

**Physics 1145 Homework # 1: Math review, Unit Conversions, 1-d motion**

1. Solve the system of equations for  $A$  :

$$\begin{aligned}7A - 5B &= -1 \\ B + A &= 5\end{aligned}$$

2. Solve the system of equations for  $C$ :

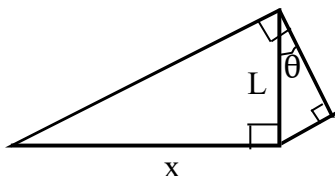
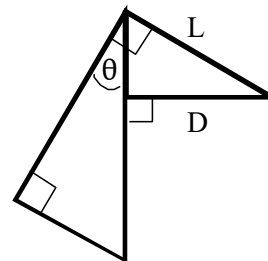
$$\begin{aligned}A + 3C &= 9 \\ 5C - 2A &= 4\end{aligned}$$

3. Sketch the functions  $\sin(x)$  and  $\cos(x)$  for  $0 \leq x \leq 2\pi$ .

4. Fill in the table. Leave square roots of 2 and 3 exact. You should be able to do this without needing a calculator.

$\theta$	$\sin \theta$	$\cos \theta$
$0^\circ$		
$30^\circ$		
$45^\circ$		
$60^\circ$		
$90^\circ$		
$180^\circ$		

5. Two similar right triangles are perpendicular to one another, as shown in the figure at right. Express the length  $L$  in terms of length  $D$  and angle  $\theta$ .



6. Two right triangles share a side of length  $L$  as shown in the figure. Express the length  $x$  in terms of  $L$  and  $\theta$ .

7. Convert to SI units and express in scientific notation.

- a)  $5 \mu\text{s}$       b)  $3.0\text{g}$       c)  $4.5 \text{ km}$       d)  $80 \text{ km/hr}$       e)  $60\text{mph}$   
 f)  $4 \text{ in}$       g)  $10 \text{ in}^2$       h)  $120 \text{ cm}^3$

8. A goose flies  $20\text{km}$  south and then turns to fly  $32\text{km}$  west. How far is the goose from its original position?

9. The figure shows position vs time graphs for two horses.

- a) Sketch velocity vs time graphs for each of the horses.  
 b) Do the horses ever have the same speed? Where?  
 c) Does horse A ever passes horse B? If so, indicate at which point in time.  
 d) Does horse B ever passes horse A? If so, indicate at which point in time.

