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Pull Up and Pull Down Maneuver Formulas

Calculators! Examples! Conversions!

List of 12 Pull Up and Pull Down Maneuver Formulas

Pull Up and Pull Down Maneuver

1) Load Factor given Pull-Down Maneuver Radius

Open Calculator

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

$$1.199973 = \left(\frac{(797.71\text{m/s})^2}{29495.25\text{m} \cdot [g]} \right) - 1$$

2) Load Factor given Pull-Down Maneuver Rate

Open Calculator

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

$$1.199993 = \left(\frac{797.71\text{m/s} \cdot 1.5496\text{degree/s}}{[g]} \right) - 1$$

3) Load Factor given Pull-UP Maneuver Radius

Open Calculator

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

ex $$1.2 = 1 + \left(\frac{(240.52\text{m/s})^2}{29495.25\text{m} \cdot [g]} \right)$$

4) Load Factor given Pull-Up Maneuver Rate

Open Calculator

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

ex $$1.489704 = 1 + \left(240.52\text{m/s} \cdot \frac{1.144\text{degree/s}}{[g]} \right)$$

5) Pull-down maneuver radius

Open Calculator

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

ex $$29494.89\text{m} = \frac{(797.71\text{m/s})^2}{[g] \cdot (1.2+1)}$$

6) Pull-Down Maneuver Rate

Open Calculator

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

ex
$$1.549605\text{degree/s} = [g] \cdot \frac{1 + 1.2}{797.71\text{m/s}}$$

7) Pull-up maneuver radius

Open Calculator

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

ex
$$29495.23\text{m} = \frac{(240.52\text{m/s})^2}{[g] \cdot (1.2 - 1)}$$

8) Pull-Up Maneuver Rate

Open Calculator

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

ex
$$1.142355\text{degree/s} = [g] \cdot \frac{1.489 - 1}{240.52\text{m/s}}$$

9) Velocity for given Pull-Down Maneuver Rate

Open Calculator

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

ex $$797.7125 \text{m/s} = [g] \cdot \frac{1+1.2}{1.5496 \text{degree/s}}$$

10) Velocity for given Pull-Up Maneuver Radius

Open Calculator

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

ex $$240.5201 \text{m/s} = \sqrt{29495.25 \text{m} \cdot [g] \cdot (1.2-1)}$$

11) Velocity for given Turn Rate for High Load Factor

Open Calculator

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

ex $$589.3843 \text{m/s} = [g] \cdot \frac{1.2}{1.144 \text{degree/s}}$$

12) Velocity given Pull-down Maneuver Radius

Open Calculator

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

ex $$797.7149 \text{m/s} = \sqrt{29495.25 \text{m} \cdot [g] \cdot (1.2+1)}$$

Variables Used

- **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

- Constant: **[g]**, 9.80665
  Gravitational acceleration on Earth
- Function: **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

Check other formula lists

- **High Load Factor Maneuver Formulas**
- **Pull Up and Pull Down Maneuver Formulas**

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