

3E-18 Monday 3-31-08

Practice: multiplying and dividing by powers of 10
(NO CALCULATORS)

① $16 \div 10 =$

② $24 \cdot 10 =$

③ $480 \div 100 =$

④ $2642 \cdot 1000 =$

⑤ $0.41 \div 10 =$

⑥ $0.000065 \cdot 1000000 =$

⑦ $1000 \div 1000 =$

⑧ $1000 \cdot 1000 =$

⑨ $10^3 \cdot 10^{-3} =$

⑩ $10^3 \cdot 10^3 =$

It is very easy in our base 10 number system to multiply and divide by powers of 10. There is a notation used to show (and use) very small or very large numbers that takes advantage of this, it is called Scientific Notation.

$$\text{Ex) } 1000 = 1.0 \times 10^3$$

$$1000000 = 1.0 \times 10^6$$

$$0.0001 = 1.0 \times 10^{-4}$$

$$1 \cdot 1000$$

$$1 \cdot 1000000$$

$$1 \cdot \frac{1}{10000}$$

$$\boxed{a \times 10^N}$$

SCIENTIFIC NOTATION

WHERE $1 \leq a < 10$

AND N IS AN INTEGER

* ONLY CASE WHERE "X" MEANS MULTIPLY IN ALGEBRA

STANDARD NOTATION to Scientific NOTATION

EX)

30,500,000

EX2
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↑
Find decimal place, count places to left until number is between 1 and 10 (1 is OK, 10 is not).

30,500,000.
↑ ↑ ↑ ↑ ↑ ↑ ↑
7 6 5 4 3 2 1

$$3.05 \times 10^7$$

→ N is how many places you counted to the left, since you made the number smaller by 10^7 , you must multiply 3.05 by 10^7 to keep it the same.
or $3.05E7$ on a calculator.

EX)

5063

$$5.063 \times 10^3$$

EX)

650000

$$6.5 \times 10^5$$

EX)

26

$$2.6 \times 10^1$$

(EX)

0.000781

EX2
PS426

↑

COUNT TO RIGHT UNTIL NUMBER IS BETWEEN
1 AND 10 (1 IS OK, 10 IS NOT)0.000781
1 2 3 4

$$7.81 \times 10^{-4}$$

← since you counted over
4 places you made the
number bigger by 10^4 ,
so to keep it the same
you multiply by $\frac{1}{10^4} = 10^{-4}$

(EX)

0.023

$$2.3 \times 10^{-2}$$

(EX)

0.0000014

$$1.4 \times 10^{-6}$$

OR $1.4E-6$
ON A CALCULATOR

In Scientific Notation, small numbers have
negative exponents, large number have positive
exponents.

Scientific Notation to Standard Notation

(EX1)

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$$2.45 \times 10^8$$

positive exponent means
"make the number bigger
by 8 decimal places"

$$2.45 \underbrace{00000000}_{1\ 2\ 3\ 4\ 5\ 6\ 7\ 8} = \boxed{245,000,000.0}$$

Note: move 2 places to get to 245
then add 6 zeros

(EX)

$$6.2 \times 10^4$$

$$\boxed{62000}$$

(EX)

$$5.308 \times 10^3$$

$$\boxed{5308}$$

(EX1)
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$$3 \times 10^{-5}$$

Negative exponent means
make number smaller by
5 decimal places

$$3.0 \times 10^{-5}$$

↑

FIND decimal place

↑ ↑ ↑ ↑ ↑ 3.0
1 2 3 4 5

COUNT 1 to the left to
get to .3, then add
4 zeros

.00003 or 0.00003

(EX) 2×10^{-2}

.02

(EX) 5.06×10^{-6}

.00000506

• Read Ch 8-3 • Pg 428 # 2, 4 to 11.