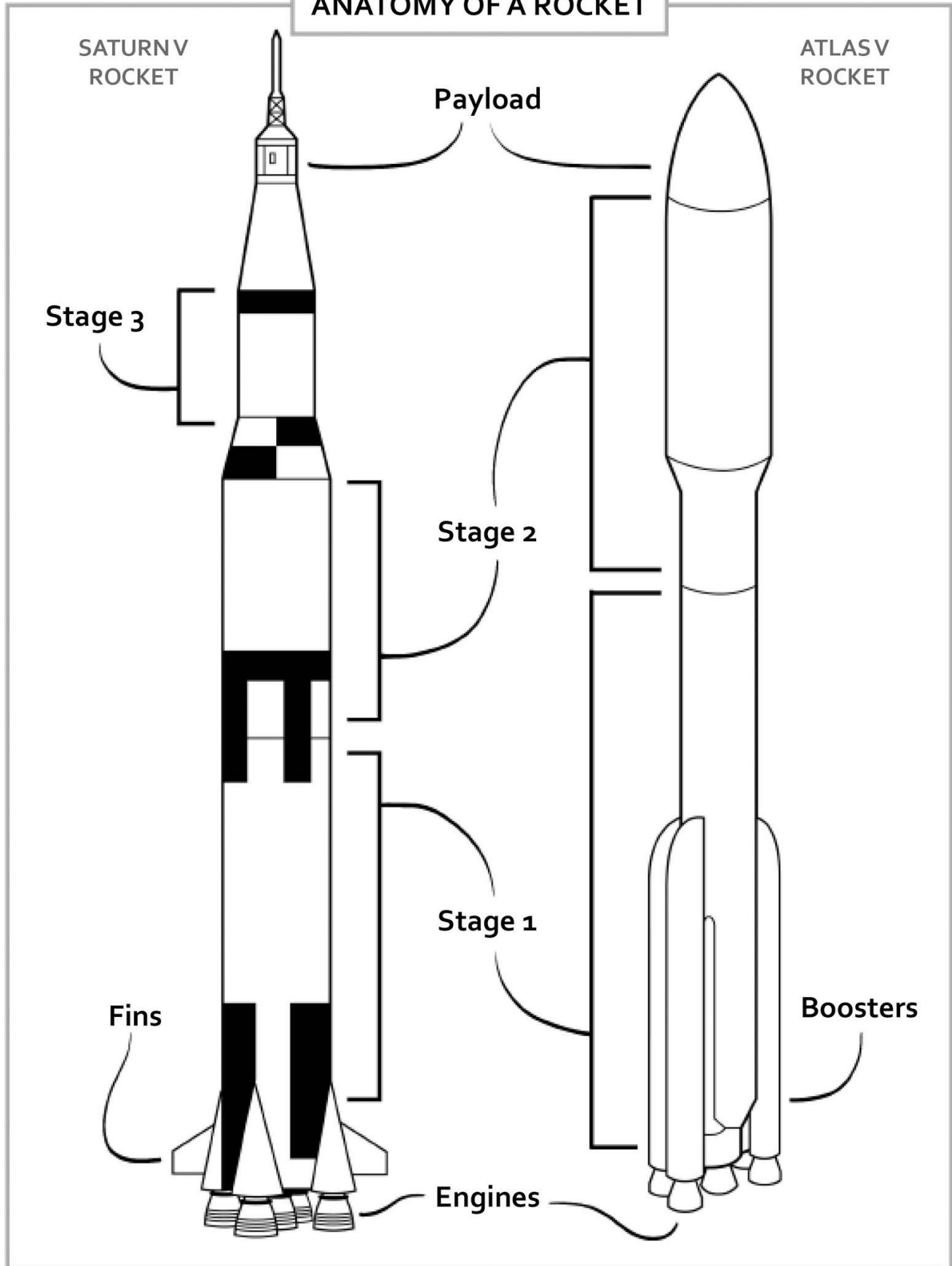


ANATOMY OF A ROCKET



# What makes a rocket?

Rockets are vehicles designed to travel out of Earth's atmosphere and into space. They can carry rovers, satellites, supplies, astronauts, and more.

**Payload:** This is the cargo that's being carried into space by the rocket. It can be a satellite, telescope, supplies, or even crew for the International Space Station.

**Stage 1:** This is the section at the bottom of the rocket stack containing the main engines that lift the rocket off the launch pad. It is usually not powerful enough to carry the payload all the way into orbit by itself, so at least one additional stage is needed later during the flight.

**Stage 2:** When the first stage has used up its fuel, the second stage sitting on top of it takes over. The rocket is now so high up that the thinner air offers less resistance, so second stage engines don't have to be as powerful as the first stage, but to make the job even easier, the empty first stage is discarded.

**Stage 3:** In the case of extremely massive payloads, yet another stage may be needed to get the payload into space. Usually, two or three stages get the job done—it's rare that rockets need more than three stages.

**Boosters:** Aside from the main engines of the first stage, some rockets use additional smaller rockets called boosters attached to the first stage to provide extra thrust to lift a payload into low Earth orbit. These are ejected after they run out of fuel.

**Engines:** These are at the bottom of each rocket stage and are where the fuel ignites to produce the explosive reaction that creates thrust and pushes the rocket in the opposite direction. Some engines fire only once and keep burning until their fuel is used up. Others can be throttled up and down to produce more or less thrust as needed, and can even be shut off and restarted later as needed for the mission.

**Fins:** Some rockets have fins for steering within Earth's atmosphere, but others don't because they can swivel their engines slightly to steer. In the particular case of the Saturn V moonrocket, the large, non-movable tail fins were meant to help the rocket stay on course in case of an in-flight emergency, which would give the crew extra time to engage the escape system. Fortunately, all the Saturn V crew launches were successful, so they never had to test the rocket in that imaginary situation.