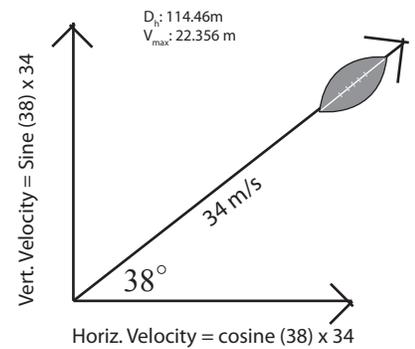


The Mechanics Of

FLIGHT

This is an airfoil, a kind of wing shape. Its design gives planes the lift they need to overcome gravity.



The Concept

Why aren't you floating around right now? Blame a little thing called gravity. The earth pulls on all of us at a constant rate, which makes it hard to get up into the air.

"Flight" is term we give to anything that overcomes this force. Objects in the air are still pulled on by gravity; they just have a force of their own that pushes them away from the Earth. Once this "pushing" force stops, gravity takes over and the object comes right back down.

All moving objects on Earth exhibit horizontal movement. Flying objects go one step further by traveling vertically, too. However, these two kinds of motion are **independent** from one another, meaning a projectile's horizontal movement won't impact its vertical motion.

The Math

If you really want to understand flight, you also have to understand a little math.

Flight deals with two kinds of motion: **constant velocity** and **accelerating velocity**. Constant velocity can be expressed in meters per second, or m/s in short. Because acceleration data tells us how many meters a second we're increasing by in a second, we express it as meters per second per second, or m/s^2 .

Remember horizontal and vertical motion? The horizontal motion for flying objects always stays the same—meaning it's at **constant velocity**. Vertical motion is always prone to change, though, meaning it's usually an **accelerating velocity**.

We can put all of this information together to create a few important equations.

First: the horizontal distance an object travels = its horizontal velocity * the duration of the flight.

Example: A stone thrown horizontally at 15 m/s that stays in the air for 2 seconds will go... 30 meters. How long will a pineapple thrown at 30 m/s for 5 seconds go?

Second: the time an object stays in the air equals its vertical velocity / 4.9.

Example: A history book is thrown with a vertical velocity of 21 m/s, meaning it will stay in the air for about 4.3 seconds. How long would it have been if thrown at 150 m/s?

Finally, we can use all of this information to create a **really important** equation:

Third: the maximum height of a flying object equals (time in air/2)² divided by 4.9.

Example: If your cousin bounces off the trampoline and stays in the air for 150 seconds, they'll have jumped about 1148 meters (almost 3/4 of a mile) in the air!