PHYS 211 College Physics I
Exam 1C

September 20, 2017

Name _____ J. C. DALY _____

1. The length of an object is divided into 3 parts. Each part is measured to determine the total length. The first part is 4.32 m long. The second part is 21.1 cm long, and the third part is 45.6 mm long.

    a. What is the total length of the object? __ 4.58 m __

    b. How many significant digits should be used to describe the total length? __ 3 __

Grades

100 — 100,100,100,100
      100,100,100,100

      98

      96,96,96,96
      95,95
      94
      93

      91

90 —

      88
      87

      85

80 — 80,80

4.32m =   4.32   m
21.1 cm =   0.211   m
45.6 mm =   0.0456
           _____
           4.5766) m
               ‿
              NOT KNOWN,
              WITH Certainty

TOTAL Length = 4.58 m

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2. Convert 25 miles per hour to ft/sec. _____

$$25 \frac{mi}{hr} * 5280 \frac{ft}{mi} * \frac{1 \ hr}{3600 \ sec} = \frac{25 \times 5280}{3600} =$$

$$= 36.67 = 37 \ ft/sec$$

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3. A hiker walks 2.50 km south. He then turns around and walks 3.00 km due north. He turns again and walks 0.75 km south.

   a. What distance did he walk? _____ 6.25 Km _____

   b. What is his final displacement relative to his initial displacement? _____ 250 m South _____

$$\text{DISTANCE} = 2.5 + 3.0 + .75 = 6.25 \text{ Km}$$
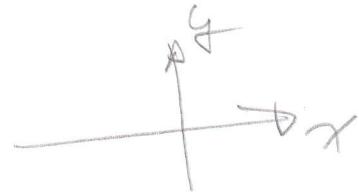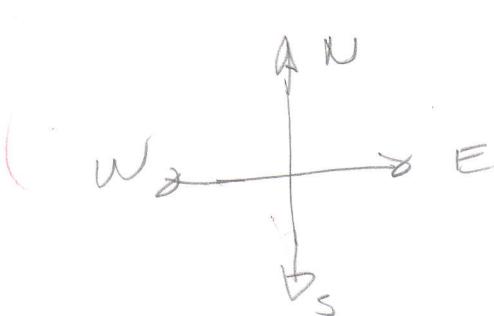
$$\text{Displacement} = -2.50\,\hat{y} + 3.00\,\hat{y} - 0.75\,\hat{y}$$

$$= -0.25\,\hat{y}$$

$$0.25 \text{ Km South} = 250 \text{ m South}$$

Conversion Factors to SI Units

Google is great for converting units. For example, to convert 10 feet to meters, type "10 ft in m" into google.

Acceleration

$1 \text{ ft/s}^2 = 0.3048 \text{ m/s}^2$
$g = 9.807 \text{ m/s}^2$

Area

$1 \text{ acre} = 9.807 \text{ m/s}^2$
$1 \text{ ft}^2 = 9.290 \times 10^{-2} \text{ m}^2$
$1 \text{ in}^2 = 6.45 \times 10^{-4} \text{ m}^2$
$1 \text{ mi}^2 = 2.59 \times 10^{6} \text{ m}^2$

Density

$1 \text{ g/cm}^3 = 10^{3} \text{ kg/m}^3$

Energy

$1 \text{ Btu} = 1054 \text{ J}$
$1 \text{ calorie (cal)} = 4.184 \text{ J}$
$1 \text{ electron volt (eV)} = 1.602 \times 10^{-19} \text{ J}$
$1 \text{ foot pound (ftlb)} = 1.356 \text{ J}$
$1 \text{ kilowatt hour (kWh)} = 3.60 \times 10^{6} \text{ J}$

Force

$1 \text{ dyne} = 10^{-5} \text{ N}$
$1 \text{ lb} = 4.448 \text{ N}$

Length

$1 \text{ angstrom (Å)} = 10^{-10} \text{ m}$
$1 \text{ ft} = 0.3048 \text{ m}$
$1 \text{ in} = 2.54 \times 10^{-2} \text{ m}$
$1 \text{ light year} = 9.461 \times 10^{15} \text{ m}$
$1 \text{ mile} = 1609 \text{ m}$

Mass

$1 \text{ atomic mass unit (u)} = 1.60606 \times 10^{-27} \text{ kg}$
$1 \text{ gram} = 10^{-3} \text{ kg}$

Power

$1 \text{ Btu} = 1054 \text{ W}$
$1 \text{ cal/s} = 4.184 \text{ W}$
$1 \text{ ftlb/s} = 1.356 \text{ W}$
$1 \text{ horsepower (hp)} = 746 \text{ W}$

Pressure

1 atmosphere (atm) = 1.013×10^5 pascal (Pa)
1 bar = 10^5 Pa
1 cmHg = 1333 Pa
1 lb/ft^2 = 47.88 Pa
1 lb/in^2 (psi) = 6895 Pa
1 N/m^2 = 1 pascal (Pa)
1 torr = 133.3 Pa

Speed

1 ft/s (fps) = 0.3048 m/s
1 km/h = 0.2778 m/s
1 mi/hr (mph) = 0.44704 m/s

Temperature

$T_{Kelvin} = T_{Celsius} = 273.15$
$T_{Kelvin} = (9/5)*(T_{Fahrenheit} + 459.67)$
$T_{Celsius} = (5/9)*(T_{Fahrenheit} - 32)$
$T_{Kelvin} = (5/9)*T_{Rankine}$

Time

1 day = 86400 s
1 year = 3.16×10^7 s

Volume

1 ft^3 = 2.832×10^{-2} m^3
1 gallon = 3.785×10^{-5} m^3
1 in^3 = 1.639×10^{-5} m^3
1 liter = 10^{-3} m