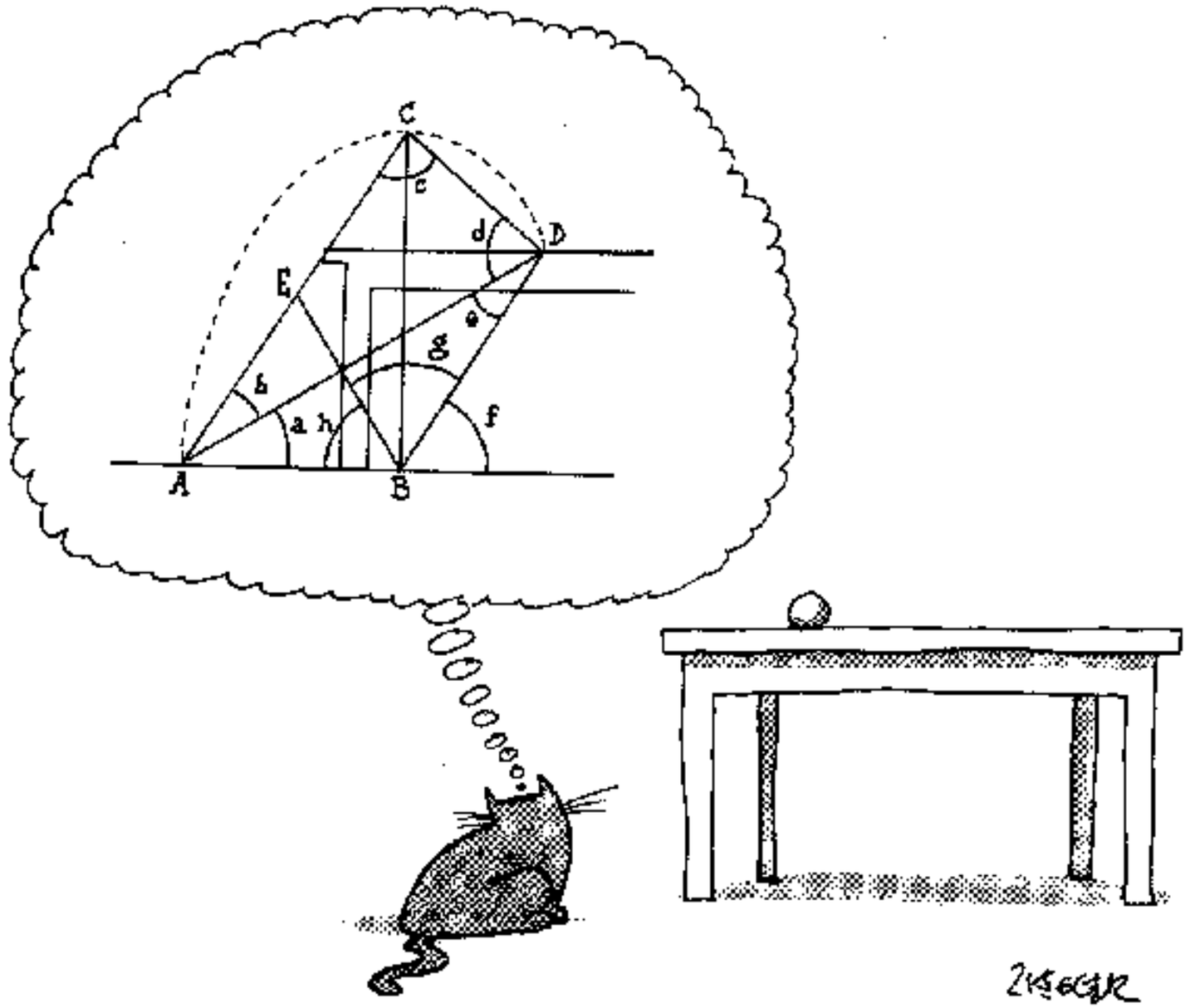
Q: Why did the programmer quit his job?

A: Because he didn’t get arrays.

I put my root beer in a square cup...
now it’s just beer.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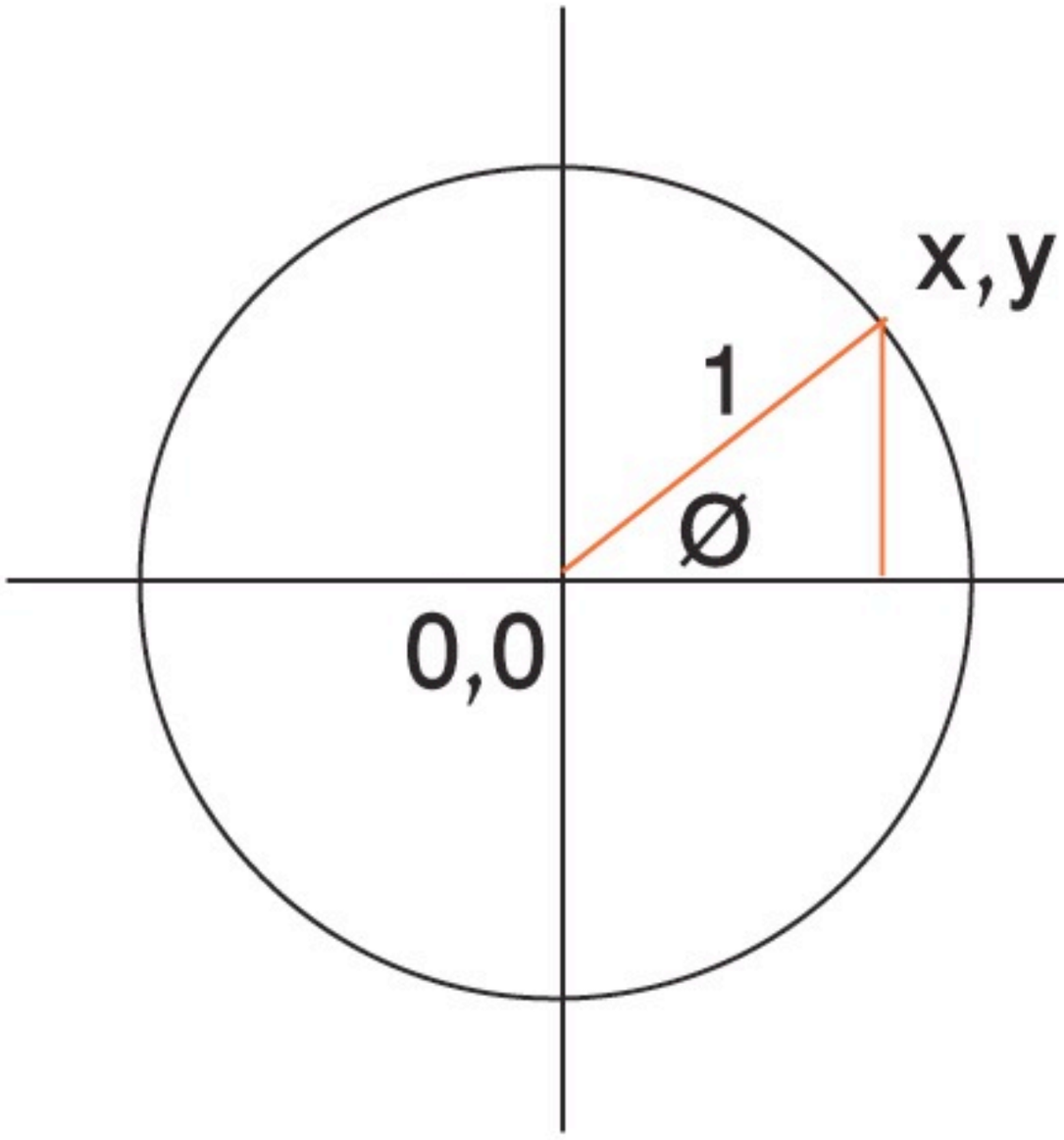
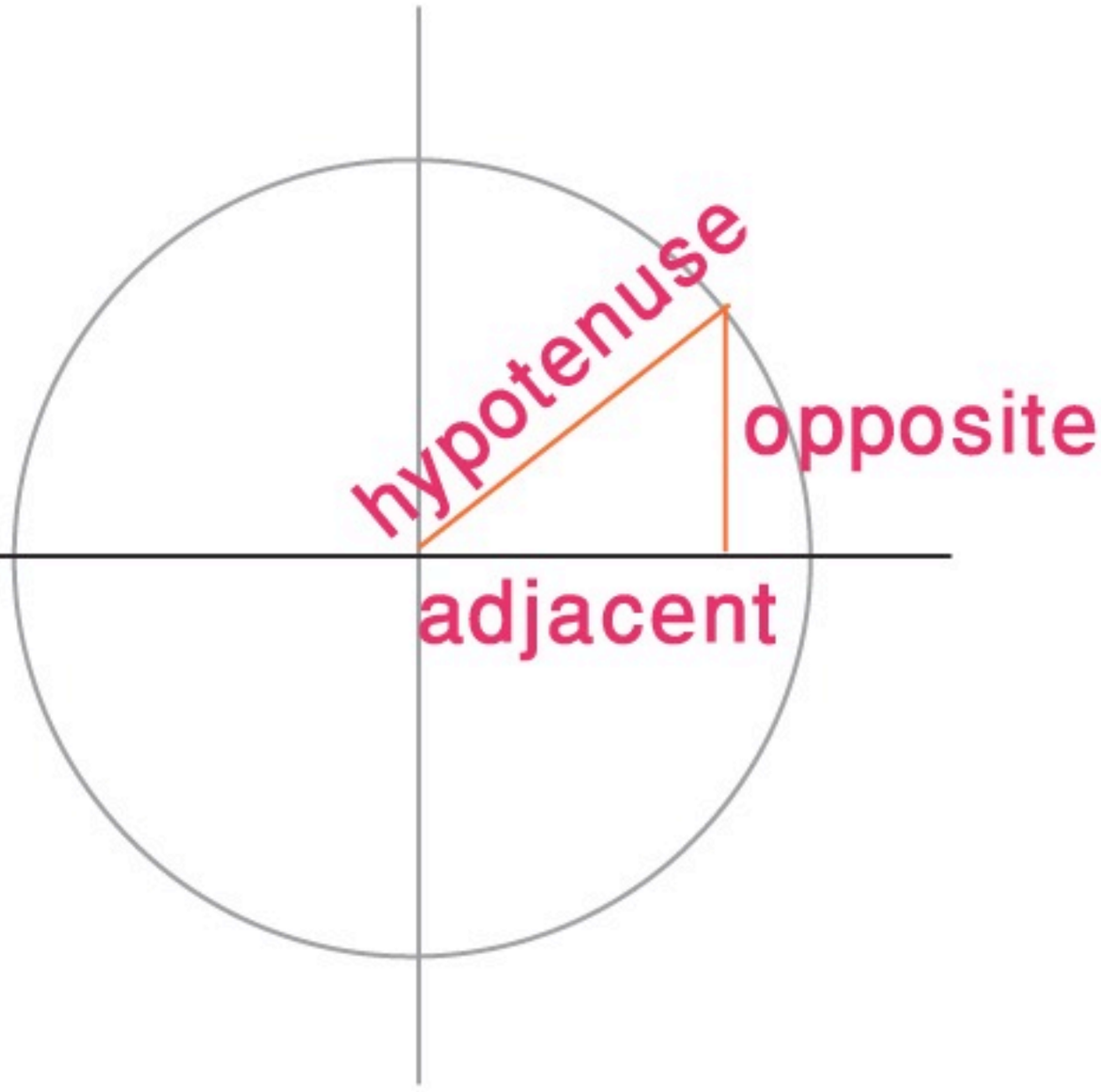
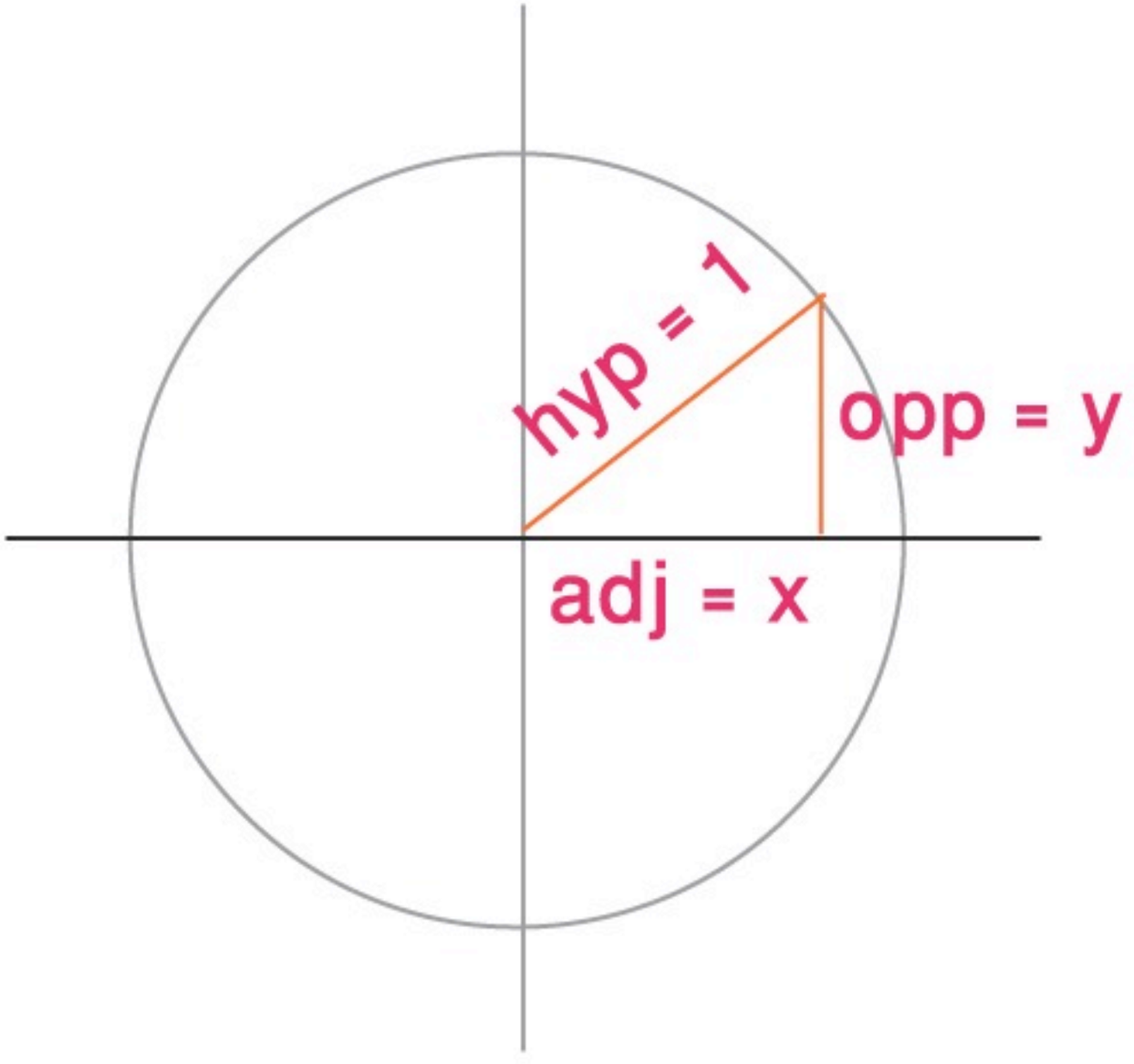
Unit circle: radius = 1







sohcahtoa

$\sin(\emptyset) = \text{opp} / \text{hyp}$

$\sin(\emptyset) = y / 1$

$y = \sin(\emptyset)$

$\cos(\emptyset) = \text{adj} / \text{hyp}$

$\cos(\emptyset) = x / 1$

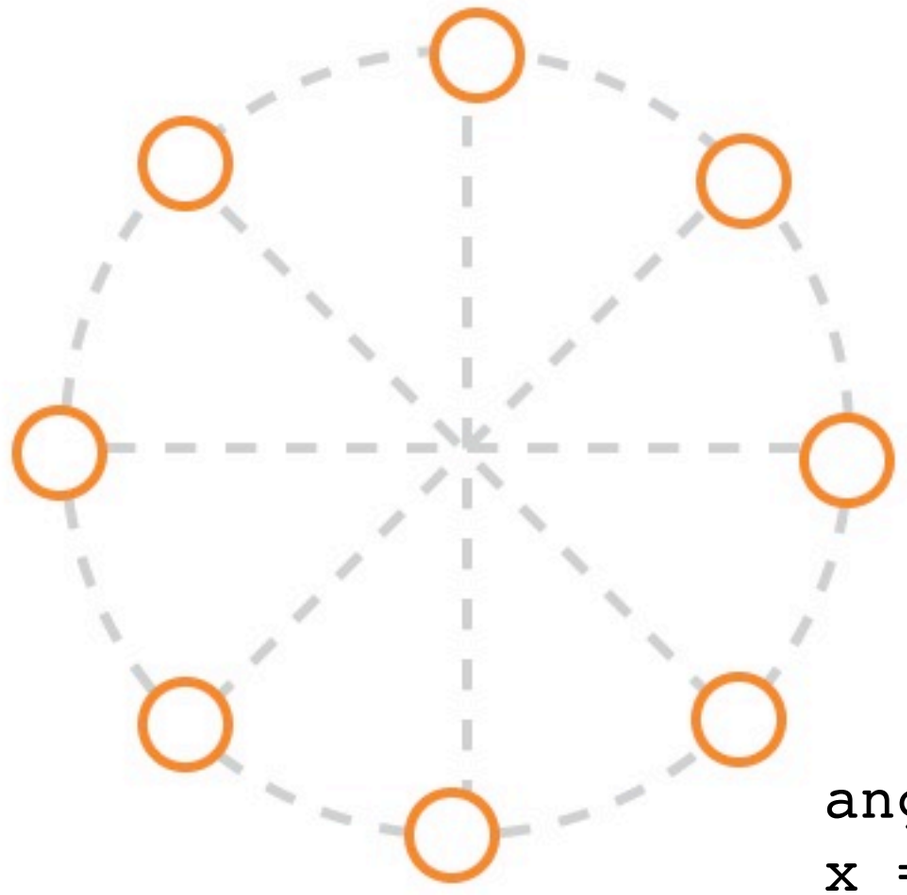
$x = \cos(\emptyset)$

$\tan(\emptyset) = \text{opp}/\text{adj}$

$\tan(\emptyset) = y/x$

$\emptyset = \text{atan}(y/x)$

if we have an angle and radius,
we can calculate an x and y position on a circle



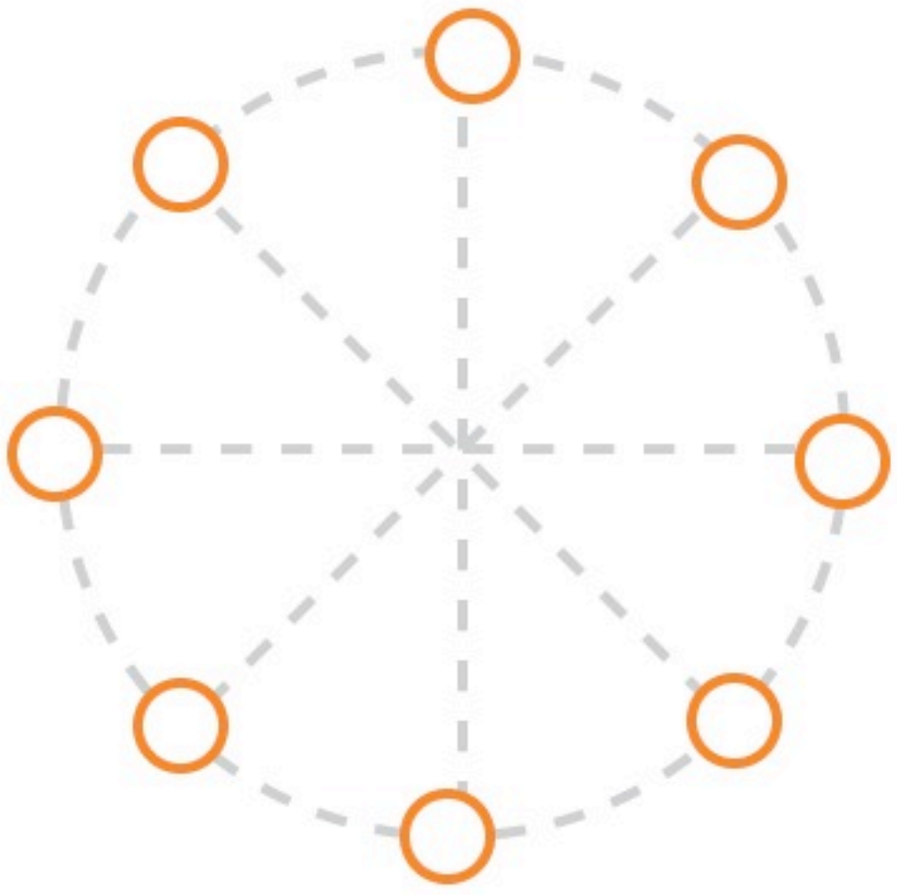
```
angle = radians(45);
x = radius * cos(angle);
y = radius * sin(angle);
```

Define a radius for a circle

Loop from 0 to 360 (use a for loop) and increment by 10 (i+=10)

Calculate the angle using i (remember to convert to radians)

Draw an ellipse at each position using sin and cos



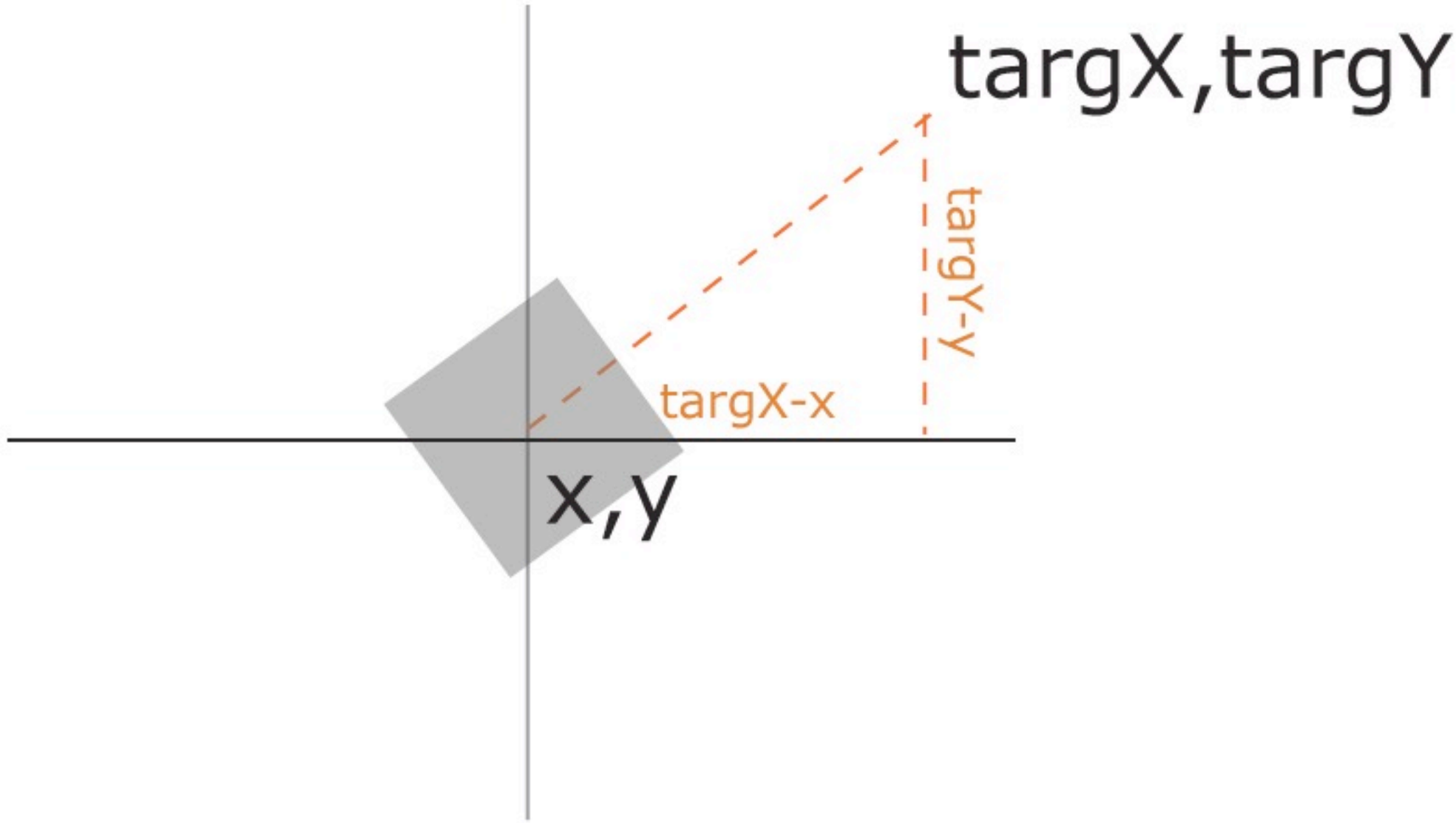
```
x = radius * cos(angle)
y = radius * sin(angle)
```

if we have an x and y, we can get the angle

$$\emptyset = \text{atan}(y/x)$$

but because arc tangent uses division,
it would treat y=3, x=2 the same as y = -3, x = -2
so most languages have a function **atan2** that takes this into account

$$\text{angle} = \text{atan2}(y,x)$$




```
float angle = atan2(targY-y,targX-x);
```