Problem 1

$[\omega t] = 1$ (because exponential argument is a number.)

$[\omega] = \frac{1}{[t]} = T^{-1}$

Problem 2

Slowing. Because slope is decreasing.

Problem 3

$\Delta t = ?$ $\quad v_i = +4.9\,\frac{m}{s}$

$\Delta y = 0$ $\quad v_f =$

$a = -9.8\,\frac{m}{s^2}$

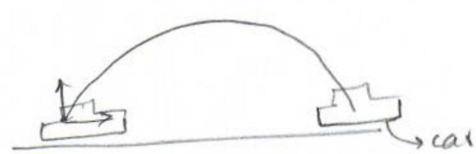
$\Delta y = v_i\,\Delta t + \frac{1}{2} a\,\Delta t^2$

$0 = 4.9\,\Delta t + \frac{1}{2}(-9.8)\,\Delta t^2$.

$\Delta t = 1.0\,s$

Problem 4

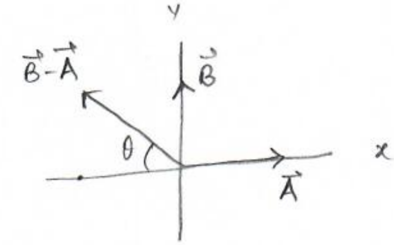
The orange returns to his hands.



Problem 5

$\vec{A} = +5.0\,\hat{i} + 0\,\hat{j}$.

$\vec{B} = 0\,\hat{i} + 5.0\,\hat{j}$



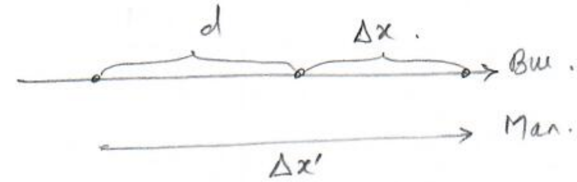
$\vec{B} - \vec{A} = -5.0\,\hat{i} + 5.0\,\hat{j}$

$\theta = \tan^{-1}\frac{5.0}{5.0} = 45°$

$|\vec{B}-\vec{A}| = \sqrt{(-5.0)^2 + (5.0)^2} = 7.1\,m$

direction of $\vec{B}-\vec{A}$ is $45°$ clockwise w.r.t. negative x.

Problem 6



$d + \Delta x = \Delta x'$

$d + \frac{1}{2} a t^2 = v t$

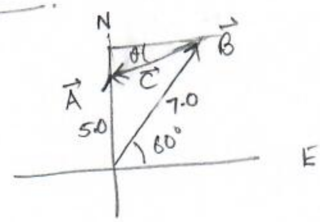
$10. + \frac{1}{2}(2.0)\, t^2 = 7.0\, t$

$t^2 - 7.0t + 10 = 0$

$$t = \frac{+7.0 \pm \sqrt{(-7.0)^2 - 4(1)(10.)}}{2} = \frac{+7.0 \pm 3.0}{2} = 5.0\,\text{s (or) } 2.0\,\text{s}$$

The man catches the bus after 2.0 s.

Problem 7



$\vec{B} + \vec{C} = \vec{A}$

$\vec{A} = 0\,\hat{i} + 5.0\,\hat{j}$

$\vec{B} = 7.0 \cos 60\,\hat{i} + 7.0 \sin 60\,\hat{j}$

$\quad = +3.5\,\hat{i} + 6.1\,\hat{j}$

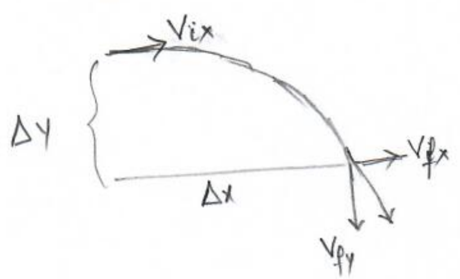
$\vec{C} = \vec{A} - \vec{B} = -3.5\,\hat{i} - 1.1\,\hat{j}$

$|\vec{C}| = \sqrt{(-3.5)^2 + (-1.1)^2} = 3.7$ km.

$\theta = \tan^{-1} \frac{1.1}{3.5} = 18^\circ$ S of W.

He has to travel 3.7 km 18° S of W.

Problem 8



$\Delta t =$

$\Delta x =$

$V_{ix} = 45$ m/s

Δt

$\Delta y = -75$ m

$V_{iy} = 0$

$V_{fy} =$

$a = -9.8$ m/s²

$V_{fy}^2 = V_{iy}^2 + 2a\Delta y$

$\quad = 0 + 2(-9.8)(-75)$

$V_{fy} = 38$ m/s.

$V_f = \sqrt{V_{fx}^2 + V_{fy}^2}$

$\quad = \sqrt{45^2 + 38^2}$

$\quad = 59$ m/s.