Please hand in PS #3
(on chair)

PS 4 coming later today
See today's NY Times
for latest exoplanet news!

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**FABLE: Einstein & Relativity**

**MORAL #1:** A genius in obscurity can revolutionize science.

**MORAL #2:** Only if new theory encompasses previous theories.

\[
\theta = 1 \\
\Rightarrow \text{Nature is right}
\]

**MORAL #3:** Patent office was key to Einstein's thinking.

(Calabria)
G.R. is a theory of gravity

Newtonian gravity

\[ F_{\text{grav}} = \frac{GMm_1m_2}{D^2} \]

mass (gravitational mass)

\[ F = ma \]

inertial mass

\[ m_1, \text{ earth} \]

\[ m_2, \text{ object} \]

Substitute \( F_{\text{grav}} \) into equation of motion

\[ \frac{GMm_2}{D^2} = ma \]
Electrostatic force \( F = \frac{\text{const} \times \text{charge}_1 \times \text{charge}_2}{D^2} \)

Gravity is weird because gravitational mass = inertial mass

Einstein: Gravity is not force

1) Objects move in straight line in absence of force
2) Presence of mass creates curvature in space and time; shortest distance between two points
What is "spacetime" 4-d coord. system
x, y, z, t
\downarrow ct

One year (time)

\| = 1 light year (distance)

Earth:
1 yr

\( t \rightarrow 10^{16} \) m

Space:
\( 2\pi \times 1 \text{AU} \)
\( 2\pi \times 1.5 \times 10^{12} \) m
\[ \frac{R_s}{R} = \text{how relavant on orbit is} \]

\[ L \text{ if } \ll 1 \Rightarrow \text{Newtonian Theory} \]

\[ \frac{3 \times 10^3 \text{ m}}{1.5 \times 10^7 \text{ m}} = 2 \times 10^{-8} \]