# 2D Kinematics Problems

Fun With Fiziks

July 5, 2022

Practice Problems

1. A basketball is launched at an angle of 45° with an initial velocity of 5 m/s.

   (a) What is the amount of time it stays in the air for?

   (b) How far does it go?

2. A baseball player is trying to hit a ball 100 m so that he gets a home run. He hits the ball at a 15 degree angle.

   (a) What initial velocity is required?

   (b) How much time will the ball stay in the air?

   (c) How high will the ball go?

3. For their physics project, Jonathan and Andrew decide to investigate the kinematics behind shooting a basketball. Assume there is no air resistance. Also, assume that the basketball goes in if it touches the top of the hoop.

   (a) Jonathan throws the basketball to Andrew, who is standing $10\ m$ away. He throws the ball at $2m/s$, at an angle of 30° to the horizontal. Does the ball reach Andrew?

   (b) Andrew stands $4\ m$ away from the hoop to shoot a free throw. The hoop is $3\ m$ tall. If Andrew is $1.5\ m$ tall and shoots the ball at an angle of 60° to the horizontal, what speed is required to make it?

   (c) Giannis once threw a basketball at Harden's face. Jonathan, being a big fan, wants to recreate this with Andrew, who stands $5\ m$ away. Jonathan accidentally chucks the basketball at Andrew with a speed of $10\ m/s$ at an angle of 10° to the horizontal. If Andrew's reaction time is $0.15\ s$, does he dodge the ball in time?

4. Justin played many carnival games at the fair. One game involves throwing a ball and bouncing it off of a wall into a basket. After many valiant attempts, he has concluded that it is physically impossible. To be fair, this may or may not be a true statement. Given the setup of the game
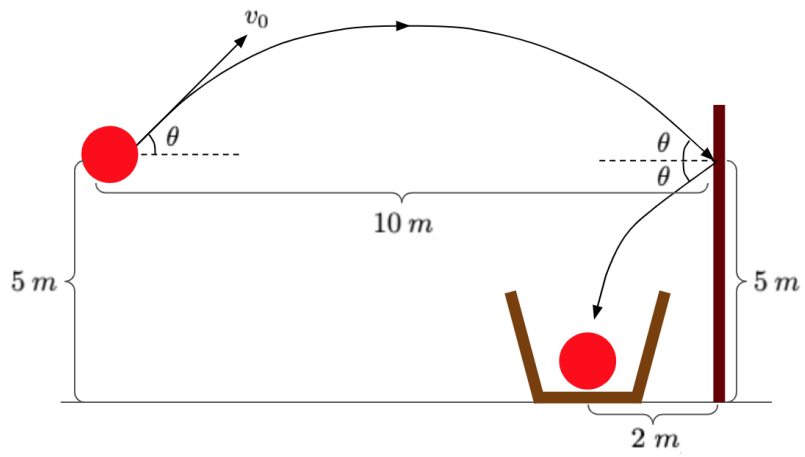
shown below, determine if Justin is correct or if he just has to get better.
If he needs to get better, find v_0 and θ so that the ball goes in.