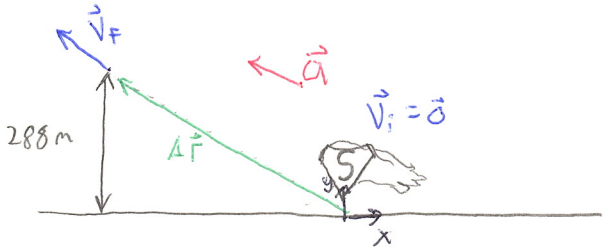
KINEMATICS: 2-D - FUNDAMENTAL EXAMPLES SOLUTIONS

(1)



$x_i = 0$ m $y_i = 0$ m

$x_f = ?$ $y_f = 288$ m

$V_{ix} = 0$ m/s $V_{iy} = 0$ m/s

$V_{fx} = ?$ $V_{fy} = ?$

$a_x = -42$ m/s^2 $a_y = 64$ m/s^2

$\Delta t = ?$

a) $y_f = y_i + V_{iy}\Delta t + \frac{1}{2}a_y\Delta t^2$

$288 = 0 + 0\Delta t + \frac{1}{2}(64)\Delta t^2$

$288 = 32\Delta t^2$

$\Delta t^2 = \frac{288}{32}$

$\Delta t = \sqrt{9} =$ (3 SECONDS)

b) Δt IS NOW KNOWN

$x_f = x_i + V_{ix}\Delta t + \frac{1}{2}a_x\Delta t^2$

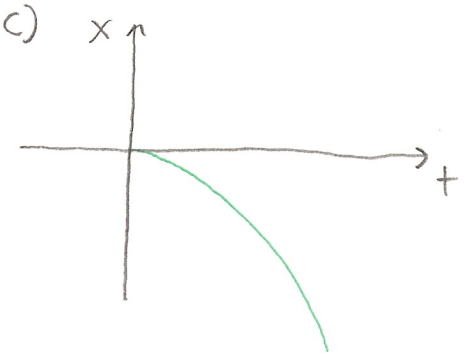
$x_f = 0 + 0\Delta t + \frac{1}{2}(-42)(3)^2$

$x_f = -189$ m

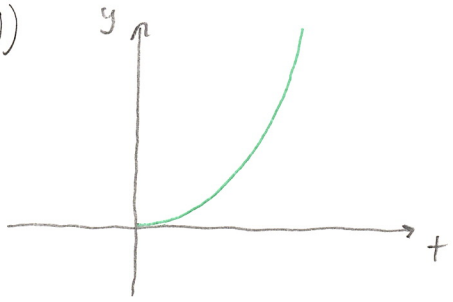
DISPLACEMENT IS A VECTOR!

$\Delta\vec{r} = \langle -189, 288 \rangle$ m

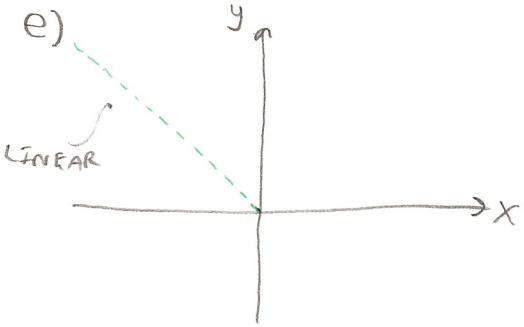
c)



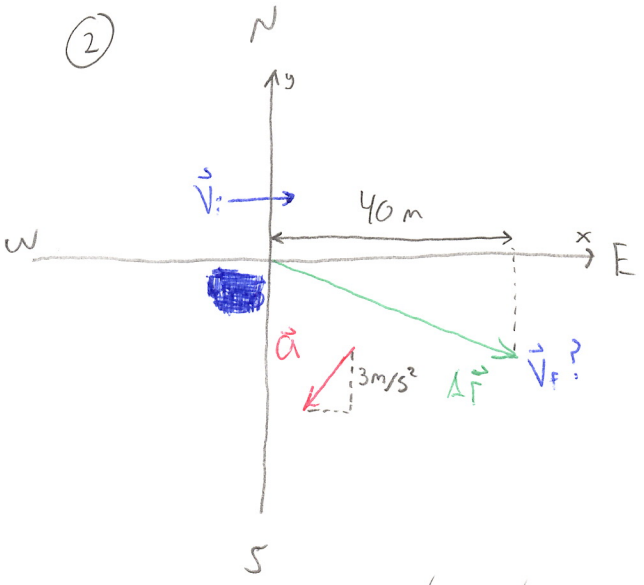
d)



e)



(2)



$X_i = 0$ m $y_i = 0$

$X_f = 40$ m $y_f = ?$

$V_{ix} = 20$ m/s $V_{iy} = 0$

$V_{fx} = ?$ $V_{fy} = ?$

$a_x = ?$ $a_y = -3$ m/s²

$\Delta t = 4$ s

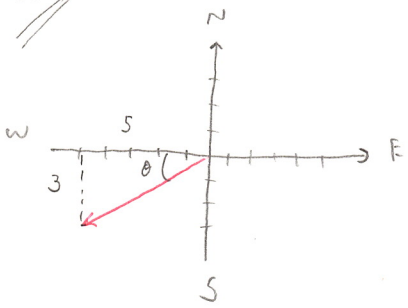
$$X_f = X_i + V_{ix}\Delta t + \frac{1}{2} a_x \Delta t^2$$

$$40 = 0 + (20)(4) + \frac{1}{2} a_x (4)^2$$

$$40 = 80 + 8a_x$$

$$-40 = 8a_x$$

$$a_x = -5 \text{ m/s}^2$$



$$\tan\theta = \frac{3}{5}$$

$$\theta \approx 31°$$

$$\vec{a} = \langle -5, -3 \rangle \text{ m/s}^2$$

$$|\vec{a}| = \sqrt{(-5)^2 + (-3)^2}$$

$|\vec{a}| \approx 5.8$ m/s² 31° S of W