

## Thrust, Drag and Rockets

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Remember, there are four forces of flight, thrust, drag, lift, and gravity.

When you through the plane forward, which of these forces were you providing?

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You provided thrust. Just like a bird flapping it's wings provides thrust and a bow provides thrust to an arrow.

In an airplane, the thrust comes from the propellers or the jet engine.

The air moving around the wings is what gives it lift, which works against gravity to keep the plane in the air.

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In a plane, propellers can create thrust or a jet engine can create thrust.

Propeller's create thrust because air passes the blade and creates a pressure difference, just like air creates a pressure difference around the wings to create lift.



With a jet engine, fuel is ignited which creates a large amount of exhaust gas to be released out of the rear of the aircraft, creating a large force that propels the aircraft forward.



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So a jet engine creates thrust forward by pushing hot gases backwards.

This is like you being on a skateboard and throwing a heavy object forwards. What happens?

-You move in the opposite direction!

So when you force something away from you, you create thrust in the opposite direction.

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Rockets work the same way!



We use a narrow passageway for the engine.

This is because fluids flow more quickly through narrow openings.

Think about a garden hose. If you let it run steadily out of the wide opening, it will flow slowly.



If you cover up most of it and leave a narrow opening, the water moves much faster!

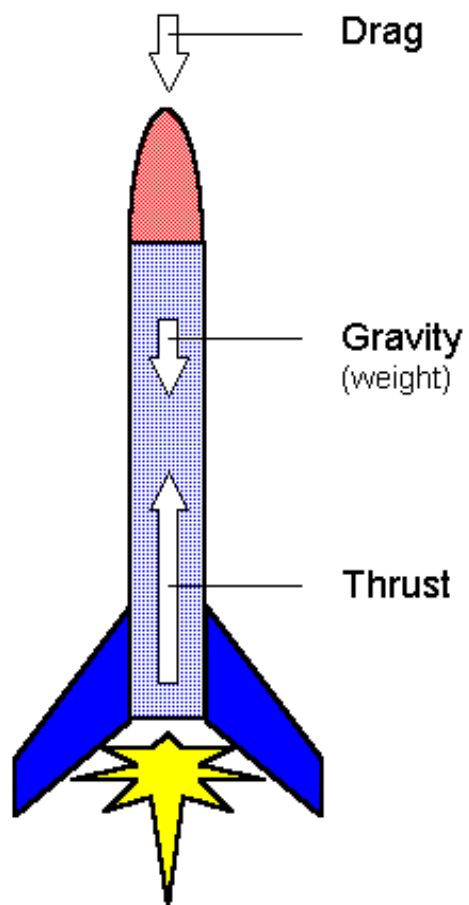
The same thing happens with the rocket engine, creating thrust!



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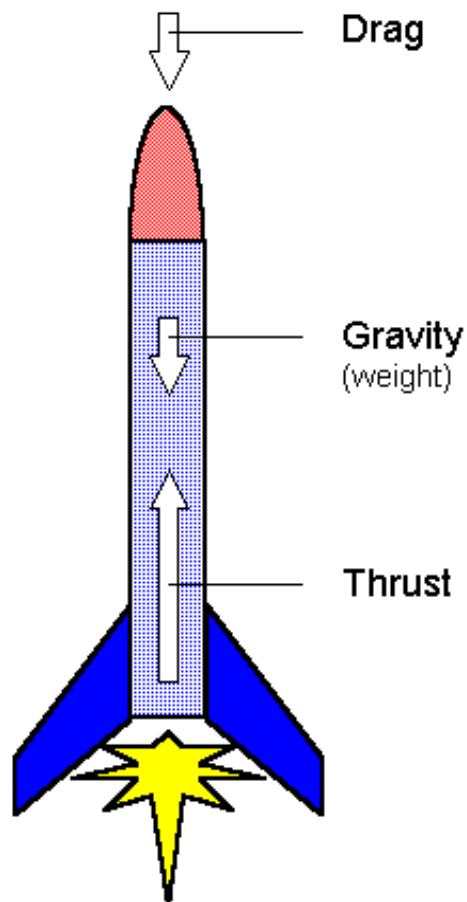
What would the force diagram of a rocket look like?

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Why isn't there lift?

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Why isn't there lift?

Remember that lift was created by the wings of an airplane and the airplane moved horizontally through the air. Because a rocket moves vertically, there is no lift created. The only force moving the rocket upward is thrust.