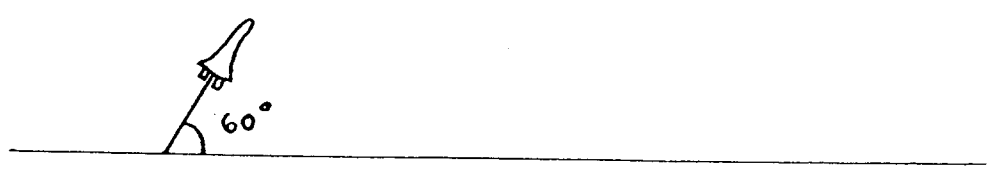


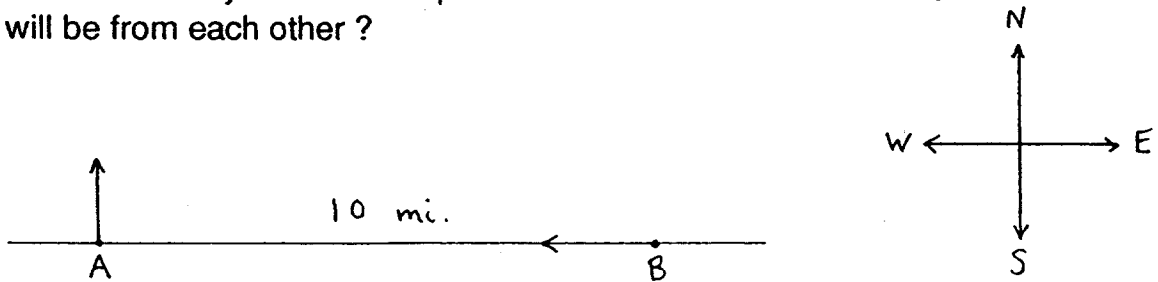
ESP
Kouba
Worksheet 15

1. Your little brother is standing on the top of a building which is 500 feet high. With a water cannon aimed at the ground below, he fires a water balloon vertically downward at 60 miles per hour. How long will it take to hit the ground? What is its velocity (in miles per hour) as it strikes the ground?
2. A toy rocket is fired from ground level with an angle of inclination of 60° . If it strikes the ground 15 seconds later, what is the initial velocity of the rocket? How far away from the "launch pad" does the rocket land? How high above the ground does the rocket get?

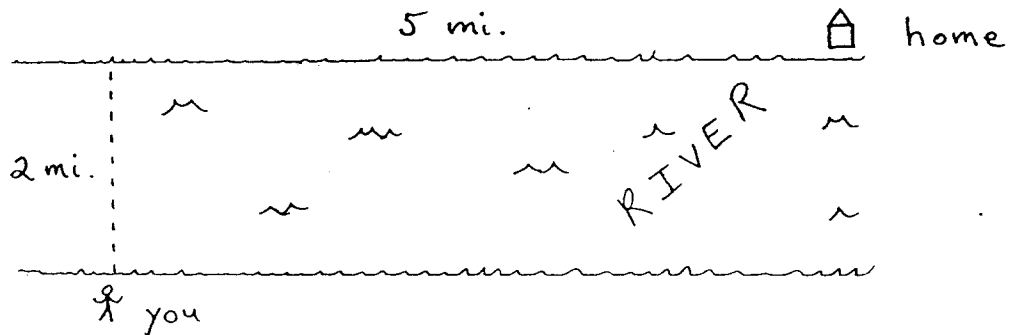


3. Determine the radius r and height h of the cylinder of maximum volume which can be obtained by revolving a rectangle of perimeter 24 in. about one of its sides.
4. Find two non-negative numbers whose sum is one and so that the sum of the square of the first number and the cube of the second number is
 - a. a maximum.
 - b. a minimum.

5. Points A and B are ten miles apart. One car leaves point A and heads directly north at 30 mph and at the same instant a second car leaves point B and heads directly west at 45 mph. What is the shortest distance the cars will be from each other?



6. You can swim at the rate of 2 mph and jog at the rate of 4 mph. What route should you take in order to get home as quickly as possible?



7. Assume that y is a function of x satisfying $y'' = 1 - x^2$. In addition, an equation of the line tangent to the graph of the function at the point $(1, 1)$ is $y = 2 - x$. Derive an equation for the function.