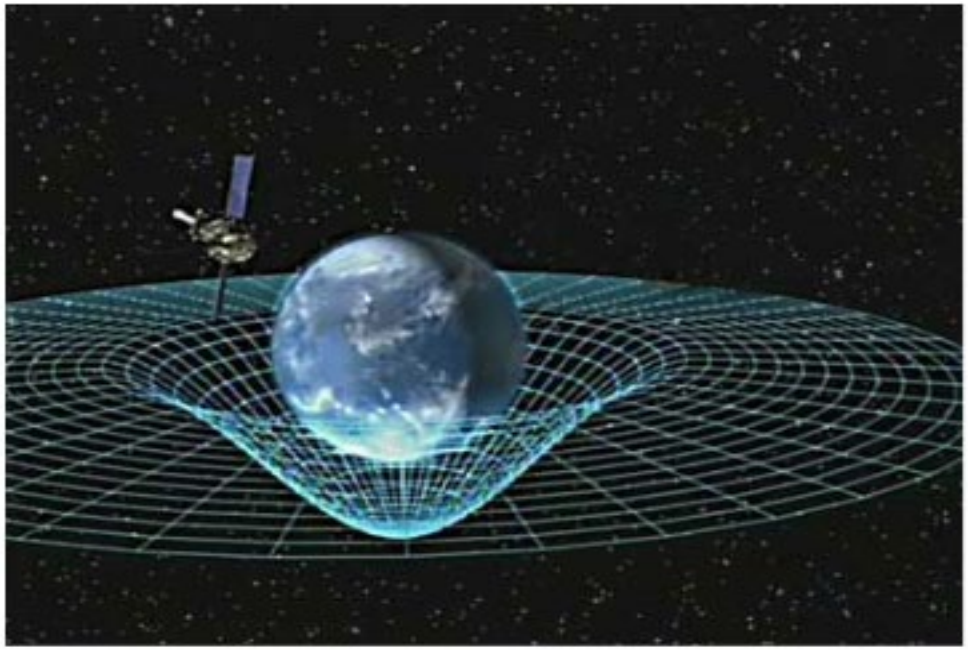
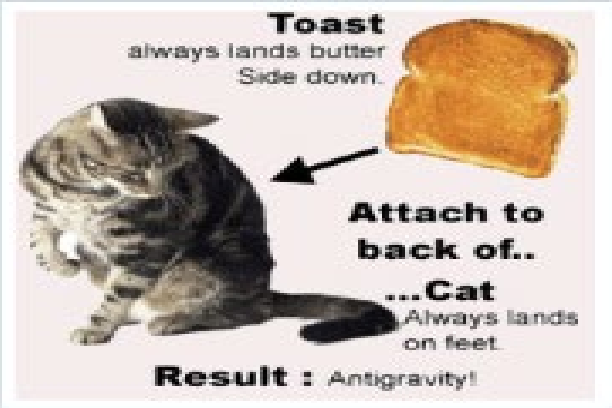
Applications of Acceleration Due to Gravity



A thought experiment...

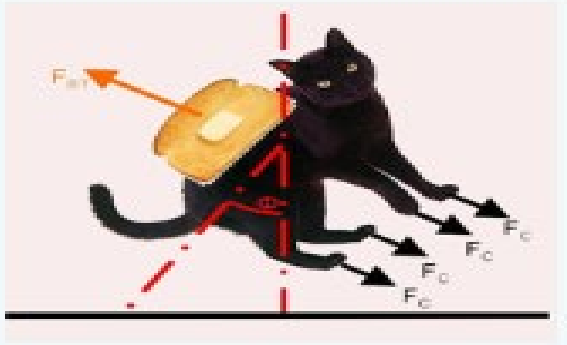
HUMOR

Cat+Toast=Anti-Gravity



For this anti-gravity experiment we will need one cat (preferably cute) and one piece of toast buttered on one side only. Now this experiment relies on two constants, one being a cat in motion will always land on its feet. And the other being when buttered toast travels from point X to point Y, it will always land butter side down.

Once the cat and toast have been properly joined together with the butter side facing away from the fur step back and enjoy, because there is no way for this paired object to reach the ground according to our newly proven scientific laws. Think about it, if the toast were about to land buttered side down that would void the kitten from landing on its feet. However, if the kitten was to land on its paws then the buttered side of the toast wouldn't be face down on the floor. There is no conceivable way for them both to land.



There you have it, the first ever kitten n' toast anti-gravity device. Now we must work on securing them to snowboards only then will we be on to something truely great.

Acceleration due to gravity key points:

1. $\vec{g}$ is a vector!

2. In calculations, use -9.81 m/s^2.

3. $\vec{g}$ can be used in place of $\vec{a}$ in any kinematics equation.

4. So far, everything is in one dimension.

Here are some typical questions dealing with objects falling towards the centre of the earth...

How high will it go?

A pizza pie is thrown up in the air with a velocity of 5.2 m/s. How high will it go?

Ans: 1.4 m

Hang Time

Mr.P jumps up to hit a volleyball. He hangs in the air for 12.0 s before hitting the ground.

a)How high did he go?*

Secret Shoes Thing

$t_{up} = 6.0$ s

Use $d = v_f t - 1/2at^2$,

where $v_f = 0$

Ans: 1.77×10^2 m

*Note: Mr.P is playing in the imaginary court in his mind.

b) What was the initial velocity of Mr.P?

Ans: = 58.9 m/s

Mr. October

Derek Jeter throws a ball vertically into the air with an initial velocity of 18.9 m/s. It is caught the same distance above the ground as it was thrown.

a) How high does it go?

Ans = 18.2 m

b) How long was it in the air?

Ans: 3.85 s for the entire trip.

Break an Egg!

An egg is thrown downward out of a window. If the window is 11.2 m above the ground, and it took the egg 0.550 s to hit the ground, what was the initial velocity of the egg?

Secret Dinosaur Egg Thing

Use a -ive displacement as the egg is falling down.

Ans: -17.7 m/s

Chopper Chucking

A care package is thrown vertically upwards from a helicopter hovering 20.0 m above the ground. The initial velocity of the object is 20.0 m/s.

a) Calculate the final velocity of the object just before it hits the ground.

Ans: -31.4 m/s

b) Calculate the time it takes the package to hit the ground.

Ans: 5.24 s

Third Second

A steel ball is dropped from a height of 50.0 m. How far does it fall during the third second of fall?