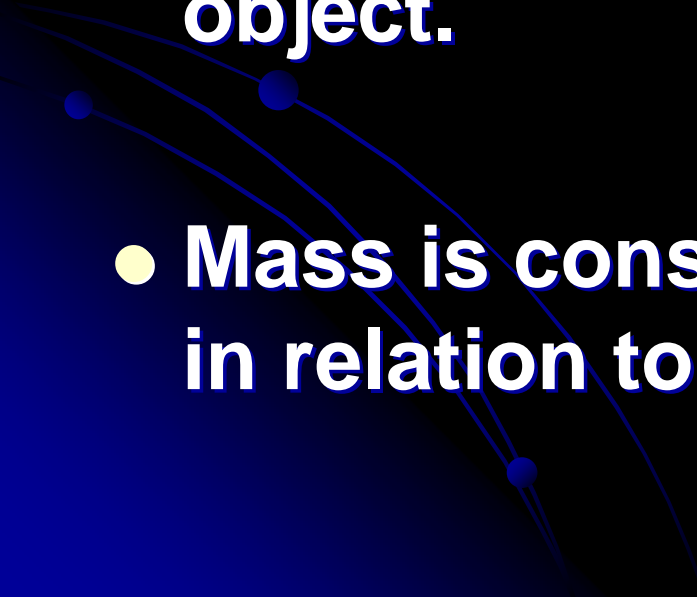


Weightless Flights of Discovery

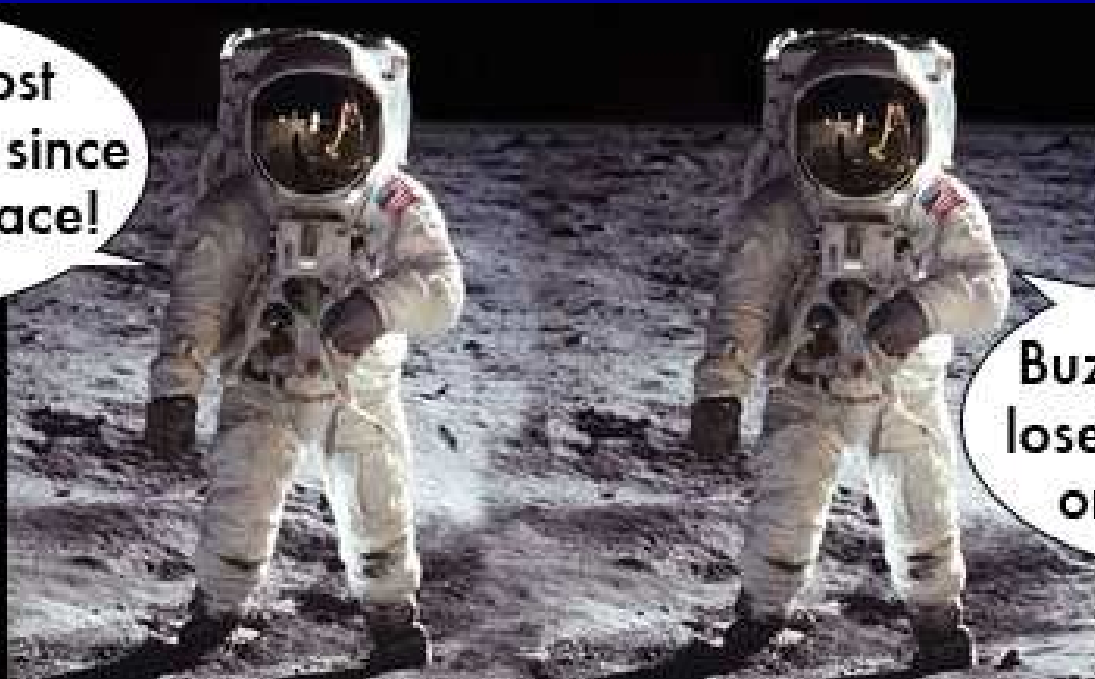
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Weight vs. Mass

- **Weight is the measure of the attraction of gravity on an object. It is a force.**
 - **Mass is the amount of matter in an object.**
 - **Mass is constant while weight changes in relation to gravitational attraction.**
- 

Neil, I've lost
so much mass since
coming to space!



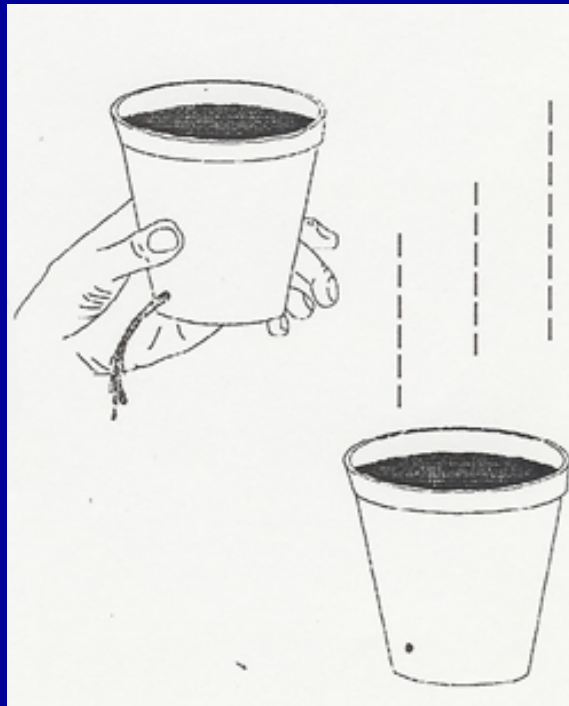
Buzz, you didn't
lose mass; you're
on the moon.

How does location change weight?

- The gravitational attraction (weight) changes depending on the mass of the object exerting the force.
- The earth's attraction is 1G. By comparison, attraction on Mars is .33 G and the moon's attraction is .16 G

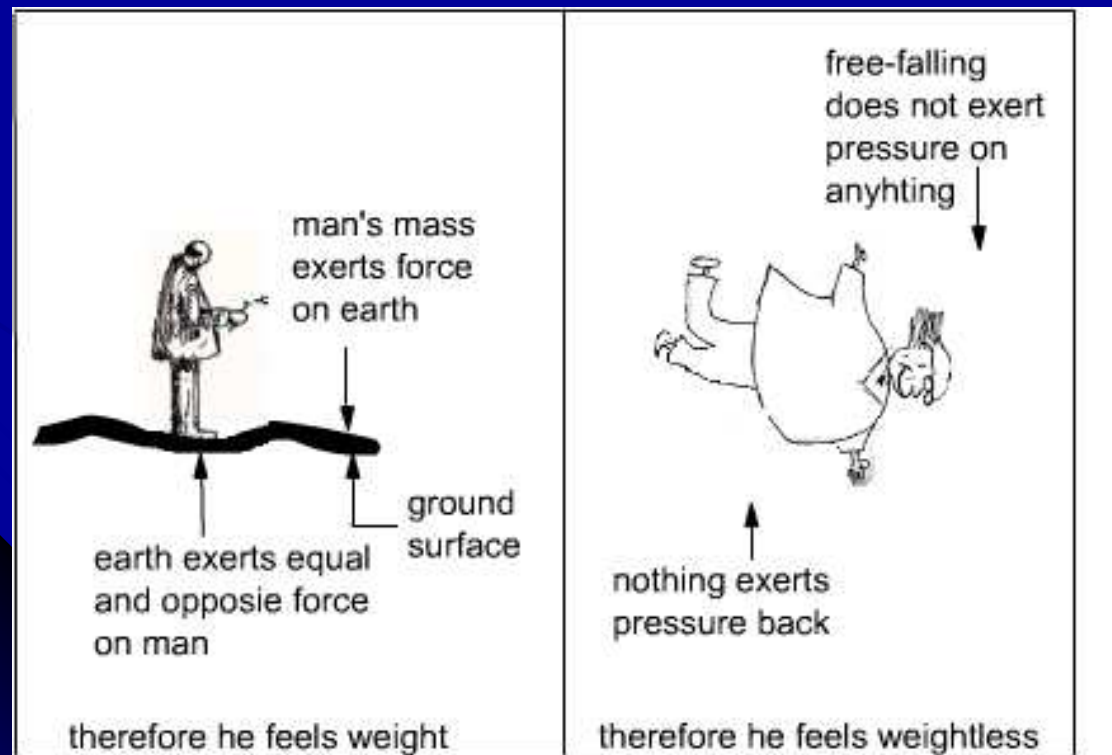
What is weightlessness?

- When there is no gravitational attraction or an object is in a state of free fall, weightlessness exists.

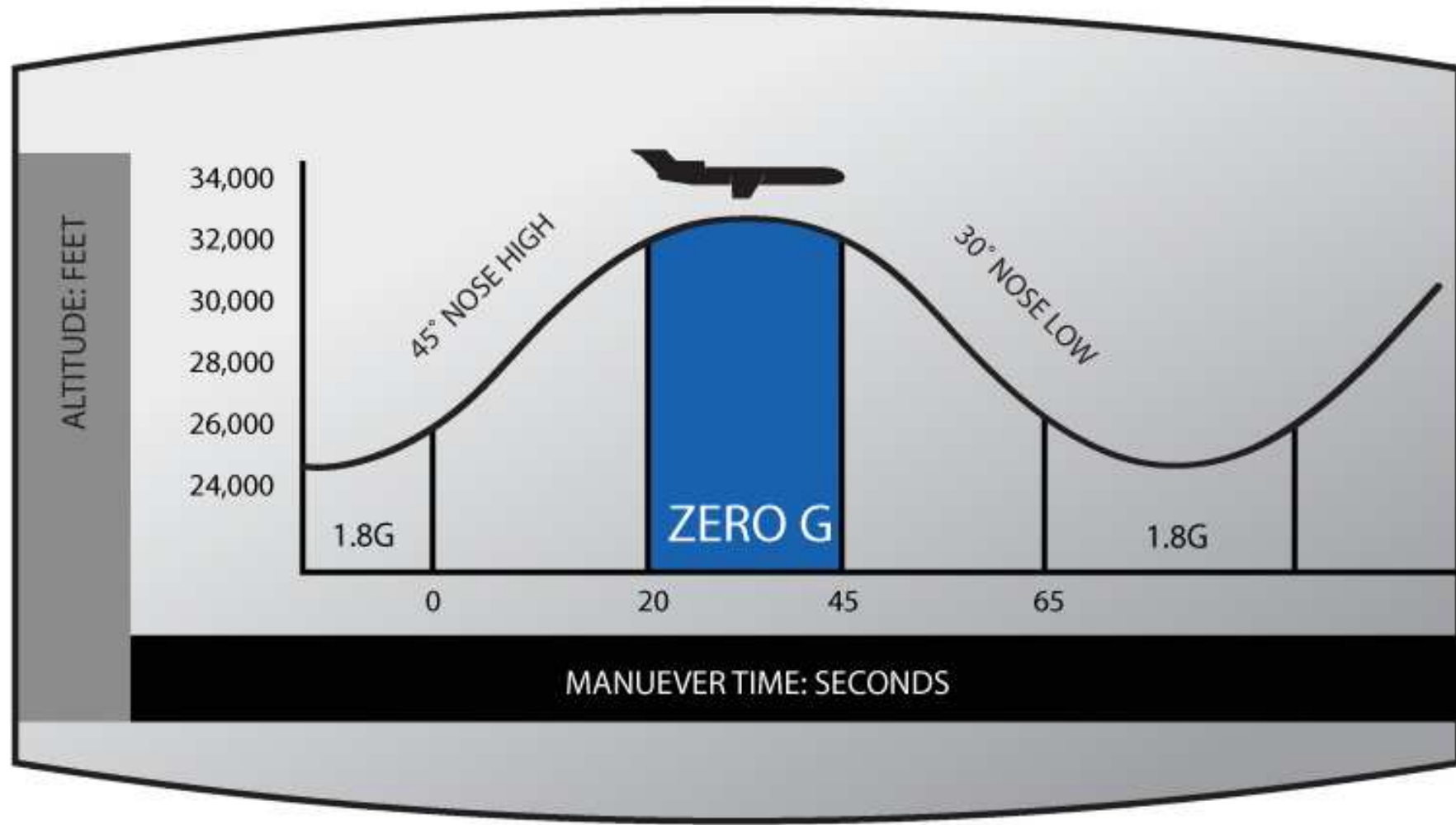


When do you feel weightless?

- This happens when you jump, ride on amusement park rides, sky dive, travel in space, and ride on parabolic flights.



What is parabolic flight?



How long are you weightless?

- Each flight has 15 parabolas and the period of weightlessness lasts about 30 seconds. In between, the force is 1.8 G.



Who uses parabolic flights?

- **NASA uses the “Vomit Comet” to test the limits of endurance. They will complete about 60 parabolas.**
- **The motion picture industry uses parabolic flights to film movies such as “Apollo 13”.**
- **Northrop Grumman has partnered with Zero G to include teachers in this experience in hopes of inspiring future scientists and engineers.**



More information

- **Northrop Grumman – Weightless Flights of Discovery**

<http://www.northropgrumman.com/community/weightless.html>

- **Zero Gravity Corporation -**

<http://www.gozerog.com>