WHICH WAY TO STEER?

SOLVING THE WIND TRIANGLE

OBJECTIVE

Demonstrate an understanding of how to determine a wind correction angle by using the wind triangle method.

MATERIALS (Per Group)

- Paper
- Protractor
- Straightedge or ruler

INSTRUCTOR PREPARATION

The steps below are an abbreviated version of the steps listed in the lesson and apply to each of the three scenarios in this assessment. The triangles that these steps create are displayed after each scenario solution below, with the numbers on the diagrams corresponding to the parenthetical call outs in the steps below.

The provided numeric solutions were determined with a flight computer to ensure precision. It would not be uncommon for hand-drawn triangles to be as much as 5 knots off in measured groundspeed and 2 to 3 degrees off in angle measurements.

Solution steps:

1. Draw a vertical north/south line (1).
2. Mark the origin point (Point E) (2).
3. With a protractor based at Point E, mark the angles for the true course (3) and wind (4).
4. Draw a line extended through the true course mark and label it with the TC (5).
5. Choose a unit of measure for scale. A useful (but not required) scale for scenario 1 is 1 inch = 40 knots, and 1 inch = 30 knots for scenarios 2 and 3.
6. Place a straight edge from the wind mark to Point E. Draw the wind line beginning at Point E away from the wind mark (6). Make the length of the line 1 inch (appropriate for these solutions using the scale mentioned in step 5).
7. Since 1 inch = 40 knots (scenario 1) or 30 knots (scenarios 2 and 3), 4 inches will equal the planned airspeed. Place the origin of the ruler on the end of the wind vector and then rotate the ruler until the 4-inch mark intersects the TC line. Draw the line (7) and label it with the airspeed. Mark the intersection of the airspeed line and the TC line (8). This was Point P in the presentation slides depicting this process.
8. Measure the TC line from Point E to the intersection and convert to airspeed. A length of 3.125 inches in the first scenario would equate to 125 knots, based on the scale determined earlier. Note that this is 2 knots different than the computer solution, which is an acceptable tolerance.
9. Determine the true heading by placing the protractor on the north/south line and measuring the angle to the AS line (9).
10. If desired, determine the wind correction angle (WCA) by placing the protractor on the TC line with the vertex at the intersection. The angle between the TC and AS lines (10) is the WCA. If the wind is blowing from the left of the TC, the WCA is subtracted from the TC. If the wind is from the right of the TC, the WCA is added to the TC.
11. The true heading should then be corrected for the provided magnetic variation and deviation to obtain a compass heading.

TC +/– MV = MC

MC +/– DEV = CH

For (Magnetic)	N	30	60	E	120	150
Steer (Compass)	0	28	57	86	117	148
For (Magnetic	S	210	240	W	300	330
Steer (Compass)	180	212	243	274	303	332

Editorial credit: Pilot's Handbook of Aeronautical Knowledge

QUESTIONS

Given the equations above, the provided compass deviation card, and the following information, determine the compass heading necessary to fly the intended course to the planned destination and the resulting groundspeed. Fill in as many intermediate steps as necessary to show your work.

Scenario 1:

Planned true course: 080 degrees

Forecast winds aloft: 040 at 40 knots

Planned airspeed: 160 knots

Magnetic variation: 6 degrees East

Solution:

A. True heading: *071 degrees*

B. Wind correction angle: *9 degrees*

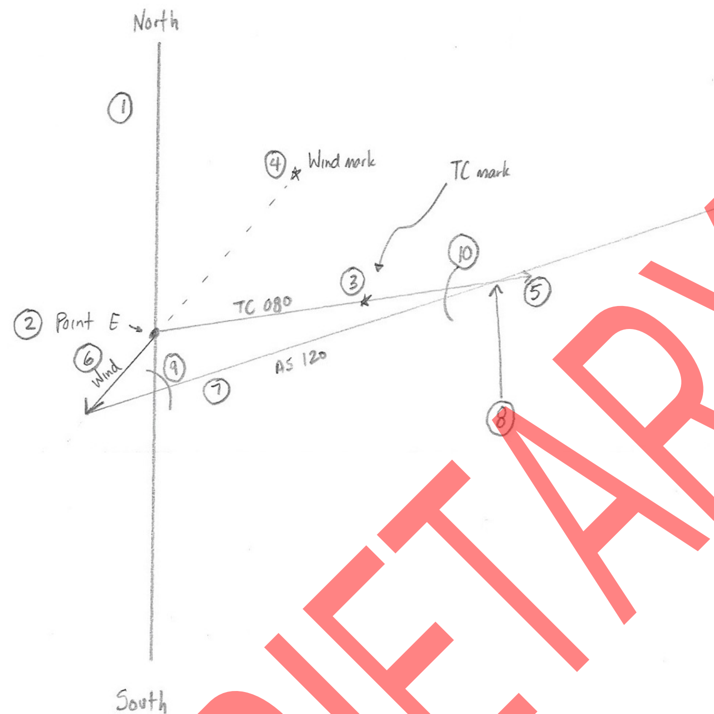
C. Magnetic course: *065 degrees*

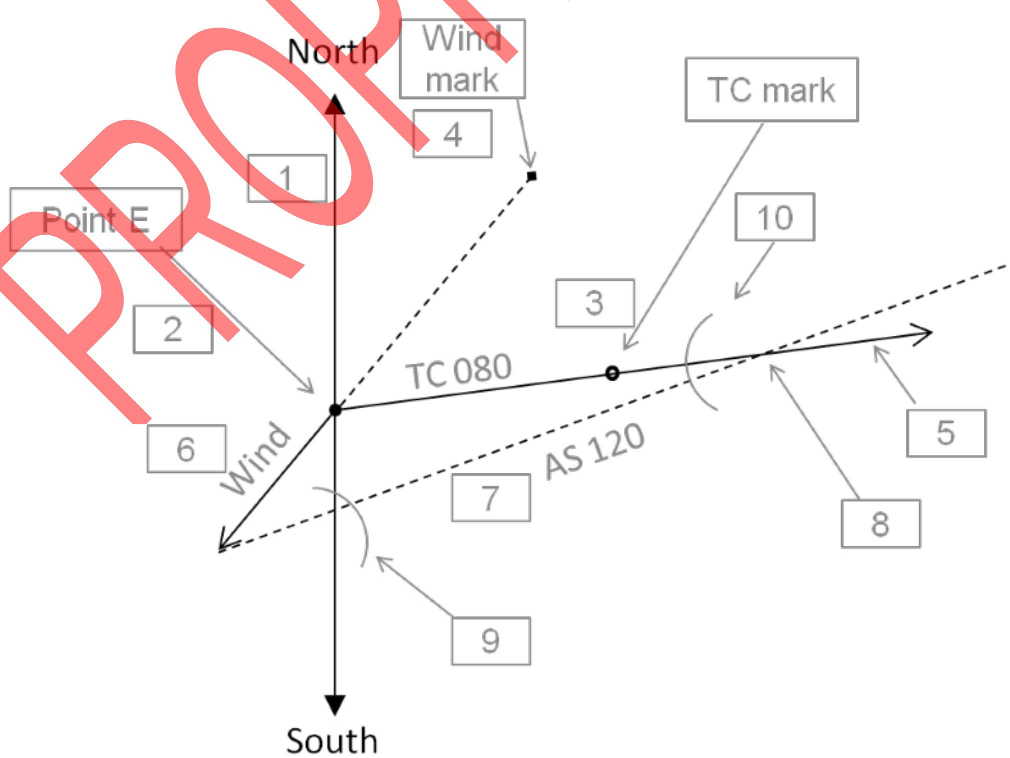
D. Compass deviation: *-3 degrees*

E. Compass heading: *062 degrees*

F. Groundspeed: *127 degrees*

Scenario 1 wind triangle:


North
1
4 Wind mark
TC mark
10
3
5
2 Point E
TC 080
6
Wind
9
7
AS 120
8
South


North
Wind mark
4
TC mark
1
Point E
10
2
3
TC 080
6
Wind
5
AS 120
7
8
9
South

Scenario 2:

Planned true course: 140 degrees

Forecast winds aloft: 090 at 30 knots

Planned airspeed: 120 knots

Magnetic variation: 10 degrees West

Solution:

A. True heading: *129 degrees*

B. Wind correction angle: *-11 degrees*

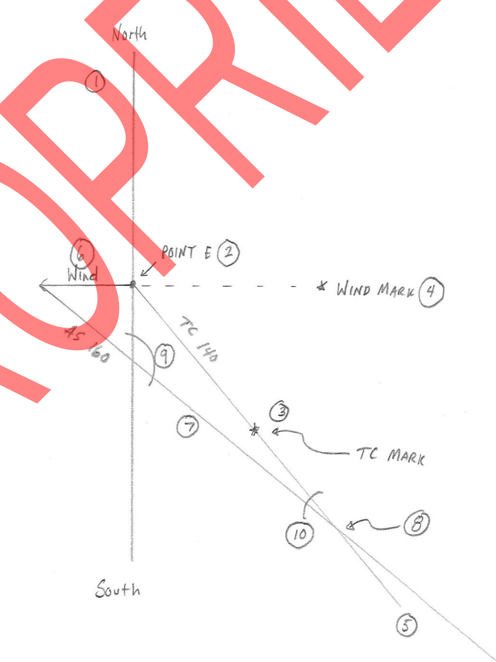
C. Magnetic course: *139 degrees*

D. Compass deviation: *-2 or -3 degrees*

E. Compass heading: *137 or 136 degrees*

F. Groundspeed: *98 knots*

Scenario 2 wind triangle:



Scenario 3:

Planned true course: 230 degrees

Forecast winds aloft: 090 at 30 knots

Planned airspeed: 120 knots

Magnetic variation: 5 degrees West

Solution:

A. True heading: *221 degrees*

B. Wind correction angle: *-9 degrees*

C. Magnetic course: *226 degrees*

D. Compass deviation: *+2 or +3 degrees*

E. Compass heading: *228 degrees or 229 degrees*

F. Groundspeed: *141 knots*

Scenario 3 wind triangle: