Physics 1100: Math Review Solutions

1. Convert the following:

   (a) 72 km/h to metres per second (m/s).

$$72\,km/h = 72\frac{km}{h}\times\frac{1000\,m}{1\,km}\times\frac{1\,h}{3600\,s} = 20\,m/s$$

   (b) 17.00 years to seconds.

$$17.00\,y = 17.00\,y\times\frac{365.25\,d}{1\,y}\times\frac{24\,h}{1\,d}\times\frac{3600\,s}{1\,h} = 5.365\times10^{8}\,s$$

   (c) 3.5 km^2 to square metres.

$$3.5\,km^2 = 3.5\,km\times km\times\frac{1000\,m}{1\,km}\times\frac{1000\,m}{1\,km} = 3.5\times10^{6}\,m^2$$

   (d) 33.0 cm^3 to cubic metres

$$33.0\,cm^3 = 33.0\,cm\times cm\times cm\times\frac{1m}{100\,cm}\times\frac{1m}{100\,cm}\times\frac{1m}{100\,cm} = 33.0\times10^{-6}\,m^3$$

   (e) 2.55 g/cm^3 to kg/m^3

$$2.55\,g/cm^3 = 2.55\,g\times\frac{1}{cm}\times\frac{1}{cm}\times\frac{1}{cm}\times\frac{1kg}{1000\,g}\times\frac{100cm}{1m}\times\frac{100\,cm}{1m}\times\frac{100cm}{1m}$$
$$= 2.55\times10^{3}\,kg/m^3$$

   (f) 35 m^3/h to cm^3/s

$$35m^3/h = 35m\times m\times m\times\frac{1}{h}\times\frac{100cm}{1m}\times\frac{100\,cm}{1m}\times\frac{100cm}{1m}\times\frac{1h}{3600\,s}$$
$$= 9.7\times10^{3}\,cm^3/h$$

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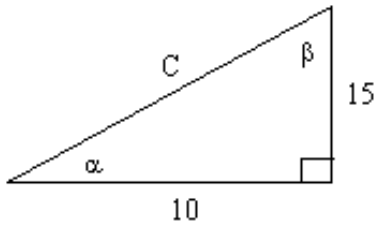
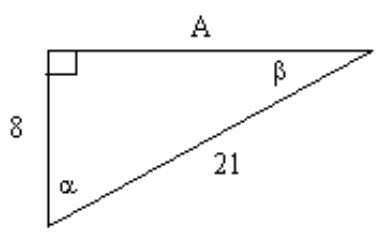
2. In the triangles below, determine the length of the missing side using Pythagoras' theorem. Determine the angles in each triangle.

(a)



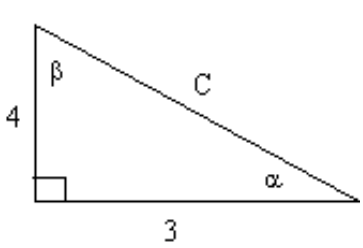
$C = [10^2+15^2]^{½} = 18.0$, $\alpha = tan^{-1}(15/10) = 56.3°$, $\beta = 90° - \alpha = 33.7°$

(b)



$A = [21^2-8^2]^{½} = 19.4$, $\alpha = cos^{-1}(8/21) = 67.8°$, $\beta = sin^{-1}(8/21) = 22.4°$

(c)



$C = [3^2+4^2]^{½} = 5$, $\alpha = tan^{-1}(4/3) = 53.1°$, $\beta = 90 - \alpha = 36.9°$

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3. Compute the following:

(a) $0.989 \times 10^4 \times 2.456 \times 10^2 = 2.43 \times 10^6$ (3 Sig. Figs.)

(b) $4.37 \times 10^2 \div 3.21 \times 10^3 = 0.136$ (3 Sig. Figs.)

(c) $2.246 \times 10^5 + 7.81 \times 10^4 = 3.027 \times 10^5$ (4 Sig. Figs.)

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Physics Coombes Handouts Problems Solutions

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