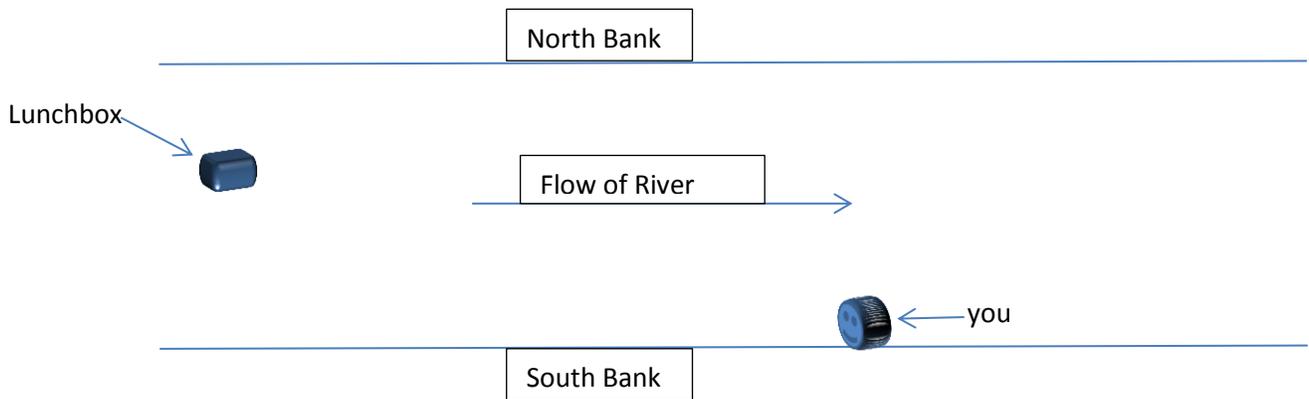


3. Consider a system of a mass (M) on a vertical spring with force equation $F_{spring} = -k x$:
 - a. Given that the units of force are $[F] = \frac{kg\ m}{s^2}$ use dimensional analysis to find the units on the *spring constant* k .
 - b. Draw a picture of the mass-spring system. Make sure you add a coordinate system and draw the vectors which represent the forces on the mass.

4. You are camping near a rapidly flowing river. You are eating your lunch when a hawk swoops down and steals your lunchbox. Realizing the lunchbox is not a good hawk meal, he drops it in the river. The river flows *east at 6 km/h*.
 - a. The hawk drops your lunchbox *1 km away* from your starting position. You decide to swim out and retrieve your lunchbox. On the diagram below, draw the vectors representing the motion of both you and your lunchbox as viewed by an observer on the *south bank*.



- b. You can swim at a speed of *2 km/h relative* to the flowing water. How long does it take you to get to your lunchbox?