



Solve:

x	y
$x_i = 0$	$y_i = 0$
$x_f = 17.1$	$y_f = -10$
$v_{xi} = 17.3$	$v_{yf} = -17.2$
$t = 2.78$	$a = -9.8$
	$t = 2.78$

$v_{yi} = 10$

$$v_{xi} = v \cos \theta = 20 \cos 30 = 17.3 \text{ m/s}$$

$$v_{yi} = v \sin \theta = 20 \sin 30 = 10 \text{ m/s}$$

a) $y_f = y_i + v_{yi}t + \frac{1}{2}at^2$

$$-10 = 0 + 10t + \frac{1}{2}(-9.8)t^2$$

$$t = 2.78 \text{ s}$$

b) $x_f = x_i + v_{xi}t$

$$= 0 + 17.3(2.78)$$

$$= 48.1 \text{ m}$$

c) $v_{yf} = v_{yi} + at$

$$= 10 + (-9.8)(2.78)$$

$$= -17.2 \text{ m/s}$$

$$v_f = \sqrt{v_{xi}^2 + v_{yf}^2}$$

$$= \sqrt{17.3^2 + 17.2^2}$$

$$= 24.4 \text{ m/s}$$

$$\phi = \tan^{-1}\left(\frac{-17.2}{17.3}\right)$$

$$= -44.8^\circ$$