

NEWTON'S 2ND LAW

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Booking a Flight to Space, With Travel Insurance



Catherine Culver, in her training suit, reserved a \$200,000 seat with Virgin Galactic, which hopes to start flights this year.



$\frac{1}{2}$ ton =
1000 lb.

170 lb. =
weight



INTRODUCTION: Paying customers will experience $\frac{1}{2}$ ton force on their 170 lb body when rockets are fired at 50,000 ft carrying them to the edge of space at 62 miles.

QUESTIONS: (a) Find the mass of a paying customer? (b) Find net force on paying space customer? (c) Find acceleration of paying space customer? Find in ft/s^2 and # g s (d) If the rocket was initially moving at 600 mph find distance traveled 30 s after rockets are fired?

HINT: 60 mph = 88 ft/s $g = 32 \text{ ft/s}^2$

ANSWERS: (a) 5.3125 slugs , (b) 830 lb. , (c) 156.23 ft/s^2 or 4.88 g , (d) $\sim 96,703$ ft

The first flights of the new airlines that will take tourists past the threshold of space **are poised to take off in 2012**, and getting a seat on one is not all that different from booking a trip someplace on Earth. You can sign up on the Web site of, say, Virgin Galactic, the most prominent of the new space tourism companies, or go to a travel agent and put down a hefty deposit. Soon you will be able to buy travel insurance, just as you can for any other vacation. Until now, space tourism has been limited to the ultrawealthy: just seven people have paid tens of millions of dollars each for a trip to the International Space Station aboard a Russian rocket. But that could change this year, when Virgin Galactic intends to start offering flights just beyond the space barrier on a rocket ship it has built, **featuring five minutes of weightlessness during a two-and-a-half hour jaunt. At \$200,000 a seat**, this will open the final frontier to far more people. "Hopefully by next Christmas, myself, my daughter and my son will be the first people to go up into space" on a commercial craft, Richard Branson, the owner of Virgin Galactic, said in a videotaped interview in November (with a touch of his signature grandiosity). **By 2017, "it'll be just like scheduling a flight to L.A.," Ms. Garrett predicted.** Soon afterward, Ms. Culver put down her \$20,000 deposit, becoming one of 475 people who have reserved a place on a Virgin Galactic flight. Most of them have already paid the full ticket price **to rise above the 62-mile mark**, which is considered the entrance to outer space. (People who pay in full will get the first seats.) **These flights will not orbit the Earth. Rather, they will be up-and-down "suborbital" jaunts more akin to a giant roller coaster ride, offering about five minutes of weightlessness at the acme of the flight. The trip is not for the faint of stomach.** For Virgin's customers, the ride to space will culminate a three-day trip to the newly built Spaceport America in Las Cruces, N.M. Part of the time will be spent on training and preparations. On the third day, a **carrier airplane with the SpaceShipTwo rocket ship slung underneath will take off from the runway and fly to 50,000 feet, where the rocket ship will be launched. (((((At that point, the force of acceleration will press passengers deep into their chairs — someone who weighs 170 pounds will feel like half a ton.))))))** Then the roar of the engine will fade to silence, the **blue sky will fade to black**, and weight will turn to weightlessness. "You'll be able to unbuckle, move about the cabin, do somersaults, get your picture taken with the Earth's curvature in the background," Ms. Garrett said. After that, the passengers will strap back into their seats before SpaceShipTwo re-enters the atmosphere, exerting another few minutes of crushing force. Once it has slowed, it will glide back to the runway.