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EDMA 657
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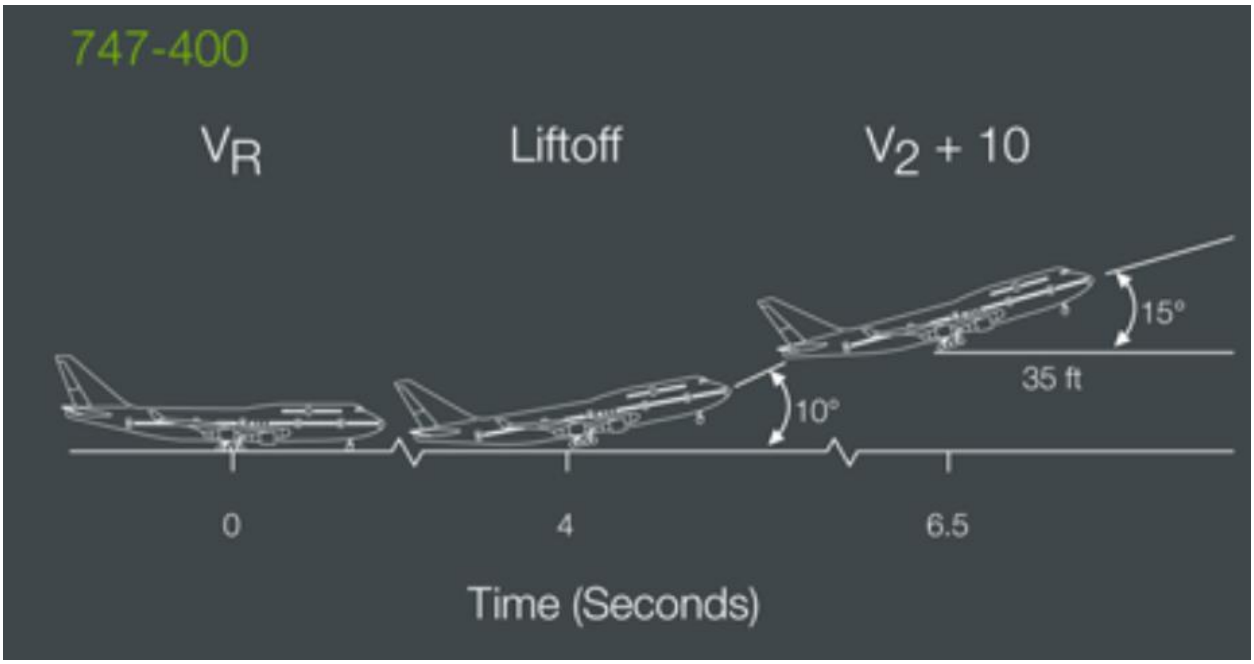
Place-based Problem #4
Trigonometry



Information taken from:
http://www.boeing.com/commercial/aeromagazine/articles/qtr_02_09/pdfs/AERO_Q209_article04.pdf

Alaska Airlines flies Boeing 747-400 jet airliners into Sitka. Boeing 747-400 reach safe take off speed around 196 knots (dependent on conditions). Once take of speed is achieved the pilot will climb at 10 degrees until the jet is at least 35 feet above the ground and then it increases its climb to 15 degrees.

How many feet does the airplane travel while at a 10 degree incline?

Sample Work

$\tan\theta = \frac{Y}{X}$

$\tan 10^\circ = \frac{35\text{ ft}}{X}$

$X = \frac{35\text{ ft}}{\tan 10^\circ}$

$X = 198.49\text{ ft}$

or

$\frac{\sin 10^\circ}{35\text{ ft}} = \frac{\sin 80^\circ}{X}$

$(\sin 10^\circ)X = 35(\sin 80^\circ)$

$X = \frac{35(\sin 80^\circ)}{\sin 10^\circ}$

$X = 198.49\text{ ft}$

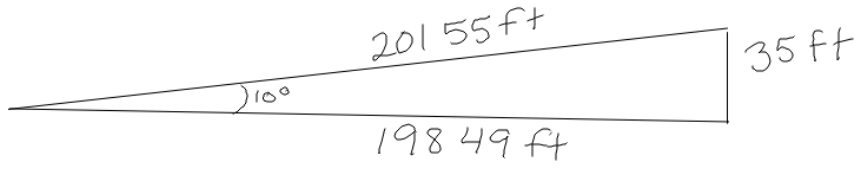
$a^2 + b^2 = c^2$

$35^2_{ft} + 19849^2_{ft} = c^2$

$40{,}623.28 = c^2$

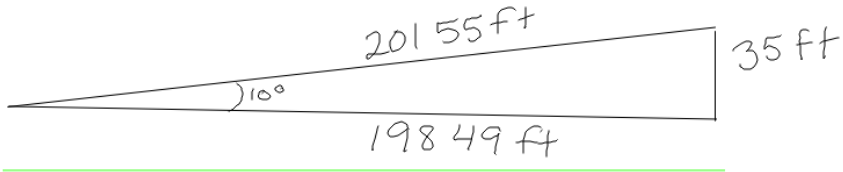
$c = \sqrt{40{,}623}$

$c = 201.55\text{ ft}$



2.5 Seconds

For fun I attempted to find the MPH of the climb and I got 54.96 mph and that seemed slow to me so I am not sure if the 2.5 seconds from chart is accurate or my math is off.



2.5 Seconds

$\frac{201.55\text{ ft}}{2.5\text{ sec.}} = 80.62\ \frac{ft}{sec}$

$\frac{201.55\text{ ft}}{2.5\text{ sec}} \times \frac{60\text{ sec}}{1\text{ min}} \times \frac{60\text{ min}}{1\text{ hr.}} \times \frac{1\text{ mi}}{5280\text{ ft}} = 54.96\text{ mph}$