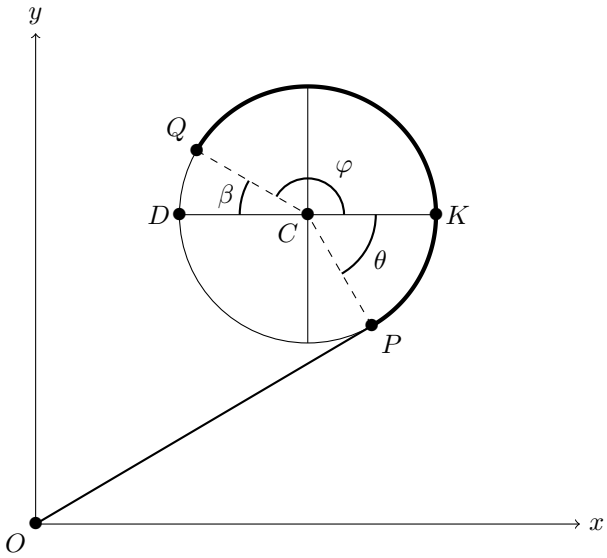
2. [11 points] A drone starts at the origin O, and flies in a straight line to a point P with coordinates (a, b). From there, it travels counterclockwise around a circle of radius 8 centered at the point $C = (20, 15)$, until it reaches the point Q. This is illustrated in the diagram below, though **the diagram is *not* drawn to scale**.



Note that θ, β and φ are the *positive* measures of the angles PCK, DCQ and QCK (respectively) given in *radians*. **You do not need to show any work for this problem**, but you should write your answers *in the spaces provided*.

a. [2 points] Find the length of the line segment OP in terms of a and b *alone*.

The length of OP is _____

b. [2 points] Find a formula for φ in terms of β *alone*.

$\varphi =$ _____

c. [3 points] Find the length of the (bolded) circular arc PQ in terms of θ and β *alone*.

The length of the circular arc PQ is _____

d. [4 points] Write a formula for b in terms of θ *alone*.

$b =$ _____