

Re: the apex of a trajectory versus free fall

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"mm" <NOPSAMmm2005@xxxxxxxxxxx> wrote in message
news:c6g3339ivdarlrud5vcvkdmqfco2qijt16@xxxxxxxxxxx

When I was little and first heard about weightlessness training for astronauts, I thought they put them in a plane, flew the plane at a steep climb and the weightlessness occurred when the astronaut in training was at the apex of the plane's climb, when he stopped going up and before he started going down.

Almost the same thing I experienced when I was on a playground swing, at the highest point of its travel.

I couldn't understand how this could take the 20 or 30 seconds they said it lasted, as in the case of Steven Hawkings today.

Eventually I learned that the plane would dive and the passengers would dive with it, and they were falling but the plane was falling at the same speed, so it seemed to an observer, including the person himself, that there was no gravity.

Not counting the length of time each lasts, is there any difference between these two kinds of "weightlessness", reaching the apex of a trajectory versus free fall?

No difference at all. As to the time, the acceleration due to gravity is (about) 10 m/s^2 , distance is $\frac{1}{2} g t^2$.
How long does it take to fall 10,000 meters (about 30,000 feet) ?

$$10,000 = \frac{1}{2} * 10 t^2$$
$$t = \sqrt{2000}$$
$$= 44 \text{ seconds.}$$

Being sane, the pilot will pull out of the dive long before he hits the water and before the plane's airspeed exceeds its permitted value as shown by the airspeed indicator. Needless to say, the higher he starts the longer he can maintain zero g, and he also gets zero g on the way up as well as down. The limitation is airspeed, but the higher he flies the thinner the air and the lower the indicated airspeed will be, so a plane

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can travel with a ground speed of 500 knots and an airspeed of 200 knots quite easily, commercial airliners fly at about 30,000 feet for that reason.

http://www.nappf.com/nappf_flight_instruments_files/image003.jpg