

Ch. 1 Problem Set

25. How many significant figures are in each of the following?
- 12
 - 1098
 - 2001
 - 2.001×10^3
 - 0.0000101
 - 1.01×10^{-5}
 - 1000.
 - 22.04030
28. Use exponential notation to express the number 480 to
- one significant figure
 - two significant figures
 - three significant figures
 - four significant figures
29. Perform the following mathematical operations, and express each result to the correct number of significant figures.
- $97.381 + 4.2502 + 0.99195$
 - $171.5 + 72.915 - 8.23$
 - $1.00914 + 0.87104 + 1.2012$
 - $21.901 - 13.21 - 4.0215$
30. Perform the following mathematical operations, and express each result to the correct number of significant figures.
- $$\frac{0.102 \times 0.0821 \times 273}{1.01}$$
 - $0.14 \times 6.022 \times 10^{23}$
 - $4.0 \times 10^4 \times 5.021 \times 10^{-3} \times 7.34993 \times 10^2$
 - $$\frac{2.00 \times 10^6}{3.00 \times 10^{-7}}$$
31. Perform the following mathematical operations, and express each result to the correct number of significant figures.
- $4.184 \times 100.62 \times (25.27 - 24.16)$
 - $$\frac{8.925 - 8.904}{8.925} \times 100$$

(This type of calculation is done many times in calculating a percentage error. Assume that this example is such a calculation; thus 100 can be considered to be an exact number.)
 - $(9.04 - 8.23 + 21.954 + 81.0) \div 3.1416$
 - $$\frac{9.2 \times 100.65}{8.321 + 4.026}$$
 - $0.1654 + 2.07 - 2.114$
 - $8.27(4.987 - 4.962)$
 - $$\frac{9.5 + 4.1 + 2.8 + 3.175}{4}$$

(Assume that this operation is taking the average of four numbers. Thus 4 in the denominator is exact.)
 - $$\frac{9.025 - 9.024}{9.025} \times 100 \text{ (100 is exact)}$$

Density

53. The density of aluminum is 2.70 g/cm^3 . Express this value in units of kilograms per cubic meter and pounds per cubic foot.
54. A material will float on the surface of a liquid if the material has a density less than that of the liquid. Given that the density of water is approximately 1.0 g/mL , will a block of material having a volume of $1.2 \times 10^4 \text{ in}^3$ and weighing 350 lb float or sink when placed in a reservoir of water?
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55. A star is estimated to have a mass of $2 \times 10^{36} \text{ kg}$. Assuming it to be a sphere of average radius $7.0 \times 10^5 \text{ km}$, calculate the average density of the star in units of grams per cubic centimeter.
56. A rectangular block has dimensions $2.9 \text{ cm} \times 3.5 \text{ cm} \times 10.0 \text{ cm}$. The mass of the block is 615.0 g . What are the volume and density of the block?
82. Calculate the percentage error for each case:
- The density of an aluminum block determined in an experiment was 2.64 g/cm^3 . (True value is 2.70 g/cm^3 .)
 - The experimental determination of iron in iron ore was 16.48% . (True value 16.12%)