

Who tested Newton's theory on the cannonball experiment?



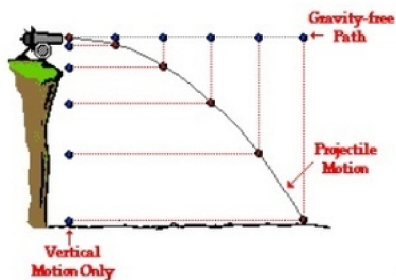
Michael Brenner

Studied Mechanical Engineering & Comparative Linguistics at Vienna University of Technology · Updated Nov 21

Nobody really, it has always remained an adventure of the mind, an act of wishful thinking without intellectual rigour and with no experimental backup. Bonaventura Cavalieri experimented with ballistics before Newton and came to the conclusion that free fall is INDEPENDENT of any other motion a body might have - something that is still taught today in every mechanics class in the world:

Horizontally Launched Projectiles

- A horizontally launched projectile is a projectile launched with only horizontal speed. Its **initial vertical speed is zero**.



- Thus, the projectile travels with a constant horizontal velocity and a downward vertical acceleration.

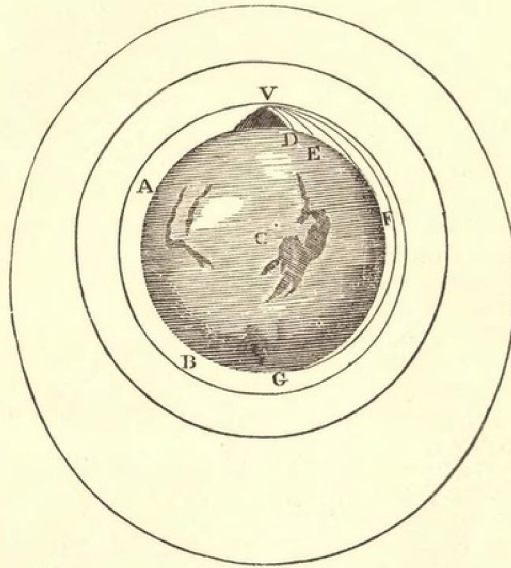
- Since the only force acting on the projectile is gravity, which is in the vertical downward direction, only the vertical motion is affected. Gravity causes a downward acceleration. The cannonball falls the same amount of distance as it did when it was merely dropped from rest.
- However, the vertical force acts perpendicular to the horizontal motion and will not affect the horizontal motion since perpendicular components of motion are independent of each other.

Newton starts his thought "experiment" with Cavalieri's cannon ball and extrapolates from standard ballistic parabolas to orbits - which not even in thought holds true as we will see.



increased, that it would describe an arc of 1, 2, 5, 10, 100, 1000 miles before it arrived at the earth, till at last, exceeding the limits of the earth, it should pass quite by without touching it.

Let AFB represent the surface of the earth, C its centre, VD, VE, VF, the curve lines which a body would describe, if projected in an horizontal direction from the top of an high mountain successively with more and

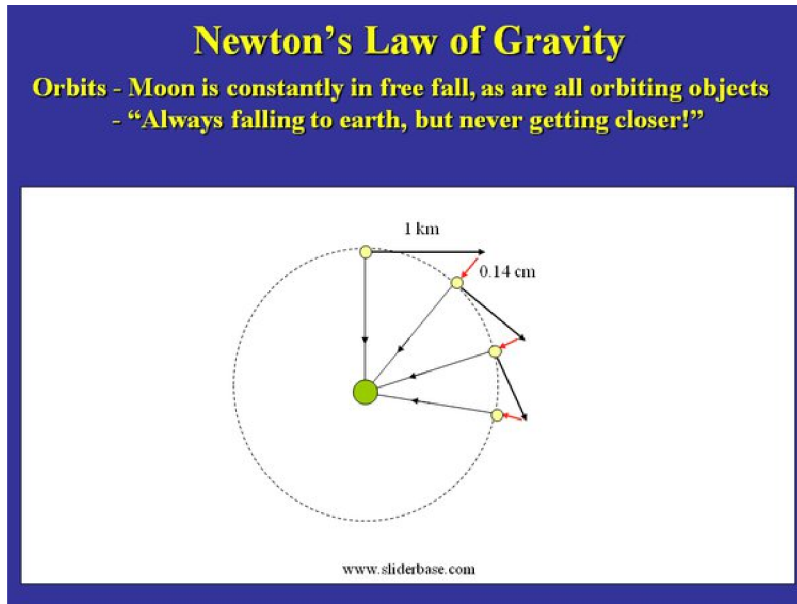


more velocity (p. 400); and, because the celestial motions are scarcely retarded by the little or no resistance of the spaces in which they are performed, to keep up the parity of cases, let us suppose either that there is no air about the earth, or at least that it is endowed with little or no power of resisting; and for the same reason that the body projected with a less velocity describes the lesser arc VD, and with a greater velocity the greater arc VE, and, augmenting the velocity, it goes farther and farther to F and G, if the velocity was still more and more augmented, it would reach at last quite beyond the circumference of the earth, and return to the mountain from which it was projected.

And since the areas which by this motion it describes by a radius drawn to the centre of the earth are (by Prop. 1, Book 1, *Princip. Math.*) proportional to the times in which they are described, its velocity, when it returns to the mountain, will be no less than it was at first; and, retaining the same velocity, it will describe the same curve over and over, by the same law

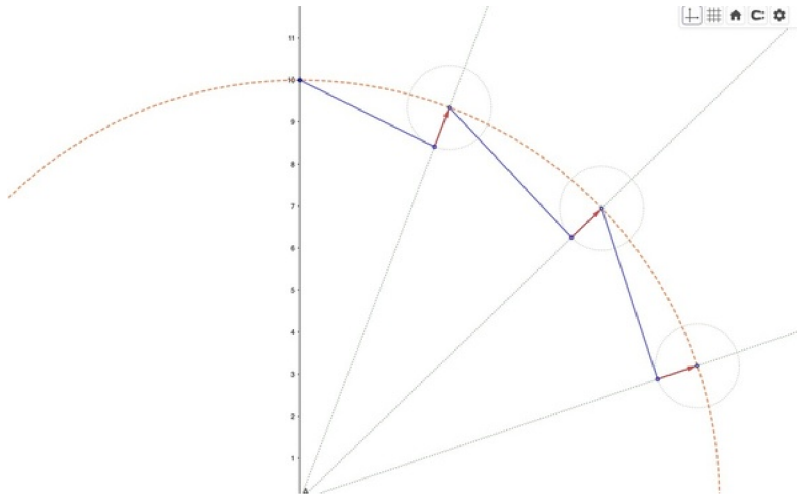
A cannonball always falls to ground in the same amount of time, no matter what velocity, and that time is only dependent on height and gravitational acceleration $t = \sqrt{2h/g}$. Because $[g]$ is a factor of position $g = GM/R^2$ it is NEVER constant, not even for two consecutive nanometers, so it's always an average: between the alleged elevation of the ISS and ground that would be $(8.7 + 9.8)/2 = 9.2$...so Hehl & Co don't even try that argument!!

Next standard argument is that the gravitational vector rotates over larger distances, which is also flawed, first because the curvature of a sphere is ALWAYS $1/r$ already from the first nanometer, and then nobody has shown that the gravitational vector has any executive power in physics, that it can lock velocity into perpendicular relationship.

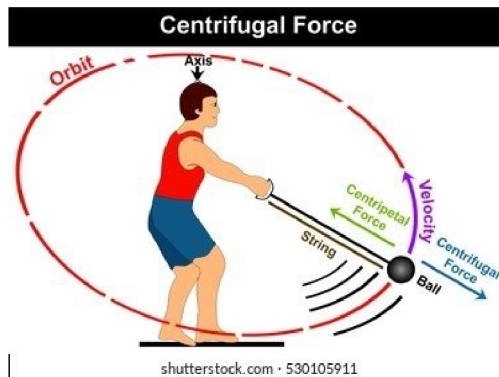


... there is no reason to believe and no experiment to support the idea that after the first red centripetal arrow the velocity now has changed direction, in fact all experiments show the contrary to be the case: free fall is always independent of any other motion.

Then, the thought process itself is flawed, as it supposes a moment where gravity does not exist in order to allow the object to move along a tangential path. If anything - because gravity is always present - the object already falls from the first instance, but then has to be lifted up to remain on constant elevation: and here we see with the red arrows the necessity for a lift force, which is introduced via velocity $F=mv^2/r$

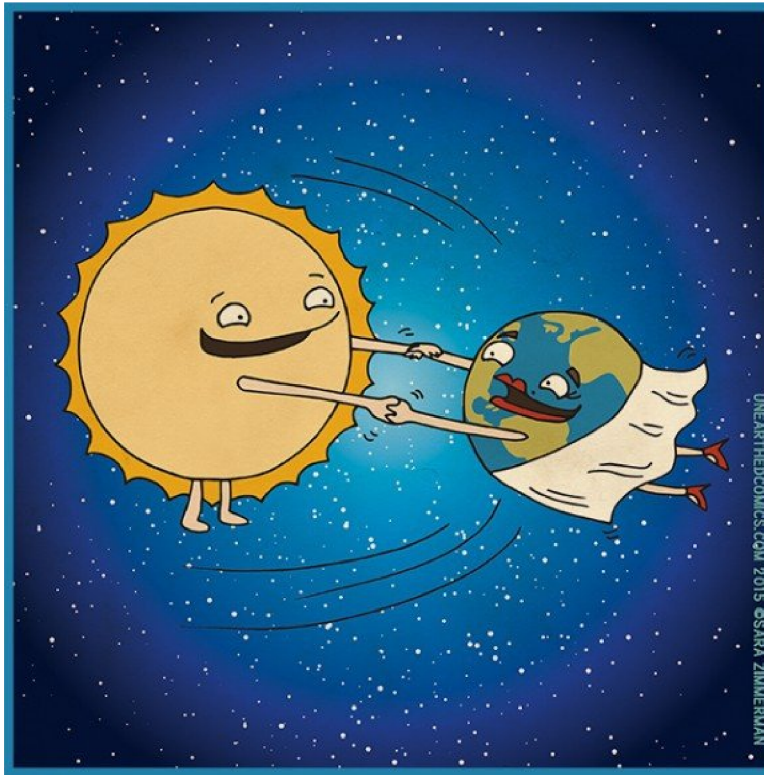


But free fall cannot introduce a lift force and thus this remains wild and irrational speculation. Or rather, it reveals the deceptive approach, as this is hammer throw physics, not free fall physics.

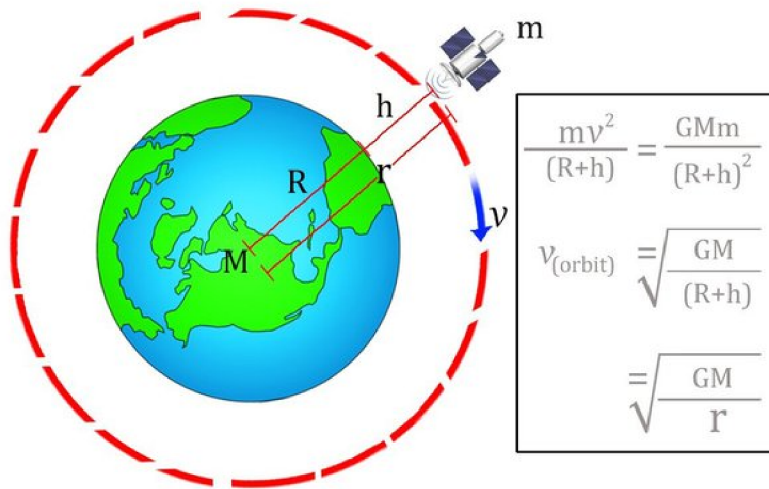


The hammer is on a forced path where it puts a stretch load on the leash, and if the leash does not hold up it breaks - why does it break? because of $F=mv^2/R$ being greater than

the tensile strength of the leash. What is the tensile strength of free fall?

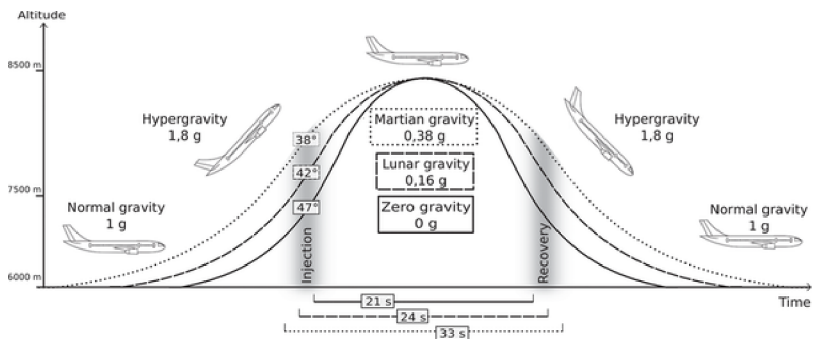


This planet is NOT in free fall, it represents the forced hammer throw math of orbital mechanics, where - in NASA's own words - centrifugal acceleration $a=v^2/(R+h)$ balances gravity $g=GM/(R+h)^2$

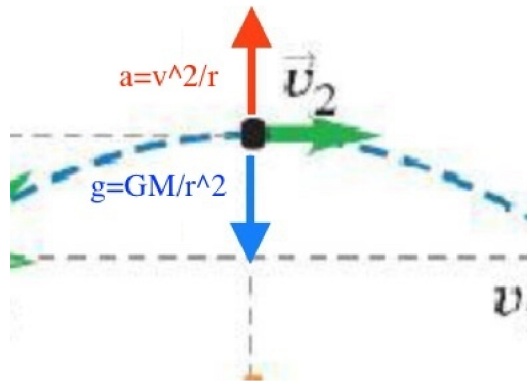


The microgravity allegedly experienced on the ISS is in theory the result of the gravity attenuating effect of $a=v^2/R$, which when tuned just right, nullifies effective gravity altogether, and that happens when the velocity takes on the value of $v=\sqrt{GM/R}$.

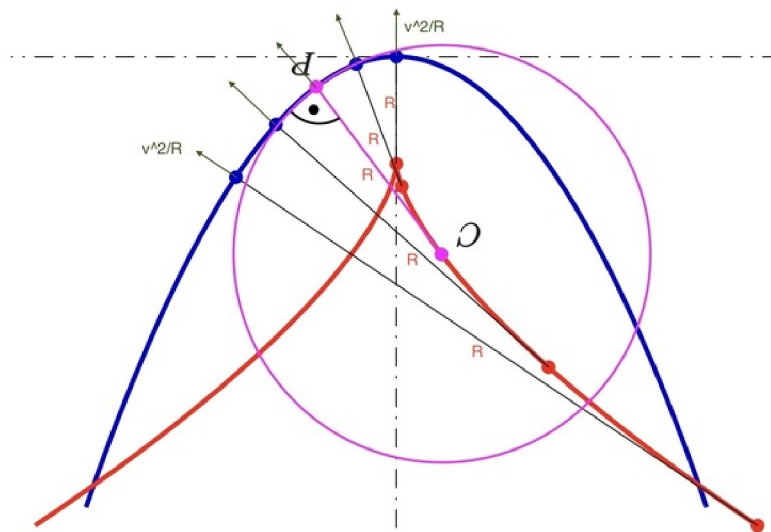
The same is true for the zero-g plane, which flies along a POWERED parabola, not a free fall parabola, at the top of which the same principle applies: centrifugal acceleration nullifies gravity and for a time slot of around 20 seconds you feel like there is no gravity.



Here below a diagram that Steve Spielmann sent me in way of making fun of me, but thanks Steve, this is exactly what happens on top of that parabola on a powered flight: blue arrow down is $g=9.8m/s^2$ and red arrow up is $a=v^2/R$ result is zero effective gravity.



..... and [R] in this case is distance to instant center of rotation: in nature there is either rectilinear motion or circular motion, no other options are available: any motion along a random curve is made up of "instant circular rotations" around the so called Instant Center of Rotation [IC]



Actually, would all that take place over a curved surface of earth instead over a flat earth on top of that, an additional acceleration factor would attenuate gravity, so that now the equation would read:

$$v^2/R(ICparable) + v^2/R(earth) - 9.8 = 0$$

If we leave out $v^2/R(earth)$ for a velocity of 100m/s as negligible with 0.0015g - not for a rifle bullet though with 0.156g and a railgun with 1.4g - we can calculate the radius the plane has to fly in order to achieve zero-g: $(v^2/R) - 9.8 = 0 \rightarrow$

$$R = v^2/9.8 = 1020m$$

In order to give you a feeling for what is called Lunar gravity of 0.16 earth gravity the plane would have to do a radius:

$$R = v^2/0.16 \times 9.8 = 6377m$$

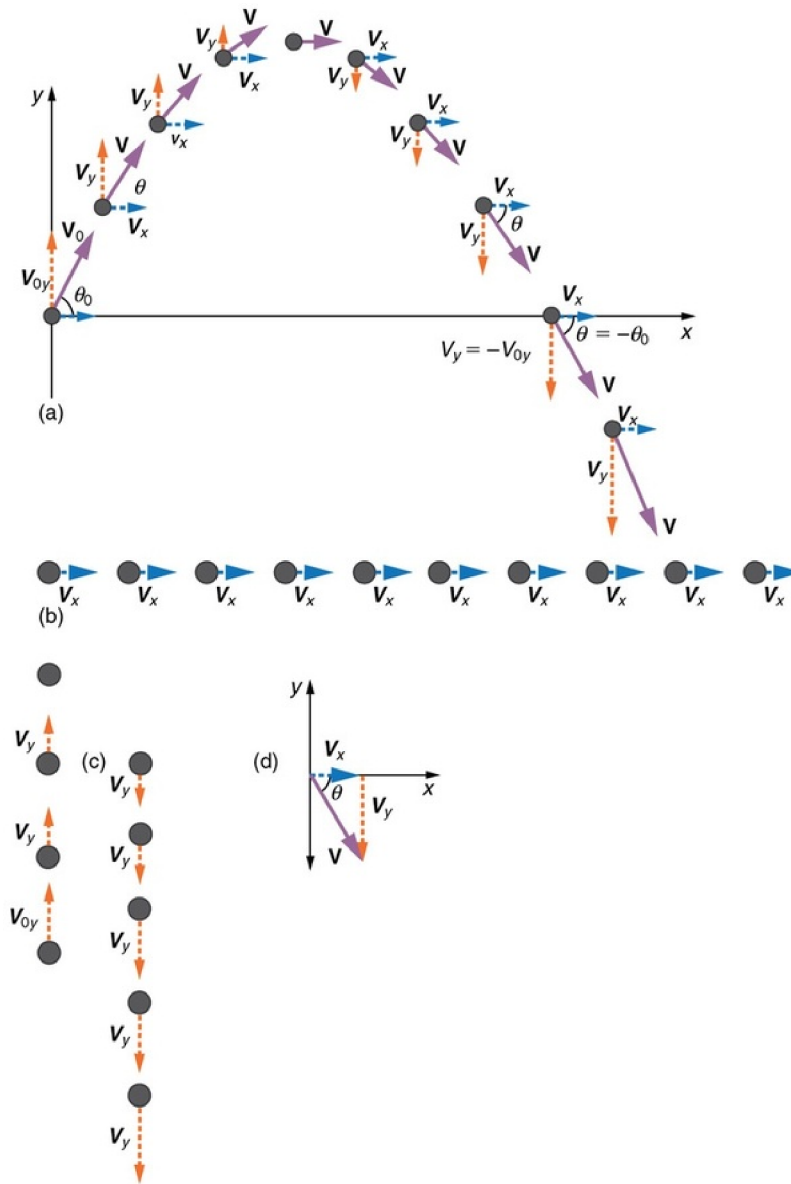
And for Martian gravity the plane would have to fly a radius of

$$R = v^2/0.38 \times 9.8 = 2685m \dots \text{ as per diagram above.}$$

That doesn't mean you are in free fall though, because free fall means reducing distance to gravitational centre as well as converting potential into kinetic energy, none of which applies to the apex of this powered parabola. What you would experience is actual absence of gravity, i.e. what they call microgravity, or reduced gravity, 0.16g and 0.38g respectively. So whenever you read or hear that zero-g planes are in free fall, you know it's wrong: it's called **zero-g-plane** for a reason, not **free-fall-plane** which would fall in full gravity, not zero: at 380km/h through an atmosphere a plane with airfoils like the A310 is not in free fall. $L = CqS = CrU^2S/2$ with [L] being lift force, [U] being airspeed, [S] being wing area, [r] being air density and [C] being lift coefficient. [L] only goes to zero when either density, wing area or airspeed goes to zero - none of which is the case here.



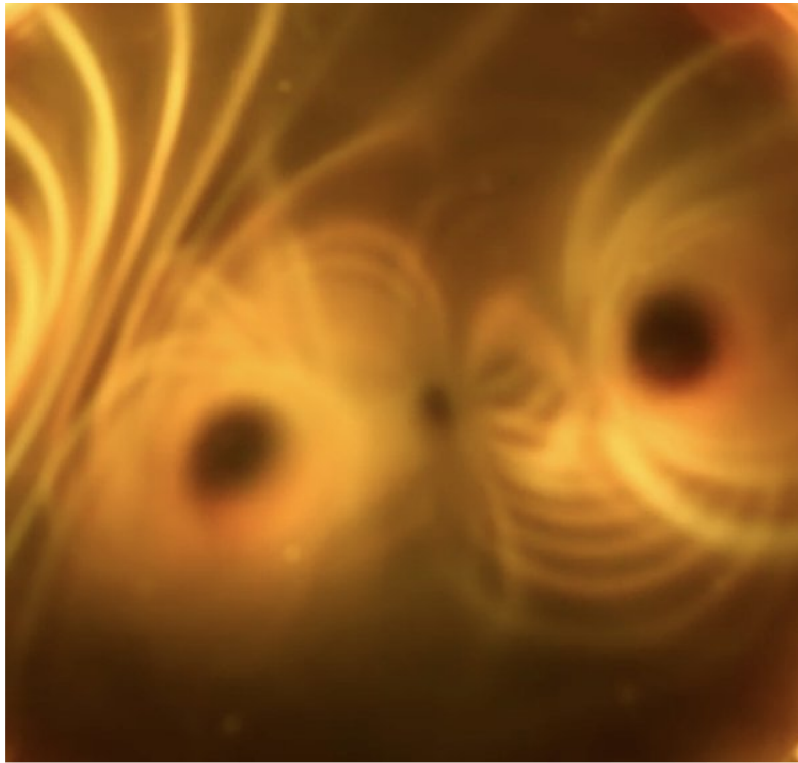
Something totally different is a **Free Fall parabola**, although to see this has proven to be the biggest hurdle for most Quoran's here, especially those who claim to be "top tier scientists". A free fall parabola, a projectile trajectory is a trace not a track: it leaves behind a parabolic trace with respect to a stationary backdrop, but the projectile never performs a parabola: what the projectile performs are two independent rectilinear motions: a first derivative motion horizontal and a second derivative motion vertical.



Both these motions are dynamically indistinguishable from being at rest, that means a cannonball after leaving the muzzle in an air-free, dark environment without any reference to its environment believes it's at rest, it would have no sense of motion whatsoever, and when ground hits, well, then it'll be surprised but will swear it was the ground that hit it, not the other way round.

Being indistinguishable from rest means that these motions cannot be attributed to the application of a force, and that shows us that free fall is NOT forced, it is "free" from force as the title says. Actually it's the opposite, it's the erasure of force: imagine a balloon with two small styrofoam balls attached on opposite sides. Now imagine you don't see the balloon and someone lets the air out. You would conclude from what you see, that these two Styrofoam balls are attracting each other, that there must be a force acting between them, an attraction of sorts, when in reality the space between them collapses and they are just following. You'd have to put up a force to inflate the balloon via $F=PA$, like you have to put up a force to lift an object, but once you let go, the deflating of the balloon is actually the erasure of that force. This is gravity, the erasure of force, the collapse of space into the incommensurable counter-space between two objects.

This can be made visible under the ferro cell, where we see the little dark opening between the bigger black spots, the magnets: this central dot is the opening into counter-space into which the field lines collapse while the magnets are moving towards each other. Nothing attracts each other, everything just follows the path to ultimate rest, inertia, as the wisest of old already knew.



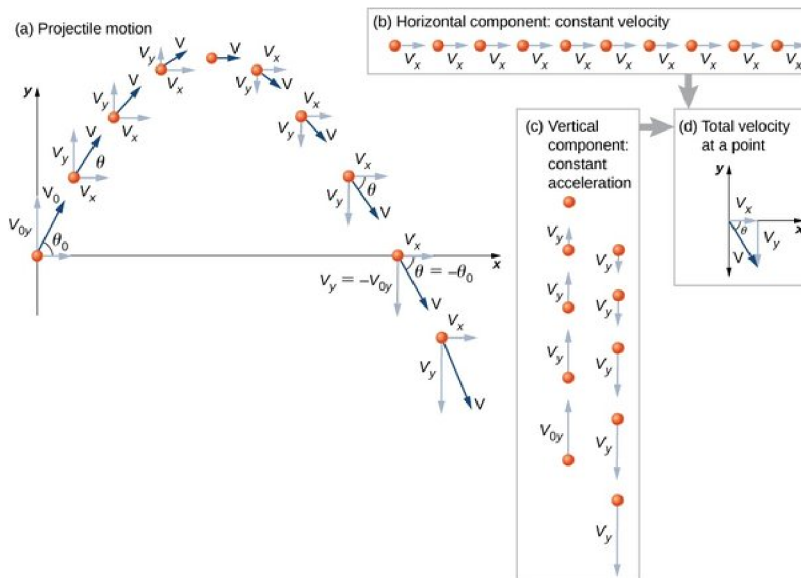
That a free fall parabola has no angularity is easily shown, here with a guy jumping on a trampoline while the trampoline is moving:

Jumping on a Moving Trampoline

Flat Earthers need to watch this video so that they understand some basic...

<https://www.youtube.com/shorts/zeqMsf66-mY>

The guy does not to his knowledge perform a parabola, he does so only with respect to the background, with respect to himself he only jumps up and down, and that's why dynamically he doesn't perform the dark blue arrow in the diagram below, he only performs the gray ones independently.



It is this independency - which has proven to be the biggest problem for so many to digest - which does not allow and does not justify the Newtonian continuum from cannon-ball thought experiment to moon orbit. To repeat: a cannonball after leaving the muzzle falls immediately with an increasing velocity $v \downarrow = gt$ and only a nullification of $[g]$ can make this zero and thus distance to ground constant. Such nullification can only happen if gravity on its own can pull a zero-g plane trick on the cannonball and so far nobody has tested that and shown that it can.

PS.: I have written many answers concerning Newton mechanics, ballistics and orbits which garnered hundreds of comments, some of them very instructive in the way the Newton mind entrapment works. Here the latest comment by Tim Good illustrates that point better than any: he proudly demonstrates how ballistics and Newton orbital mechanics coincide down to the 7th decimal point which he takes as argument for the veracity of Newton's claim that the mere power increase of a ballistic throw will eventually lead to orbit. He doesn't realise that he has fallen for a simple semantics trick: conflating "in one second" with "in the first second": ballistics gives the same result as orbital mechanics only "in the first second" because the square of "1" is still "1" $D=0.5gt^2=0.5g$ for $t=1$ And in Newton's case of the derivation of the moon orbit it is forced to give the same result because Newton defined it to be so:

Now how far would we expect the Moon to fall if it is acted upon by the same force that makes apples fall? The moon is 60 times as far from the center of the Earth as the apple; let us suppose the Earth attracts the apple as if all the mass was concentrated at the center. Then we would expect the force on the Moon to be smaller by a factor of 60^2 , which is 3600. We know that the apple falls $\frac{1}{2}gt^2 = g/2$ feet on Earth; since $g = 32$ that is 16 feet, or 192 inches. if g goes down by a factor of 3600, the Moon should fall 0.053 inches in one second. One-twentieth of an inch. As Newton said, the two calculations "answer pretty nearly."

But as I have shown in the rebuttal of his argument, ballistic math gives a vastly different result from orbital math, proving that the one is NOT the continuation of the other, but instead invoking a completely different domain of physics: ballistics is **free fall physics** whereas orbital mechanics is **hammer throw physics**.

Here is how off people are when they parrot "science Sunday school sermons" instead of looking at what they have in front of them: a simple ballistics example of a rifle bullet exiting the muzzle with $v=1000\text{m/s}$ from an elevation of 1000m. Range would be to the claimed 7th decimal point

$$s = vt = v\sqrt{2h/g} = 14,285.7142857m.$$

Now applying orbital mechanics which Good claims must lead to the same result:

$$s = vt = v\sqrt{2h/(g-v^2/R)} = 14,433.7567297m$$

You see that we are not even talking about decimal points, we are talking about a difference of 3 digits **before** the decimal point, that is a 10digit difference between claim and reality!!!!

Here is what Feynman says about such mathematical shenanigans:

Let us ask, "What is the meaning of the physical laws of Newton, which we write as $F = ma$? What is the meaning of force, mass, and acceleration?" Well, we can intuitively sense the meaning of mass, and we can *define* acceleration if we know the meaning of position and time. We shall not discuss those meanings, but shall concentrate on the new concept of *force*. The answer is equally simple: "If a body is accelerating, then there is a force on it." That is what Newton's laws say, so the most precise and beautiful definition of force imaginable might simply be to say that force is the mass of an object times the acceleration. Suppose we have a law which says that the conservation of momentum is valid if the sum of all the external forces is zero; then the question arises, "What does it *mean*, that the sum of all the external forces is zero?" A pleasant way to define that statement would be: "When the total momentum is a constant, then the sum of the external forces is zero." **There must be something wrong with that, because it is just not saying anything new** If we have discovered a fundamental law, which asserts that the force is equal to the mass times the acceleration, and then *define* the force to be the mass times the acceleration, we have found out nothing. We could also define force to mean that a moving object with no force acting on it continues to move with constant velocity in a straight line. If we then observe an object *not* moving in a straight line with a constant velocity, we might say that there is a force on it. **Now such things certainly cannot be the content of physics, because they are definitions going in a circle.** The Newtonian statement above, however, seems to be a most precise definition of force, and one that appeals to the mathematician; **nevertheless, it is completely useless,** because no prediction whatsoever can be made from a definition. One might sit in an armchair all day long and define words at will, but to find out what happens when two balls push against each other, or when a weight is hung on a spring, is another matter altogether, because **the way the bodies behave is something completely outside any choice of definitions.**

And here is what Heisenberg says about similar problems with Relativity theory and Quantum theory:

"...the impact of quantum theory and relativity theory on the minds of those scholars who helped found them during the first half of our century is conceivably such that they are **imprisoned** by these theories and thus cannot help but reason conformably, that is, in terms of traditional concepts; whereas the need is for a whole revolution of thought, which can only be carried through by nonconformists.... " (Mercier 1971)

PS 2: after dozens of more comments desperately trying to circumnavigate the problem, here's the synopsis of arguments in one diagram:

Horizontally Launched Projectiles

- A horizontally launched projectile is a projectile launched with only horizontal speed. Its **initial vertical speed is zero**.
- Since the only force acting on the projectile is gravity, which is in the vertical downward direction, only the vertical motion is affected. Gravity causes a downward acceleration. The cannonball falls the same amount of distance as it did when it was merely dropped from rest.
- Thus, the projectile travels with a constant horizontal velocity and a downward vertical acceleration.
- However, the vertical force acts perpendicular to the horizontal motion and will not affect the horizontal motion since perpendicular components of motion are independent of each other.

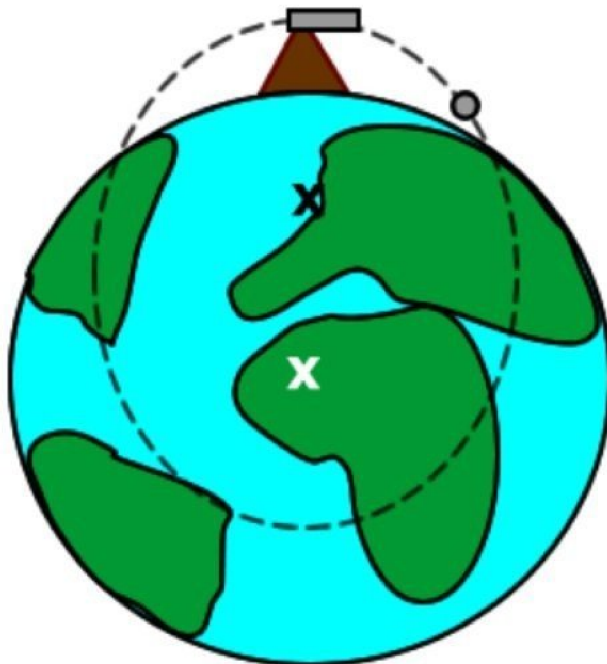
....the orange sawtooth path is claimed to be the principle on which orbits are based - as **opposed to** and NOT as **following from** cannonball ballistics:

Newton's Law of Gravity

Orbits - Moon is constantly in free fall, as are all orbiting objects
- "Always falling to earth, but never getting closer!"

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.... the dashed blue line is the path of a cannonball would it follow orbital mechanics - the argument is that that would be more precise, because it is claimed that a cannonball in reality does an elliptical orbit cut short by earth



.... and finally everyday terrestrial reality as observed since before Newton and taught in every school: free fall trajectories as two independent rectilinear motions sharing the same time.

Projectile Motion

Projectile- object that is launched, thrown, or fired in the air that is in a state of free fall

Trajectory- the path the projectile follows.

- projectile motion is described in terms of position, velocity, and acceleration.
- **The horizontal and vertical components of velocities are independent of each other.**

Orbits are fantasy!

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1 of 1 answer



Add a comment...

Add comment



Bill Cooksey · Oct 16

Jeez, what an unruly pile of "imveryconfused"-isms. Let's take a look. * Cavalieri - you're gonna have to explain his "ballistics" work. Yes, what he did helped usher in calculus, but I'm unsure how you can attribute "Newton's Cannon" to him. * \ (more)



Reply

...



Michael Brenner · Oct 17

Thanks for such a systematic catalogue of misunderstandings - will have to make a main answer out of it: * "ballistic parabolas to orbits - which not even in thought holds true as we will see" - What? Show us what you mean. New (more)

Reply ...

Adrian Fagg You could help your argument by writing more clearly. What is the IC that...

Tim Good · Oct 14
Why do you keep repeating the same long screed but refuse to even attempt to understand why Newton's laws match all this perfectly (outside of relativistic situations, of course)?

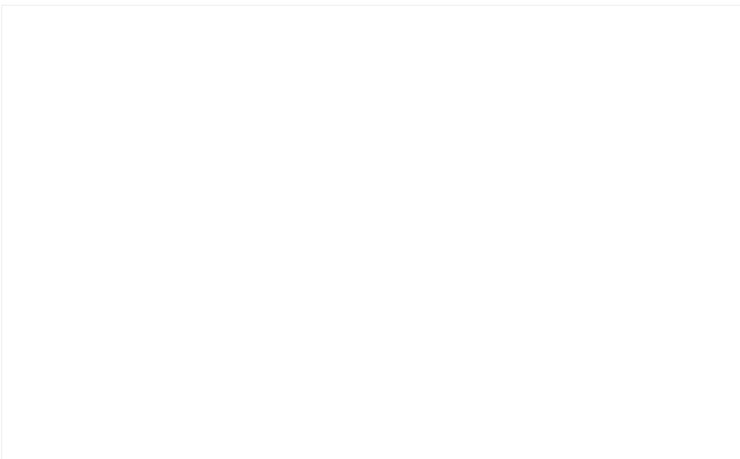
7 Reply ...

Michael Brenner · Oct 14
As Feynman said, definitions always match, that's what makes them useless, same with relativity. There is no such thing as a "space-time-intervall" because $a^2+b^2+c^2-(ct)^2=0$ is a cartesian hypotenuse and has nothing to do with time: ct is simply a length in [m]

Reply ...

Tim Good More gibberish to distract from straight talk to get to understanding. How about...

Ewan Brown · Oct 16
Lots and lots of words. But you still haven't addressed the point from our last conversation. If you take into account the earths curvature, by your own figures for the amount the object will have fallen, it won't hit the earth. Your entire figure [\(more\)](#)



3 Reply ...

Gert Van Der Walt · Oct 27
You only have to look up into the sky to see orbit. The earth and moon orbit each other, with a system Bary centre about 4000km below the earth surface. But Michael you and other flat earthers keep avoiding a very simple question. Explain [sout \(more\)](#)

1 Reply ...

Chris Solbe · Nov 1
Let's all have a silent minute in respect of Michael not having been anywhere near a university math or physics department.

1 Reply ...

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About the Author

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