

WORK-ENERGY-POWER

Units 10 & 11 , Dr. John P. Cise,

Professor of Physics, Austin Com. College, Austin Tx., jpcise@austincc.edu & NYTimes , June 30, 2017 by Tom Voelk

A Family-Friendly Ferrari, for the Family of Means



INTRODUCTION: This Ferrari output power (P_{OUT}) goes into doing (output work/unit time) where $W_{OUT} = \text{Useful kinetic energy} = \frac{1}{2} m v^2$. Thus $P_{OUT} = \frac{1}{2} m v^2/t$ and since

$$X = \text{efficiency} = P_{OUT}/P_{input} ,$$

$$X = [\frac{1}{2} m v^2]/t(P_{INPUT})$$

QUESTIONS: (a) Find mass of Ferrari ? (b) Convert Ferrari HP to ft. lb./s.? (c) Find efficiency X of Ferrari? .

HINTS: $W = mg$, $g = 32 \text{ ft./s.}^2$, $60 \text{ mph} = 88 \text{ ft./s.}$, $550 \text{ ft. lb./s.} = 1 \text{ HP}$

ANSWERS: (a) $m = 132.19 \text{ slugs}$, (b) $P_{INPUT} = 374,000 \text{ ft. lb./s.}$, (c) $X = \text{efficiency} = \sim 41.5 \%$,

Driven | 2017 Ferrari GTC4Lusso The GTC4Lusso provides the kind of performance most Ferraris lack — the ability to haul four passengers. Just don't call it a station wagon. Few of us have the disposable income that allows a choice between a useful crossover and a Ferrari. But for the fortunate few, Ferrari, the automaker from Maranello, Italy, provides a family-friendly choice. The GTC4Lusso seats four fairly comfortably, though its high performance may scare the Pampers off the twins. The vast majority of eyes attracted to the Lusso's svelte silhouette see it as a station wagon. It's not. It's a "[shooting brake](#)." What's the difference? Station wagons have four doors; shooting brakes have two. That makes it less practical than a minivan, but hey, there's a price to pay for high style. Ah, a perfect segue to the price tag. With shipping and the mandatory \$3,000 guzzler tax, the GTC4Lusso starts at **about \$306,000**. With a \$20,249 panoramic glass roof (worth it) and a \$12,486 paint job (nice, but could be a pass), my tester came to \$377,222. The engine, which doubles as a piece of modern sculpture, is a 6.3-liter V12. Think about it: The

cylinder count is equal to three Honda CR-Vs. There are **680 horsepower** and 514 pound-feet of torque to summon. Nearing the red line of 8,250 r.p.m.s, a wicked snarl barks from the four exhaust pipes. Drive modes cover everything from dropping off the babysitter to slicing up the autobahn. This can be a relaxing car to drive (as relaxed as one can be driving a \$377,000 car).

This being a **Ferrari, the V12 propels this 4,230-pound machine in the expected rapid fashion. Its 0-to-60 mile per hour time of 3.3 seconds** is easy to replicate with launch control **Ferrari claims the top speed is 208 miles an hour** (I didn't verify that, if you're wondering.) Carbon ceramic brakes will bring it to a rest in an amusement-park-ride manner.