PRECISION, ERROR, & ACCURACY

1. A student measures the acceleration due to gravity and finds it to be 9.72 m/s^2. What is his percentage error (or percentage deviation), if the accepted value is 9.81 m/s^2?
2. When determining Planck's constant, a student's measurements produce values of 5.78×10^{-34} J·s & 7.29×10^{-34} J·s. If the accepted value is 6.63×10^{-34} J·s, what is
   (a) the percentage difference for the measured values?
   (b) the percentage error for each value?

ROUNDING, SCIENTIFIC NOTATION, & SIGNIFICANT DIGITS

3. State the number of significant digits in each of the following.
   (a) 908 (b) 70.600 (c) 0.0050
   (d) 0.010 (e) 760 (f) 0.000 000 000 69
4. Express each of the following in scientific notation.
   (a) 6807 (b) 0.000 053 (c) 5200
   (d) 0.000 000 000 813 (e) 6.8 (f) 4 000 000 000
5. Express each of the following in common notation.
   (a) $7x10^1$ (b) 5.2×10^3 (c) 8.3×10^9
   (d) 10.1×10^{-2} (e) 6.3868×10^3 (f) 4.086×10^{-3}
6. Perform the following mathematical operations, expressing the answers to the correct number of significant digits.
   (a) 463.66 + 29.2 + 0.17 (b) 426.66 - 39.2 (c) (2.6)(42.2)
   (d) (65)(0.041)(325) (e) (0.0060)(26)(55.1) (f) 650 ÷ 4.0
   (g) 0.452 ÷ 0.012 (h) 3.5^2 (i) $\sqrt{4.9}$
7. If a gold atom is considered to be a cube with sides 2.5×10^{-9} m, how many gold atoms could stack on top of one another in a piece of gold foil with a thickness of 1.0×10^{-7} m?
8. On the average, 1.0 kg of aluminum consists of 2.2×10^{25} atoms. How many atoms would there be in a block of aluminum with a mass of 653 g.
9. There are approximately 1.0×10^{11} stars in our galaxy. If the average mass of a star and its planets is 2.0×10^{30} kg, what is the approximate mass of our galaxy?
10. Electric current flows through a conductor at a rate of 2.50 C/s. If a coulomb is composed of 6.24×10^{18} electrons, how many electrons will flow through the conductor in 10.0 min?

ANSWERS

1. 0.917%

2. (a) 23.1%
   (b) 12.8%, 9.95%

3. (a) 3 (b) 5
   (c) 2 (d) 2
   (e) 2 (f) 2

4. (a) 6.807×10^3
   (b) 5.3×10^{-5}
   (c) 5.2×10^3
   (d) 8.13×10^{-10}
   (e) 6.8×10^0
   (f) 4×10^9

5. (a) 70
   (b) 5200
   (c) 8 300 000 000
   (d) 0.101
   (e) 6386.8
   (f) 0.004 086

6. (a) 493.0
   (b) 387.5
   (c) 1.1×10^2 (110)
   (d) 8.7×10^2 (870)
   (e) 8.6
   (f) 1.6×10^2 (160)
   (g) 38
   (h) 12
   (i) 2.2

7. 4.0×10^1 atoms

8. 1.4×10^{25} atoms

9. 2.0×10^{41} kg

10. 9.36×10^{21} electrons