

A stick is 1 metre long. Ants are running up and down the stick. Every ant is moving at a speed of exactly 1 metre per minute - this never changes. When an ant reaches an end of the stick, it instantaneously turns around and starts moving the other way. When two ants collide head-on, they both instantaneously turn around and continue moving back the way they came. At a particular moment (time $t = 0$) there is an ant at the midpoint of the stick. Her name is Alice.

- Show that exactly one minute later, there will again be an ant at the midpoint of the stick.
- Under what circumstances will this ant be Alice herself?