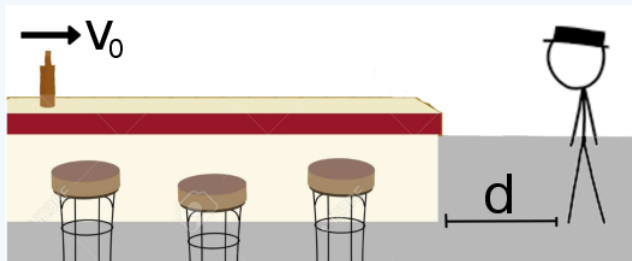


## 17.3: Examples

### ? Whiteboard Problem 17.3.1: A Projectile Pint



A bartender slides a bottle down his bar to a customer. Unfortunately, he pushes it too hard and the bottle flies off the end of the bar!

1. The force of friction between the bar and the bottle is 0.150 N, and the bottle has a mass of 0.520 kg. What is the acceleration of the bottle as it travels down the bar?
2. If it started with a speed of 2.97 m/s, what is the speed of the bottle as it leaves the bar, 2.80 m away from where the bartender pushed it?
3. Black Hat from the webcomic XKCD is standing nearby, a distance 1.25 m from the end of the bar (which is 1.15 m tall). Does the bottle hit him after it slides off the end of the bar?

### ? Whiteboard Problem 17.3.2: Two Blocks in a Row

Consider two blocks which are in contact with each other on a horizontal frictionless surface. The masses of the blocks are 5 kg and 10 kg. The 5 kg block is being pushed with an unknown force  $F_p$ , which then pushes on the 10 kg block, making them both accelerate to the right at  $2.00 \text{ m/s}^2$ .

1. How big is the force pushing on the 10 kg block from the 5 kg block?
2. What is the magnitude of the pushing force  $F_p$ ?

### ✓ Whiteboard Problem 17.3.3: Three Blocks in a Row

Consider three blocks which are in contact with each other on a horizontal frictionless surface. From left to right, the masses of the blocks are 5 kg, 10 kg, and 25 kg. The leftmost block is being pushed to the right with an unknown force  $F_p$ , and the blocks are accelerating to the right at  $2.00 \text{ m/s}^2$ .

1. What is the magnitude and direction of the forces the blocks are exerting on each other?
2. What is the magnitude of the pushing force  $F_p$ ?

### ? Whiteboard Problem 17.3.4: Crates on a Lift

A 40.0 kg crate is sitting on top of a 60.0 kg crate on the floor of an elevator. The elevator floor is exerting an upwards force of 1050 N to the 60.0 kg crate.

1. Determine the magnitude and direction of the acceleration of the crates in the elevator.
2. Determine the magnitude and direction of the contact force that the 40.0 kg crate exerts on the 60.0 kg crate.
3. Determine the magnitude and direction of the contact force that the 60.0 kg crate exerts on the 40.0 kg crate.

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