SELF ASSESSMENT – MODULE A-4: MEASUREMENT SYSTEMS AND SCIENTIFIC NOTATION

1. Express numerically:

   A. $2.36 \times 10^0 =$ **2.36**

   B. $5.8 \times 10^0 =$ **5.8**

   C. $9.2 \times 10^3 =$ **9,200**

   D. $6.3 \times 10^5 =$ **630,000**

   E. $8.6 \times 10^0 =$ **8.6**

   F. $8.3 \times 10^4 =$ **83,000**

   G. $6.37 \times 10^3 =$ **6,370**

   H. $8.3 \times 10^{-3} =$ **0.0083**

2. Convert to scientific notation

   A. 0.0075 = **7.5×10^{-3}**

   B. 20,820 = **2.082×10^4**

   C. 630,000 = **6.3×10^5**

   D. 0.00047 = **4.7×10^{-4}**

   E. 3,000,000 = **3.0×10^6**

3. Convert within the metric scale:

   A. 15 g = **15, 000** mg

   B. 200 mg = **0.2** g

   C. 5 feet 7 inches = **170** cm

$$\left(\frac{5\ feet}{1} \times \frac{12\ inches}{1\ foot}\right) + 7\ inches = 60 + 7\ inches = 67\ inches$$

$$\frac{67\ inches}{1} \times \frac{2.54\ cm}{inch} = 170.18\ cm = 170\ cm$$

D. 8 feet 6 inches = **2.6** m

$$\left(\frac{8\ feet}{1}\times\frac{12\ inches}{1\ foot}\right)+6\ inches=96+6\ inches=102\ inches$$

$$\frac{102\ inches}{1}\times\frac{2.54\ cm}{inch}=259.08\ cm$$

$$\frac{259.08\ cm}{1}\times\frac{1\ m}{100\ cm}=\frac{259.08}{100}\ m=2.59\ m=2.6\ m$$

E. 3 mL = **3** cc

F. 0.150 qt = **142** mL

$$\frac{0.150\ qt}{1}\times\frac{946\ mL}{1\ qt}=141.9\ mL=142\ mL$$

G. 6 L = **6,000** mL

H. 20 mL = **0.02** L

I. 1 L = **10** dL

J. 1 dL = **10** cL

K. 1 dL = **100** mL

L. 1 cm = **10** mm

M. 20 cg = **10** mg

N. A male patient weights 138 lbs. What would his weight be in kilograms?

$$\frac{138\ lb}{1}\times\frac{1\ kg}{2.2\ lb}=\frac{138\ kg}{2.2}=62.7\ kg$$

O. A baby weights 3 kg. What would his weight be in lbs?

$$\frac{3\ kg}{1}\times\frac{2.2\ lb}{1\ kg}=6.6\ lb$$

P. The normal adult body contains approximately 6.0 liters of blood. What is the volume in quarts?

$$\frac{6\ L}{1}\times\frac{1.0567\ qts}{1L}=6.3\ qts$$

Q. After fasting 10 hours, the blood glucose level of a healthy person might be 80 mg/dL. If the total blood volume of the person is 6.0 liters, what is the total number of milligrams of glucose in the blood?

$$\frac{6\ L}{1}\times\frac{10\ dL}{1\ L}=60\ dL$$

$$\frac{80\ mg}{dL}\times\frac{60\ dL}{1}=4{,}800\ mg$$

4. Temperature conversions

A. 66°F = **18.9** °C

$$°C=\left(\frac{5}{9}\right)\times(°F-32)=\left(\frac{5}{9}\right)\times(66-32)=\left(\frac{5}{9}\right)\times 34=18.9°C$$

291.9°K

$$°K=°C+273=18.9+273=291.9°K$$

B. ⁻10°F = **⁻23.3** °C

$$°C=\left(\frac{5}{9}\right)\times(°F-32)=\left(\frac{5}{9}\right)\times(-10-32)=\left(\frac{5}{9}\right)\times -42=-23.3°C$$

249.7 °K

$$°K=°C+273=-23.3+273=249.7°K$$

C. ⁻25°C = **⁻13** °F

$$°F=\left(\frac{9}{5}\times°C\right)+32=\left(\frac{9}{5}\times -25\right)+32=-45+32=-13°F$$

D. 68°F = **293** °K

$$°C=\left(\frac{5}{9}\right)\times(°F-32)=\left(\frac{5}{9}\right)\times(68-32)=\frac{5}{9}\times 36=20°C$$

$$°K=°C+273=20+273=293°K$$

E. 277°K = **4** °C

$$°K=°C+273$$

$$°C=°K-273=277-273=4°C$$

F. 33°C = **91.4** °F

$$°F=\left(\frac{9}{5}\times°C\right)+32=\left(\frac{9}{5}\times 33\right)+32=59.4+32=91.4°F$$

G. 200°C = **473**°K

$$°K=°C+273=200+273=473°K$$

H. -18°F = **-27.8** °C

$$°C = \left(\frac{5}{9}\right) \times (°F - 32) = \left(\frac{5}{9}\right) \times (-18 - 32) = \left(\frac{5}{9}\right) \times -50 = -27.8°C$$

245.2 °K

$$°K = °C + 273 = -27.8 + 273 = 245.2°K$$

I. -8°C = **265** °K

$$°K = °C + 273 = -8 + 273 = 265°K$$

J. 48°F = **281.9**°K

$$°C = \left(\frac{5}{9}\right) \times (°F - 32) = \left(\frac{5}{9}\right) \times (48 - 32) = \frac{5}{9} \times 16 = 8.9°C$$

$$°K = °C + 273 = 8.9 + 273 = 281.9°K$$

K. 210°F = **98.9**°C

$$°C = \left(\frac{5}{9}\right) \times (°F - 32) = \left(\frac{5}{9}\right) \times (210 - 32) = \left(\frac{5}{9}\right) \times 178 = 98.9°C`$$

L. -53°C = **-63.4**°F

$$°F = \left(\frac{9}{5} \times °C\right) + 32 = \left(\frac{9}{5} \times -53\right) + 32 = -95.4 + 32 = -63.4°F$$

M. The autoclave used to sterilize surgical instruments and respiratory therapy equipment operates at a temperature of 255°F. What does this temperature correspond to on the Celsius Scale?

$$°C = \left(\frac{5}{9}\right) \times (°F - 32) = \left(\frac{5}{9}\right) \times (255 - 32) = \left(\frac{5}{9}\right) \times 223 = 123.9°C$$

N. Dry ice (solid carbon dioxide) has a temperature of -78°C. What is the temperature of dry ice in °F? **-108.4**;

$$°F = \left(\frac{9}{5} \times °C\right) + 32 = \left(\frac{9}{5} \times -78\right) + 32 = -140.4 + 32 = -108.4°F$$

in °K?

$$°K = °C + 273 = -78 + 273 = 195°K$$

O. A patients temperature is 95°F. How would you record this temperature in °C?

$$°C = \left(\frac{5}{9}\right) \times (°F - 32) = \left(\frac{5}{9}\right) \times (95 - 32) = \left(\frac{5}{9}\right) \times 63 = 35.0°C$$