

## Aviation Formulas

### Celsius to Fahrenheit

$$((9 * ^\circ\text{C}) / 5) + 32 = ^\circ\text{F}$$

$$(9/5 * ^\circ\text{C}) + 32 = ^\circ\text{F}$$

### Lapse Rates

Standard air is  $-2^\circ\text{C} / -3.5^\circ\text{F}$  per 1000' increase in altitude

Dry air is  $-3^\circ\text{C} / -5.4^\circ\text{F}$  per 1000' increase in altitude

### (Convective) Cloud Bases

$$\text{AGL} = (\text{Temp in C} - \text{Dew Point } ^\circ\text{C}) / 2.5 * 1000$$

$$\text{AGL} = (\text{Temp in C} - \text{Dew Point } ^\circ\text{C}) * 400$$

$$\text{AGL} = (\text{Temp in F} - \text{Dew Point } ^\circ\text{F}) / 4.4 * 1000$$

### CG

$$\text{New CG} = (\text{original total moments} \pm \text{change}) / (\text{original total weight} \pm \text{change})$$

### Fuel Needed

$$\text{Gallons needed} = (\text{Distance in NM} / \text{Speed in kts}) * \text{gal per hour}$$

### Off Course

$$\text{Degrees off course} = (60 * (\text{miles off} / \text{miles flown})) + (60 * (\text{miles off} / \text{miles remaining}))$$

### VOR Navigation

Time to Station = 60 x minutes between bearing changes  $\div$  degree of bearing change

Distance to station = GS x minutes between bearing changes  $\div$  degree of bearing change

Degrees to parallel = 60 x miles off course  $\div$  miles flown

### Crosswind Component

$$\text{crosswind component} = \text{wind speed} * \sin(\text{wind angle})$$

$$\text{wind angle} = \text{TC} - \text{wind direction}$$

### Miles Per Minute

$$\text{miles per min} = \text{TAS} / 60$$

### Wind Correction Angle (WCA)

$$\text{WCA} = \text{crosswind component} / \text{miles per min}$$

If wind direction is to the left of course then  $\text{TH} = \text{TC} - \text{WCA}$

If wind direction is to the right of course then  $\text{TH} = \text{TC} + \text{WCA}$

### Magnetic Variation

$$\text{\#E then MH} = \text{TH} - \text{MV}$$

$$\text{\#W then MH} = \text{TH} + \text{MV}$$

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sin()

$$\sin(90^\circ) = 1.0$$

$$\sin(80^\circ) = .98$$

$$\sin(70^\circ) = .94$$

$$\sin(60^\circ) = .87$$

$$\sin(50^\circ) = .77$$

$$\sin(40^\circ) = .64$$

$$\sin(30^\circ) = .5$$

$$\sin(20^\circ) = .34$$

$$\sin(10^\circ) = .17$$

$$\sin(0^\circ) = 0.0$$