Name: *Caleb McWhorter — Solutions*

MATH 101
Spring 2024
HW 7: Due 02/14

"Language is the foundation of civilization. It is the glue that holds the people together, it is the first weapon drawn in a conflict."
— Louise Banks, Arrival

Problem 1. (10pts) Express the following decimal numbers in scientific notation:

(a) 0.000000623

(b) 150000

(c) 8

(d) 0.1

Solution.

(a)

$$0.000000623 = 6.23 \cdot 10^{-7}$$

(b)

$$150000 = 1.5 \cdot 10^{5}$$

(c)

$$8 = 8 \cdot 10^{0}$$

(d)

$$0.1 = 1.0 \cdot 10^{-1}$$

Problem 2. (10pts) Express the following numbers in scientific notation as decimal numbers:

(a) $6.7 \cdot 10^4$

(b) $3.3 \cdot 10^{-6}$

(c) $7.89 \cdot 10^0$

(d) $1.113 \cdot 10^8$

Solution.

(a)

$$6.7 \cdot 10^4 = 67{,}000$$

(b)

$$3.3 \cdot 10^{-6} = 0.0000033$$

(c)

$$7.89 \cdot 10^0 = 7.89$$

(d)

$$1.113 \cdot 10^8 = 111{,}300{,}000$$

Problem 3. (10pts) Showing all your work and expressing the result in scientific notation with three significant figures, convert the following:

(a) 16,000,000 centigrams to megagrams

(b) 260 oz to stones [1 oz = 28.35 g, 1 stone = 6.35 kg]

(c) 2.6 gallons to milliliters [1 gal = 3.785 L]

(d) $0.02 \cdot 10^9$ ft^3 to mi^3 [5,280 ft = 1 mi.]

(e) 16.5 meters per square second to feet per square minute [0.3048 m = 1 ft]

(a)

$$\frac{16{,}000{,}000 \text{ cg} \left\| \frac{10^{-2} \text{ g}}{1 \text{ cg}} \right| \frac{1 \text{ Mg}}{10^6 \text{ g}}}{} = 0.16 \text{ Mg} = 1.60 \cdot 10^{-1} \text{ Mg}$$

(b)

$$\frac{260 \text{ oz} \left\| \frac{28.35 \text{ g}}{1 \text{ oz}} \right| \frac{1 \text{ kg}}{1{,}000 \text{ g}} \left| \frac{1 \text{ stone}}{6.35 \text{ kg}} \right.}{} = 1.16079 \text{ stone} \approx 1.16 \text{ stone} = 1.16 \cdot 10^0 \text{ stone}$$

(c)

$$\frac{2.6 \text{ gallons} \left\| \frac{3.785 \text{ L}}{1 \text{ gal}} \right| \frac{1000 \text{ mL}}{1 \text{ L}}}{} = 9{,}841 \text{ mL} \approx 9{,}840 \text{ mL} = 9.84 \cdot 10^3 \text{ mL}$$

(d)

$$\frac{0.02 \cdot 10^9 \text{ ft}^3 \left\| \frac{1 \text{ mi}}{5{,}280 \text{ ft}} \right| \frac{1 \text{ mi}}{5{,}280 \text{ ft}} \left| \frac{1 \text{ mi}}{5{,}280 \text{ ft}} \right.}{} = 0.000135871 \text{ mi}^3 \approx 0.000136 \text{ mi}^3 = 1.36 \cdot 10^{-4} \text{ mi}^3$$

(e)

$$\frac{16.5 \text{ m}}{1 \text{ s}^2} \left\| \frac{1 \text{ ft}}{0.3048 \text{ m}} \right| \frac{60 \text{ s}}{1 \text{ min}} \left| \frac{60 \text{ s}}{1 \text{ min}} \right. = 194{,}881.889764 \text{ ft/min}^2 \approx 195{,}000 \text{ ft/min}^2 = 1.95 \cdot 10^5 \text{ ft/min}^2$$