

Work Sheet I (Significant Figures and Dimensional Analysis)

8 and 10 March, 2009

I) Which one of the following are exact numbers?

- (a) There are 100 cm in 1 m.
(b) One meter equals 1.094 yard.
(c) We can use the equation:
$$^{\circ}\text{F} = \frac{9}{5}^{\circ}\text{C} + 32$$
to convert from Celsius to Fahrenheit temperature. Are the numbers 9/5 and 32 exact?
(d) $\pi = 3.1415927$

II) How many significant figures are there in each of the following?

- (a) 6.07×10^{-15} (b) 0.003840
(c) 17.00 (d) 8×10^8
(e) 463.8052 (f) 300
(g) 301 (h) 300.

III) Evaluate each of the following and write the answer to the correct number of significant figures.

- (a) $212.2 + 26.7 + 402.09$
(b) $1.0028 + 0.221 + 0.10337$
(c) $2.01 \times 10^2 + 3.014 \times 10^3$
(d) $7.255 - 6.8350$

IV) Perform the following mathematical operations and express the results to the correct number of significant figures.

(a)
$$\frac{(6.404 \times 2.91)}{(0.187 - 0.171) \times 10^2}$$

(b)
$$\frac{9.5 + 4.1 + 2.8 + 3.175}{4}$$

Assume that this operation is taking the average of four numbers (four readings, the scores of four students, etc.)

V) The circumference of the earth is 25000 miles at the equator. What is the circumference in meters?

(1 mile = 1.6093 km)

VI) A rectangular solid measures 1.0 m by 5.6 cm by 2.1 dm. express its volume in cubic centimeters.

(1 m = 10 dm) ← This would not be given in the exam!

VII) The density of osmium is reported by one source to be 22610 kg/m^3 . What is the mass of osmium in grams measuring $10.0 \text{ cm} \times 8.0 \text{ cm} \times 9.0 \text{ cm}$?