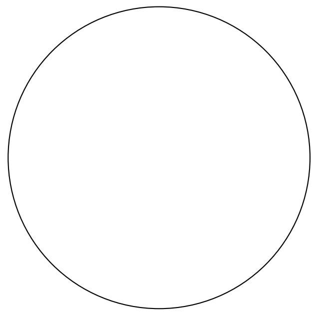
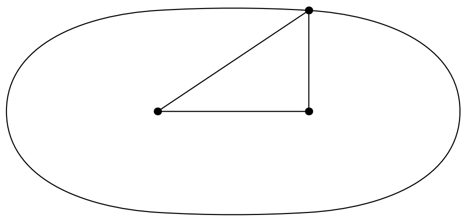


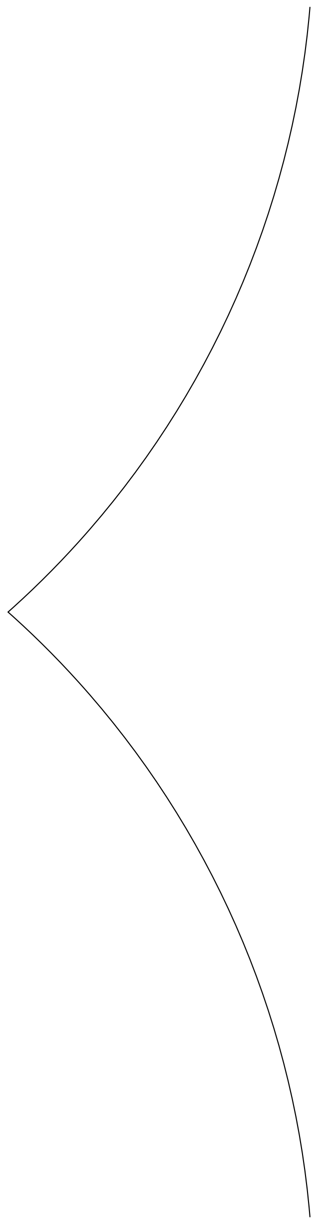
A circle.

The goat is tethered to a pole at the centre of the circle. If it keeps the rope tight, it will trace out the circle.

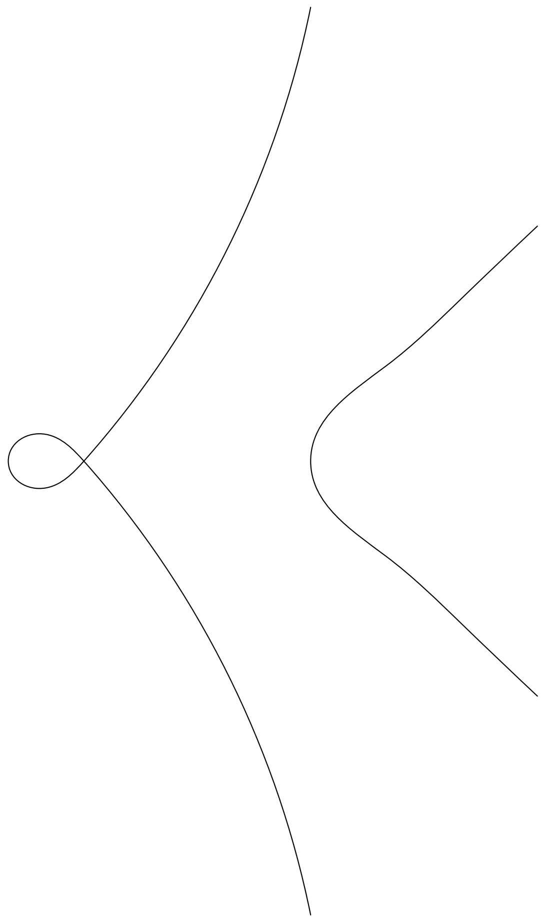


An ellipse.

The goat is attached to a rope which passes round two poles. If it keeps the rope tight, it will trace out the ellipse.

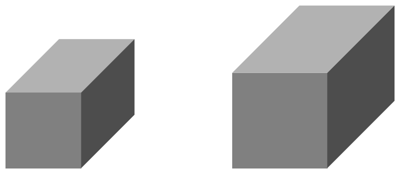


An ivy-leaf curve (cissoid). The ancient Greeks discovered this, 2500 years ago.



Some more curves which are rather like the ivy-leaf curve.

This problem seems to have nothing to do with curves: but it does!



The sugar cube on the right is twice as heavy as the cube on the left. How much longer are the sides of the sugar cube on the right?

The answer is much less than twice as long! A cube with edges twice as long would be eight times as heavy. The right answer is $\sqrt[3]{2}$ times as long: that's a little bit more than one and a quarter.

You can't draw a line of *exactly* that length if you are only allowed to use a ruler and a compass. But you can if you are allowed to use the ivy-leaf curve.