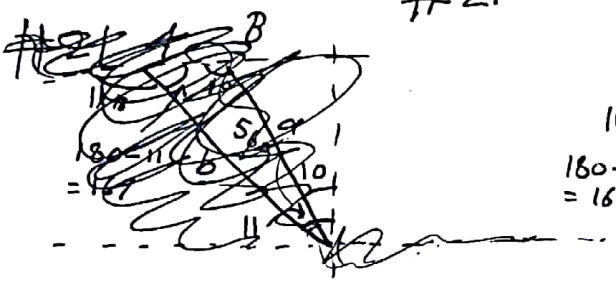
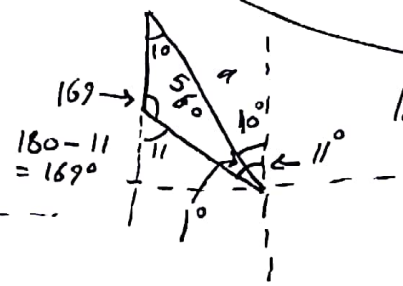
#9 $\frac{a}{\sin A} = \frac{c}{\sin C} \rightarrow \sin C\, a = c \sin A$

$C = \sin^{-1}\frac{c \sin A}{a} = \frac{136 \times \sin 29.3°}{71.6} = 68.4°$

$\rightarrow \sin^{-1}\left(\frac{136 \times \sin 29.3°}{71.6}\right) = 68.4°$

#21





$11° - 10° = 1°$

$A = 169°$

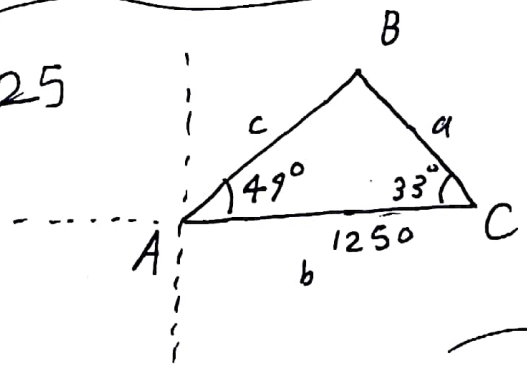
$a = 560$

$B = 10$

$b = ?$

$\frac{a}{\sin A} = \frac{b}{\sin B} \rightarrow b = a\left(\frac{\sin B}{\sin A}\right) = 560\left(\frac{\sin 10}{\sin 169}\right) = 510$ mi/hr

#25



$A = 49$

$a = ?$

$b = 1250$

$B = 180 - C - A$

$= 180 - 49 - 33 = 98°$

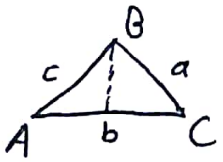
$\frac{b}{\sin B} = \frac{a}{\sin A}$

$a = b\left(\frac{\sin A}{\sin B}\right) = 1250\left(\frac{\sin 49}{\sin 98}\right) = 953$ ft

Ch 9 section 9.4

Ch 9 section 9.5

#1



$A = 46.3°$

$a = ?$

$B = ?$

$b = 1$

$C = ?$

$c = 2.30$

$a^2 = b^2 + c^2 - 2bc\cos A$

$= 1^2 + 2.3^2 - 2 \times 2.3 \times 1 \times \cos 46.3$

$a^2 = 3.11$

$a = \sqrt{3.11}$

$a = 1.76$

$\frac{b}{\sin B} = \frac{a}{\sin A} \rightarrow$

$b \sin A = a \sin B$

$\sin^{-1} \frac{b \sin A}{a} = B$

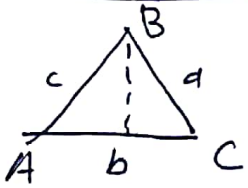
$B = \sin^{-1}\left(\frac{1 \times \sin 46.3}{1.76}\right) = 24.25°$

$C = 180 - B - A$

$= 180 - 24.3 - 46.3$

$C = 109.4°$

#9



$A = ?$

$a = 126$

$B = ?$

$b = 80.1$

$C = 39.4°$

$c = ?$

$C^2 = a^2 + b^2 - 2ba\cos C$

$= 126^2 + 80.1^2 - 2 \times 126 \times 80.1 \times \cos 39.4°$

$C^2 = 6694.23$

$C = \sqrt{6694.23}$

$C = 81.82$

$\frac{c}{\sin C} = \frac{b}{\sin B} \rightarrow B = \sin^{-1}\left(\frac{b \sin C}{c}\right)$

$= \sin^{-1}\left(\frac{80.1 \times \sin 39.4}{81.82}\right)$

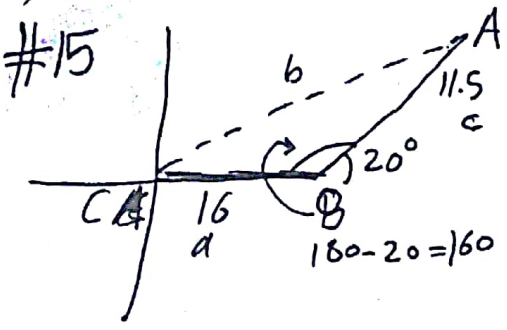
$= 38.42°$

$\angle A = 180 - B - C$

$= 180 - 38.42 - 39.4$

$= 102.18°$

#15



$b^2 = a^2 + c^2 - 2ac\cos B$

$= 16^2 + 11.5^2 - 2 \times 11.5 \times 16 \times \cos 160°$

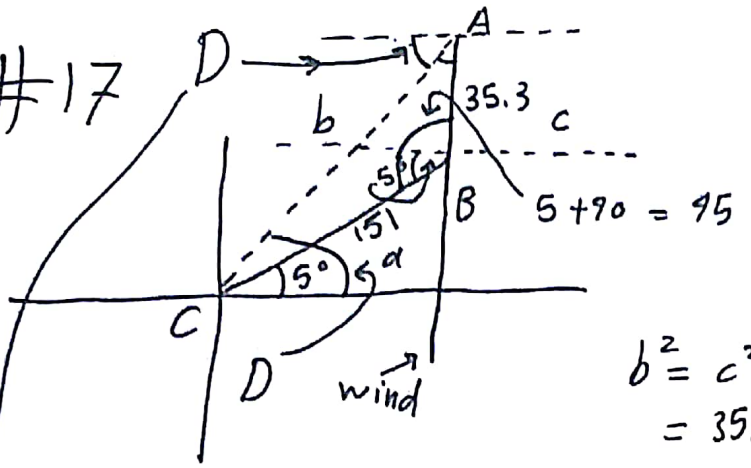
$b^2 = 734.056$

$b = \sqrt{734.056}$

$b = 27.09$ km

#17

Ch9 Section 9.5



$5 + 90 = 95$

$b^2 = c^2 + a^2 - 2ac \cos B$

$= 35.3^2 + 151^2 - 2 \times 151 \times 35.3 \cos 95$

$b^2 = 24976.22$

$b = \sqrt{24976.22}$

$b = 158.038$ mi/hr

D = from sin Law

$$\frac{b}{\sin B} = \frac{a}{\sin A} \rightarrow A = \frac{a \sin B}{b \sin} \Rightarrow A = \sin^{-1}\left(\frac{a \sin B}{b}\right)$$

$$= \sin^{-1}\left(\frac{151 \times \sin 95}{158.038}\right)$$

$= 72.14°$

$D = 90 - A$

$= 90 - 72.14$

$D = 17.86°$ N of E

I think there is easy way to get D but I don't know it ☺

Ch 16

Section 16.1

#9 $\tan\theta \cos\theta \cot\theta$

$\frac{\sin\theta}{\cos\theta} \cos\theta \frac{\cos\theta}{\sin\theta}$

$\cos\theta$

#27 $\csc^2\alpha - \cot^2\alpha$ — 16.1

$\frac{1}{\sin^2\alpha} - \frac{\cos^2\alpha}{\sin^2\alpha}$

$\frac{(1-\cos^2\alpha)}{\sin^2\alpha} \rightarrow \frac{\sin^2\alpha}{\sin^2\alpha} = 1$

#31 16.1

$\cot\theta \cos^2\theta + \cot\theta \sin^2\theta$

$\frac{\cos\theta}{\sin\theta} \cos^2\theta + \frac{\cos\theta}{\sin\theta} \sin^2\theta$

$\frac{\cos^3\theta + \cos\theta(1-\cos^2\theta)}{\sin\theta}$

$\frac{\cos^3 + \cos\theta - \cos^3\theta}{\sin\theta} = \frac{\cos\theta}{\sin\theta} = \cot\theta$

16.2 #9 $\frac{1+\tan^2 w}{1+\cot^2 w} = \tan^2 w$

L.H.S

$\frac{1+\tan^2 w}{1+\cot^2 w}$

$\frac{1+\frac{\sin^2 w}{\cos^2 w}}{1+\frac{\cos^2 w}{\sin^2 w}} \rightarrow \frac{\frac{\cos^2 w + \sin^2 w}{\cos^2 w}}{\frac{\sin^2 w + \cos^2 w}{\sin^2 w}}$

$= \frac{1}{\frac{\cos^2 w}{\sin^2 w}} \rightarrow \frac{1}{\cos^2 w} \times \frac{\sin^2 w}{1}$

$= \tan^2 w$

#27 16.2 $\frac{\tan\theta}{\csc\theta - \cot\theta} - \frac{\sin\theta}{\csc\theta + \cot\theta}$

$\frac{\frac{\sin\theta}{\cos\theta}}{\frac{1}{\sin\theta} - \frac{\cos\theta}{\sin\theta}} - \frac{\sin\theta}{\frac{1}{\sin\theta} + \frac{\cos\theta}{\sin\theta}}$

$= \frac{1}{\cos\theta} + \cos\theta$

$\frac{1}{\cos\theta} + \frac{\cos\theta}{\cos\theta} - 1 + \cos\theta \rightarrow \frac{1}{\cos\theta} + 1 - 1\cos\theta$

$\frac{\frac{\sin\theta}{\cos\theta}}{\frac{1-\cos\theta}{\sin\theta}} - \frac{\sin\theta}{\frac{1+\cos\theta}{\sin\theta}}$

$\frac{\sin\theta}{\cos\theta} \times \frac{\sin\theta}{1-\cos\theta} - \sin\theta \times \frac{\sin\theta}{1+\cos\theta}$

$\frac{\sin^2\theta}{\cos\theta(1-\cos\theta)} - \frac{\sin^2\theta}{1+\cos\theta} \rightarrow \frac{1-\cos^2\theta}{\cos\theta(1-\cos\theta)} - \frac{1-\cos^2\theta}{1+\cos\theta}$

$\frac{(1-\cos\theta)(1+\cos\theta)}{\cos\theta(1-\cos\theta)} - \frac{(1-\cos\theta)(1+\cos\theta)}{1+\cos\theta}$

$\frac{1+\cos\theta}{\cos\theta} - (1-\cos\theta)$

$\frac{1}{\cos\theta} + \frac{\cos\theta}{\cos\theta} - 1 + \cos\theta$

#39 16.2 $\dfrac{\tan x - \sin x}{\sin^3 x}$

$\dfrac{\frac{\sin x}{\cos x} - \sin x}{\sin^3 x} \rightarrow \dfrac{\frac{\sin x - \sin x \cos x}{\cos x}}{\sin^3} \rightarrow \dfrac{\frac{\sin x(1-\cos x)}{\cos x}}{\sin^3 x}$

$\dfrac{\sin x(1-\cos x)}{\cos x} \times \dfrac{1}{\sin^3 x} \rightarrow \dfrac{1-\cos x}{\cos x} \times \dfrac{1}{\sin^2 x} \rightarrow \dfrac{1-\cos x}{\cos x} \times \dfrac{1}{1-\cos^2 x}$

$\dfrac{1-\cos x}{\cos x} \times \dfrac{1}{(1-\cos x)(1+\cos x)} \rightarrow \dfrac{1}{\cos x} \times \dfrac{1}{1+\cos x}$

#15 16.3 $\cos 3x \cos x + \sin 3x \sin x \rightarrow \cos(3x - x) \Rightarrow \cos 2x$

#35 $\sin\left(x + \frac{\pi}{4}\right) \rightarrow \sin x \cos 45 + \sin 45 \cos x$ 16.3

Hint → $\left(\frac{\pi}{4}\right)\left(\frac{180}{\pi}\right) = 45^\circ$

$= \sin x (0.71) + (0.71)\cos x$

$= 0.71(\sin x + \cos x)$

#47 16.3 $\tan(x-y) - \tan(y-x)$

$\dfrac{\tan x - \tan y}{1 + \tan x \tan y} - \dfrac{(\tan y - \tan x)}{1 + \tan y \tan x}$

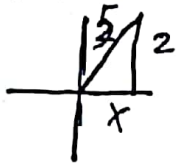
$\dfrac{\tan x - \tan y - \tan y + \tan x}{1 + \tan x \tan y} = \dfrac{2(\tan x - \tan y)}{1 + \tan x \tan y}$

#9 16.4

$5^2 = x^2 + 2^2$

$x = \sqrt{5^2 - 2^2}$

$x = 4.6$



$\cos 2\theta = \cos^2\theta - \sin^2\theta$

$\cos 2\theta = \left(\frac{4.6}{5}\right)^2 - \left(\frac{2}{5}\right)^2$

$\cos 2\theta = 0.68$

$\cos\theta = \frac{4.6}{5}$

$\sin\theta = \frac{2}{5}$

#29 16.4 L.H.S

$$\frac{(\cos 2\theta)+\cos\theta+1}{\sin 2\theta+\sin\theta}$$

$$\frac{\cos^2\theta-\sin^2\theta+\cos\theta+1}{2\sin\theta\cos\theta+\sin\theta} \rightarrow \frac{\cos^2\theta-(1-\cos^2\theta)+\cos\theta+1}{\sin\theta(2\cos\theta+1)}$$

$$\frac{\cos^2\theta-1+\cos^2\theta+\cos\theta+1}{\sin\theta(2\cos\theta+1)} \rightarrow \frac{\cos^2\theta+\cos^2\theta+\cos\theta}{\sin\theta(2\cos\theta+1)} \rightarrow \frac{2\cos^2\theta+\cos\theta}{\sin\theta(2\cos\theta+1)}$$

$$\frac{\cos\theta(2\cos\theta+1)}{\sin\theta(2\cos\theta+1)} = \frac{\cos\theta}{\sin\theta}$$

L.H.S

#35 16.4 $\dfrac{\csc^2\theta-2}{\csc^2\theta}$

$$\frac{\frac{1}{\sin^2\theta}-2}{\frac{1}{\sin^2\theta}} \rightarrow \frac{\frac{1-2\sin^2\theta}{\sin^2\theta}}{\frac{1}{\sin^2\theta}} \rightarrow \frac{1-2\sin^2\theta}{\sin^2\theta}\times\sin^2\theta$$

$$= 1-2\sin^2\theta = \cos 2\theta$$

Hint

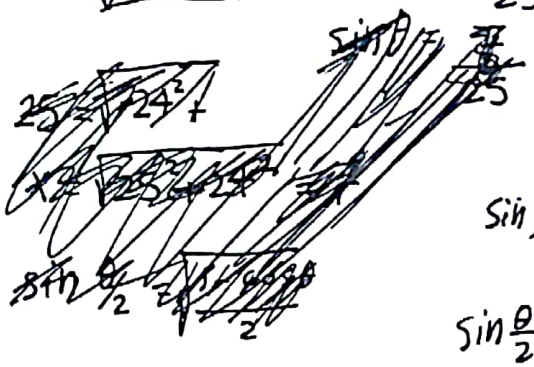
$\cos 2\theta = \cos^2\theta-\sin^2\theta$

$\cos 2\theta = (1-\sin^2\theta)-\sin^2\theta$

$\cos 2\theta = 1-\sin^2\theta-\sin^2\theta$

$\boxed{\cos 2\theta = 1-2\sin^2\theta}$

#7 16.5 $\cos\theta = \frac{-24}{25}$



$\sin\frac{\theta}{2} = \sqrt{\frac{1-\cos\theta}{2}}$

$\sin\frac{\theta}{2} = \sqrt{\frac{1-\left(\frac{-24}{25}\right)}{2}}$

$\sin\frac{\theta}{2} = 0.99 = \frac{7\sqrt{2}}{10}$

#19 16.5 $\cos^2 2x$

$\cos 2x = \cos^2 x-\sin^2 x$

$\cos 2x = \cos^2 x-(1-\cos^2 x)$

$\cos 2x = \cos^2 x-1+\cos^2 x$

$\cos 2x = 2\cos^2 x-1$

$\cos 2x+1 = 2\cos^2 x$

$2\cos^2 x = \cos 2x+1$

$\cos^2 x = \frac{\cos 2x+1}{2}$

$x = 2x$

$\cos^2 2x = \frac{\cos 4x+1}{2}$

#25 16.5 $\frac{\sin 2\theta}{2\sin\theta}$ L.H.S

$\frac{2\sin\theta\cos\theta}{2\sin\theta} \rightarrow \cos\theta = \cos^2\frac{\theta}{2} - \sin^2\frac{\theta}{2}$

Hint

$\cos 2\theta = \cos^2\theta - \sin^2\theta$

$\cos\theta = \cos^2\frac{\theta}{2} - \sin^2\frac{\theta}{2}$