# Trailer Tongue Weight and Tow Vehicle Axle Loads

Trailer tongue (hitch) weight from the loaded CG and axle position, its share of trailer weight, and the load change on the tow vehicle's axles.

**Method:** Static moments of a towed trailer

## Input parameters

Unit system: SI

| Parameter | Value | Unit |
|---|---|---|
| Loaded trailer weight | 15.000 | kN |
| Hitch to trailer axle(s) centre | 3.5000 | m |
| Hitch to trailer CG | 3.0000 | m |
| Tow vehicle wheelbase | 2.9000 | m |
| Rear axle to hitch ball | 1.1000 | m |

## Calculated results

| Parameter | Value | Unit |
|---|---|---|
| Tongue weight | 2.1429 | kN |
| Tongue weight share | 14.286 | % |
| Added rear axle load of tow vehicle | 2.9557 | kN |
| Change in front axle load (negative: unloaded) | -0.81281 | kN |

### Notes for this case

• Moments about the trailer axle: W_tw = W_t(L_t − x_g)/L_t. Tongue weight of about 10–15 % keeps a conventional trailer stable; below that it can sway. On the tow vehicle it loads the rear axle by W_tw(L_v + o)/L_v and unloads the front by W_tw·o/L_v, reducing steering grip; weight-distributing hitches shift some back to the front.

## Formula and method

$$W_{tw} = W_t \frac{L_t - x_g}{L_t}, \quad \Delta W_r = W_{tw} \frac{L_v + o}{L_v}, \quad \Delta W_f = -W_{tw} \frac{o}{L_v}$$

### Variables

| | | |
|---|---|---|
| $W_t$ | Loaded trailer weight | N |
| $L_t$ | Hitch to trailer axle(s) centre | m |
| $x_g$ | Hitch to trailer CG | m |
| $L_v$ | Tow vehicle wheelbase | m |
| $o$ | Rear axle to hitch ball | m |
| $W_{tw}$ | Tongue weight | N |
| $W_{tw}/W_t$ | Tongue weight share | - |
| $\Delta W_r$ | Added rear axle load of tow vehicle | N |
| $\Delta W_f$ | Change in front axle load (negative: unloaded) | N |

### Method and standards

Tongue weight.

### Assumptions and limits

- Level, static; single-axle (or equivalent) trailer.

### References

Static moments of a towed trailer

## Report details

| | |
|---|---|
| Report reference | FCC-NP9A-GJRC (the same inputs always give the same reference) |
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| Software release | FireCAD Calc, release of 22 November 2026 |
| Release checks | 3 reference cases of this calculator, computed independently, are checked on every release |

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

### This calculator online

https://calc.firecad.com/automotive/vehicle-dynamics/trailer-tongue-weight

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.