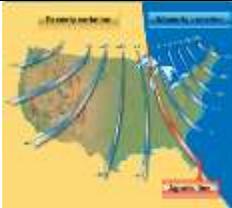


Chap 16 NAVIGATION

1.	Navigation is the process of ...	Piloting an aircraft from one geographic location to another while monitoring ones position and flight progress
2.	Navigation planning includes 7 steps	(i)Plotting a course on an aeronautical chart, (ii) selecting checkpoints, (iii) measuring distance, (iv) weather info, (v) computing flight time, (vi) computing headings, (vii) computing fuel requirements
3.	3 methods of navigation	(i) Pilotage, (ii) dead-reckoning, (iii) radio navigation
4.	3 types of charts for VFR	Section charts, World Aeronautical Charts (Skyvector.com) VFR Terminal Area charts (Airnav.com)
LATITUDES/LONGITUDES		
5.	Circles around Earth parallel to Equator	Latitude Parallels Degrees North Degrees South U.S. 25 degrees to 49 degrees North
6.	Lines from North pole to South pole	Meridians Longitude (U.S. 67 degree to 125 degrees West)
7.	The Prime Meridian	Passes through Greenwich, England Zero line East and West
TIME		
8.	Time Zones defined by Meridians
9.	Complete rotation of earth = 360 degrees and Day is 24 hours, how many degrees Longitude is an Hour	15 degrees
10.	Width of 1 hour Time Zone ...	15 degrees
11.	Flying east, how many hours are lost per time zone	1 hour
12.	What is the problem flying east	Sunset is earlier
13.	Aviation uses a 24 hour clock. Express 9am, 1pm and 10pm in 24 hour time	09:00, 13:00, 22:00
14.	Standard Time System adopted world-wide is	Universal Time Coordinate UTC
15.	UTC is the time at which location	Greenwich, England
DIRECTION		
16.	Direction from origin to destination on a chart is the ...	Course (degrees)
17.	Course I measured clockwise from ...	True North
18.	Because Meridians merge at poles,	Midpoint

	it is good practice to measure course at which point on the route ...	
19.	A measurement of direction from True North is known as ...	True Course
20.	True Heading ...	The direction of the nose of the aircraft
21.	True Heading is measured by ...	Direction from True North
22.	When is True Heading different from True Course ?	In presence of cross wind
23.	(Magnetic) variation is ...	Difference between True North and Magnetic North
24.	Magnetic North is located at ...	71 degrees N and 96 degrees W (about 1300 miles from the geographic True North)
25.	Variation is not constant everywhere because ...	Earth is not uniformly magnetized
26.	Magnetic variation is _____ on the West Coast and _____ on the East Coast	
27.	Magnetic Deviation is	Effect of aircraft systems on compass on board the aircraft (electrical, engines, tools, , ...)
28.	If magnetic variation for an aircraft is 9 degrees east. If a True Course of 360 degrees (i.e. North) is to be flown, ...	9 degrees must be subtracted from 360 degrees leaving a Magnetic Heading of 351 degrees
WIND		
29.	Wind is ...	Mass of air moving over the surface of the Earth in a specific direction
30.	Aircraft position is affected by (2)	(i) Movement of air mass referenced to the ground, (ii) movement of aircraft through the air mass
31.	Ground speed ...	Speed relative to the ground
32.	Airspeed ...	Speed relative to the air
33.	Aircraft with 120 knots airspeed and no wind will have groundspeed of ...	120 knots
34.	Aircraft with 120 knots airspeed and 20 knots headwind wind will have groundspeed of ...	100 knots
35.	Aircraft with 120 knots airspeed and 20 knots tailwind wind will have groundspeed of ...	140 knots
36.	The actual path over throe ground flown by aircraft is called ...	Track
37.	The angle between the Heading and the Track is called ...	Drift Angle

38.		TH +/- Variation = Magnetic Heading +/- Deviation = Compass Heading
39.	The pilot uses the drift angle to ...	Counteract the effect of the wind make the aircraft track the desired course
40.	If the wind is blowing from the left of the track, without a drift angle correction, the aircraft will track ...	To the right of the desired course
41.	If the wind is blowing from the left of the track, for the aircraft to track the desired course...	A drift angle to the left must be applied
TIME, DISTANCE AND SPEEDS		
42.	To convert minutes to equivalent hours ..	Divide by 60 minutes (e.g. 30 minutes = 0.5 hours)
43.	Time = Distance/GroundSpeed. What is the time to fly 210 nm at 140 knots ground speed	210/140 = 1.5 hours
44.	Distance = GS * Time. What is distance flown at 120 knots GS from 1 hour and 45 minutes	120 * 1.75 = 210 nm
45.	GS = D/T. What is GS is aircraft flies 270 nm in 3 hours	270/3 = 90 knots
46.	Knots to mph	Multiply knots by 1.15 to get mph
FUEL CONSUMPTION		
47.	Fuel consumption is measures in ...	Lbs per hour
48.	Jet fuel varies with temperature so it is measured by volume ...	1000 lbs
49.	Specific Range of Aircraft is measured by ...	nm per 1000 lbs fuel
50.	Specific Range of Aircraft is computed by ...	(TAS + Winds)/ 1000 lbs fuel per hour
51.	Fuel Required for a Trip =	Estimated Flight Time * Fuel Consumption
52.	How much fuel is required for a 400 nm trip at 100 knots Ground speed for an aircraft that consumes 5 gallons of fuel per hour	<ul style="list-style-type: none"> • 400 nm/100 knots = 4 hours • 4 hours * 5 gallons per hour = 20 gallons
53.	Should one use Ground Speed or True Airspeed for calculating fuel required? Why?	GS because this determines time aloft (or ETE).
PILOTAGE, DEAD RECKONING		
54.	Pilotage is navigation by	landmarks
55.	Checkpoints in a flightplan should be ...	Visible landmarks
56.	Dead reckoning is navigation by ...	Computations based on time, airspeed, distance and direction
57.	Outputs of Dead-reckoning navigation are ...	Heading (intended path) and Ground Speed (i.e. time at each waypoint)

58. If there is no wind, ground track is the same as ..	Heading
59. If there is no wind, groundspeed is the same as ...	True airspeed
60. Steps to Flightplan	<ul style="list-style-type: none"> (1) TC connecting two waypoints (2) Wind Correction Angle (for cross wind) (3) True Heading (measured from True North) (4) Variation (from Aero Chart) (5) Magnetic Heading (6) Deviation (from deviation card on aircraft) (7) Compass Heading (8) Total Distance (sum lengths of TC line) (9) Groundspeed (10) Estimated Time Enroute = Distance / Groundspeed (11) Fuel Burn = ETE * Fuel Burn Rate