

How much weight?

Here are some common questions about tow vehicles and what they can tow:

1. Can my tow vehicle tow this trailer?
2. What tow vehicle do I need to tow this trailer?

These are fairly common questions, all with a common answer. Regardless of which question you are trying to answer, you will need to know what the following weights are all about and how they play a role in your decision making process.

(Use of the word “trailer” is used here to represent either a travel trailer, pop-up, hybrid or fifth wheel.)

UVW (Unloaded Vehicle Weight)

The easiest way to get this number is take your tow vehicle to a weigh station that has scales large enough to drive onto. You can usually find them at a truck stop along many interstate highways or at a weigh station along the road. Other locations could include larger recycling centers or waste transfer stations. Some locations may charge a small fee for this (\$5-\$10). When you do this, have a full tank of gas in your tow vehicle.

If you cannot get your tow vehicle to a scale, look in your owner’s manual or sales brochure for a “dry”, “curb” or “unloaded” weight. All of these weights are usually for the “base” model, the one with the smallest engine and no optional equipment. For any options that you have, try to estimate what the weight might be. Since this will involve guessing the weight of several things, guess high. Options can add up to 500 pounds to the weight of some tow vehicles, so it would be best if you could get your tow vehicle to a scale to be sure of its actual weight. On a new vehicle, the dealer may be able to tell you what the weight was when it left the factory.

If you can take your tow vehicle to a scale and if possible, take along all the people and cargo that would normally be in the tow vehicle when going on a camping trip. If this is not possible or you’re not sure what stuff you would be taking with you, you can calculate it, but it may not be as accurate. (Calculating it will also not give you an accurate picture of weight on the front and rear axles.)

See the separate page on how to weigh your tow vehicle and/or trailer at a scale.

The **UVW** plus the weight of all passengers and cargo will give you the **GVW** (Gross Vehicle Weight)

Most of the following weights can usually be found in an owner’s manual or on a label somewhere on the tow vehicle or trailer.

GVWR (Gross Vehicle Weight Rating)

This can be found in several places: a label on the inside frame of the driver's door or in the engine compartment, or in the owner's manual or sales brochure. This is the maximum the tow vehicle can weigh.

GCWR (Gross Combined Weight Rating)

You may find this rating along with the GVWR as outlined above. This is the maximum the combination of tow vehicle and trailer can weigh.

TGVWR (Trailer Gross Vehicle Weight Rating, not a common term but used here to distinguish between tow vehicle GVWR and trailer GVWR)

Similar to the tow vehicle, the TGVWR can be found in a sales brochure, on a label on the inside of an interior cabinet door, or somewhere on the outside of the trailer, usually on the driver's side near the front of the trailer. This is the maximum loaded trailer weight, not the dry weight.

However, the difference between the dry weight and the TGVWR (also known as cargo carrying capacity) is another important weight. You will have to determine what you will take with you in your trailer and how much it weighs, and add that to the dry weight to make sure you stay under the TGVWR. There are the things that may stay in the trailer, or be carried back and forth from the house. Such as; television, radio, CD player, videos, laptop computer, cameras, games, books, dishes, pots, pans, towels, tools, blocks, hoses...you get the idea. It all adds up to more weight in the trailer. All this stuff can weigh more than you think, maybe as much as 500 pounds! Figure an additional 50-200 pounds per person depending on the size of the trailer and the length of your average trip for food, clothes and other personal items. Will you be carrying fresh water in the holding tank with you? Add another 8.25 pounds per gallon. Are you still under the TGVWR? Good!!!

TW (Tongue Weight for travel trailers, or Pin Weight for fifth wheels)

You may find this rating along with the TGVWR as outlined above, but it may not be accurate. It may not include any options added at the factory or by the dealer. And it will be a "dry" weight, meaning all holding tanks are empty and no propane. It may not even include the weight of the propane tanks or batteries. Propane weighs about 4.25 pounds per gallon. An average 30# propane tank weighs about 25 pounds empty. Batteries vary a bit, but figure 30-40 pounds for each battery. When loaded properly, the tongue weight for travel trailers will be about 15% of the TGVWR, while the pin weight for fifth wheels will be around 20%. For fifth wheels, also add about 200 pounds for the weight of the hitch in the truck bed. For other trailers, if your tow vehicle does not already have one installed, add about 100 pounds for a receiver hitch platform, and another 100 pounds for a weight distributing hitch with spring bars and sway control.

Have you noticed that the "tow rating" or "towing capacity" is not mentioned here? That's for a good reason. Most manufacturers come up with this number by taking the GCWR minus the

“base” tow vehicle weight plus a few pounds for gas and a small driver. This is not a realistic number to use when selecting a tow vehicle for towing purposes, so it is not used here.

Now, which question are you trying to solve?

If you are trying to answer the question, “Can my tow vehicle tow this trailer?”, use this formula:

$$\#1. GCWR - GVWR = TGVWR$$

Is the GVWR of the trailer you are looking at less than or equal to what is calculated above? If so, so far, so good! But wait! Remember the TW? That has to be added to the GVW of the tow vehicle. If the GVW + TW is greater than GVWR, the trailer you have selected is too big for your tow vehicle. You will have to look at a different trailer, or consider upgrading to a different and perhaps larger tow vehicle.

If you are trying to answer the question “What tow vehicle do I need to tow this trailer?”, use this formula:

$$\#2. TGVWR + GVWR = \text{Total GVWR}$$

Is this Total GVWR less than or equal to the GCWR? If so, so far, so good! But this question is a bit trickier than the other. Why? All this shows is that the combination is a workable one based on these numbers. You need to examine the tow vehicle’s GVWR more closely. Remember the TW? That has to be added to the GVW of the tow vehicle. If the GVW + TW is greater than the tow vehicle’s GVWR, the trailer you have selected is too big for your tow vehicle. You will have to look at a different trailer, or consider upgrading to a different and perhaps larger tow vehicle.

For either question, you will also need to look at these formulas:

$$\#3. GVWR - TW - UVW = \text{Cargo Capacity of the tow vehicle}$$

This will show you how much weight all of your passengers and other cargo can total. Will this be enough capacity? If so, great! If not, you know what you have to do. (Another way to look at this would be: the result of GVWR – TW should be greater than or equal to GVW.)

And

$$\#4. TGVWR - TW = \text{Maximum GVW of the trailer}$$

Let’s see how these formulas work out. I’ll use the specs for my 2001 Suburban K1500 (1/2 ton) LT package 4WD with 5.3 liter engine and 3.73 rear axle ratio for the tow vehicle. And I’ll use

the specs for my 2001 Prowler 27H. Let's also assume that we load up both the trailer and tow vehicle to their respective GVWR.

Suburban:

GVWR = 7,200#

GCWR = 13,000#

UVW = 5,700# (actual scale weight, full tank of gas, no other cargo)

Prowler:

TGVWR = 7,600# (This is the GVWR published in the sales brochure.)

TW = 850 (dry, according to brochure)

Maximum TW based on 15% of GVWR = 1,140#

(To keep this simple, let's assume that all of the tongue weight gets transferred to the tow vehicle.)

The first formula (#1) would look like this:

$13,000 - 7,200 = 5,800$,

which is less than formula #4 of $7,600 - 1,140 = 6,460$

This trailer is too much for this tow vehicle, but only by 660#!

Let's look at formula #2:

$7,600 + 7,200 = 14,800$, which is 1,800# over the 13,000# GCWR.

Again, not enough tow vehicle for this trailer!

And formula #3:

$7,200 - 1,140 - 5,700 = 360$

Well, if the other numbers weren't so bad, I guess I'd be doing a lot of camping by myself!

But the 2001 Suburban brochure and owner's manual says that I can tow up to 7,600# with this rig, and that's what my TGVWR is!!! Not according to these results!

Now let's look at my new 2003 Suburban K2500 (3/4 ton) LT package 4WD with 8.1 liter engine and 3.73 rear axle ratio for the tow vehicle and use the same trailer.

GVWR = 8,600#

GCWR = 17,000#

UVW = 6,700# (actual scale weight, full tank of gas, no other cargo)

The first formula would look like this:

$17,000 - 8,600 = 8,400$,

which is more than formula #4 of $7,600 - 1,140 = 6,460$

This looks good so far.

Let's look at formula #2:

$7,600 + 8,600 = 16,200$, which is 800# less than the 17,000# GCWR.

This looks good, too.

And formula #3:

$$8,600 - 1,140 - 6,700 = 760$$

This doesn't leave much, but it's just enough for my family to go camping!

But the 2003 Suburban brochure and owner's manual says that I can tow up to 10,100# with this rig!!! Based on these formula results, it really can't tow that much!

Are you likely to max out both the tow vehicle and trailer at the same time? Probably not, but you have the ability to, so it would be best to figure that you will to give yourself a cushion. My actual weights are less than all of the maximums, which gives me almost 1,000# (instead of the 760#) of cargo capacity in the Suburban and 500# in the trailer.

Another set of weights that was mentioned earlier were the front and rear axle weight ratings (or GAWR), which you can also find on the same sticker on the inside frame of the driver's door or in the engine compartment.

For fifth wheel's, almost all of the pin weight will be placed directly on the rear axle, while a small amount will go up front. Is the rear GAWR enough to handle the load?

For other trailers that do not use a weight-distributing hitch (usually when the TW is less than 500 pounds), all of the TW will be placed on the rear axle. Is the rear GAWR enough to handle the load?

For other trailers that do use a weight distributing hitch (TW over 500 pounds), some of the TW will be placed on the front and rear axles of the tow vehicle as well as some moved back to the trailer axle(s). Are the GAWR's enough to handle the load? Just for argument sake, lets assume the worst situation (this would not be an ideal situation, but it could happen) where the weight-distributing hitch is not set up properly and the TW is places entirely on the rear axle. Is it strong enough?

If you could answer yes to these GAWR questions, then you have selected a tow vehicle capable of towing the desired trailer.

Hopefully, you can see the importance of understanding how all of the different weights interact with each other. And now you can see why those "tow rating" or "towing capacity" numbers are so inflated!

It is strongly recommended to stay under the GAWR's, GVWR, GCWR and TGVWR. The manufacturer's came up with these numbers for a reason, and there is plenty of debate as to the validity of these numbers. Performance from the tow vehicle will begin to suffer the closer you get to the GCWR. When possible, get more tow vehicle than you think you will need to give you that extra margin of performance. You may be sorry if you don't!

Many people try to factor gas mileage into the equation in selecting a tow vehicle. Keep in mind what you are trying to do with the tow vehicle, TOW!!! Gas engines may get less gas mileage

and have less power than a similar size diesel engine, but diesel engines cost more initially. You would need to factor in the additional cost of the diesel engine compared to a gas engine, what the difference is in fuel mileage and the cost of fuel to determine how many miles you would have to drive the diesel engine to break even on the additional expense. The break-even point could be well over 75,000 miles depending on how much you tow. Also, some diesel engines may be more costly to maintain than a gas engine.

There is another web site that has a good series of articles dealing with weight, tow ratings and trailer brakes. (www.popuptimes.com/articles/archive1/ruleofthumb_1.asp) The only thing I don't like about this web site is "the rule" they use. Although there may be situations where "the rule" works fine, I'm sure that there are just as many situations where it does not. If you do the math I have outlined here, you get a much clearer picture of what your tow vehicle is capable of towing.

I would also suggest you check out the "Horsepower" pages. There have been some interesting online discussions about tow ratings verses horsepower. You may find that your selected tow vehicle may or may not have enough horsepower to pull your intended trailer. I am not advocating that you use the horsepower calculations to overrule the manufacturer's weight ratings. I'm just suggesting that it could be used as another way to answer the question, "Do I have enough truck?" This could be very useful if you live or travel in hilly areas.

Visit my web site at www.geocities.com/dgrvweb for other topics on:

How to weigh?

How long?

Horsepower