Important Pull Up and Pull Down Maneuver Formulas PDF

Formulas
Examples
with Units

List of 12
Important Pull Up and Pull Down Maneuver Formulas

1) Load Factor given Pull-Down Maneuver Radius Formula

Evaluate Formula

Formula

$$n = \left(\frac{V_{pull\text{-}down}^{2}}{R \cdot [g]} \right) - 1$$

Example with Units

$$1.2 = \left(\frac{797.71\,m/s^{2}}{29495.25\,m \cdot 9.8066\,m/s^{2}} \right) - 1$$

2) Load Factor given Pull-Down Maneuver Rate Formula

Evaluate Formula

Formula

$$n = \left(\frac{V_{pull\text{-}down} \cdot \omega_{pull\text{-}down}}{[g]} \right) - 1$$

Example with Units

$$1.2 = \left(\frac{797.71\,m/s \cdot 1.5496\,degree/s}{9.8066\,m/s^{2}} \right) - 1$$

3) Load Factor given Pull-UP Maneuver Radius Formula

Evaluate Formula

Formula

$$n = 1 + \left(\frac{V_{pull\text{-}up}^{2}}{R \cdot [g]} \right)$$

Example with Units

$$1.2 = 1 + \left(\frac{240.52\,m/s^{2}}{29495.25\,m \cdot 9.8066\,m/s^{2}} \right)$$

4) Load Factor given Pull-Up Maneuver Rate Formula

Evaluate Formula

Formula

$$n_{pull\text{-}up} = 1 + \left(V_{pull\text{-}up} \cdot \frac{\omega}{[g]} \right)$$

Example with Units

$$1.4897 = 1 + \left(240.52\,m/s \cdot \frac{1.144\,degree/s}{9.8066\,m/s^{2}} \right)$$

5) Pull-down maneuver radius Formula

Evaluate Formula

Formula

$$R = \frac{V_{pull\text{-}down}^{2}}{[g] \cdot (n + 1)}$$

Example with Units

$$29494.8856\,m = \frac{797.71\,m/s^{2}}{9.8066\,m/s^{2} \cdot (1.2 + 1)}$$

6) Pull-Down Maneuver Rate Formula

Evaluate Formula

Formula

$$\omega_{\text{pull-down}} = [g] \cdot \frac{1 + n}{V_{\text{pull-down}}}$$

Example with Units

$$1.5496\,\text{degree/s} = 9.8066\,\text{m/s}^2 \cdot \frac{1 + 1.2}{797.71\,\text{m/s}}$$

7) Pull-up maneuver radius Formula

Evaluate Formula

Formula

$$R = \frac{V_{\text{pull-up}}^2}{[g] \cdot (n - 1)}$$

Example with Units

$$29495.2254\,\text{m} = \frac{240.52\,\text{m/s}^2}{9.8066\,\text{m/s}^2 \cdot (1.2 - 1)}$$

8) Pull-Up Maneuver Rate Formula

Evaluate Formula

Formula

$$\omega = [g] \cdot \frac{n_{\text{pull-up}} - 1}{V_{\text{pull-up}}}$$

Example with Units

$$1.1424\,\text{degree/s} = 9.8066\,\text{m/s}^2 \cdot \frac{1.489 - 1}{240.52\,\text{m/s}}$$

9) Velocity for given Pull-Down Maneuver Rate Formula

Evaluate Formula

Formula

$$V_{\text{pull-down}} = [g] \cdot \frac{1 + n}{\omega_{\text{pull-down}}}$$

Example with Units

$$797.7125\,\text{m/s} = 9.8066\,\text{m/s}^2 \cdot \frac{1 + 1.2}{1.5496\,\text{degree/s}}$$

10) Velocity for given Pull-Up Maneuver Radius Formula

Evaluate Formula

Formula

$$V_{\text{pull-up}} = \sqrt{R \cdot [g] \cdot (n - 1)}$$

Example with Units

$$240.5201\,\text{m/s} = \sqrt{29495.25\,\text{m} \cdot 9.8066\,\text{m/s}^2 \cdot (1.2 - 1)}$$

11) Velocity for given Turn Rate for High Load Factor Formula

Evaluate Formula

Formula

$$v = [g] \cdot \frac{n}{\omega}$$

Example with Units

$$589.3843\,\text{m/s} = 9.8066\,\text{m/s}^2 \cdot \frac{1.2}{1.144\,\text{degree/s}}$$

12) Velocity given Pull-down Maneuver Radius Formula

Evaluate Formula

Formula

$$V_{\text{pull-down}} = \sqrt{R \cdot [g] \cdot (n + 1)}$$

Example with Units

$$797.7149\,\text{m/s} = \sqrt{29495.25\,\text{m} \cdot 9.8066\,\text{m/s}^2 \cdot (1.2 + 1)}$$

Variables used in list of Pull Up and Pull Down Maneuver Formulas above

- **n** Load Factor
- $n_{pull-up}$ Pull-Up Load Factor
- **R** Turn Radius *(Meter)*
- **v** Velocity *(Meter per Second)*
- $V_{pull-down}$ Pull-Down Maneuver Velocity *(Meter per Second)*
- $V_{pull-up}$ Pull-Up Maneuver Velocity *(Meter per Second)*
- **ω** Turn Rate *(Degree per Second)*
- $\omega_{pull-down}$ Pull-Down Turn Rate *(Degree per Second)*

Constants, Functions, Measurements used in list of Pull Up and Pull Down Maneuver Formulas above

- constant(s): **[g]**, 9.80665
  Gravitational acceleration on Earth
- Functions: **sqrt**, sqrt(Number)
  A square root function is a function that takes a non-negative number as an input and returns the square root of the given input number.
- Measurement: **Length** in Meter (m)
  Length Unit Conversion
- Measurement: **Speed** in Meter per Second (m/s)
  Speed Unit Conversion
- Measurement: **Angular Velocity** in Degree per Second (degree/s)
  Angular Velocity Unit Conversion

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