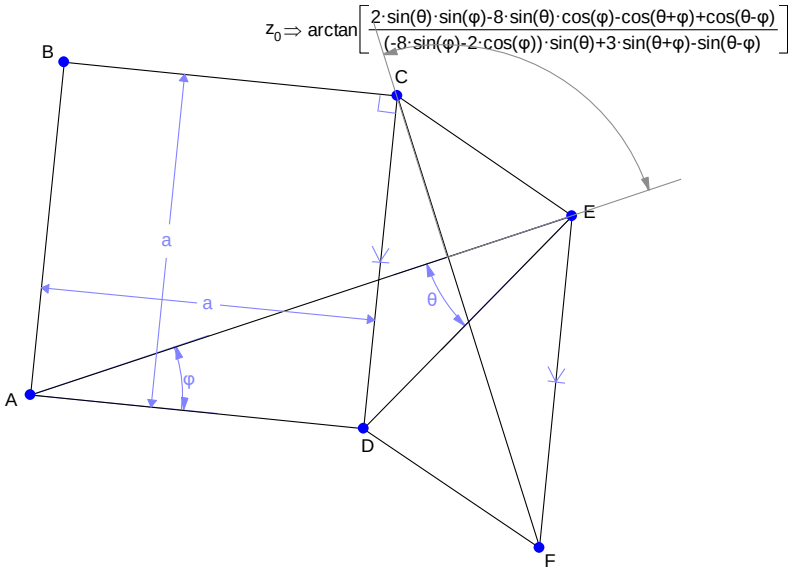
Here is an alternate way to constrain it. We now need to find phi such that the denominator of the argument of the arctan is 0.



A little Maple:

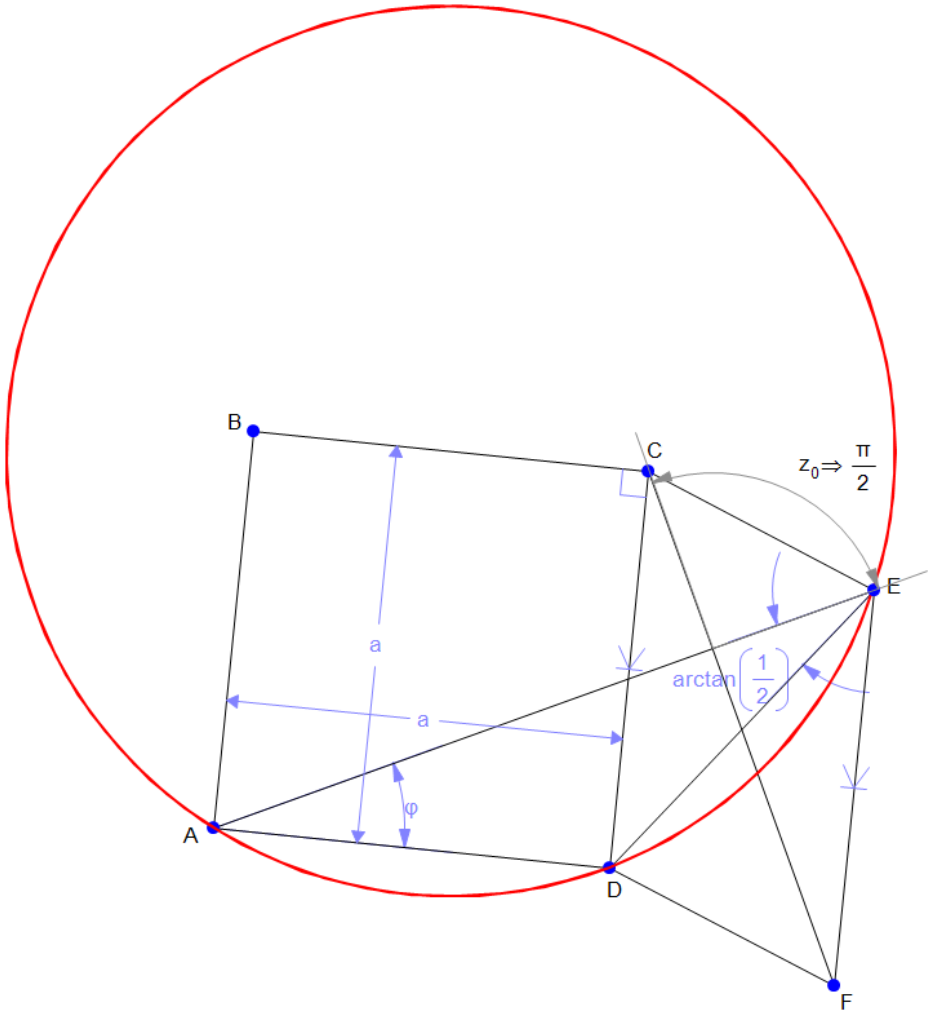
> **expand(%,trig);**

$$-8\sin(\phi)\sin(\theta)+4\cos(\theta)\sin(\phi)=0$$

This will be zero if phi is 0 (degenerate) or sin(theta) / cos(theta) = ½

So the angle theta is arctan(1/2)

(And the locus of E is the circle whose center is the midpoint of B and C and which passes through A.


B
C
$z_0 \Rightarrow \frac{\pi}{2}$
E
a
a
$\arctan\left(\frac{1}{2}\right)$
φ
A
D
F