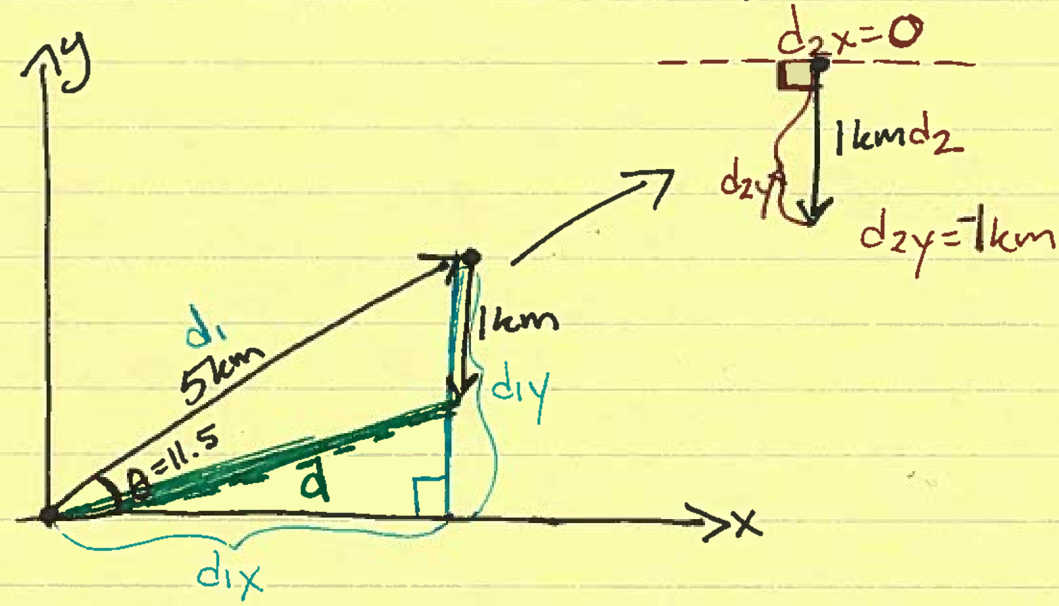
3.2 P.P. Solutions - Prob. A

2.



$d_{1x} = 5\cos(11.5) = \underline{4.9 km}$

$d_{1y} = 5\sin(11.5) = .99 \rightarrow \underline{1.0 km}$

$x_T = 4.9 + 0 = 4.9 km$

$y_T = 1.0 - 1.0 = 0 km$

$d = \sqrt{x^2 + y^2}$

$d = \sqrt{(4.9^2) + (0^2)}$

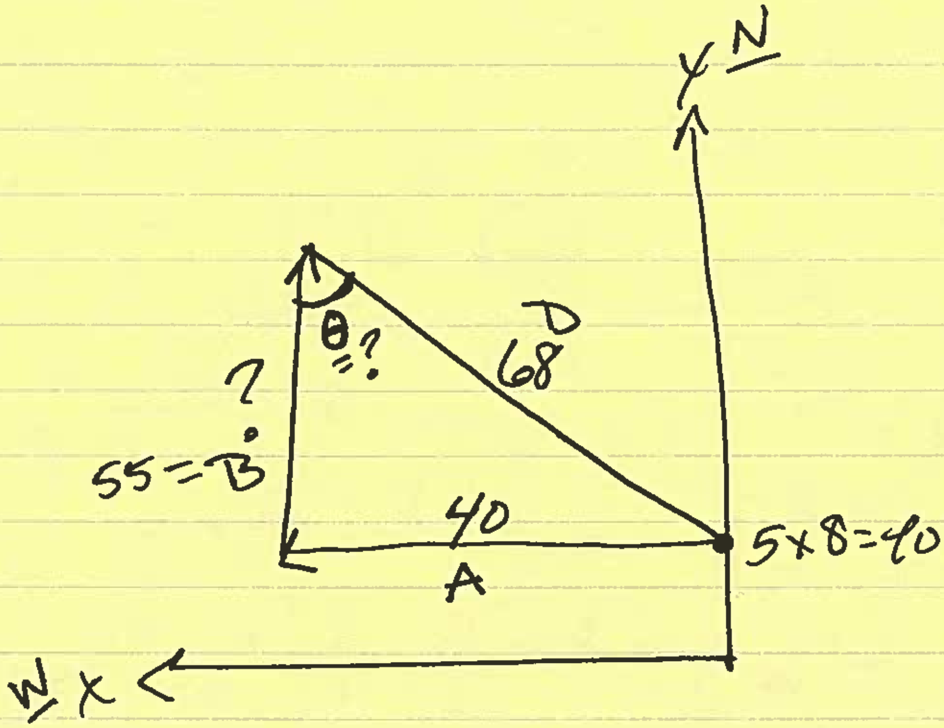
$\boxed{d = 4.9 km}$

$\tan\theta = \frac{opp}{adj} = \frac{y_T}{x_T}$

$\theta = \tan^{-1}\left(\frac{0}{4.9}\right)$

$\boxed{\theta = 0°}$

3.



$$A^2 + B^2 = D^2$$

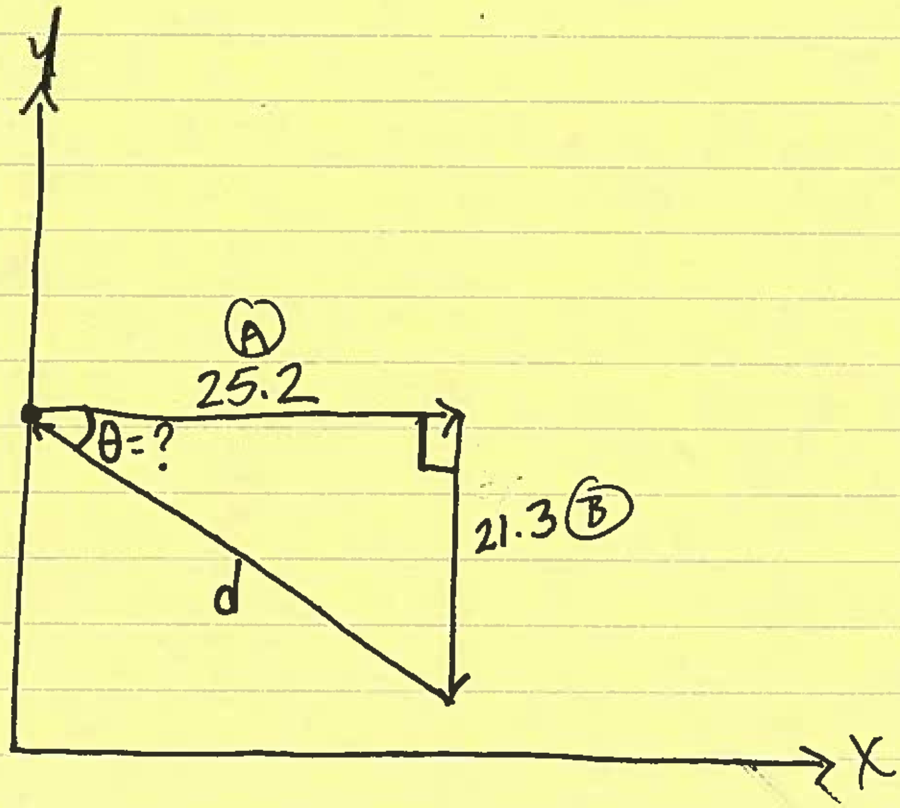
$$40^2 + B^2 = 68^2$$

$$B = \sqrt{68^2 - 40^2} = \underline{\underline{55}} / 8 = 6.9 = \boxed{7 \text{ jumps}}$$

$$\theta = \tan^{-1}\left(\frac{opp}{adj}\right) = \theta = \tan^{-1}\left(\frac{A}{B}\right)$$

$$\theta = \tan^{-1}\left(\frac{40}{55}\right) = \boxed{36° \text{ WoN}}$$

4.



$$A^2 + B^2 = d^2$$

$$d = \sqrt{A^2 + B^2} = \sqrt{25.2^2 + 21.3^2}$$

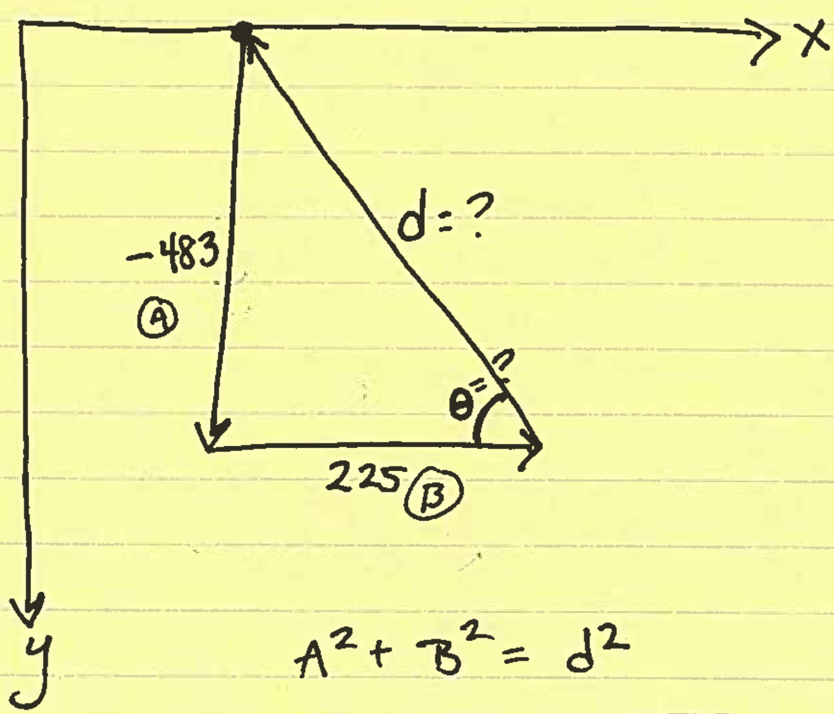
$$\boxed{d = 33m}$$

$$\tan\theta = \frac{opp}{adj} = \frac{B}{A}$$

$$\theta = \tan^{-1}\left(\frac{21.3}{25.2}\right)$$

$$\boxed{\theta = 40^\circ}$$

5.



$$A^2 + B^2 = d^2$$

$$d = \sqrt{A^2 + B^2}$$

$$d = \sqrt{483^2 + 225^2} = \boxed{533m}$$

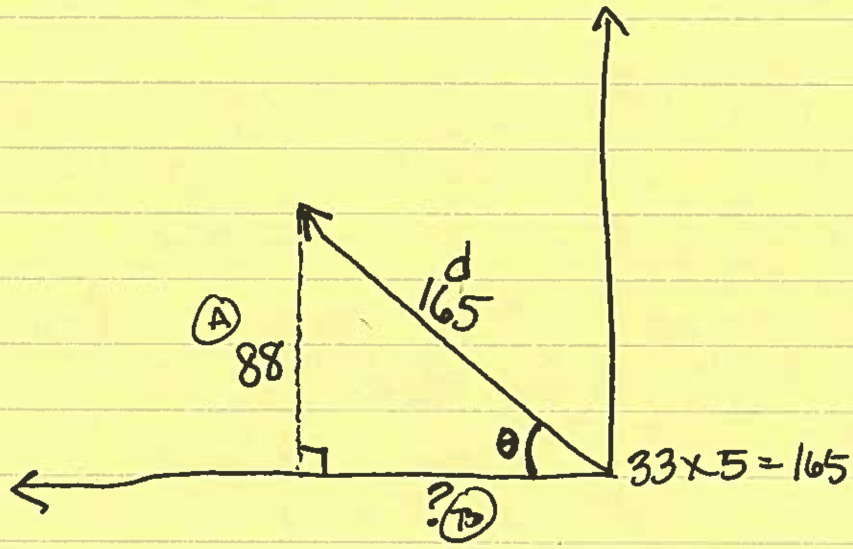
$$\tan\theta = \frac{opp}{adj} = \frac{A}{B} \rightarrow \theta = \tan^{-1}\left(\frac{A}{B}\right)$$

$$\theta = \tan^{-1}\left(\frac{-483}{225}\right)$$

$$\boxed{\theta = -65°}$$

Problem B

1.



$\sin\theta = \frac{opp}{hyp} = \frac{88}{165}$ $\theta = \sin^{-1}\left(\frac{88}{165}\right) = $ **32° N of W**

$A^2 + B^2 = d^2$

$B^2 = d^2 - A^2$ $B = \sqrt{d^2 - A^2}$

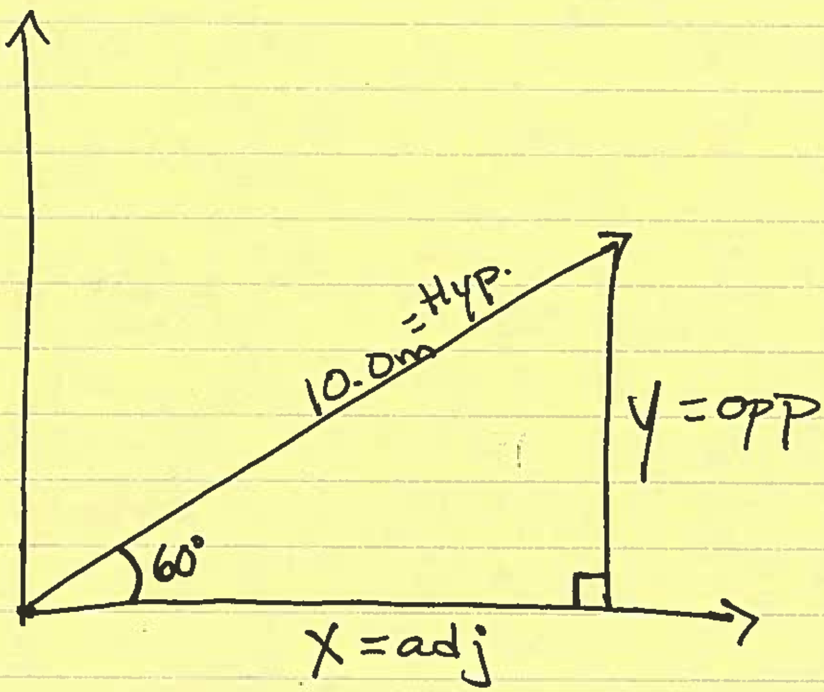
$B = \sqrt{(165^2) - (88^2)} = $ **140 cm W**

or

$\cos\theta = \frac{adj}{hyp} = \frac{B}{165}$ $B = 165 \cdot \cos(32)$

B = 140 cm W

2.



$\sin\theta = \frac{opp}{hyp} = \frac{y}{10}$ $\quad 10 \times \sin(60) = y$

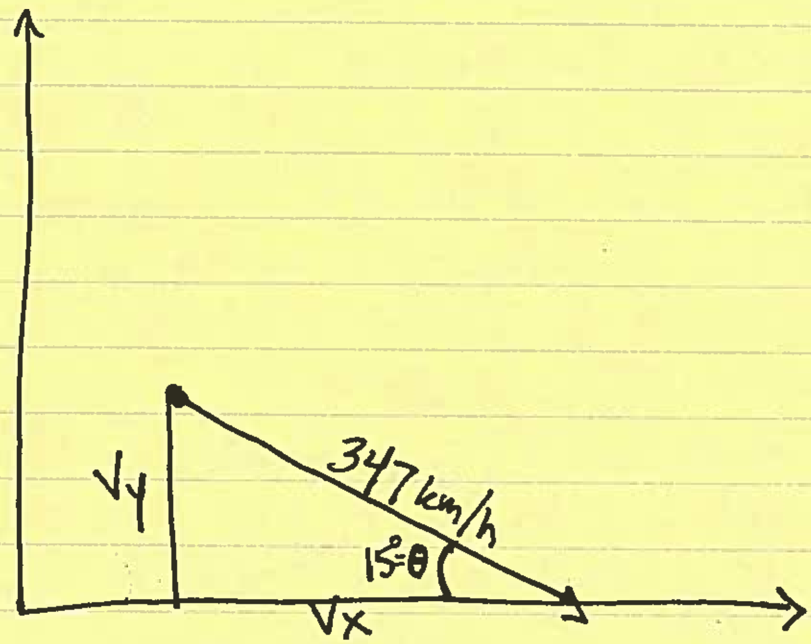
$8.66\,m = y$

$\boxed{9m = y}$

$\cos\theta = \frac{adj}{hyp} = \frac{x}{10}$ $\quad 10 \times \cos(60) = x$

$\boxed{5m = x}$

5.



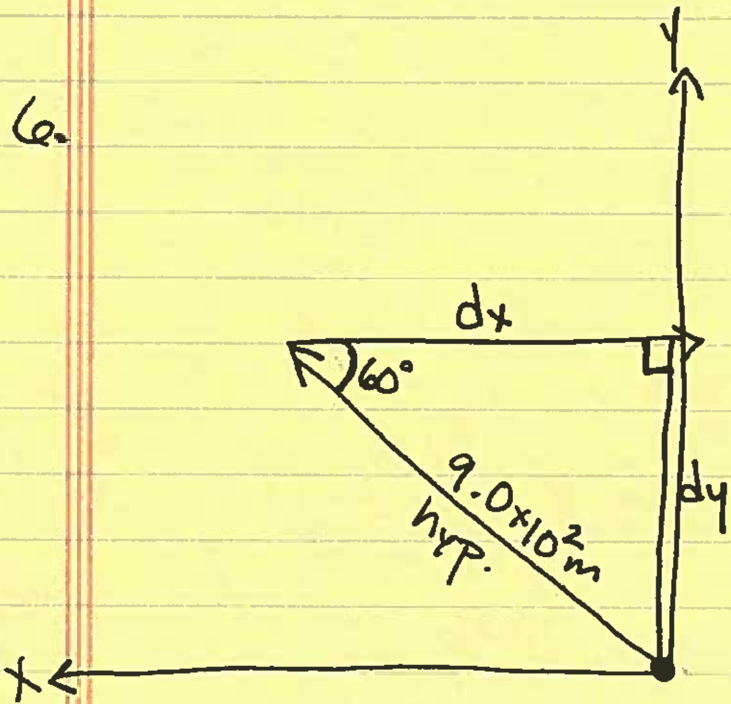
$\sin\theta = \frac{opp}{hyp} \rightarrow \sin(15) = \frac{V_y}{347}$ $V_y = 347 \times \sin(15)$

$V_y = 90$ km/hr

$\cos\theta = \frac{adj}{hyp} \rightarrow \cos(15) = \frac{V_x}{347}$ $V_x = 347 \times \cos(15)$

$V_x = 335$ km/hr

6.



★ This problem wants displacement. So 1st use the velocity eq. to solve for d.

$347 \frac{km}{hr} \times \frac{1000}{3600} = 96.4\, m/s$

$V = \frac{d}{t}$

$d = V \cdot t$

$d = 96.4 \times 8.7$

$d = 9.0 \times 10^2 m$

$\sin(60) = \frac{opp}{hyp} = \frac{dy}{9.0 \times 10^2} \rightarrow dy = 9.0 \times 10^2 \times \sin(60)$

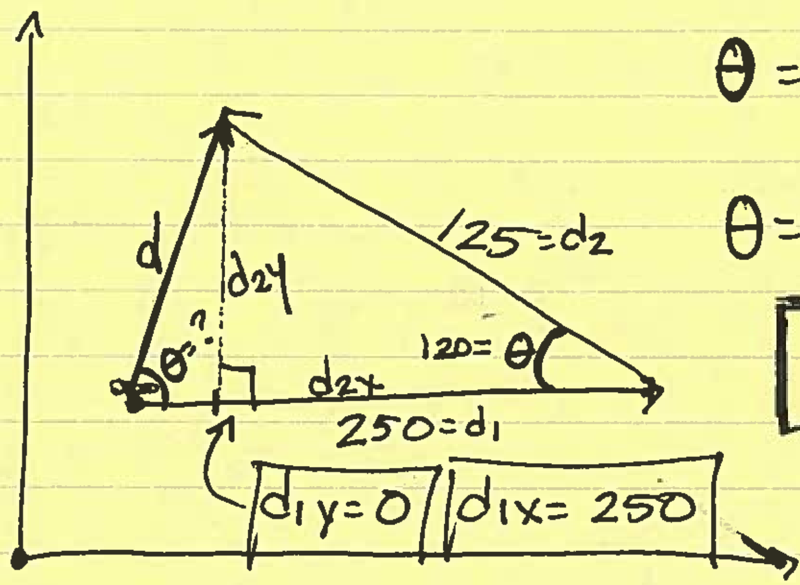
dy = 780 m N

$\cos(60) = \frac{adj}{hyp} = \frac{dx}{hyp\ 9.0 \times 10^2} \rightarrow dx = 9.0 \times 10^2 \times \cos(60)$

dx = 450 m E

Problem C

1.



$\theta = \tan^{-1}\left(\frac{Y_T}{X_T}\right)$

$\theta = \tan^{-1}\left(\frac{108m}{187m}\right)$

$\boxed{\theta = 30° \text{ N of E}}$

(d_2)

$\sin\theta = \frac{opp}{hyp} \rightarrow \sin(120) = \frac{d_{2y}}{125}$ $d_{2y} = 125 \cdot \sin(120)$

$\boxed{d_{2y} = 108m}$

$\cos\theta = \frac{adj}{hyp} \rightarrow \cos(120) = \frac{d_{2x}}{125} = d_{2x} = 125 \cdot \cos(120)$

$\boxed{d_{2x} = -63m}$

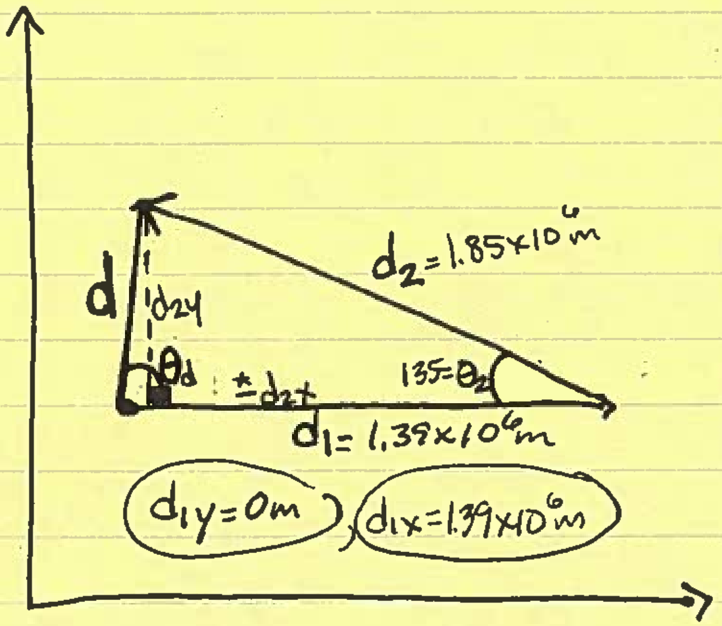
$X_T = 250 + -63 = 187m$

$Y_T = 0 + 108 = 108m$

$d = \sqrt{X_T^2 + Y_T^2}$

$d = \sqrt{187^2 + 108^2} = \boxed{216m}$

4.



★ First calculate displacement using the velocity eq.

$$925 \frac{km}{hr} \times 1000 \frac{m}{km} = 9.25\times10^5 \frac{m}{hr}$$

$$v = \frac{d}{t} \quad d = v\cdot t$$

$$d_1 = (9.25\times10^5 \tfrac{m}{hr})(1.5 hr)$$

$$\underline{d_1 = 1.39\times10^6 m}$$

$$d_2 = (9.25\times10^5 \tfrac{m}{hr})(2.0 hr)$$

$$\underline{d_2 = 1.85\times10^6 m}$$

d_2

$$\sin\theta = \frac{opp}{hyp} \rightarrow \sin(135) = \frac{d_{2y}}{1.85\times10^6}$$

$$d_{2y} = 1.85\times10^6 \times \sin(135)$$

$$\underline{d_{2y} = 1.31\times10^6 m}$$

★Note neg. direction

$$\cos\theta = \frac{adj}{hyp} \rightarrow \cos(135) = \frac{-d_{2x}}{1.85\times10^6}$$

$$d_{2x} = 1.85\times10^6 \times \cos(135)$$

$$\underline{d_{2x} = -1.31\times10^6 m}$$

$$X_T = -1.31\times10^6 + 1.39\times10^6 = \underline{8.0\times10^4 m}$$

$$Y_T = 0 + 1.31\times10^6 = \underline{1.31\times10^6 m}$$

$$d = \sqrt{x_T^2 + y_T^2}$$

$$d = \sqrt{(8.0\times10^4)^2 + (1.31\times10^6)^2}$$

$$\boxed{d = 1.31\times10^6 m}$$

$$\theta_d = \tan^{-1}\left(\frac{Y_T}{X_T}\right)$$

$$\theta_d = \tan^{-1}\left(\frac{1.31\times10^6}{8.0\times10^4}\right)$$

$$\theta_d = 86.5$$