PHYS 211 College Physics I
Exam 1A

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 6.13 mm long. The second part is 256 cm long, and the third part is 64.3 m long.

   a. What is the total length of the object? 66.9 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

6.13 mm = .00613 m
256 cm = 2.56 m
64.3 m = 64.3 m

66.86613

NOT KNOWN WITH CERTAINTY

Length = 66.9 m

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2. How many seconds are there in September? 2.592×10^6 s

$30\,\text{day} * \frac{24\,\text{hr}}{\text{day}} * \frac{3600\,\text{s}}{\text{hr}} = 30 * 24 * 3600\,\text{s}$

$= 2,592,000\,\text{s}$

$= 2.592 \times 10^6\,\text{s}$

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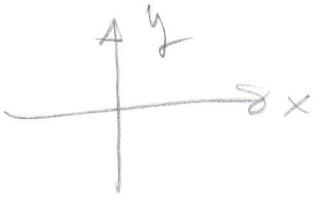
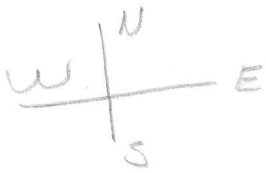
3. A hiker walks 1.50 km east. He then turns around and walks 2.50 km due west. He turns again and walks 0.75 km east.

   a. What distance did he walk? 4.75 km

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

DISTANCE = 1.50
2.50
+ .75
4.75 km





DISPLACEMENT = $1.50\hat{x}$
$-2.50\hat{x}$
$+.75\hat{x}$

1.50 − 2.50 + 0.75 = −0.25 km

0.25 km = 250 m West

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 $ft/s^2 = 0.3048\ m/s^2$
g = $9.807\ m/s^2$

Area

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

Density

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

Energy

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

Force

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

Length

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

Mass

1 atomic mass unit (u) = 1.60606×10^{-27} kg
1 gram = 10^{-3} kg

Power

1 Btu = 1054 W
1 cal/s = 4.184 W
1 ftlb/s = 1.356 W
1 horsepower (hp) = 746 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