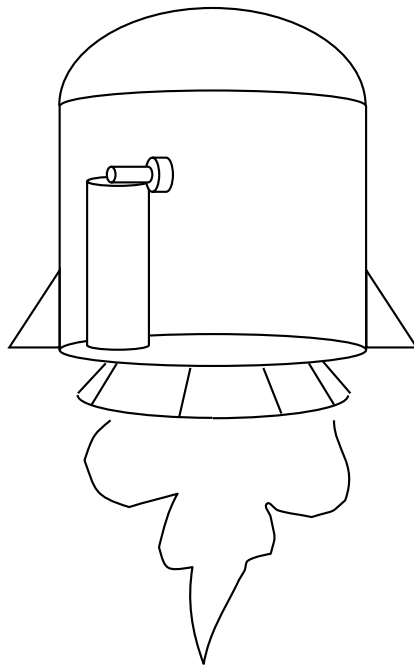


## Assignment #9. Principle of Equivalence

1. What is meant by the claim that the gravitational force is universal? Why does this allow the gravitational force to be geometricized in a way that the electromagnetic force cannot be?
2. Imagine that you are in a spaceship in some remote part of space and the spaceship is accelerating in some direction. What does the Principle of Equivalence tell you about what you see inside the spaceship?
3. Imagine that there is a flashlight beam pointed across the direction of motion of the spaceship in #1. Apply the principle of equivalence to this beam and determine the effect of a gravitational field on a beam of light.



4. The effect derived in #3 will be very small. It can be measured under very special circumstances that proved famous in the history of general relativity. Describe these circumstances.
5. An observer lowers a clock into a very strong gravitational field. How does the rate of the clock appear to that observer? How will it appear to another observer lowered in with the clock?