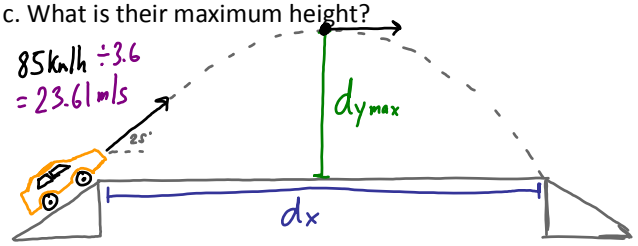
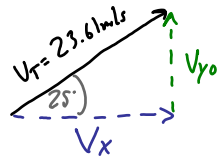
Problem Type 2: The Dukes of Hazzard are traveling at 85 km/h when they hit a jump that makes an angle of 25° above the horizontal.

a. How long are they airborne? $t = ?$

b. How far forward do they fly through the air?

c. What is their maximum height?





$\sin 25° = \frac{V_{yo}}{V_T}$

$V_{yo} = V_T \sin 25°$

$= (23.61)\sin 25°$

$= 9.978$ m/s

$\cos 25° = \frac{V_x}{V_T}$

$V_x = V_T \cos 25°$

$= 21.40$ m/s

x	y @ $t_{\frac{1}{2}}$
$V_x = 21.40$ m/s	$V_y = 0$
$d_x = ?$	$V_{yo} = 9.978$ m/s
$t = 2.036$ s	$a_y = -9.8$ m/s^2
b) $V_x = \frac{d_x}{t}$	$d_y = ?$
$d_x = V_x \cdot t$	$t_{\frac{1}{2}} = ? = 1.018$ s
$= (21.40)(2.036)$	a) $V = V_o + at_{\frac{1}{2}}$
$= 43.57$ m	$t_{\frac{1}{2}} = \frac{V - V_o}{a} = \frac{0 - 9.978}{-9.8}$
$= \boxed{44\text{ m}}$	$= 1.018$ s
	$t_{total} = 1.018 \times 2 = 2.036$ s
	$= \boxed{2.0\text{ s}}$

c) $v^2 = v_o^2 + 2ad$

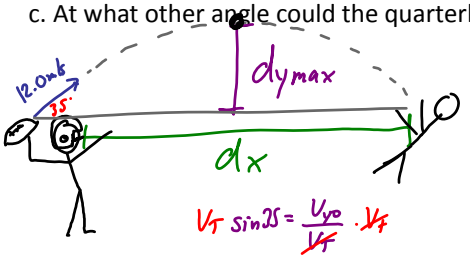
$d = \frac{v^2 - v_o^2}{2a} = \frac{0^2 - 9.978^2}{2(-9.8)} = \boxed{5.1\text{ m}}$

Example: A quarterback launches a ball to his wide receiver by throwing it at 12.0 m/s at 35° above horizontal.

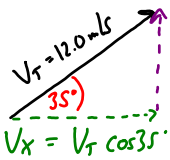
a. How far downfield is the receiver?

b. How high does the ball go?

c. At what other angle could the quarterback have thrown the ball and reached the same displacement?



$V_T \sin 35° = \frac{V_{yo}}{V_T} \cdot V_T$



$V_{yo} = V_T \sin 35°$

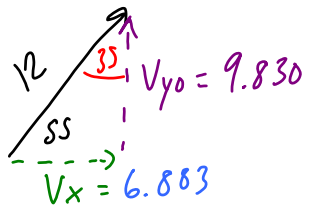
$= 12 \sin 35$

$= 6.883$ m/s

$V_x = V_T \cos 35°$

$= 12 \cos 35°$

$= 9.830$ m/s



x	y @ $t_{\frac{1}{2}}$
$V_x = 9.830$ m/s	$V_y = 0$
$d_x = ?$	$V_{yo} = 6.883$ m/s
$t = (0.7023) \times 2$	$a_y = -9.8$ m/s^2
$= 1.405$ s	$d_y = ?$
a) $V = \frac{d}{t}$	$t_{\frac{1}{2}} = ?$
$d = v \cdot t$	$V = V_o + at_{\frac{1}{2}}$
$= (9.830)(1.405)$	$t_{\frac{1}{2}} = \frac{V - V_o}{a} = \frac{0 - 6.883}{-9.8}$
$= 13.81$ m	$= 0.7023$ s
$= \boxed{14\text{ m}}$	b) $v^2 = v_o^2 + 2ad$
	$d = \frac{v^2 - v_o^2}{2a} = \frac{0^2 - (6.883)^2}{2(-9.8)}$
	$= \boxed{2.4\text{ m}}$

c) complimentary ∠ have to same range

$90 - 35 = \boxed{55°}$