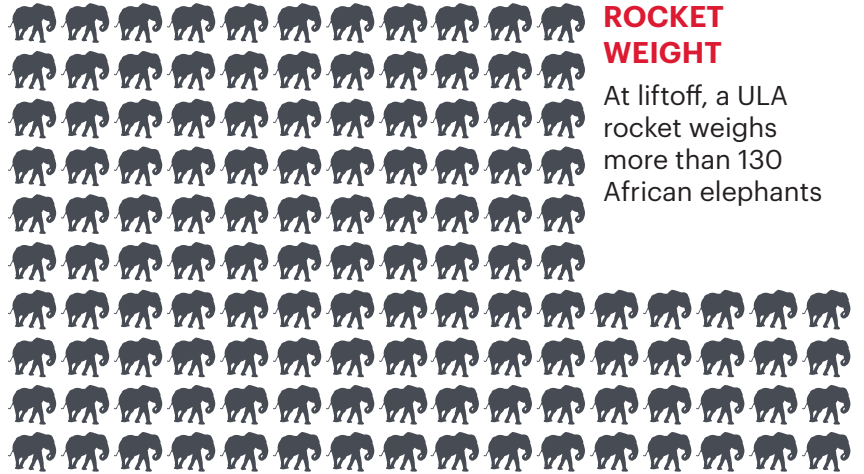


# ROCKET SCIENCE:

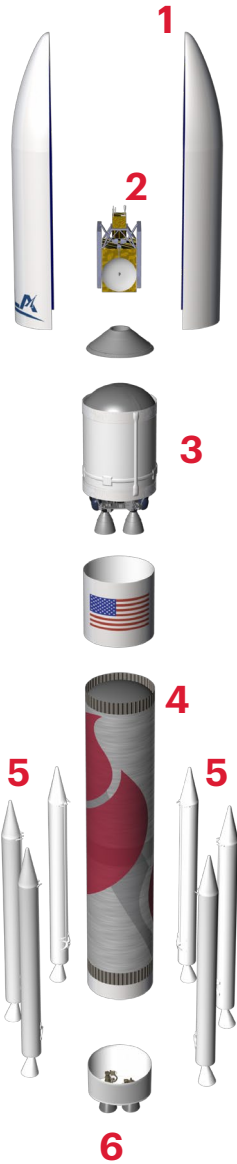
## A Beginner's Guide To Launch



**ROCKET WEIGHT**  
At liftoff, a ULA rocket weighs more than 130 African elephants

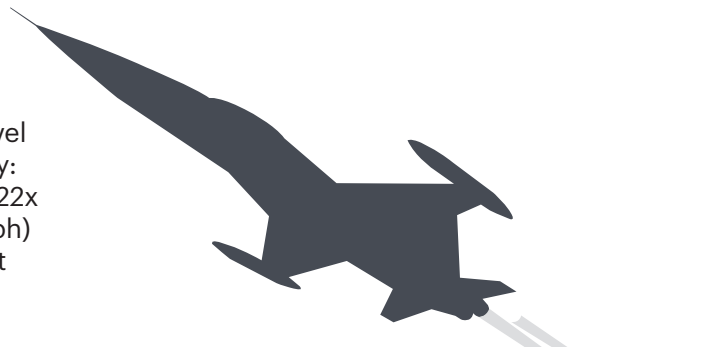
### ROCKET

- 1 Payload Fairing:** Encloses the satellite or spacecraft and protects it from the Earth's atmosphere.
- 2 Payload:** Satellite or spacecraft carried by a rocket.
- 3 Upper Stage:** The upper stage is ignited after the booster is jettisoned to push the payload to the required separation point.
- 4 First Stage:** The first stage ignites the main engines thrusting the rocket off the ground and into its initial flight.
- 5 Solid Rocket Boosters:** Solid rocket boosters, ignited at liftoff, give the rocket extra thrust to lift larger payloads.
- 6 Main Engines:** Produces thrust that lifts the rocket off the ground.



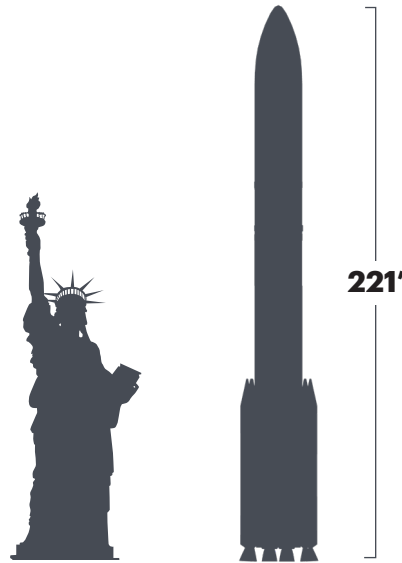
### ROCKET SPEED

ULA rockets travel at approximately: 22,000 mph or 22x faster (1,000 mph) than a fighter jet



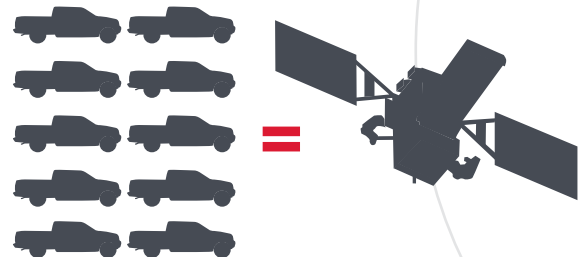
### ROCKET HEIGHT

ULA's tallest rocket stands 221 feet or about 1.5x the height of the Statue of Liberty



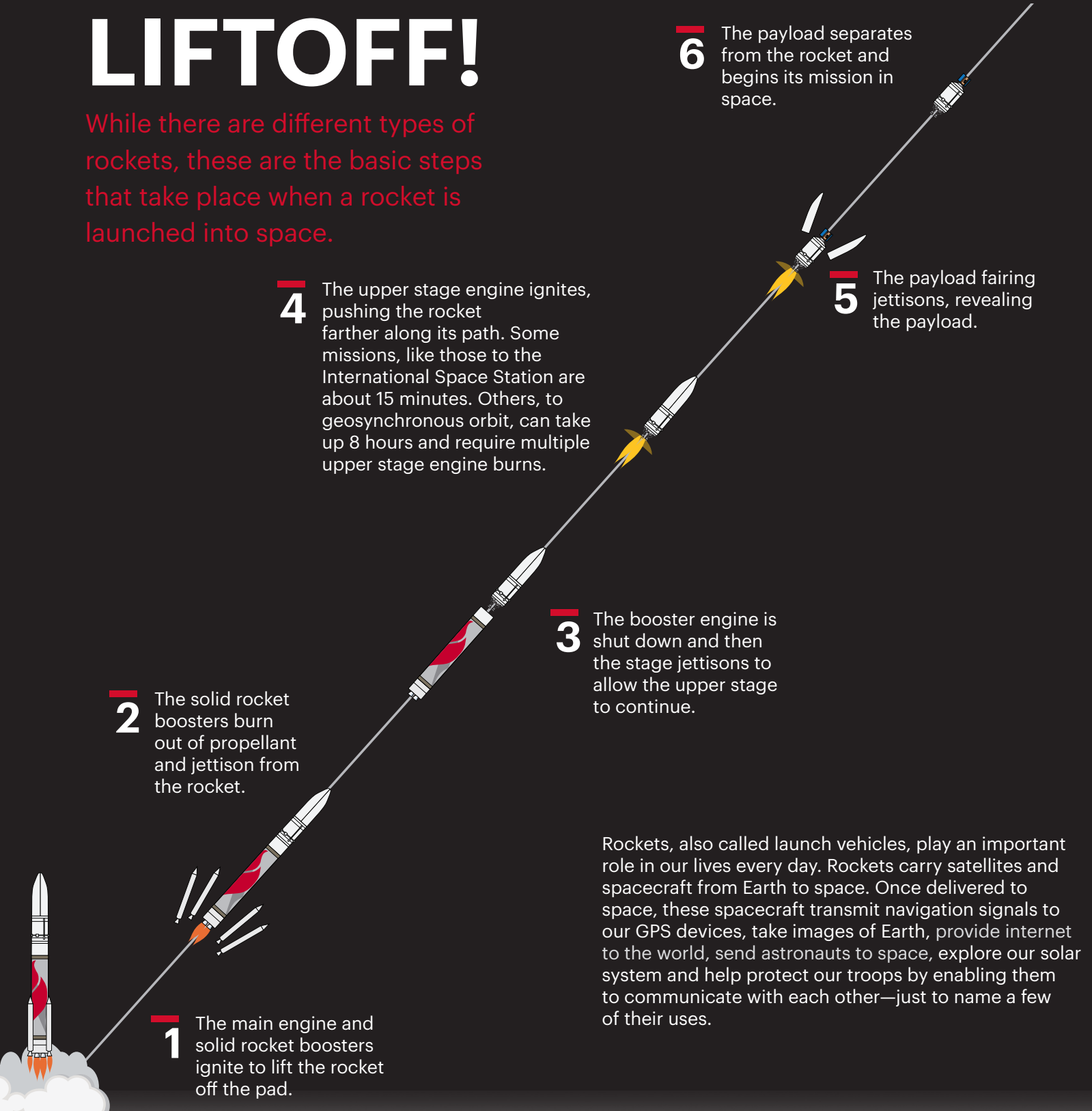
### PAYLOAD WEIGHT

The Vulcan rocket can launch payloads that weigh up to 60,000 lbs.



# 3 - 2 - 1... LIFTOFF!

While there are different types of rockets, these are the basic steps that take place when a rocket is launched into space.



**1** The main engine and solid rocket boosters ignite to lift the rocket off the pad.

**2** The solid rocket boosters burn out of propellant and jettison from the rocket.

**4** The upper stage engine ignites, pushing the rocket farther along its path. Some missions, like those to the International Space Station are about 15 minutes. Others, to geosynchronous orbit, can take up 8 hours and require multiple upper stage engine burns.

**3** The booster engine is shut down and then the stage jettisons to allow the upper stage to continue.

**5** The payload fairing jettisons, revealing the payload.

**6** The payload separates from the rocket and begins its mission in space.

Rockets, also called launch vehicles, play an important role in our lives every day. Rockets carry satellites and spacecraft from Earth to space. Once delivered to space, these spacecraft transmit navigation signals to our GPS devices, take images of Earth, provide internet to the world, send astronauts to space, explore our solar system and help protect our troops by enabling them to communicate with each other—just to name a few of their uses.

