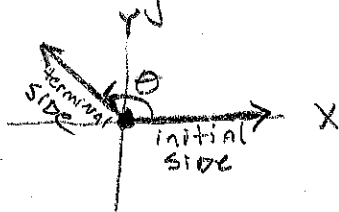WS # 5.1 Solutions

1.) Definitions + Formulas

Standard Position — Vertex is at the origin and its initial side coincides w/ the positive x-axis.

2.) Conversions

A. $50°6'21''$ to Dec. Deg $\rightarrow 50 + 6\left(\frac{1}{60}\right) + 21\left(\frac{1}{60} \cdot \frac{1}{60}\right) = \boxed{50.105833°}$

B. $21.256°$ to DMS $\rightarrow 21 + (0.256)(60') = 21° + 15.36'$
   $= 21° + 15' + 0.36(60'') = 21° + 15' + 21.6'' \approx \boxed{21°15'22''}$

C. $60°$ to radians (exact) $\rightarrow \cancel{60} \cdot \frac{\pi}{\cancel{180}\,3} = \boxed{\dfrac{\pi}{3} \text{ radians}}$

D. $107°$ to radians (approx) $\rightarrow 107 \cdot \frac{\pi}{180} \approx \boxed{1.868 \text{ radians}}$

E. $\frac{\pi}{6}$ radians to Degrees $\rightarrow \dfrac{\cancel{\pi}}{\cancel{6}_1} \cdot \dfrac{\overset{30}{\cancel{180}}}{\cancel{\pi}} = \boxed{30°}$

F. 3 to Degrees $\rightarrow 3 \cdot \dfrac{180}{\pi} \approx \boxed{171.89°}$

3.) Arc Length of a Circle $\rightarrow$ For a circle of radius r, a central angle of θ radians subtends an arc whose length S is: $\boxed{S = r\theta}$

A. $S = r\theta \rightarrow S = (2)(.25) = \boxed{0.5 \text{ meter}}$
   $\hookrightarrow [\theta \text{ must be in radians}]$

B. G = Glasgow, MT $= 48°9'$ N ; A = Albuquerque, NM $= 35°5'$ N
   radius of earth $= 3960$ mi. Find distance b/w G & A.
   ① Measure of the central angle b/w G & A $\rightarrow 48°9' - 35°5' = 13°4'$
   $\theta = 13°4' = 13 + 4\left(\frac{1}{60}\right) \approx 13.0667° \cdot \dfrac{\pi}{180}$ rad ≈ 0.228 rad
   ② $S = r\theta \rightarrow S = (3960)(0.228 \text{ rad}) = \boxed{903 \text{ miles}}$

4.) Area of Sector $\rightarrow A = \frac{1}{2}r^2\theta$ [θ must be in radians]

① $30° = 30 \cdot \dfrac{\pi}{180_6}$ rad $= \dfrac{\pi}{6}$ rad ② $A = \frac{1}{2}r^2\theta = \frac{1}{2}(2)^2\left(\frac{\pi}{6}\right) \approx \boxed{1.05 \text{ ft}^2}$