

Using Your CALCULATOR

Using a calculator simplifies performing arithmetic operations on numbers in scientific notation.

$$4.0 \times 10^{-6} \text{ kg} - 3.0 \times 10^{-7} \text{ kg}$$

Keys

$$\boxed{4.0} \boxed{\text{EXP}} \boxed{6} \boxed{+/-} \boxed{-}$$

Answer

$$4.06$$

$$\boxed{3.0} \boxed{\text{EXP}} \boxed{7} \boxed{+/-} \boxed{=}$$

$$3.76$$

$$3.7 \times 10^{-6} \text{ kg}$$

$$\frac{8 \times 10^6 \text{ m}}{2 \times 10^{-2} \text{ s}}$$

$$\boxed{8} \boxed{\text{EXP}} \boxed{6} \boxed{+}$$

$$8.06$$

$$\boxed{2} \boxed{\text{EXP}} \boxed{2} \boxed{+/-} \boxed{=}$$

$$4.08$$

$$4 \times 10^8 \text{ m/s}$$

Example Problem

Adding and Subtracting with Like Exponents

a. $4 \times 10^8 \text{ m} + 3 \times 10^8 \text{ m} = 7 \times 10^8 \text{ m}$

b. $6.2 \times 10^{-3} \text{ m} - 2.8 \times 10^{-3} \text{ m} = 3.4 \times 10^{-3} \text{ m}$

If the powers of ten are not the same, they must be made the same before the numbers are added or subtracted. Move the decimal points until the exponents are the same.

Example Problem

Adding and Subtracting with Unlike Exponents

a. $4.0 \times 10^6 \text{ m} + 3 \times 10^5 \text{ m}$

$$= 4.0 \times 10^6 \text{ m} + 0.3 \times 10^6 \text{ m} = 4.3 \times 10^6 \text{ m}$$

b. $4.0 \times 10^{-6} \text{ kg} - 3 \times 10^{-7} \text{ kg}$

$$= 4.0 \times 10^{-6} \text{ kg} - 0.3 \times 10^{-6} \text{ kg} = 3.7 \times 10^{-6} \text{ kg}$$

Suppose you have to add a measurement made in meters to one made in kilometers. You first must convert the measurements to a common unit, then make the power of ten the same. Finally you add or subtract.

Example Problem

Adding and Subtracting with Unlike Units

a. $4.1 \text{ m} + 1.5468 \text{ km} = 4.1 \text{ m} + 1546.8 \text{ m}$

$$= 1550.9 \text{ m} = 1.5509 \text{ km}$$

b. $2.31 \times 10^{-2} \text{ g} + 6.1 \text{ mg} = 23.1 \text{ mg} + 6.1 \text{ mg} = 29.2 \text{ mg}$

c. $2.03 \times 10^2 \text{ m} + 1.057 \text{ km} = 2.03 \times 10^2 \text{ m} + 10.57 \times 10^2 \text{ m}$

$$= 12.60 \times 10^2 \text{ m} = 1.260 \text{ km}$$

Practice Problems

Solve the following problems. Express your answers in scientific notation.

6. a. $5 \times 10^{-7} \text{ kg} + 3 \times 10^{-7} \text{ kg}$

b. $4 \times 10^{-3} \text{ kg} + 3 \times 10^{-3} \text{ kg}$

c. $1.66 \times 10^{-19} \text{ kg} + 2.30 \times 10^{-19} \text{ kg}$

d. $7.2 \times 10^{-12} \text{ kg} - 2.6 \times 10^{-12} \text{ kg}$

7. a. $6 \times 10^{-8} \text{ m}^2 - 4 \times 10^{-8} \text{ m}^2$

b. $3.8 \times 10^{-12} \text{ m}^2 - 1.90 \times 10^{-11} \text{ m}^2$

c. $5.8 \times 10^{-9} \text{ m}^2 - 2.8 \times 10^{-9} \text{ m}^2$

d. $2.26 \times 10^{-18} \text{ m}^2 - 1.80 \times 10^{-18} \text{ m}^2$

► 8. a. $5.0 \times 10^{-7} \text{ mg} + 4 \times 10^{-8} \text{ mg}$

b. $6.0 \times 10^{-3} \text{ mg} + 2 \times 10^{-4} \text{ mg}$

c. $3.0 \times 10^{-2} \text{ pg} - 2 \times 10^{-6} \text{ ng}$

d. $8.2 \text{ km} - 3 \times 10^2 \text{ m}$