

WORK, ENERGY, POWER

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Austin Community College, 1212 Rio Grande St., Austin Tx. 78701 & NYTimes August 16, 2013 by John Pearly Huffman

BEHIND THE WHEEL | BMW 6 SERIES GRAN COUPE

A Coupelike Sedan Suitable for Caligula



INTRODUCTION: The purpose of this exercise is to find weight of this car by first finding it's mass. Turbo charged engines are more efficient in sending power(effective) to the car wheels(0.37% or 0.37 of total car engine Power) than normal car engines. The work(W) done by engine goes into kinetic energy($K = 1/2mV^2$). Effective Power $P = W/t$, Thus $(.37 P) = 1/2mV^2/t$ Thus, $m = (.37)P2t/V^2$. When using this to find mass, HP should be in ft lb/s , mph in ft/s.

HINTS: 1 hp = 550 ftlb/s , 60 mph = 88 ft/s
 $G = 32 \text{ ft/s}^2$, weight = m g

QUESTIONS: (a) Convert 560 hp to ft lb/s? (b) Convert 60 mph to ft/s? (c) With the information given find this car's mass in slugs? (d) Find this car's weight in lb.? (e) How does the computed weight compare to the stated weight in motor trend site listed at left?

ANSWERS: (a) 308,000 ft lb/s. (b) 88 ft/s., (c) 135.4 slugs (d) 4468 lb. (e) site of motor trend where weight of 651i is stated as 4450 lb.

www.motortrend.com/roadtests/sedans/1304_2014_bmw_m6_gran_coupe_first_drive/viewall.html

SANTA BARBARA, CALIF. — It's the screwiest name on any new car, a name that seems swiped from the mid-1970s heyday of the Ford Gran Torino Brougham, the Dodge Royal Monaco Brougham and the Oldsmobile Delta 88 Royale Brougham. More shocking, it's on a [BMW](#), a company generally known for rationality. But there the name is, discreetly appearing in chrome in the quarter windows of each rear door: **Gran Coupe**. There's plenty of space to add "Brougham," and BMW should. At \$111,995, the as-tested price of a 650i Gran Coupe, it darn well ought to be a Brougham. In the United States, the Gran Coupe is offered as a 640i with a 315-horsepower twin-turbocharged 3-liter straight 6, as a 650i with a 445-horsepower twin-turbo 4.4-liter V-8 or as an **M6 with a version of that twin-turbo V-8 fortified to produce(((560 horsepower)))**. **My 650i test car had the M Sport package**, a giant glass roof and other options that knocked the sticker up from the \$87,395 base price for the 2013 model. Press the Start button and the V-8 quietly whirs to life. There's a rumble in its exhaust note that's obvious from outside the car, but so subdued inside that you don't notice it unless you're listening for it. There's plenty of throttle travel in the pedal, so it's easy to keep the engine running at low speeds where, around town, the huge amount of torque (a constant 480 pound-feet from 2,000 to 4,500 r.p.m.) allows all those gears in the transmission to do most of the work. Dip further into the throttle, however, and the car rips through the atmosphere as if it could churn the nitrogen in the air into butter. **In testing by Car and Driver, a 650i Gran Coupe with all-wheel drive (((dashed to 60 m.p.h. in only 4.6 seconds)))**.