

CAN YOU TIE A KNOT WITH STICKY HANDS?

- 1) Start with a rope or string which is about 2 feet long.
- 2) Start by tying a simple knot in the rope and then untying it. Your knotted rope should look something like this:



- 3) Now imagine that you have *sticky hands*. That is, once you grab hold of the rope, you aren't allowed to let go.

Can you still tie a knot in the rope?

Look at the bottom of this sheet for a hint.

Once you hold the rope, it forms a complete loop with your body. If this loop isn't knotted at the beginning, it won't be at the end!

Sticky Hands Knot – Mentor Sheet

Materials: Learner sheet, mentor sheet, rope/string which can be cut into pieces which are around 2ft long, at least the length from elbow to fingertips.

Setup: Cut some pieces of rope/string for learners to use. Fold down the learner sheet so that the hint is hidden and place it in view.

Advice for mentoring the activity:

- Learners should mostly complete the activity themselves.
- Ensure that everybody can tie a knot the usual way. For earlier learners, even learning to tie a knot might be the activity!
- Try to have learners spend 2-3 minutes on the activity before looking at the hint and try for another 2-3 minutes after looking at the hint before being told the solution.
- Once learners are ready to hear the solution, encourage others to share the solution with each other rather than hearing it from you.

Solution: To tie a knot with sticky hands, first cross your arms (i.e. your right hand under your left elbow and your left hand above your right elbow). Now grab both ends of the rope and uncross your arms.

Additional Information:

In mathematics, the term *knot* refers to a loop embedded in 3D-space. The knot tied in this activity is not a ‘mathematical knot’ since the rope has loose ends. But once we attach those ends, we obtain the *trefoil knot* (pictured).



Mathematicians care about knots up to *ambient isotopy*. The word isotopy means “same space/place”, and “ambient” refers to the fact that we are moving the knot around in the ambient space that we live in.

When you hold onto both sides of the rope, you create a knot with the rope and your body. Since the circle (or *unknot*) is not ambient isotopic to the trefoil, you will never tie a knot in the rope after holding on!

Crossing your arms and grabbing the rope creates a trefoil on your arms, so uncrossing your arms then moves the trefoil onto the rope itself.