

# River Crossing

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## 1 Puzzle

This week we have a much simpler - and probably familiar puzzle - to do with a farmer who wishes to cross a river. The river is too wide to ford, so he must use a small rowboat - which only has enough room for him and one other object.

His problem however is that he is not alone. He has with him a fox, a chicken and some grain. While he is around to keep an eye on them he can keep order, but the moment he leaves them alone the fox is sure to eat the chicken, and equally the chicken will surely scoff the grain.

So given that he can't afford to leave them alone, and can only take one at a time, how can he get them all across the river?

## 2 Discussion

The puzzle, which has been quite faithfully reproduced, is slightly misleading. It is true that you can't leave the fox with the chicken, or the chicken with the grain, but that doesn't mean there isn't some combination of his companions that he can't leave alone.

Having spotted that, which might give his first move, you're not necessarily done. Don't also forget that he can take things both ways across the river.

Finally, remember this is a maths puzzle. So you can ignore such real-world problems as "won't the fox run away if left alone?" and equally such out-of-the-box solutions such as "tie the fox to the boat and let him swim" - you must assume everything must be taken in the boat, and that the farmer must be in there, so you can only have one other thing in there at a time.

Good luck!

### 3 Solution

As you'll spot quickly enough, you can leave the fox with the grain without any problems. The following steps result in getting everything across without anything eating anything else:

1. The farmer takes the chicken across to the far bank
2. The farmer rows back by himself
3. The farmer takes the fox across to the far bank
4. The farmer takes the chicken back to the original bank
5. The farmer takes the grain across to the far bank
6. The farmer rows back by himself
7. The farmer takes the chicken across to the far bank

What is slightly interesting is that every step is actually forced.

In the first step, the farmer must take the chicken, taking anything else results in some unwanted scoffing.

At the second, he only has the chicken to take, and he just took that across so bringing it back would be pointless.

For the third in fairness he could take either the fox or the grain (rowing back alone would just reverse step 2 - pointless), but it amounts to the same thing.

For the fourth, taking back the fox reverses the previous step, rowing back alone leaves the chicken unable to fend for itself so he must take the chicken.

For the fifth, similar logic means he must take the grain.

For the sixth he could in theory take the fox back, but that would clearly be pointless, so he must row alone.

And finally he only has the chicken to take across.

So really, the puzzle isn't as hard as it first looks at all!