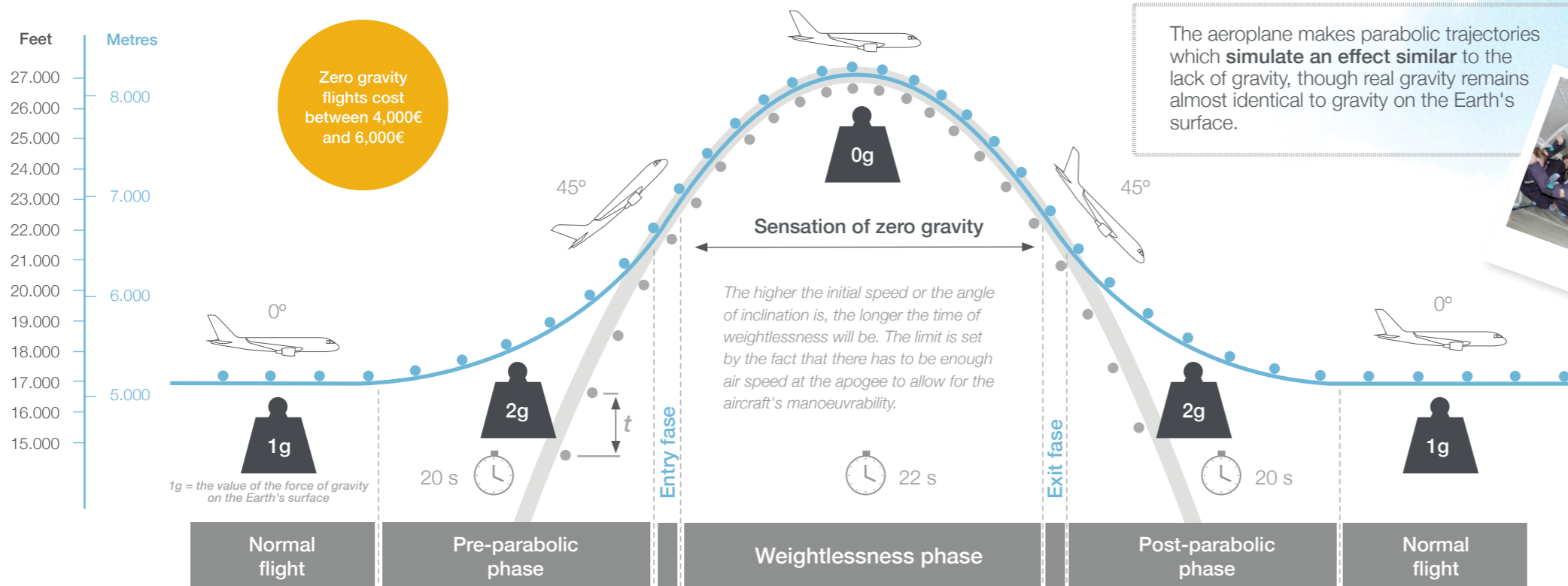


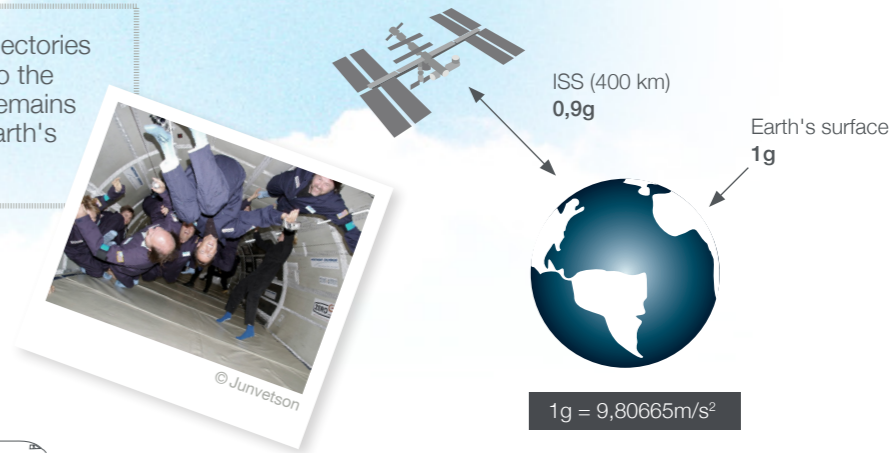


# Zero gravity flights

## A perfect combination of physics, aeronautics and skill



Zero gravity flights cost between 4,000€ and 6,000€



Astronauts float in the **International Space Station (ISS)** due to the fact that they are falling continually at the same time as the entire space station. In this case, no force acts on them except gravity.

Zero gravity parabola  
 $X(t) = V_0 t \cos \alpha$   
 $Z(t) = V_0 t \sin \alpha - \frac{g_0 t^2}{2}$

- Normal flight altitude of around 5000 m and typical average speed of 825 km/h. Nose of aeroplane on the horizon.
- The ascent is initiated. Acceleration with 45° angle of climb. The sensation of hypergravity results from the sum of the Earth's gravity (1g) and the ascent gravity (1g).
- At around 7000 metres, engine acceleration is reduced (from 570 to 370 km/h) for five seconds. Entry into weightlessness phase.
- The aircraft's route coincides with the zero gravity parabola. The pilot inverts inclination until the opposing angle is reached (from +45° to -45°) and starts the accelerated descent.
- The aircraft descends and flies at 2 g during around three seconds before levelling off.
- The sensation of hypergravity is produced during 20 seconds until the planes levels off at the same initial altitude and speed.

A curious fact

Did you know?

The movie **"Apollo 13"** used a free flight in a KC135A (NASA 930) to film scenes of weightlessness. Six hundred parabolas were necessary to complete filming the scenes needed by the film.

The sensation of weightlessness is felt when the floor (or the enclosure) moves at the same time as us under the same and only influence of the Earth's gravitational force.

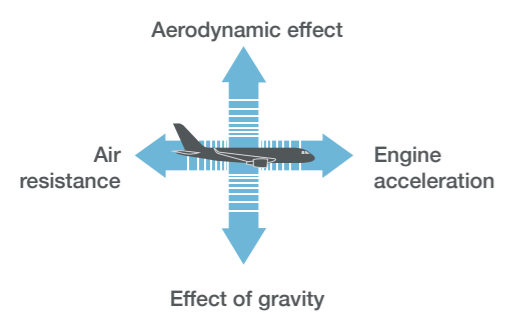
The passenger cabin is emptied and cushioned to prevent passengers from harming themselves



Different parabolas can be made to achieve zero gravity (0 g), lunar gravity (0.16 g) or Martian gravity (0.38 g) effects.

One has to be at a distance equivalent to 16 times the distance between the Earth and the Moon to feel a thousandth of the Earth's gravity (1 g).

Some of the companies that organise these flights are: Novespace, ZeroG Corp. or MiGFlug



### Some aircraft used for zero gravity flights

	Length	Wingspan	Range	Altitude	Cruising speed	Climb rate
	m	m	km	m	km/h	m/min
McDonnell Douglas C9	36.4	28.4	4,700	11,000	927	900
Airbus A300	53.6	44.8	7,500	12,200	833	914
Boeing 727-200	46.7	32.9	4,300	13,000	830	884
Ilyushin IL76 MDK	46.6	50.5	5,000	13,000	900	565