# Question 6.5 from CTCI: Jugs of Water

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## Question

Jugs of Water: You have a five-quart jug, a three-quart jug, and an unlimited supply of water (but no measuring cups). How would you come up with exactly four quarts of water? Note that the jugs are oddly shaped, such that filling up exactly "half" of the jug would be impossible.

## Explanation and Algorithm

Jug X is the five gallon jug and jug Y is the three gallon jug.
Here are the steps:

1. Fill jug X from water supply. State X = 5, Y = 0.
2. Fill jug Y using water from jug X. State X = 2, Y = 3.
3. Empty jug Y. State X = 2, Y, = 0.
4. Fill jug Y with water from jug X. State X = 0, Y = 2.
5. Fill jug X from water supply. X = 5, Y = 2.
6. Fill jug Y with water from jug X. X = 4, Y =3.
7. X now has 4 gallons.

## Hints

1. Play around with the jugs of water, pouring water back and forth, and see if you can measure anything other than 3 quarts or 5 quarts. That's a start.

2. If you fill the 5-quart jug and then use it to fill the 3-quart jug, you 'll have two quarts left in the 5-quartjug. You can either keep those two quarts where they are, or you can dump the contents of the smaller jug and pour the two quarts in there.

3. Once you've developed a way to solve this problem, think about it more broadly. If you are given a jug of size X and another jug of size Y, can you always use it to measure Z?

## Sources

Question, answer and other material taken from Cracking the Coding Interview 6th edition by Gayle Laakmann McDowell.