

Series: Mathematics - from zero to engineer (17).

Arithmetic: Review exercises III

Find the value of each of the following numbers, correct to three decimal places.

a) $11^{\frac{1}{4}} = 1,821$

b) $\sqrt[4]{3} = 3^{\frac{1}{4}} = 1,170$

c) $(-81)^{\frac{1}{5}} = -2,408$

d) $(-81)^{\frac{1}{4}}$ = does not exist.

Express in scientific notation.

a) $537,6 = 5,376 \cdot 10^2$

b) $0,364 = 3,64 \cdot 10^{-1}$

c) $4902 = 4,902 \cdot 10^3$

d) $0,000125 = 1,25 \cdot 10^{-4}$

Convert to engineering notation.

a) $6,147 \cdot 10^7 = 61,47 \cdot 10^{-1} \cdot 10^7 = 61,47 \cdot 10^6$

b) $2,439 \cdot 10^{-4} = 243,9 \cdot 10^{-2} \cdot 10^{-4} = 243,9 \cdot 10^{-6}$

c) $5,286 \cdot 10^5 = 528,6 \cdot 10^{-2} \cdot 10^5 = 528,6 \cdot 10^3$

d) $4,371 \cdot 10^{-7} = 437,1 \cdot 10^{-2} \cdot 10^{-7} = 437,1 \cdot 10^{-9}$

Calculate the following product, giving the result in both scientific notation and engineering notation.

$$(6,43 \cdot 10^3)(7,35 \cdot 10^4) = 6,43 \cdot 7,35 \cdot 10^3 \cdot 10^4 = 47,2605 \cdot 10^7$$

$$4,72605 \cdot 10^1 \cdot 10^7 = 4,72605 \cdot 10^8$$

scientific notation

$$472,605 \cdot 10^{-1} \cdot 10^7 = 472,605 \cdot 10^6$$

engineering notation.

Each of the following parts contains numbers obtained from measurements.

Perform the calculations, maintaining the appropriate degree of accuracy.

a) $18,4^{16} \cdot 0,01 = 105,6108448 \cdot 0,01 = 1,056108448 \approx 1$

one significant figure

one significant figure

b) $\frac{7,632 \cdot 2,14 - 8,32 : 1,1}{16,04} = \frac{16,33248 - 7,56(36)}{16,04} = \frac{8,768844}{16,04} =$

$= 0,5466860349 \approx 0,55 \rightarrow$ two significant figures

Express the following numbers in the decimal number system.

a) $1111,11_2 = 15,75_{10}$

$$\begin{array}{r} 1 \\ \cdot 2 \\ \hline 2 \end{array} \quad \begin{array}{r} 1 \\ + 2 \\ \hline 3 \\ \cdot 2 \\ \hline 6 \end{array} \quad \begin{array}{r} 1 \\ + 6 \\ \hline 7 \\ \cdot 2 \\ \hline 14 \end{array} \quad \begin{array}{r} 1 \\ + 14 \\ \hline 15 \end{array} \quad \begin{array}{r} 1 \\ \cdot 2 \\ \hline 2 \end{array} \quad \begin{array}{r} 1 \\ + 2 \\ \hline 3 \end{array}$$

$$3 \cdot 2^{-2} = 3 \cdot \frac{1}{4} = \frac{3}{4} = 0,75$$

b) $777,701_8 = 511,877_{10}$

$$\begin{array}{r} 7 \\ \cdot 8 \\ \hline 56 \end{array} \quad \begin{array}{r} 7 \\ + 56 \\ \hline 63 \\ \cdot 8 \\ \hline 504 \end{array} \quad \begin{array}{r} 7 \\ + 504 \\ \hline 511 \end{array} \quad \begin{array}{r} 7 \\ \cdot 8 \\ \hline 56 \end{array} \quad \begin{array}{r} 0 \\ + 56 \\ \hline 56 \\ \cdot 8 \\ \hline 448 \end{array} \quad \begin{array}{r} 1 \\ + 448 \\ \hline 449 \end{array}$$

$$449 \cdot 8^{-3} = 449 \cdot \frac{1}{512} = \frac{449}{512} = 0,877$$

c) $3\Lambda 3,9\Lambda 1_{12} = 567,827_{10}$

$$\begin{array}{r} 3 \\ \cdot 12 \\ \hline 36 \end{array} \quad \begin{array}{r} 11 \\ + 36 \\ \hline 47 \\ \cdot 12 \\ \hline 564 \end{array} \quad \begin{array}{r} 3 \\ + 564 \\ \hline 567 \end{array} \quad \begin{array}{r} 9 \\ \cdot 12 \\ \hline 108 \end{array} \quad \begin{array}{r} 11 \\ + 108 \\ \hline 119 \\ \cdot 12 \\ \hline 1428 \end{array} \quad \begin{array}{r} 1 \\ + 1428 \\ \hline 1429 \end{array}$$

$$1429 \cdot 12^{-3} = 1429 \cdot \frac{1}{1728} = \frac{1429}{1728} = 0,827$$

d) $E02, FAB_{16} = 3586,979_{10}$

$$\begin{array}{r} 14 \\ \cdot 16 \\ \hline 224 \end{array} \quad \begin{array}{r} 0 \\ + 224 \\ \hline 224 \\ \cdot 16 \\ \hline 3584 \end{array} \quad \begin{array}{r} 2 \\ + 3584 \\ \hline 3586 \end{array} \quad \begin{array}{r} 15 \\ \cdot 16 \\ \hline 240 \end{array} \quad \begin{array}{r} 10 \\ + 240 \\ \hline 250 \\ \cdot 16 \\ \hline 4000 \end{array} \quad \begin{array}{r} 11 \\ + 4000 \\ \hline 4011 \end{array}$$

$$4011 \cdot 16^{-3} = 4011 \cdot \frac{1}{4096} = \frac{4011}{4096} = 0,979$$

Convert $19,872_{10}$ to its equivalent forms in the octal, duodecimal, and hexadecimal system.

$19,872_{10} = 23,676_8 = 13,D F_{16} = 17,X57_{12}$

remainder

$$\begin{array}{r} 19 : 8 \\ 2 : 8 \\ 0 \end{array} \quad \begin{array}{c} 3 \uparrow \\ 2 \end{array}$$

$$\begin{array}{r} 0,872 \cdot 8 \\ 6,976 \cdot 8 \\ 7,808 \cdot 8 \\ 6,464 \cdot 8 \\ 3,712 \end{array}$$

$$\begin{array}{cccccc} 010 & 011 & 110 & 111 & 110 \\ 2 & 3 & 6 & 7 & 6 \end{array}$$

$$\begin{array}{cccccc} 0001 & 0011 & 1101 & 1111 & 0000 \\ 1 & 3 & D & F & 0 \end{array}$$

remainder

13 : 12
1 : 12
0

↑ 7
1

↓
0,872 · 12
10,464 · 12
5,568 · 12
6,816 · 12
9,792