

Physics 20

Assignment 2

Metric Conversion Answer Key

Use your Metric Staircase sheet to answer the following questions. Show your work.

Single Unit Conversion

$$1. \quad 49.6 \text{ dm} \times \frac{1 \text{ m}}{10 \text{ dm}} = 49.6 \text{ m}$$

$$2. \quad 240 \text{ kg} \times \frac{100 \text{ g}}{1 \text{ kg}} = 240\,000 \text{ g}$$

$$3. \quad 6.37 \text{ N} \times \frac{1\,000\,000\,000 \text{ nN}}{1 \text{ N}} = 6\,370\,000\,000 \text{ nN}$$

$$4. \quad 4.5 \text{ L} \times \frac{1 \text{ daL}}{10 \text{ L}} = 0.45 \text{ daL}$$

$$5. \quad 90 \text{ hm} \times \frac{100\,000 \text{ mm}}{1 \text{ hm}} = 9\,000\,000 \text{ mm}$$

$$6. \quad 200 \text{ mL} \times (1 \text{ L} / 1000 \text{ mL}) = 0.200 \text{ L}$$

$$7. \quad 12.1 \text{ fV} \times (1 \text{ V} / 1\,000\,000\,000\,000\,000 \text{ fV}) = 0.000\,000\,000\,000\,012\,1 \text{ V}$$

$$8. \quad 478 \text{ MHz} \times (1\,000\,000 \text{ Hz} / 1 \text{ MHz}) = 478\,000\,000 \text{ Hz}$$

$$9. \quad 8 \text{ Tmol} \times (1\,000\,000\,000\,000 \text{ mol} / 1 \text{ Tmol}) = 8\,000\,000\,000\,000 \text{ mol}$$

$$10. \quad 0.023 \text{ nW} \times (1 \text{ W} / 1\,000\,000\,000 \text{ nW}) = 0.000\,000\,000\,023 \text{ W}$$

$$11. \quad 7.3 \text{ m} \times (100 \text{ cm} / 1 \text{ m}) = 730 \text{ cm}$$

$$12. \quad 0.61 \text{ A} \times (1\,000\,000 \text{ }\mu\text{A} / 1 \text{ A}) = 610\,000 \text{ }\mu\text{A}$$

$$13. \quad 34.2 \text{ g} \times (1 \text{ kg} / 1000 \text{ g}) = 0.0342 \text{ kg}$$

$$14. \quad 62.3 \text{ J} \times (1 \text{ GJ} / 1\,000\,000\,000 \text{ J}) = 0.000\,000\,062\,3 \text{ GJ}$$

$$15. \quad 22 \text{ m} \times (1\,000\,000\,000\,000 \text{ pm} / 1 \text{ m}) = 22\,000\,000\,000\,000 \text{ pm}$$

Double Unit Conversion

1. 7.82 mC/mV
 $\times \frac{1 \text{ C}}{1000 \text{ mC}} \times \frac{1000 \text{ mV}}{1 \text{ V}} = 7.82 \text{ C/V}$
2. 0.045 g/L $\times \frac{1000 \text{ mg}}{1 \text{ g}} \times \frac{1 \text{ L}}{1000 \text{ mL}} = 0.045 \text{ mg/mL}$
3. 3.84 kmol/dal $\times \frac{1000 \text{ mol}}{1 \text{ kmol}} \times \frac{1 \text{ dal}}{10 \text{ L}} = 384 \text{ mol/L}$
4. 150 cJ/g $\times \frac{1 \text{ J}}{100 \text{ cJ}} \times \frac{1000 \text{ g}}{1 \text{ kg}} = 1500 \text{ J/kg}$
5. 25 kJ/mC $\times \frac{1000 \text{ J}}{1 \text{ kJ}} \times \frac{1000 \text{ mC}}{1 \text{ C}} = 25\,000\,000 \text{ J/C}$
6. 8.98 kV/A $\times \frac{1000 \text{ V}}{1 \text{ kV}} \times \frac{1 \text{ A}}{1000 \text{ mA}} = 8.98 \text{ V/mA}$
7. $0.0922 \text{ N} \cdot \text{m}$ $\times \frac{1\,000\,000 \text{ } \mu\text{N}}{1 \text{ N}} \times \frac{1 \text{ km}}{1000 \text{ m}} = 92.2 \text{ } \mu\text{N} \cdot \text{km}$
8. 1.62 hK/dm $\times \frac{100 \text{ K}}{1 \text{ hK}} \times \frac{10\,000 \text{ dm}}{1 \text{ km}} = 1\,620\,000 \text{ K/km}$
9. 40 nm/mg $\times \frac{1 \text{ cm}}{10\,000\,000 \text{ nm}} \times \frac{1\,000\,000 \text{ mg}}{1 \text{ kg}} = 4.0 \text{ cm/kg}$
10. 0.0278 kg/mL $\times \frac{100\,000 \text{ cg}}{1 \text{ kg}} \times \frac{100\,000 \text{ mL}}{1 \text{ hL}} = 278\,000\,000 \text{ cg/hL}$

Time conversion

1. 3 s $\times \frac{1 \text{ min}}{60 \text{ s}} = 0.05 \text{ min}$
2. 1080 s $\times \frac{1 \text{ min}}{60 \text{ s}} \times \frac{1 \text{ hour}}{60 \text{ min}} = 3 \text{ hours}$
3. 14400 min $\times \frac{1 \text{ hour}}{60 \text{ min}} \times \frac{1 \text{ day}}{24 \text{ hours}} = 10 \text{ days}$
4. 0.021 days $\times \frac{24 \text{ hours}}{1 \text{ day}} \times \frac{60 \text{ min}}{1 \text{ hour}} = 30.24 \text{ min}$
5. 2 years $\times \frac{12 \text{ months}}{1 \text{ year}} \times \frac{30 \text{ days}}{1 \text{ month}} \times \frac{24 \text{ hr}}{1 \text{ day}} = 17280 \text{ hours}$
6. 90 km/hour $\times \frac{1000 \text{ m}}{1 \text{ km}} \times \frac{1 \text{ hour}}{3600 \text{ s}} = 25 \text{ m/s}$
7. 362 V · s $\times \frac{1 \text{ kV}}{1000 \text{ V}} \times \frac{1 \text{ min}}{60 \text{ s}} = 0.006 \text{ kV} \cdot \text{min}$
8. 2.00 cm/s $\times \frac{1 \text{ m}}{100 \text{ cm}} \times \frac{3600 \text{ s}}{1 \text{ hour}} \times \frac{24 \text{ hr}}{1 \text{ d}} = 1728 \text{ m/day}$
9. 0.00189 J/s $\times \frac{1\,000\,000 \text{ }\mu\text{J}}{1 \text{ J}} \times \frac{3600 \text{ s}}{1 \text{ hour}} = 680400 \text{ }\mu\text{J/hour}$
10. 7150 dm/s $\times \frac{1 \text{ km}}{10\,000 \text{ dm}} \times \frac{60 \text{ s}}{1 \text{ min}} = 42.9 \text{ km/min}$

Bonus!

11. 0.0004 min $\times \frac{60 \text{ s}}{1 \text{ min}} \times \frac{1\,000\,000\,000 \text{ ns}}{1 \text{ s}} = 24\,000\,000 \text{ ns}$
12. 360 km/hour² $\times \frac{1000 \text{ m}}{1 \text{ km}} \times \frac{(1 \text{ hour})^2 \Rightarrow 1 \text{ hr}^2}{(3600 \text{ s})^2 \Rightarrow 12\,960\,000 \text{ s}^2} = 0.0278 \text{ m/s}^2$