activity ten

Flying the Sectional Chart

USING THE TRIED AND TRUE WIND TRIANGLE

OBJECTIVE

This is a great activity for learning how to use the sectional chart for flight planning. It can be used on a cadet orientation flight or as a Sunday afternoon round-robin flight with a group of seniors.

In our proposed flight, we are going to fly from Graham (Texas) to Seymour, Texas.

NATIONAL SCIENCE STANDARDS

3. Geometry Standard
   - Specify locations and describe spatial relationships using coordinate geometry and other representational systems.
   - Use visualization, spatial reasoning, and geometric modeling to solve problems.

4. Measurement Standard
   - Understand measurable attributes of objects and the units, systems, and processes of measurement.
   - Apply appropriate techniques, tools, and formulas to determine measurements.

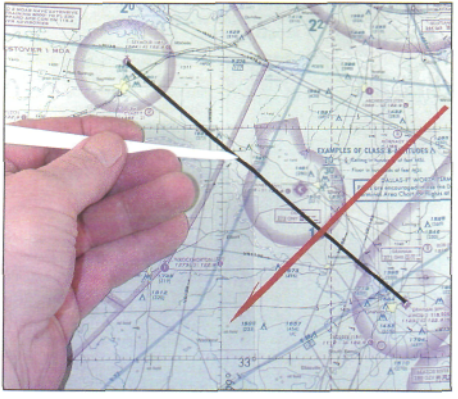
PROCEDURE

1. The forecasted winds aloft are going to be from the Northeast at 25 knots. You will be flying at a legal altitude and the distance is 55 statute miles or converted, is 48 nautical miles.

2. The large red line represents a wind out of the northeast. (This information would have been given us as part of the winds aloft forecast in our pilot briefing from the Flight Service Station).

3. **The true course is 313°** as measured from true north. Using the protractor portion of our plotter, confirm this as the TC.

The black line is actually straight and true. The paper has a small crease in it making the line bend.



4. The winds are out of the northeast (45°) **at 25 nautical miles per hour.**

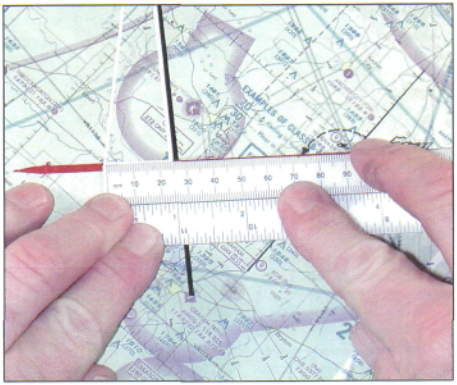
5. Using a metric ruler (so it has enough unit markings for our air and ground speeds), measure along the wind line (shown as a white line on the red) and make a mark at 25.

The black line is our true course and the red line represents our wind out of the Northeast.

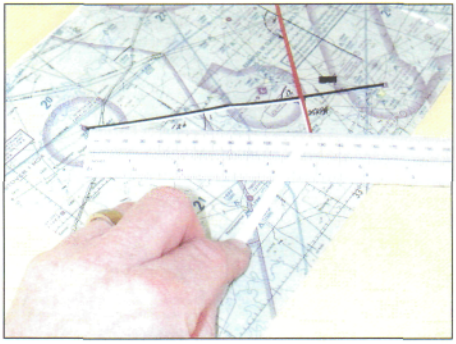
6. From our performance charts in the airplane, we have determined that at the altitude we're going to fly, the **true airspeed of the airplane (through the air) will be 124 nautical miles per hour (or 124 kph).**

7. Now, from the end of the wind line (called a wind vector since it has both direction and speed), draw a line that is **124 units** long and intersects the true course line. The units represent miles so our line will represent 124 nautical miles. **Please note, the "units" are for mathematical calculation only. This does not represent the actual chart scale distances between Graham and Seymour.**

8. Where the intersection of the two lines come together, an angle will form. This is called the WCA or Wind Correction Angle. In our case, it just happens to be **12°**.



A metric ruler is used to show the winds at 25 knots along the red line (direction). Using the metric portion of a ruler allows enough numbers to visually show wind, velocity, air and ground speeds. When a line has direction and velocity, we call this a vector.

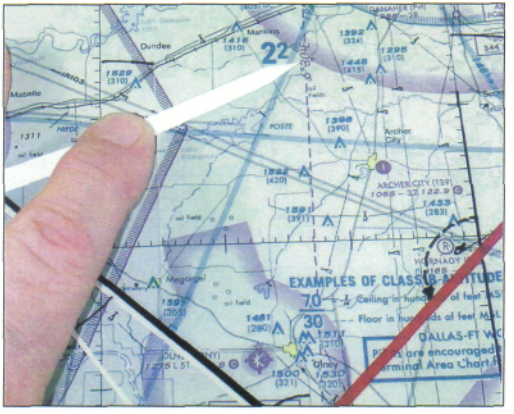


9. Along our route of flight, there is a magenta line that crosses our true course about 12 nautical miles from the Graham airport. This is called **a line of magnetic variation.** This means that the compass will be slightly off to the right (East) as we fly through this area.

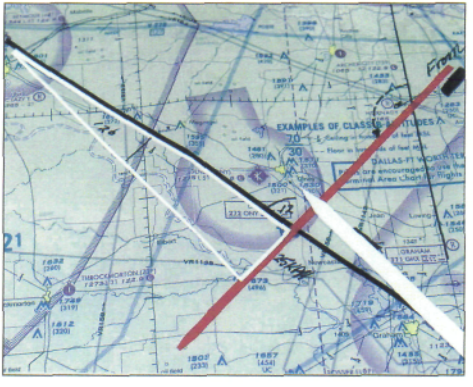
10. So...when we take off from Graham, we will climb to our desired altitude and turn our airplane so that it will make a track across the ground exactly where we want it, 313°. To do this we must make a correction for the wind and another correction for compass error.

A line representing the true air speed, which in this case is 124.

11. Here's the solution: Take 313° + 12° + 7° = and this will give you a **heading of 332°**. If your calculations are correct and the wind remains constant, you will fly right down the black line from Graham to Seymour Airport.

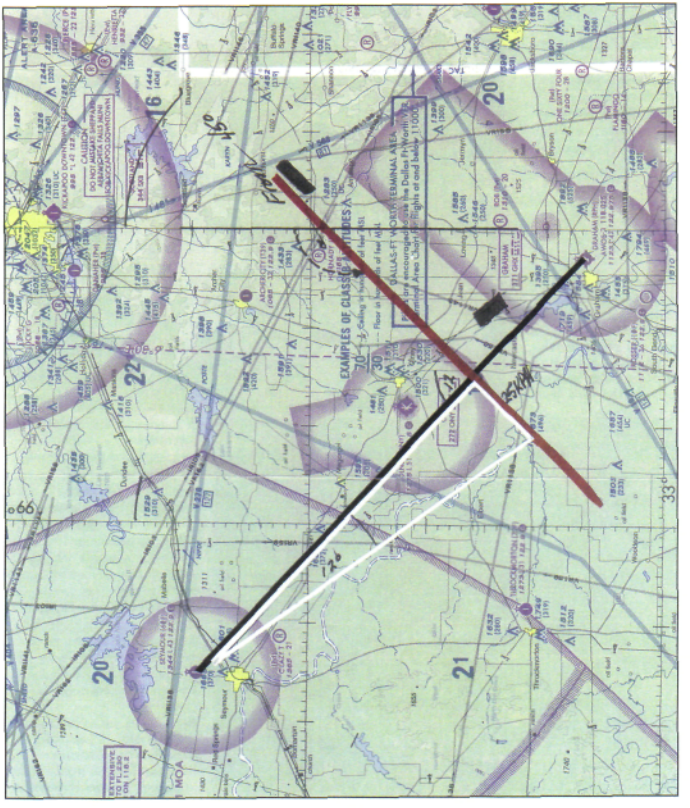


This is the dashed magenta line that shows how much the compass will be off in the area. In our case this means that a compass will be off six degrees and 30 minutes to the East of True North.



In summary, this is only a small part of the actual flight planning process. Take a look at the Sectional we used and you will note that we pass close to some military training areas as well as some low-level flight corridors. It is highly recommended that the senior members study the sectional way beyond the scope of this activity. This gives a small part of the fun you can have with a ruler, a plotter, and a compass to see how much wind affects flight and how much there is involved in the science of aeronautics.

Please note, the actual magnetic variation is 6° 30'; we elected to use seven only because Seymour, Texas is slightly closer to having 7° magnetic variation.


EXAMPLES OF CLASSIC
DALLAS-FT WORTH TERMINAL AREA
Dallas Area Chart
Denton
Sherman
Bonham
Greenville
Cooper
Paris
Commerce
Terrell
Kaufman
Ennis
Waxahachie
Cleburne
Granbury
Stephenville
Weatherford
Decatur
Bowie
Gainesville
Ponder
Denton
Lewisville
Grapevine
Mesquite
Dallas
Ft Worth
Arlington
Grand Prairie
Cedar Hill
Duncanville
Desoto
Lancaster
Hutchins
Red Oak
Ferris
Waxahachie
Midlothian
Venus
Alvarado
Burleson
Keller
Haslet
Roanoke
Justin
Northwest
Denton
Sanger
Pilot Point
Bonham
Ivanhoe
Gunter
Van Alstyne
Howe
Tom Bean
Leonard
Celina
Prosper
Frisco
Plano
Richardson
Garland
Rockwall
Forney
Terrell
Kaufman
Cedar Creek
Seagoville
Mesquite
Grand Prairie
Arlington
Ft Worth
Dallas