Two-Axle Truck Axle Loads and Maximum Payload

Front and rear axle loads of a two-axle truck from its tare axle loads and a payload's position, and the largest payload allowed by the axle and gross limits.

Method: Static axle load distribution

Input parameters

Unit system: SI

Parameter	Value	Unit
Tare front axle load	32.000	kN
Tare rear axle load	23.000	kN
Payload weight	70.000	kN
Payload centre behind the front axle	3.4000	m
Wheelbase	4.5000	m
Front axle limit	65.000	kN
Rear axle limit	100.00	kN
Gross weight limit	160.00	kN

Calculated results

Parameter	Value	Unit
Front axle load	49.111	kN
Rear axle load	75.889	kN
Gross weight	125.00	kN
Largest payload at this position	101.91	kN
Front axle share	39.289	%

Notes for this case

• Moments about the axles split the payload: the front axle takes P(L − x)/L and the rear Px/L. The maximum payload is the smallest of the gross limit minus tare and each axle's spare capacity divided by its share. Loads placed too far back overload the rear axle and lighten the steering axle (keep the front share above about 20–25 %); bodybuilders use this to position bodies and fifth wheels. Use the legal limits that apply to the vehicle.

Formula and method

$$W_f = W_{f0} + P\frac{L - x}{L}, \quad W_r = W_{r0} + P\frac{x}{L}$$

Variables

W_{f0}	Tare front axle load	N
W_{r0}	Tare rear axle load	N
P	Payload weight	N
x	Payload centre behind the front axle	m
L	Wheelbase	m
$W_{f,max}$	Front axle limit	N
$W_{r,max}$	Rear axle limit	N
W_{max}	Gross weight limit	N
W_f	Front axle load	N
W_r	Rear axle load	N

W	Gross weight	N
P_{max}	Largest payload at this position	N
W_f/W	Front axle share	-

Method and standards

Axle loads.

Assumptions and limits

- Rigid two-axle vehicle; static loads.

References

Static axle load distribution

Report details

Report reference	FCC-KE70-47WE (the same inputs always give the same reference)
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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/truck-axle-load-payload

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.