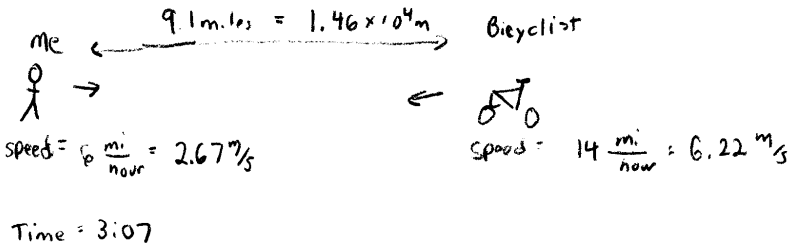
Context-Rich Problems: Solutions Outline

FOCUS the PROBLEM

Draw a picture of the situation including ALL the information given in the problem.



Question(s): What is the problem asking you to find?

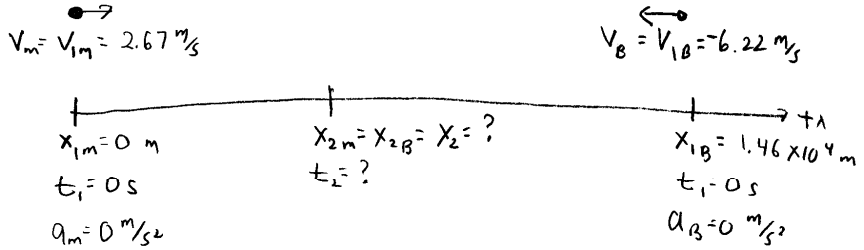
when will I see this bicyclist again

Approach: Outline the approach you will use.

Use equations for constant velocity to determine at what point between us we will meet and how long it will take to get there.

DESCRIBE the PHYSICS

Draw physics diagram(s) and define ALL quantities uniquely.



Which of your defined quantities is your Target variable(s)? t_2

Quantitative Relationships: Write equations you will use to solve this problem.

$$x_2 - x_1 = v(t_2 - t_1)$$

PLAN the SOLUTION
Construct Specific Equations (Same Number as Unknowns)

$X_{2m} - X_{1m}^{0} = V_m (t_2 - t_1^{0})$ UNKNOWNS

$X_2 = V_m t_2$ (1) $\boxed{X_2, t_2}$

$X_{2B} - X_{1B} = V_B (t_2 - t_1)$

$X_2 - X_{1B} = V_B t_2$ (2)

2 eqn, 2 unknowns, Plug X_2 from (1) into (2)

$V_m t_2 - X_{1B} = V_B t_2$

$t_2 (V_m - V_B) = X_{1B}$

$t_2 = \dfrac{X_{1B}}{V_m - V_B}$

Check Units

$[T] = \dfrac{[L]}{\frac{[L]}{[T]}} = [T]$ ok

EXECUTE the PLAN
Calculate Target Quantity(ies)

$t_2 = \dfrac{1.46 \times 10^4 \text{ m}}{[2.67 \text{ m/s} - (-6.22 \text{ m/s})]}$

$= 1.6 \times 10^3$ sec $\sim$ 27 minutes

EVALUATE the ANSWER
Is Answer Properly Stated?
Yes, in time

Is Answer Unreasonable?
About right, check total distance

$\Delta X_m = V_m t_2 = 4.3 \times 10^3$ m

$\Delta X_B = |V_B| t_2 = 10.0 \times 10^3$ m

$\Delta X_m + \Delta X_B = 1.43 \times 10^4$ m (ok to sig Fig)

Is Answer Complete? $\cong 1.46 \times 10^4$ m

No, time is 3:07 + :27 = 3:34 p.m.

(extra space if needed)