

## Assignment: Approximate Numbers and Change of Units

Question 1. (3 marks) How many significant digits

- a. 5010 3 sig. fig.  
 b. 5010. 4 sig. fig.  
 c. 50.00 4 sig. fig.  
 d. 0.0052 2 sig. fig.  
 e. 0.00500 3 sig. fig.  
 f. 3. 1 sig. fig.

Question 2. (1 mark) How many significant digits are in  $2.410 + 1030$ , why?

$= 1030$  we look at the least precise number  
 when adding 1030  
 ↑ last sig. fig.

Question 3. (1 mark) Round

- a. 2342223.32 to 2 significant digits.  
 b. 0.034200 to 2 significant digit.

a) 2300000

b) 0.034

Question 4. (3 marks) (use the correct number of significant figures)

- a.  $435.2234 + 2316.70 = 2751.92$   
 b.  $234 - 26.2 = 208$   
 c.  $11.7 \times 13.2 \times 16.7243 = 2580$   
 d.  $34642 \div 212 = 163$   
 e.  $(32.21 + 1.235) \times 22 = 740$   
 f.  $(23.73 \times 34) - (23.5 \div 2.13) = 795.78\dots$

$$\begin{array}{r} \downarrow \qquad \downarrow \\ = 810 - 11.0 \\ = 8.0 \times 10^2 \end{array}$$

↑  
 2 sig. fig.

∴ 795.78 need to be rounded to 2 sig. fig.  
 $8.0 \times 10^2$

Question 5. (2 marks) Convert 12550 square feet to

- a.  $m^2$
- b.  $inch^2$
- c.  $mi^2$
- d.  $km^2$

b)  $12550 \text{ ft}^2 \cdot \left(\frac{12 \text{ in}}{1 \text{ ft}}\right)^2 = 1807000 \text{ in}^2$

c)  $12550 \text{ ft}^2 \cdot \left(\frac{1 \text{ mi}}{5280 \text{ ft}}\right)^2 = 0.0004502 \text{ mi}^2$

a)  $12550 \text{ ft}^2 \cdot \left(\frac{30.5 \text{ cm}}{1 \text{ ft}}\right)^2 \cdot \left(\frac{1 \text{ m}}{100 \text{ cm}}\right)^2 = 1167 \text{ m}^2$

d)  $12550 \text{ ft}^2 \cdot \left(\frac{1.61 \text{ km}}{5280 \text{ ft}}\right)^2 = 0.001167 \text{ km}^2$

Question 6. (1 mark) Convert 21 000 psi (lb/in<sup>2</sup>) to MPa.

$$21000 \frac{\text{lb}}{\text{in}^2} \cdot \left(\frac{4.45 \text{ N}}{1 \text{ lb}}\right) \cdot \left(\frac{1 \text{ in}}{2.54 \text{ cm}}\right)^2 \cdot \left(\frac{100 \text{ cm}}{1 \text{ m}}\right)^2 \cdot \left(\frac{1 \text{ M}}{10^6}\right) = 140 \text{ MPa}$$

Question 7. (2 marks) Convert 65 miles/hr to

- a. km/hr
- b. ft/s
- c. m/min
- d. in/s

a)  $65 \frac{\text{mi}}{\text{hr}} \cdot \frac{1.61 \text{ km}}{1 \text{ mi}} = 10 \times 10^2 \text{ km/hr}$

b)  $65 \frac{\text{mi}}{\text{hr}} \cdot \frac{1 \text{ hr}}{60 \text{ min}} \cdot \frac{1 \text{ min}}{60 \text{ s}} \cdot \frac{5280 \text{ ft}}{1 \text{ mi}} = 95 \text{ ft/s}$

c)  $65 \frac{\text{mi}}{\text{hr}} \cdot \frac{1 \text{ hr}}{60 \text{ min}} \cdot \frac{1.61 \text{ km}}{1 \text{ mi}} \cdot \frac{1000 \text{ m}}{1 \text{ km}} = 1700 \text{ m/min}$

d)  $65 \frac{\text{mi}}{\text{hr}} \cdot \frac{5280 \text{ ft}}{1 \text{ mi}} \cdot \frac{1 \text{ hr}}{60 \text{ min}} \cdot \frac{1 \text{ min}}{60 \text{ s}} = 1100 \text{ in/s}$

Question 8. (1 mark) Convert 2144 ft-lb bending moment to N·m (Newton meters).

$$2144 \text{ ft} \cdot \text{lb} \cdot \frac{4.45 \text{ N}}{1 \text{ lb}} \cdot \frac{30.5 \text{ cm}}{1 \text{ ft}} \cdot \frac{1 \text{ m}}{100 \text{ cm}} = 2.910 \times 10^3 \text{ N} \cdot \text{m}$$

Question 9. (1 mark) Convert a load of 22450 lb into kN (kilo Newtons).

$$22450 \text{ lb} \cdot \frac{4.45 \text{ N}}{1 \text{ lb}} \cdot \frac{1 \text{ k}}{10^3} = 99.90 \text{ kN}$$

Question 10. (1 mark) Convert a load of 460 kN/m into lb/ft.

$$460 \frac{\text{kN}}{\text{m}} \cdot \frac{10^3}{1 \text{ k}} \cdot \frac{1 \text{ lb}}{4.45 \text{ N}} \cdot \frac{1 \text{ m}}{100 \text{ cm}} \cdot \frac{30.5 \text{ cm}}{1 \text{ ft}} = 32000 \text{ lb/ft}$$

Question 11. (1 mark) Given 250.1 lbs/ft<sup>3</sup> convert to kg/m<sup>3</sup>.

$$250.1 \frac{\text{lb}}{\text{ft}^3} \cdot \frac{0.454 \text{ kg}}{1 \text{ lb}} \cdot \left(\frac{1 \text{ ft}}{30.5 \text{ cm}}\right)^3 \cdot \left(\frac{100 \text{ cm}}{1 \text{ m}}\right)^3 = 4002 \frac{\text{kg}}{\text{m}^3}$$