1}) = 4 \times 10^4$) c) sometimes ($(4 \times 10^2)^2 = 1.6 \times 10^5$) d) always
2) a) 1.8×10^4 b) 2×10^7 c) 9×10^{-4}
3) a) 1.44×10^{13} b) 5×10^2 seconds
4) a) 8 and 4 b) 4 and 2.5 c) 7 and 5