

1. A spaceship has length 100 m when measured at rest. How long will it appear when moving at a speed $c/2$? ($c = 300,000 \text{ km/sec}$).

2. A spaceship travels to the star Procyon and back. The distance from the Earth to Procyon is 11.4 light years. How long will this trip take from the point of view of people on Earth, if the speed of the spaceship is $0.99c$? How much time will pass from the point of view of the astronauts? For example, if one of the astronauts was 30 years old at departure, how old will he be when he comes back?

3. A gigantic spaceship full of green bug-eyed monsters intending to invade Earth is flying towards us at a speed $c/2$. The length of the ship is 1000 km. A radiosignal is sent from the middle of the ship towards both ends of the ship. From the point of view of observers on the Earth, the signal first arrives at the back of the ship, and then at the front of the ship. How big is the time difference between these two events?

4. In the situation of problem 3, imagine that when either signal reaches the end of the ship, it is reflected back and travels towards the middle of the ship. Obviously, from the point of view of the monsters, both reflected signals reach the middle of the ship simultaneously. Will they reach the middle simultaneously from the point of view of observers on the Earth?