

Magnetism gets mysterious

This simple demonstration can be used to introduce the concept of magnetism. Show your class two lengths of rope. Give one to a student while you handle the other. Get the student to tie the two ends together, making a loop, while you do the same with your piece. Finally, take the student's rope loop and link it to your rope loop, in interlocking configuration, in full view of the class.

So how do you achieve this? You will need two pieces of soft rope about 1 m in length and 1 cm in diameter. Ideally the ropes should be different colours for ease of handling. Cut one length of rope at a point around three-quarters along its length (figure 1). A portion of the innards from the cut ends should be carefully removed with scissors to create 'pockets' about 1 cm deep. Into each of these pockets insert a small cylindrical magnet of an appropriate size so that its open end is flush with the cut end of the rope. Opposite polarities of the magnets must be maintained at the ends. A bit of glue will be needed to secure the magnets into the rope. When the cut ends are brought together,

the opposite poles of the magnets will attract each other, making it virtually impossible to detect that this piece of rope is actually two pieces.

To present the demonstration, take the prepared rope yourself and offer the other length of rope to a student. Ask them to examine the rope to ensure that it is nothing out of the ordinary. You both then tie the open ends of your ropes together, creating loops (figure 2). Take back the piece of rope from the student and hold it together with your rope in such a way that the (concealed) cut ends of your rope are in the palms of your hands. Apply a bit of force with your fingers to separate the cut ends of your rope just enough so that the other rope can be inserted inside the loop. Bring the cut ends of your rope together so that the loop is whole again. Now show the linked ropes to the class (figure 3). To unlink the ropes, reverse the process.

The physics principle involved is simple—that opposing magnetic poles attract each other when brought close together—but it has been cleverly concealed in this set-up. Traditionally, this prin-

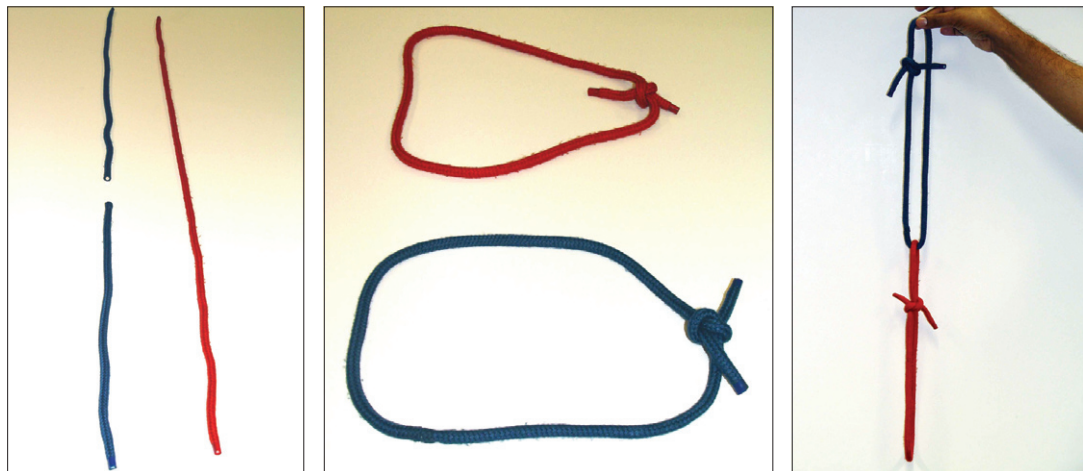


Figure 1 (left). The two lengths of rope, with the secretly cut ends in view. **Figure 2** (middle). The lengths of rope tied into loops. **Figure 3** (right). The two rope loops linked together. David Toh is thanked for his assistance with these photographs.

ciple is illustrated just by bringing two bar magnets close together but this ‘trick’ demonstrates it in a more intriguing fashion.

To foster critical thinking, ask your class how it might have been done. This conversation is always illuminating and enriching, and may supply new ideas for demonstrations. When you reveal how the trick was done, encourage the students to fabricate their own versions. This can be of significant help

in aiding successful learning.

The simplicity of the set-up is important. The ropes and magnets are easily and cheaply available. A quality but expensive version of the set-up can be purchased from magic shops.

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