Today, we will:

- Continue discussing EFs: **Tank filling**, and do some example problems
- Begin to discuss some basics of meteorology: **Coriolis effect**, **global wind patterns**, **atmospheric stability**

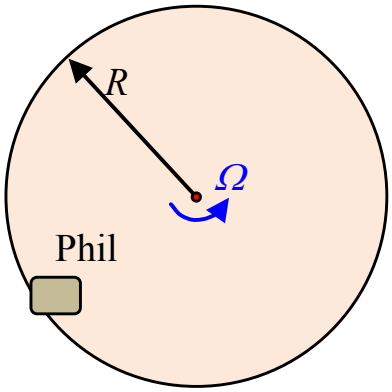
Continuation of the gasoline-tank-filling problem from last lecture:
We estimated that approximately 0.057 kg of gasoline vapors are emitted into the atmosphere for each 15-gallon fill-up of gasoline at a gas station.

Bias in the media: Which sounds more alarming to the average person on the street?

1. You emit 0.057 kg of gasoline vapors into the atmosphere every time you fill up your car.
2. You emit 57 g of gasoline vapors into the atmosphere every time you fill up your car.
3. You emit 57,000 mg of gasoline vapors into the atmosphere every time you fill up your car.
4. You pollute the air by emitting 57,000 mg of toxic gasoline vapors into the atmosphere *every* time you fill up your car!

Example: Coriolis Force

Given: A merry-go-round of radius R = 15 m rotates at Ω = 10 rpm. Phil (m = 90 kg) is riding the merry-go-round. He stands at the edge of the ride ($r = R$) and holds on to a rail to keep from flying off.



(a) To do: Calculate the magnitude of the Coriolis acceleration in g's experienced by Phil ["g" = a_c/g, where g = 9.807 m/s^2].

Solution: The Coriolis force is $\vec{F}_c = m\vec{a}_c - 2m\left(\vec{\Omega}\times\vec{U}\right)$.

(b) To do: Calculate the radial force Phil needs to exert on the rail to keep from flying off.

Solution:

(c) To do: If Phil throws a baseball horizontally at 67.11 mph (30 m/s), calculate the initial value of the magnitude of the Coriolis acceleration acting on the ball from Phil's perspective, in g's.

Solution: The Coriolis force is $\vec{F}_c = m\vec{a}_c - 2m\left(\vec{\Omega}\times\vec{U}\right)$.

Global Wind Patterns