IB Physics
FA26.2 - Energy and General Relativity

Name_____

Worst joke Murray ever made:_____

_____

Show your work, circle your answers, and use sig figs to receive full credit.

1. What is the kinetic energy of a 0.142 kg baseball going 0.780c?

2. What is the velocity of a 0.128 MeV electron?

3. A black hole has an event horizon of 4.30×10^{6} m in radius. What must be its mass?

4. A very strong concertmaster is on top of a 148 m tall tower near a black hole where the gravitational field strength is 5.53×10^{12} N/kg. If another player is making a frequency of 440.0 Hz at the bottom, what frequency does the concertmaster hear at the top? What beat frequency do they hear?

5. A black hole has a mass of 21.0 solar masses. (The mass of the sun is 1.99×10^{30} kg.) *Calculate the radius of the event horizon, *Calculate the time it would take a clock 160. km <u>beyond the event horizon</u> to register 60.0 seconds of elapsed time as we observe it from a great distance.