

Name: Key

Assignment 2: Scientific Notation and Unit Analysis

A. Scientific Notation to Know

1 thousand = 10^3 10 thousand = 10^4 million = 10^6 billion = 10^9 trillion = 10^{12}

Metric Units You Must Know

1 m	100 cm or 10^2
1m	1000 mm or 10^3
10^3 m or 10^3	1km
10^6 m	1Mm
10^9 m	1Gm
1mL	1 cm ³

B. Scientific Notation in Practice

Place the following numbers into scientific notation.

1. one billion

1×10^9 or just 10^9

2. twenty three thousand

23×10^3 or 2.3×10^4

3. 70 trillion

70×10^{12} or 7.0×10^{13}

Do the following calculations in scientific notation. * Add exponents when multiplying and subtract when dividing

4. five hundred billion times thirty five thousand

typo \rightarrow ~~billion~~ 500×10^9
 or $(5 \times 10^{11}) \times (35 \times 10^3) = 175 \times 10^{14}$

5. six thousand divided by 300

$\frac{6000}{300} = 20$ or $\frac{6 \times 10^3}{3 \times 10^2} = 2 \times 10^1 = 20$

6. one ten thousandth of three million

so divide by 10^4 or multiply by 10^{-4}
 $\frac{3 \times 10^6}{10^4} = 3 \times 10^2$ or 300

C. Metric Conversions

Things to remember: No calculator and must show work. The most common problem type is unit analysis. can also do basic metric conversions by moving decimal

1. Example: How many centimeters in 5.0m? (1inch = 2.54cm)

$5.0m \times \frac{100cm}{m} = 500cm$

2. 14000 millimeters = ? meters

14m

3. 6544 liters = ? milliliters

$6,544 \times 10^3 mL$ or $6.544 \times 10^6 mL$

4. 0.078 kilometers = ? meters

78m

5. 0.17 grams = ? kilograms

.017 kg

6. Expand the following:

a. 2.96×10^7

~~2.9600000~~ $29,600,000$

b. 0.00602×10^{-3}

~~0.00602~~ $.00602$

6. Put the following in scientific notation:

a. 0.025

2.5×10^{-2}

b. 150000

1.5×10^6

c. 6.67×10^{-11}
 $.0000000000667$

d. 9.8×10^5
 $980,000$

c. 0.0000550
 5.50×10^{-5}

d. 6070
 6.070×10^3

7. Perform the following calculations without a calculator and write the answers in scientific notation:

a. $(2.96 \times 10^7) + (1.0 \times 10^7) = 3.96 \times 10^7$

b. $(6.0 \times 10^8) \div (3.0 \times 10^4) = 2.0 \times 10^2$

c. $(2 \times 10^5) \times (3 \times 10^{10}) = 6 \times 10^{15}$

d. $(8.0 \times 10^{12}) - (1.2 \times 10^{11}) = 7.9 \times 10^{12}$
 $.12 \times 10^{12}$

8. Perform the following calculations without a calculator and write the answers in scientific notation:

a. $(2.96 \times 10^7) + (1.0 \times 10^8) = 1.3 \times 10^8$
 $(.296 \times 10^8)$

b. $(6.0 \times 10^8) \div (3.0 \times 10^4) = 2.0 \times 10^2$

c. $(2 \times 10^5) \times (3 \times 10^{-10}) = 6 \times 10^{-5}$

D. Unit Analysis

More to remember: What units are area? What units are volume? How do you use the metric prefixes above to convert?

Given: 1 square mile = 640 acres, 1 hectare = 2.5 acre, 1 km = .6 mi, 1 football field = 1 hectare

Examples:

1. How many cubic cm in a cubic meter?

2. How many gallons in 1.0m³? (1.0 L = .25 gallons)

3. A 100 square mile area of national forest is how many acres? How many hectares?