# Special relativity

## Exercises

1. If an electron moved at with respect to an observer what mass would the observer measure the moving electron to have? (rest mass of an electron )
2. For a proton (rest mass ) moving at find:
   1. non-relativistic momentum
   2. relativistic momentum (hint: use effective mass)
3. If a particle had a half-life of at rest calculate the half-life the particle would have if measured by a stationary observer when the particle was travelling at with respect to the observer.
4. If a spacecraft had a length of when measured at rest how long would it appear to a stationary observer if it was moving at with respect to the observer?
5. Consider a particle moving in the LHC at .
   1. How long would the particle take to make one cycle of the radius collider?
   2. If the observer could see a clock travelling with the particle how much time would have passed on the clock as the particle travelled the circumference?
   3. How long would the circumference appear to be to the moving particle?

## Answers