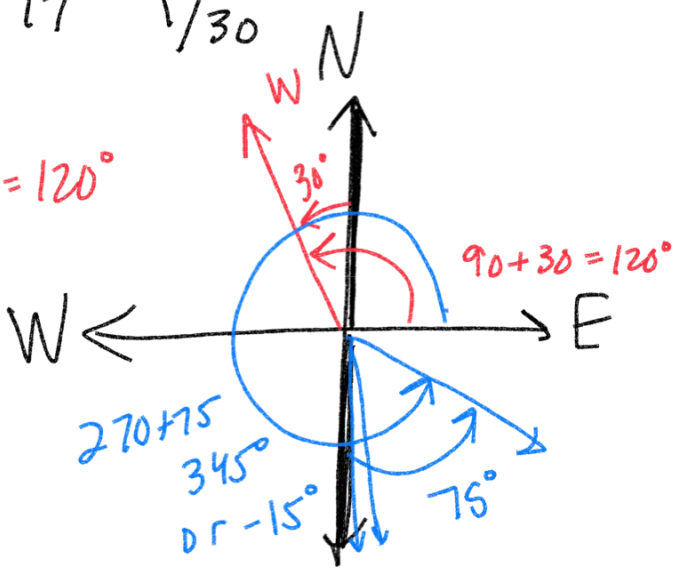
M-GP General Physics Week 17 1/30

(A) 60 mi 30° W of N $\theta = 120°$

(B) 40 mi 75° E of S



x comp (A)

$r\cos\theta$

$(60\text{ mi})\cos 120° = (60\text{ mi})(-\frac{1}{2}) = \boxed{-30\text{ mi}}$ S

y comp (A)

$r\sin\theta$

$(60\text{ mi})\sin 120° = \boxed{51.96\text{ mi}}$

x comp B

$(40\text{ mi})\cos 345 = \boxed{38.6\text{ mi}}$

y comp B

$(40\text{ mi})\sin 345 = \boxed{-10.4\text{ mi}}$

tot x comp

(A) (B)

$-30\text{ mi} + 38.6\text{ mi} = \boxed{8.6\text{ mi}}$

tot y comp

(A)

$51.96\text{ mi} + (-10.4\text{ mi}) = \boxed{41.6\text{ mi}}$

$r = \sqrt{x^2 + y^2} = \sqrt{(8.6)^2 + (41.6)^2}$

$= \boxed{42.5\text{ mi}}$

$\theta = \tan^{-1}\frac{y}{x} = \tan^{-1}\left(\frac{41.6}{8.6}\right)$

$\boxed{\theta = 78.3°}$

Dwayne "The Rock" Johsan (obj) drives a zamboni (obj) off of a all-ix 500 (distance) m building going 69 (velocity) m/s. How far from the base of the building will it land?

1.) Time of flight — y-direction → behave like a drop/free fall

$$y = y_0 + v_0 t - 4.9t^2$$

($v_0 = 0$)

$$0 = 500 - 4.9t^2$$

$$-500 - 500$$

$$\frac{-500}{-4.9} = \frac{-4.9t^2}{-4.9}$$

$$\sqrt{102.04} = \sqrt{t^2}$$

$$10.1\text{ s} = t$$

$$x_f = x_0 + v_0 t$$

$$= 69\ \text{m/s}\,(10.1\ \text{s}) = \boxed{696.969\ \text{m}}$$

Walt Disney's cryogenically frozen head drives a Splash Mountain Log flume off of a 1,200 m building going $3*10^8$ m/s speed of light

How far from the base of the building will it land?

Time of flight: $y = y_0 + \cancel{v_0 t}^{0} - 4.9t^2$

$0 = 1200 - 4.9t^2$

$-1200 \quad -1200$

$\frac{-1200}{-4.9} = \frac{-4.9t^2}{-4.9}$

$\sqrt{244.9} = t = \boxed{15.6\ s}$

$x = \cancel{x_0}^{0} + vt$

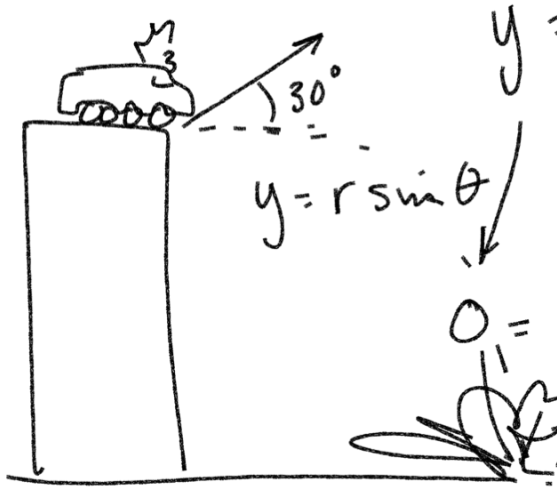
$= \left(3.00*10^8 \frac{m}{s}\right)(15.6s) = 4.68*10^9\ m/s$

4,680,000,000 m

circumference of earth: 40,075,000 $\simeq$ 117 times goes around the world

Guy Fieri drives a Taylor Swift's tour bus(es) off of a 999 m building going 343 m/s 30° above horizontal.

How far from the base of the building will it land?



time of Flight

$y = y_0 + v_{oy}t - 4.9t^2$

$y = r\sin\theta$ ↓ $343\sin 30°$

$0 = 999 + (343\sin 30°)t - 4.9t^2$

$999 + 171.5t - 4.9t^2$

$t = 40.086\text{ s}$ (desmos)

$X = \cancel{X_0}^{0} + (343\cos\theta)t$

$= (343\cos 30°)(40.086)$

$\boxed{11907.4\text{ m}}$