

# Special Relativity – Time Dilation Questions

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Name: \_\_\_\_\_ Date: \_\_\_\_\_

1. Einstein gets into a spaceship and travels at  $0.7c$  for 5 years. He leaves a friend behind that started their clock at the same time. Upon return from his travels how many years would have passed on Earth?
  
2. An astronaut travels into space at  $0.99c$ . Upon return to Earth he realizes that a clock he left behind when he departed says he was gone for 3 years. How long would the clock on his ship indicate he was gone for? Compare how much he would have aged compared to people on Earth.
  
3. Two identical (and super precise) clocks/timers are synchronized. One clock is set into motion and maintains a constant speed. Upon returning to the position of the other stationary clock both times are recorded. The moving clock measures 56 seconds and the stationary clock measures that 66 seconds has passed. Calculate the speed that the moving clock was moving (in m/s and as a multiple of the speed of light).

4. Using the equation for time dilation as a reference, explain why time dilation is not observed by humans.

5. You get into your car and synchronize your clock with another stationary clock. You drive at 100 km/h for 20 minutes (measured from the clock in your car). Calculate the time difference between the two clocks at the end of this event.

## Cosmic Speed Limit

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