

## CALCULATOR SKILLS

These problems are designed to give you practice using your calculator in operations with scientific notation. Report your answers in proper scientific notation. (Do not be concerned about significant figures now. You can go back and to this later after we've covered it in Chapter 2.)

### 1. **Multiply:**

a)  $(6.1 \times 10^{13}) \times (4.532 \times 10^7) =$

b)  $(9.876 \times 10^{-9}) \times (1.13874 \times 10^{-8}) =$

c)  $(8.71 \times 10^{-15}) \times (4.65 \times 10^8) =$

d)  $(-5.39 \times 10^8) \times (2.157823 \times 10^{-5}) =$

e)  $(0.00013805) \times (3.77461 \times 10^{12}) =$

### 2. **Divide:**

a)  $(1.987052 \times 10^3) \div (3.678991 \times 10^6) =$

b)  $(3.753 \times 10^{-7}) \div (2.39 \times 10^{-14}) =$

c)  $(8.94523 \times 10^5) \div (6.2439 \times 10^{-9}) =$

d)  $(5.679 \times 10^{-12}) \div (2.997104 \times 10^5) =$

e)  $(-6.029 \times 10^{-6}) \div (1.03 \times 10^{-7}) =$

### 3. **Add:**

a)  $(1.23 \times 10^4) + (9.876 \times 10^3) =$

b)  $(1.23 \times 10^2) + (9.876 \times 10^{-1}) =$

c)  $(4.9921 \times 10^{-2}) + (7.06182 \times 10^2) =$

d)  $(1.03724 \times 10^{-9}) + (9.913 \times 10^{-11}) =$

e)  $(1.97236 \times 10^{-23}) + (8.7110 \times 10^{-23}) =$

**OVER . . .**

4. **Subtract:**

a)  $(1.2317 \times 10^4) - (9.876 \times 10^3) =$

b)  $(4.8639 \times 10^2) - (6.115 \times 10^{-1}) =$

c)  $(7.10550 \times 10^{-3}) - (1.625 \times 10^2) =$

d)  $(1.025611 \times 10^{-17}) - (9.9813 \times 10^{-18}) =$

e)  $(6.3925 \times 10^{-10}) - (2.38 \times 10^{-14}) =$

5. **Mixed Mode:**

a)  $(5.159 + 8.23 \times 10^1) \times (2.4 \times 10^{-2} + 3.00) =$

b)  $(456 \times 8.271 \times 10^{-3}) + 7.416 =$

c) 
$$\frac{(49.82 + 75.97)(3.8462 \times 10^3)}{(9.21110 \times 10^{-2})} =$$

## CALCULATOR SKILLS - ANSWERS

The first answer is the number I got from my calculator, to several decimal places. The second answer contains the proper number of significant figures. (Do not be concerned about significant figures now. You can go back and to this later after we've covered it in Chapter 2.)

### 1. **Multiply:**

$$\text{a) } (6.1 \times 10^{13}) \times (4.532 \times 10^7) = 2.76452 \times 10^{21} = 2.8 \times 10^{21}$$

$$\text{b) } (9.876 \times 10^{-9}) \times (1.13874 \times 10^{-8}) = 1.1246196 \times 10^{-16} = 1.125 \times 10^{-16}$$

$$\text{c) } (8.71 \times 10^{-15}) \times (4.65 \times 10^8) = 4.05015 \times 10^{-6} = 4.05 \times 10^{-6}$$

$$\text{d) } (-5.39 \times 10^8) \times (2.157823 \times 10^{-5}) = -1.1630666 \times 10^4 = -1.16 \times 10^4$$

$$\text{e) } (0.00013805) \times (3.77461 \times 10^{12}) = 5.2108491 \times 10^8 = 5.2108 \times 10^8$$

### 2. **Divide:**

$$\text{a) } (1.987052 \times 10^3) \div (3.678991 \times 10^6) = 5.4010787 \times 10^{-4} = 5.401079 \times 10^{-4}$$

$$\text{b) } (3.753 \times 10^{-7}) \div (2.39 \times 10^{-14}) = 1.5702929 \times 10^7 = 1.57 \times 10^7$$

$$\text{c) } (8.94523 \times 10^5) \div (6.2439 \times 10^{-9}) = 1.4326351 \times 10^{14} = 1.4326 \times 10^{14}$$

$$\text{d) } (5.679 \times 10^{-12}) \div (2.997104 \times 10^5) = 1.8948291 \times 10^{-17} = 1.895 \times 10^{-17}$$

$$\text{e) } (-6.029 \times 10^{-6}) \div (1.03 \times 10^{-7}) = -5.8533981 \times 10^1 = -5.85 \times 10^1$$

### 3. **Add:**

$$\text{a) } (1.23 \times 10^4) + (9.876 \times 10^3) = 2.2176 \times 10^4 = 2.22 \times 10^4$$

$$\text{b) } (1.23 \times 10^2) + (9.876 \times 10^{-1}) = 1.239876 \times 10^2 = 1.24 \times 10^2$$

$$\text{c) } (4.9921 \times 10^{-2}) + (7.06182 \times 10^2) = 7.0623192 \times 10^2 = 7.06232 \times 10^2$$

$$\text{d) } (1.03724 \times 10^{-9}) + (9.913 \times 10^{-11}) = 1.13637 \times 10^{-9}$$

$$\text{e) } (1.97236 \times 10^{-23}) + (8.7110 \times 10^{-23}) = 1.068336 \times 10^{-22} = 1.06834 \times 10^{-22}$$

### 4. **Subtract:**

$$\text{a) } (1.2317 \times 10^4) - (9.876 \times 10^3) = 2.441 \times 10^3$$

$$\text{b) } (4.8639 \times 10^2) - (6.115 \times 10^{-1}) = 4.857785 \times 10^2 = 4.8578 \times 10^2$$

**OVER ...**

$$c) (7.10550 \times 10^{-3}) - (1.625 \times 10^2) = -1.6249589 \times 10^2 = -1.625 \times 10^2$$

$$d) (1.025611 \times 10^{-17}) - (9.9813 \times 10^{-18}) = 2.7481 \times 10^{-19} = 2.748 \times 10^{-19}$$

$$e) (6.3925 \times 10^{-10}) - (2.38 \times 10^{-14}) = 6.392262 \times 10^{-10} = 6.3923 \times 10^{-10}$$

**NOTE:** The number of significant figures in addition and subtraction is governed by the decimal place and not the lowest number of significant figures present in a problem. Therefore, the number of significant figures may at times increase or decrease from those shown in a given problem/calculation. This is demonstrated by the following examples:

$$3 c. \quad (4.9921 \times 10^{-2}) + (7.06182 \times 10^2) = 7.06232 \times 10^2$$

Although  $4.9921 \times 10^{-2}$  has only 4 significant figures after the decimal place, the answer is reported with 5. This can really only be seen if the numbers are used with the same exponential terms (same power of 10):

$$\begin{array}{r} \underline{7.06182} \quad \times 10^2 \quad \text{Keep the \# with the greater exponential term.} \\ + \underline{0.00049921} \times 10^2 \quad \text{Converted from } 10^{-2} \text{ to } 10^2. \\ \hline 7.06231921 \times 10^2 \quad \text{5 places after the decimal place are significant since this is the last place common} \\ \text{to both numbers and the answer is rounded to: } \mathbf{7.06232} \times 10^2 \end{array}$$

### 5. Mixed Mode:

$$a) \quad (5.159 + 8.23 \times 10^1) \times (2.4 \times 10^{-2} + 3.00) = 264.476 = 264$$

$$\begin{array}{r} 5.159 \\ + \underline{82.3} \\ \hline 87.459 \end{array} \qquad \begin{array}{r} 3.00 \\ + \underline{0.024} \\ \hline 3.024 \end{array}$$

Both of these sums are good to 3 significant figures which lets you report the product to 3 significant figures = **264**

$$b) \quad (456 \times 8.271 \times 10^{-3}) + 7.416 =$$

$$3.771576 \quad + \quad 7.416 = 11.187576 = 11.19 \quad (4 \text{ s.f.})$$

3 s.f.                      4 s.f.  
(2<sup>nd</sup> decimal place)    (3<sup>rd</sup> decimal place)

In the addition, the 2<sup>nd</sup> decimal place (100<sup>th</sup> place) is common to both numbers so the answer can only be reported to the 2<sup>nd</sup> decimal place.

$$c) \quad \frac{(49.82 + 75.97) (3.8462 \times 10^3)}{(9.21110 \times 10^{-2})}$$

$$\begin{array}{r} 49.82 \\ + \underline{75.97} \\ \hline 125.79 \end{array} \qquad \begin{array}{r} 5 \text{ s.f.} \quad 5 \text{ s.f.} \\ (125.79) (3.8462 \times 10^3) \\ \hline (9.21110 \times 10^{-2}) \\ 6 \text{ s.f.} \end{array} = 5.252505108 \times 10^6$$

5 s.f. (gained 1 s.f. in the addition -  
added 2 numbers with 4 s.f.  
got a number with 5 s.f.)

(round to 5 s.f.)  
(using mult/div rule)

$$= 5.2525 \times 10^6$$