



Years 3-8

Cricket Stump Pulleys

Materials

3 x strong bits of wood, preferably with a circular cross-section (cricket stumps are ideal).

1 x 10m (ish) length of hemp rope (preferably not nylon).

A wall to tie one end of the rope to (to which to tie one end of the rope) – those climbing frames you get in some school halls are good.

You will also need:

2 x larger children

Instructions

1. Ask for a couple of volunteers (A and B).

With their help, tie one end of the rope in the centre of each stump. Each one holds one stump. Take up the slack. Let them have a go at seeing who is the strongest – (tug-of-war!)

Invite the class to predict the outcome.

2. Choose another class member (C), not as big as the others. Have the first two team up with one stump. Give the other stump to (C). Get them to do the tug-of-war.

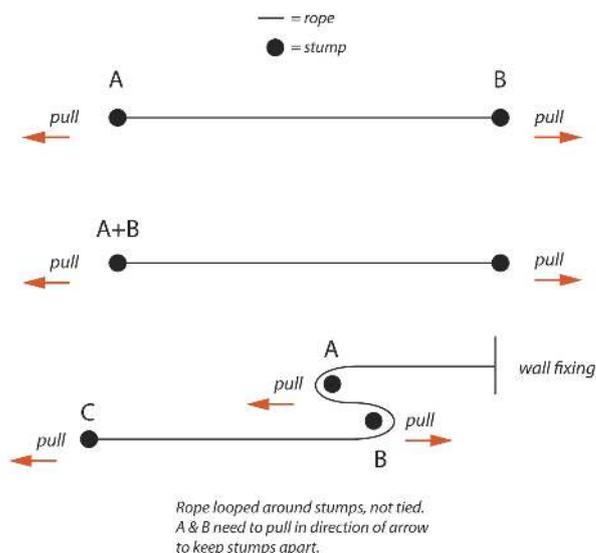
Again, have the audience predict what should be a more obvious outcome.

3. Now you can say: 'I bet I can make C stronger than A and B just by using one extra stump.'

Then, undo the rope from one stump and tie it securely to the wall. You now have a rope tied at one end to the wall and at the other to the stump.

Take the other two stumps and loop the rope somewhere on its length, first on one stump, then back around the other with the two stumps about two metres apart (see diagram).

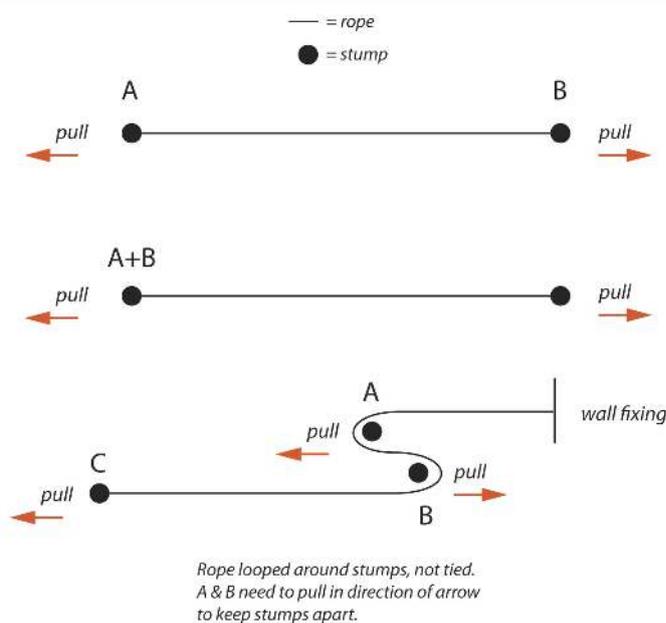
4. Give the stump tied to the rope to C. Give A and B stumps, one each and get them to face each other.





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5. Now, and here comes the magic bit, ('what's going to happen now?'). Instruct A and B that all they have to do is to keep the two stumps apart. Simple. Well, perhaps not.

Instruct C to hold the other stump and pull - away from the wall, where the other end of the rope is tied.

6. Stand back and be amazed.

What is supposed to happen is that, as C pulls away, A and B will be drawn inexorably together. Essentially, the stumps act as a movable pulley, reducing the force needed to pull the heavy objects, A and B, together. C will need to move quite a distance – halving the force needed by C will double the distance to be moved.

This can lead on to talking about the force, Newtons (N); about Sir Isaac Newton; about gravity; using a spring balance graduated in Newtons to demonstrate the difference in 'mechanical advantage' when using pulleys; that using a pulley system reduces the force needed to move objects.

