

(35 pts) Approx. 4 days

The last part of this unit returns to the idea of navigation from the perspective of the pilot. When flying a plane, it’s essential to know where you are and where you are going. VOR Navigation is a worldwide system that makes this possible for all pilots. In this part of the unit, we’ll look at some of the Section Maps used to plan out flights, and how the VOR dial and dashboard 6-pack in the cockpit of the Cessna 172 can be used to aid in flight navigation.

1. Watch the videos *Section Charts*, *Planning with VOR*, and *Flying with VOR*. Take a full page of notes on these ideas in your engineering notebook. Make sure that your notes include details on the 6-pack of indicators on a plane’s dashboard, as well as how VOR notation works. You’ll be able to add to these notes as you continue working!
2. Next, get the two small sector maps (both printed on the same page) and cut them apart. One is of the Fairbanks area, the other is of an area in Wisconsin with locations listed like “Kettle Moraine” and “Lake Winnebago”.
3. **SECTION MAP ACTIVITY:**
  - a. Using the Wisconsin Section Map, identify and annotate each of the following:

Find VOR-FALLS	Find VOR-OSHKOSH	Find the MANITOWOC VOR frequency
Find the VOR bearing from FALLS to OSHKOSH	Find an airport. They look like this: 	Draw a plane at the location which has a bearing of 160 on Freq 111.8 and a bearing of 240 on Freq 111.0

- b. Next, using the Fairbanks Section Map, identify and annotate each of the following:

The city of Fairbanks	The city of Manley Hot Springs	The Tanana River
Find the VOR bearing from NENANA to FAIRBANKS	Find the FAIRBANKS VOR frequency	Draw a plane in the circle at <i>Minto Wright</i> and then find the VOR bearings for that plane back to FAIRBANKS and to NENANA

4. Next, go back into XPlane and open the section map available for the region in which we can fly. This Section Map is from the Colorado area. Pick a starting airport and an ending airport. Then, plan out a flight between the airports using VOR and the available stations. *Write down your flight plan* in you engineering notebook. Then, *complete your flight* by following your flight plan as closely as possible. Take a screen shot of your finished route
5. Finally, write a full-page reflection in your engineering notebook about navigation. What parts of the unit were interesting and fun? What parts of navigation were difficult or tedious? What do you think it would be like to be a pilot? What kinds of tools, processes, or technology would help pilots have an easier time flying?

Part 3: Tasks	5 points	4-3 points	2-1-0 points
 Notes on VOR Navigation	+ You took a full page of notes on <i>Section Charts</i> , <i>Planning VOR</i> , and <i>Flying VOR</i> presentations.	- Your notes are less than a page or are missing parts	- No notes - Large parts missing
 Complete Section Map Activity	+ You completed the Section Map Activity + You taped your annotated Section map into your engineering notebook	- You completed most of the Section Map Activity	- You did not complete the Section Map Activity
	<b>15-12 points</b>	<b>11-8 points</b>	<b>7-0 points</b>
 Plan & Fly VOR Route	+ You planned out a flight using a section map & VOR stations. + You used the Cessna 172 to fly your planned route + Your flight map looks like your plan	- Your flight did not turn out as planned - Your plan is not fully recorded in your notebook	- You did not make a flight plan - You did not fly your route
	<b>10-9 points</b>	<b>8-5 points</b>	<b>4-0 points</b>
 Post-Flight Reflection	+ You wrote a full-page reflection in your notebook that addresses the reflection prompts above	- Your reflection was less than a full page	- Your reflection was less than a half-page

