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TOW BALL MASS *leverage*



IS YOUR FRONT AXLE FREELOADING? HERE'S HOW TOW BALL MASS AFFECTS YOUR REAR AXLE WEIGHT IN TWO WAYS
WORDS MICHAEL BORG, CAMPER TRAILER LIFESTYLE EDITOR



Surpassing the tow vehicle's rear axle maximum weight rating is a common

compliance issue as the trailer's towball weight must be added to the vehicle's rear axle. Now, this Gross

Axle Weight Rating (GAWR) is much easier to exceed than you would think, because not all is as it seems.

Hidden Kilos

I'll give you an example. I recently weighed a brand new 300 Series LandCruiser and caravan.

I measured the vehicle's rear axle at 1233kg unhitched from the van, then weighed the caravan's Tow Ball Mass at 270kg. Now, a logical person would say if you added 270kg (TBM) to the rear axle weight of 1233kg, you'll have 1503kg, right? Well, when we weighed the rear axle while the caravan was hitched up, we got a figure of 1650kg, which is an extra 147kg.



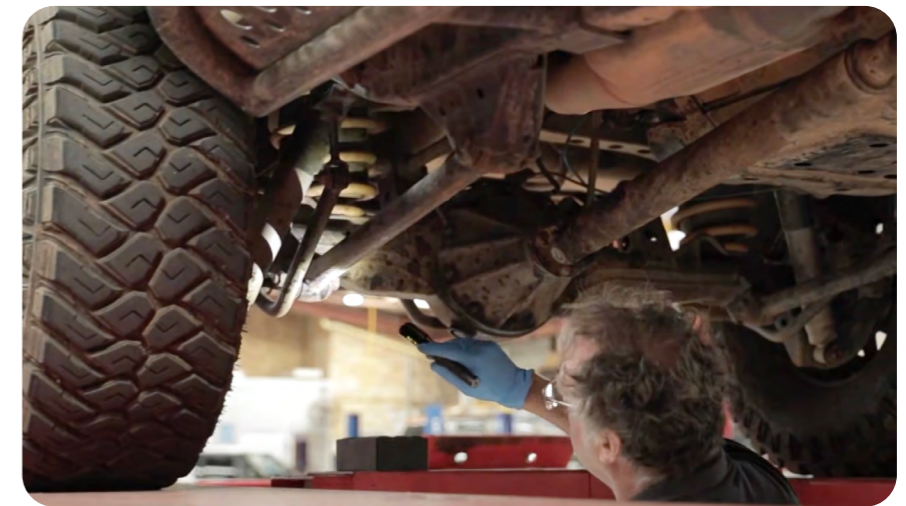
Where did this extra weight come from? Well, that would be the effect of leverage, effectively transferring weight from the front axle to the rear.

The Leverage

When you hitch your caravan to your tow vehicle, you're exerting a force onto your tow vehicle's rear suspended extremity that affects how your axles share the vehicle's weight.

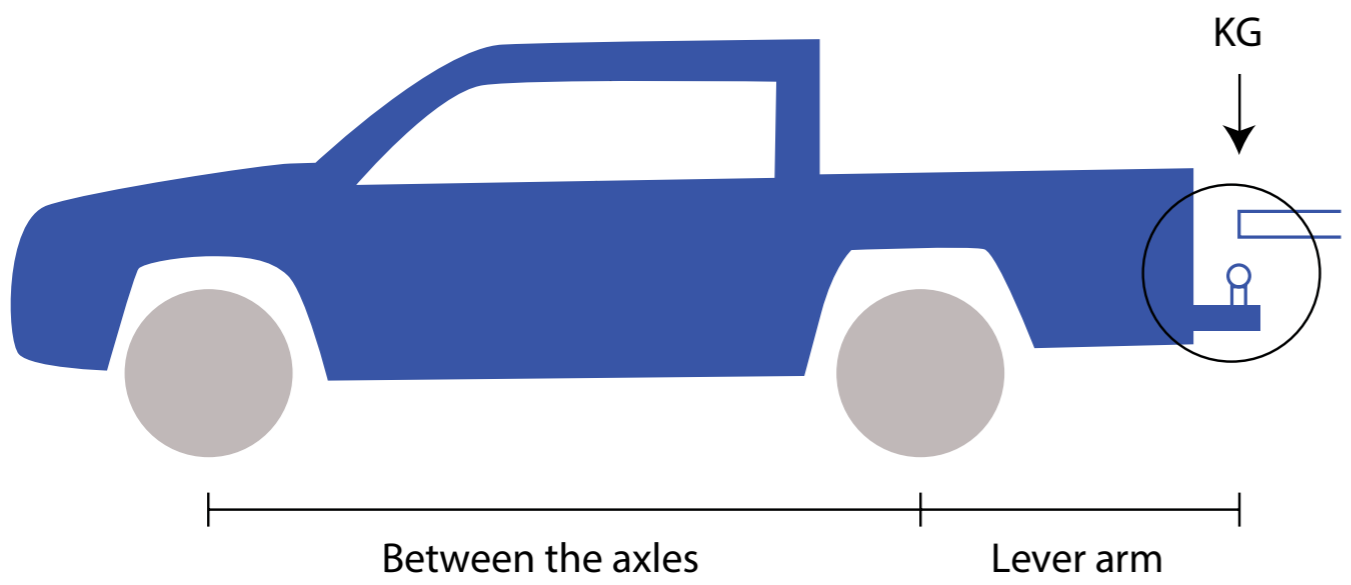
The amount of weight transferred to the vehicle's rear axle when it's hitched up is primarily influenced by three factors.

Number one, the actual Tow Ball Weight of the caravan. Number two, the horizontal



distance from the tow ball to the vehicle's rear axle, known as the 'Lever Arm' (LA).

And three, the distance between your vehicle's front and rear axles.



Estimating the Impact

A handy 'rule of thumb' typically used to estimate the extra weight applied to the rear axle goes like this:
 Tow Ball Weight x Lever Arm ÷ the distance between the vehicle's front and rear axles.

the front and rear axle, you've effectively transferred 125kg to the rear axle on top of the original 250kg of Tow Ball Mass. So, your rear axle is now potentially carrying an extra 375kg.

These figures look like they're within the legal weight range of a late model LandCruiser 300 but you can see how quickly that can change. And if you fit a fridge, drawers and a full tank of fuel you can easily pass the GAWR.

So, if you've got 250kg of Tow Ball Mass, a distance of two metres between the tow bar and rear axle on your car (overhang), and 4m between

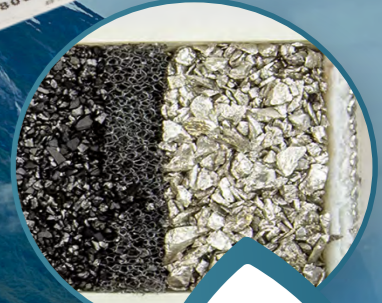
See here: $250\text{kg} \times 2\text{m} \div 4\text{m} = 125\text{kg}$...then we add the TBM: $250\text{kg} + 125\text{kg} = 375\text{kg}$.



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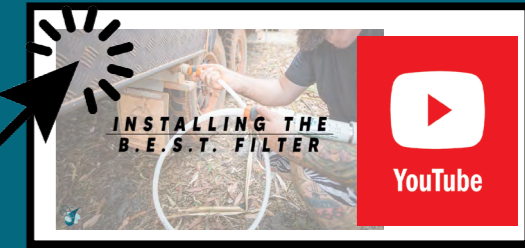
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Parting Words

So there you have it. Tow Ball Mass and the dimensions of your tow vehicle can both impact rear axle weight.

Understanding the leverage effect and how weight is transferred when you hitch up your caravan is fundamental for safe and enjoyable towing.

Be sure to measure your loaded setup for safe and accurate towing.

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