



Timed Turns: Performing basic math under pressure – By Jeff Serpas

During the process of studying for my instrument rating, one of the biggest challenges that faced me at the time was timed turns, a common challenge for instrument students. Timed turns require the pilot to turn the airplane left or right a given number of degrees to a new heading using only the turn coordinator, compass, and clock. The first step is to figure out the number of degrees between your current heading and desired new heading. You then take that number and divide by 3 (if you are going to be executing the turn at standard rate). Sounds pretty easy right? A little subtraction followed by a little division.

However, I found the stress of maintaining aircraft control without the heading and attitude indicators made doing simple math in my head very difficult! After the new heading was given by my instructor, I blanked. I needed to find a way to practice these basic math steps on the ground so that when I got in the air I could focus on flying the airplane and planning my next actions, instead of worrying about math. I started by just using pen and paper: writing down 2 numbers, calculating the number of degrees between them, and dividing by 3. This became taxing both in the waste of paper and in the fact that I would have to figure out the answer on paper in order to check the answer I had arrived at in my head. The goal was speed, and it was too tedious and didn't exactly simulate the flying conditions to go the pen and paper route. There had to be a better way.

I decided the better solution would be to leverage my education in computer science and write a small program, an app for the iPhone, that could generate a timed turns quiz. It's a simple computer program that randomly generates a current heading and a new heading with a direction of turn. I do the turn math in my head, arrive at the number of seconds of turn, and then click a button to display the correct answer in order to see if my mental calculation is correct.

I practiced no more than 10 minutes a day and was amazed by how much faster and more accurate my timed turns math became. The calculations became routine and familiar on the ground as well as in the air. By the time my check ride came around, I wasn't fazed by timed turns. I still use the app from time to time to stay sharp. If I'm unfortunate enough to lose my heading and attitude indicator in IMC, having confidence in the math to properly turn the plane to a desired new heading would be invaluable for handling the emergency and staying cool under pressure.



Samples of two such questions are shown following:

Your current heading is 075°
You need to turn **left** to a heading of 010°
[\[Answer\]](#)

Answer: At standard rate, it will take 22 seconds to turn the required number of degrees (65°).
[\[Next Question\]](#)

Clicking [\[Answer\]](#) reveals the answer.

Clicking [\[Next Question\]](#) randomly generates another question.

Your current heading is 195°
You need to turn **right** to a heading of 255°
[\[Answer\]](#)

Answer: At standard rate, it will take 20 seconds to turn the required number of degrees (60°).
[\[Next Question\]](#)

You can use the following link to find the “flashcard” program and use it on any computer to do the same kind of practice:

Source: <http://www.unserpasdesign.com/flying/timedturns.php>

[On the page that opens on the PC, you also will find a link that will allow the same thing to be done on your iPhone or iPodTouch.]

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