Proposed Problem

5. Because of your technical background, you have been given a job as a student assistant in a University research laboratory that has been investigating possible accident avoidance systems for oil tankers. Your group is concerned about oil spills in the North Atlantic caused by a super tanker running into an iceberg. The group has been developing a new type of down-looking radar which can detect large icebergs. They are concerned about its rather short range of 2 miles. Your research director has told you that the radar signal travels at the speed of light which is 186,000 miles per second but once the signal arrives back at the ship it takes the computer 5 minutes to process the signal. Unfortunately, the super tankers are such huge ships that it takes a long time to turn them. Your job is to determine how much time would be available to turn the tanker to avoid a collision once the tanker detects an iceberg. A typical sailing speed for super tankers during the winter on the North Atlantic is about 15 miles per hour. Assume that the tanker is heading directly at an iceberg that is drifting at 5 miles per hour in the same direction that the tanker is going.

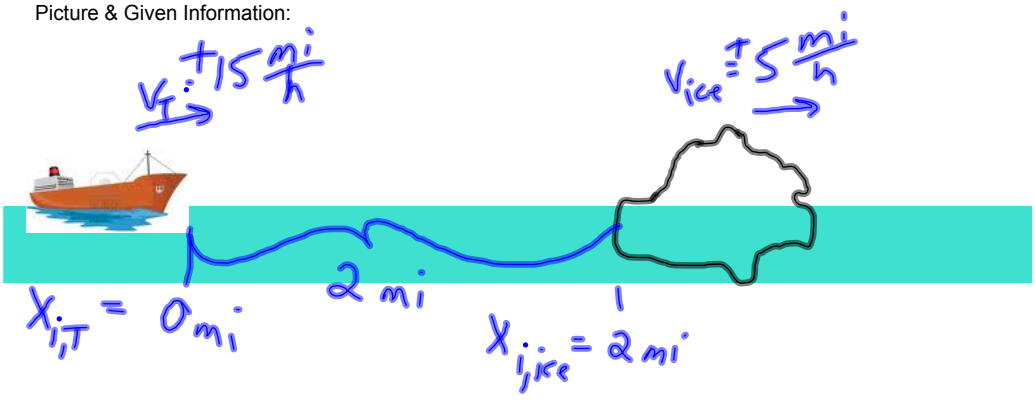
- Create Useful description - sketch, graphs, define quantities, define problem
- Physics Approach - list physics concepts that would apply to this problem
- Specific Application of Physics - use the concepts to model mathematically model the problem
- Mathematical Procedures - use the equations to solve the problem

Aug 5-9:52 AM

Physics Problem Solving Sheet

Useful Description

Picture & Given Information:



Question: How much time does the superstanker have to turn? Δt

Target Quantiy:

Physics Problem Solving Sheet (cont.)

Physics Approach

Physics Concepts and/or Principles:

Const. vel.

Specific Application of Physics

Assumptions/ Constraints:

ignoring speed of light

Specific Equations:

$v = \frac{\Delta x}{\Delta t} = \frac{x_f - x_i}{\Delta t}$

Mathematical Procedures

Employ specific equations to solve for target quantity.

$x_{f,T} = v_T \Delta t + x_{i,T} = \left(15 \frac{mi}{h}\right) t + 0\,mi$

$x_{f,ice} = (v_{ice}) \Delta t + x_{i,ice} = \left(5 \frac{mi}{h}\right) t + 2\,mi$

calculator

12 min − 5 min = 7 min

Jul 26-9:49 PM

$15t = 5t + 2$

$10t = 2$

$t = 0.2\,h \cong 12\,min$

$-5\,min$ processing time

7 min to turn

Oct 20-10:11 AM