

#2. What quantity of a 60% DEET solution must be mixed w/ a 30% DEET sol'n to produce 300 mL of solution 50% DEET.

let x = volume of 60% sol'n. So $.60x$ represents amt. of DEET in the 60% solution.

Set up an equation using given info...
... which represent amt. of DEET involved

$$\underbrace{.60x}_{\text{(amt of DEET in 60% sol'n)}} + \underbrace{.30(300-x)}_{\text{(amt. of DEET in 30% sol'n)}} = \underbrace{.50(300)}_{\text{(amt. of DEET in 50% sol'n)}} \text{ (DEET)}$$

$$.60x + 90 - .30x = \boxed{150}$$

$$.30x = 60 \Rightarrow 3x = 600 \Rightarrow \boxed{x = 200 \text{ mL}}$$

3.



6L

Concentration: 120 g/L

$$\text{Amt of Salt} = \boxed{6L \times 120 \text{ g/L} = 720 \text{ g.}}$$

We want 200 g/L. How much should we boil off = x

$$\underbrace{(6-x)}_{\text{sol'n amount remaining}} \cdot 200 \text{ g/L} = 720 \text{ g}$$

Total salt.

sol'n amount remaining

}

Solve for x :

$$(6-x)200 = 720$$

$$1200 - 200x = 720$$

$$480 = 200x$$

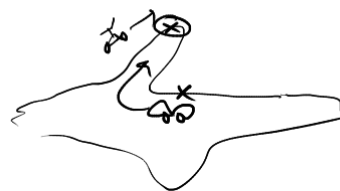
$$\boxed{x = 2.4 \text{ L}}$$

4. MQT $\rightarrow$ Copper Harbor is 150

Car Speed: 50 mi/h

Bike Speed: 10 mi/h

Entire Trip: 6 hours



* How much time did we spend on the bike?

Combine with

$$D = RT$$

$$\text{Total Distance} = \text{Car Dist.} + \text{Bike Dist.}$$

$$150 = 50 \cdot (6-x) + 10 \cdot x = 300 - 50x + 10x = 300 - 40x$$

$$40x = 150 \Rightarrow x = \frac{150}{40} = 3.75$$

Text. 1.6

We're mixing two kinds of bug repellent. ① 60% DEET
we want to produce 300 mL of 50% DEET

$x = \text{amt of solution } \textcircled{1} \left\{ \begin{array}{l} \text{write an equation for} \\ \text{amt. of DEET (not solution)} \end{array} \right\}$

"60% of x"

$$.60x + .3(300 - x) = .5 \cdot 300$$

amt of DEET in ① amt of DEET in ② counting amt. of DEET

implies

$$.6x + 90 - .3x = 150 \Rightarrow .3x = 60 \Rightarrow x = 200 \text{ mL}$$

3



We want at end concentration = 200 g/L

6L of salt water at 120 g/L concentration

How much salt is there? 720g

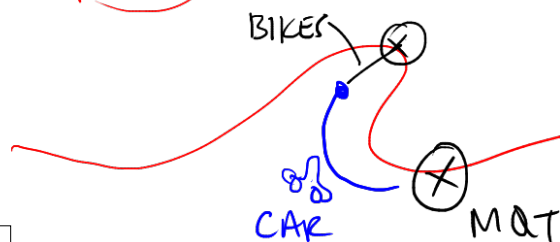
Does the salt disappear by boiling? No.

Write an equation for amount of salt, after boiling.

let $x = \text{amt of water to boil off}$

$$\begin{array}{ccc} (6 - x) & \cdot & 200 \\ \text{Volume After Boiling} & \cdot & \text{Concentration After Boiling} \end{array} = 720$$

$$1200 - 200x = 720 \Rightarrow 480 = 200x \Rightarrow x = 2.4$$



DISTANCE : 150
CAR SPEED : 50 m/h
BIKE SPEED : 10 m/h
Total Time : 6 h
Traveling

$x = \text{time spent on bikes}$

$D = RT$

Total Dist = Bike Dist + Car Dist

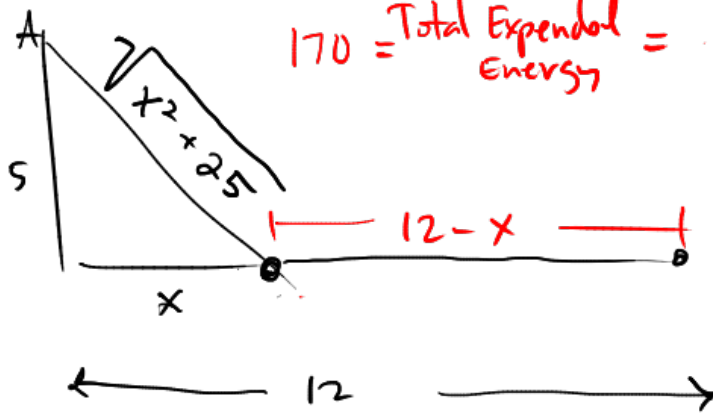
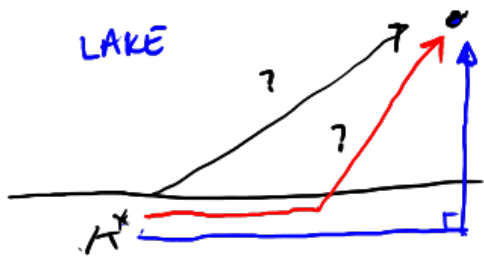
$$150 = 10(x) + 50(6 - x) = 10x + 300 - 50x$$

$$= -40x + 300$$

$D = R \cdot T$

$$-150 = -40x \Rightarrow x = \frac{150}{40}$$

$x = 3.75$



$$170 = \text{Total Expendable Energy} = 14 \sqrt{x^2 + 25} + \underbrace{10(12 - x)}_{120 - 10x}$$

$$(A+B)^2 = A^2 + \underline{2AB} + B^2$$

$$\begin{array}{r} 50 \cdot 10 = 500 \\ \times 2 \\ \hline 1000 \end{array}$$

$$10x + 50 = 14 \sqrt{x^2 + 25}$$

square



square



$$100x^2 + 1000x + 2500 = 14^2 \cdot (x^2 + 25) = 196x^2 + 4900$$

$$x = \frac{1000 \pm \sqrt{1000^2 - 4 \cdot 96 \cdot 2400}}{2 \cdot 96}$$

$$\textcircled{1} = 96x^2 - 1000x + 2400$$

$$= \textcircled{6.6 \text{ and } 3.75}$$

