

AVIATION RULES OF THUMB

1) Altimeter correction for non-standard pressure



'From high to low, look below'
1 mb = 30 feet

FL 270 QNH 977
ISA - 36 mb → 36 x 30 = 1080 feet
Altitude = 25920 feet

2) Altimeter correction for non-standard temperature



'From high to low, look below'
Corr (feet) = 4 x Δ ISA x $\frac{\text{altitude (feet)}}{1000}$

FL 300 ISA - 6°C
Corr = 4 x 6 x 30 = 680 feet
Alt = 29320 feet

3) SAT out of TAT



SAT (°C) = TAT (°C) - 3 x Mach

TAT = -17 °C Mach 0.64
SAT = -17 - 3 x 6 = -17 - 18 = -35 °C

4) SAT out of TAT for higher Mach and lower Temp



SAT (°C) = TAT (°C) - (100 x Mach) - 50

TAT = -31 °C Mach 0.74
You have 24 above M 0.50
SAT = -31 - 24 = -55 °C

5) Level Off procedure if R/C ≤ 1000 feet/min (also for descent R/D)



Δ feet = $\frac{\text{R/C (feet/min)}}{10}$

Climbing to FL 210 R/C = 2000 feet/min
Δ feet = 200 feet → start level off at 20800 feet

6) Level Off procedure if R/C > 1000 feet/min (also for descent R/D)



Δ feet = 2 x $\frac{\text{R/C (feet/min)}}{10}$

Climbing to FL 300 R/C = 2500 feet/min
Δ feet = 500 feet → start level off at 29500 feet

7) Cruise Flight Level computation



Cruise FL = Trip Distance (NM)

EBBR-EBOS = 60 NM
Optimum is FL 60

8) Vertical Speed to rejoin assigned altitude



V/S (feet/min) = 2 x Δ feet

If on 6250 feet instead of 6000 feet, correct with V/S = 500 feet/min

9) To obtain TAS out of Mach-number (high altitudes - cruise)



TAS (kt) = 6 x Mach

M 0.72
TAS = 420 kt

10) To find TAS out of IAS and FL



TAS (kt) = IAS (kt) + $\frac{\text{FL}}{2}$

FL 300 IAS = 240 kt
TAS = 240 + 150 = 390 kt

11) Ground Speed out of Mach



GS (NM/min) = 10 x Mach

M 0.72
GS = 7,2 NM/min

12) Drift computation in cruise



$$\text{Drift (}^\circ\text{)} = \frac{\text{X-wind (kt)}}{\text{Mach}}$$

M 0.7 X-wind 35 kt
Drift = $35 / 7 = 5^\circ$

13) Drift computation out of TAS (not IAS, unless during approach)



$$\text{Drift (}^\circ\text{)} = \frac{\text{X-wind (kt)}}{\text{speed number}}$$

TAS 180 kt X-wind 36 kt
Drift = $36 / 3 = 12^\circ$

14) To find Ground Speed with DME station available



$$\text{GS (kt)} = 10 \times \text{distance (NM) in 36s}$$

Read distance covered in 36 seconds towards or away from station

15) Off-Track distance



$$\text{Off-Track Distance} = \frac{\Delta^\circ \times \text{distance to station}}{60}$$

9° off track 11 NM from station
Off-Track Distance = $9 \times 11 / 60 = 99 / 60 = 1.6$ NM

16) Slant distance overhead a DME – station



$$\text{each 6000 feet altitude} \rightarrow 1 \text{ NM DME}$$

Overhead station FL 330
you will read $33000 / 6000 = 5.5$ NM on DME

17) Intercepting outbound leg when close to the VOR-DME station (valid for Mach 0.7)



$$1 \text{ NM for each } \Delta 30^\circ$$

FL 330 Inbound on R-180 (Hdg N) to track 060 outbound
Start your turn to 060 at 2 NM before (+ slant 5.5NM)

18) Intercept Heading when passing over station before turning to outbound Heading



$$\text{Attack (}^\circ\text{)} = 1/3 \times \Delta \text{Track (}^\circ\text{)}$$

Inbound on 180 (Hdg N) to track 060 outbound
Take Heading 080 overhead Station to intercept Radial

19) Intercept Heading when a little bit off-track



$$\text{Attack (}^\circ\text{)} = 3 \times \text{Off-Track angle (}^\circ\text{)}$$

On R-310 outbound instead of R-315
Take attack 15° to rejoin

20) Top of Descent (Idle thrust - 3° descent path)



$$\text{TOD (NM)} = \frac{\Delta \text{FL}}{3}$$

FL 280 down to 2000 feet
TOD = $260 / 3 = 87$ NM

21) R/D required to be down at certain point



$$\text{R/D (feet/min)} = \frac{\text{speed number} \times \text{altitude (feet)}}{\text{distance (NM)}}$$

Descent 17000 feet in the next 28 NM TAS 240 kt
R/D = $4 \times 17000 / 28 = 2400$ feet/min

22) Vertical speed by changing Body Attitude (valid for high speeds)



$$\text{R/D (feet/min)} = \text{Mach} \times \Delta \text{BA (}^\circ\text{)}$$

Mach 0.74 \rightarrow One degree BA results in 740 feet/min

23) Vertical speed by changing Body Attitude (valid for lower speeds)

Use TAS or IAS in approach



$$\text{R/D (feet/min)} = \text{speed number} \times \Delta \text{BA (}^\circ\text{)}$$

Speed TAS 420 kt BA 3 degrees down
R/D = $7 \times 3 = 2100$ feet/min

24) Distance required if you want to maintain a certain R/D profile



$$\text{Distance (NM)} = \frac{\text{speed number} \times \text{altitude (feet)}}{\text{R/D}}$$

Descent 23000 feet at 1000 feet/min TAS 300 kt
Distance = 5 x 23 = 115 NM

25) Wind correction for descent distance



$$\text{Wind Corr (NM)} = 10\% \text{ for each } 40 \text{ kt component}$$

Example Thumbrule 20) with 20 kts Tailwind
Add 58 to 87 = 92 NM

26) R/D required to follow a certain glide %



$$\text{R/D (feet/min)} = \text{Ground Speed (kt)} \times \%$$

TAS 350 kts 20 kts tailwind Glide 3° = 5%
R/D = 370 x 5 = 1850 feet/min

27) Conversion % versus degrees for glide path



$$\% = \frac{10 \times \text{degrees}}{6}$$

ILS 3° Glide Slope → 30 / 6 = 5%

28) Start the roll-out from a turn when



$$\Delta \text{Heading (°) to go} = \frac{\text{Bank (°)}}{3}$$

Bank 25° Right turn to Hdg 080
Start roll-out 8° in advance, thus on Hdg 072

29) Amount of Bank required for a turn



$$\text{Bank (°)} = \Delta \text{Heading (°)}$$

Heading North Right to Heading 007
Take 7° Bank

30) Bank required for a rate one turn



$$\text{Bank (°)} = 15\% \text{ TAS (kt)}$$

TAS 180 kt Rate one turn
Bank = 18 + 9 = 27°

31) Turn diameter of a rate one turn



$$\text{Diameter (NM)} = \frac{\text{TAS (kt)}}{100}$$

TAS 150 kt
Turn Φ = 1,5 NM

32) Outbound timing for a base turn, when not mentioned on the chart



$$\text{Time (min)} = \frac{36}{\Delta \text{Track}}$$

ILS Rwy 27 (QFU 270) Teardrop 066 outbound
Time = 36 / (090-066) = 1,5 min

33) R/D to follow the glide slope ILS 3° = 5%



$$\text{R/D (feet/min)} = 5 \times \text{Ground Speed (kt)}$$

On Glide Slope TAS 140 kt 10 kt Tailwind
R/D = 750 feet/min

34) Visibility required to see threshold at VDP (Non-Precision Approach)



$$\text{Vis (m)} = 6 \times \text{MDA (feet)}$$

MDA 430 feet
Visibility = 6 x 430 feet = 2500 m

35) Memorize this table 1/60

speed (kt)	120	150	180	210	240	270	300	330
speed number	2	2½	3	3½	4	4½	5	5½