

ENERGY & POWER

Unit 10 & 11 Dr. John P. Cise, Professor of Physics, Austin

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The typical boost provided by either a **turbocharger or a supercharger** is 6 to 8 pounds per square inch (psi). Since normal atmospheric pressure is 14.7 psi at [sea level](#), you can see that you are getting about 50-percent more air into the engine. Therefore, you would expect to get 50-percent more power. **It's not perfectly efficient, though, so you might get a 30-percent to 40-percent improvement instead.**

“In 2013, Sports Cars(and Detroit) Came Roaring Back”

PORSCHE CAYMAN(\$53,550 BASE, \$91,820) There are faster sports cars and more expensive sports cars, including the Cayman's big brother, the 911. But the real public service performed by this Porsche is to remind the more-is-better crowd that real drivers don't need 600 horsepower for a ticket to heaven. The Cayman's classic beauty, refinement, agility and pure sensation still trump, say, the excellent new Corvette Stingray. And, it's not as if the Cayman is slow: **(((the S version zips to 60 mph in 4.7 seconds)))**. That's what **(((a fatherly 2,900-pound curb weight can do)))**, mated to 6 cylinders with a “mere” **(((325 horsepower)))**.

INTRODUCTION: $\text{Power}_{\text{output}} = \text{Work}/\text{time}$, $P = W/t$
Work done by engine is required to increase kinetic energy(K) of a car. Car engines are not 100% efficient. $\text{Power}_{\text{output}}$ is less than $\text{Power}_{\text{input}}$.
 $[\text{Power}_{\text{output}}]/[\text{Power}_{\text{input}}] = \text{efficiency}$.
 $\text{Power}_{\text{input}} = \text{stated horsepower of car}$.

QUESTIONS: (a) Find mass of car in slugs?
(b) Find Kinetic energy(K) of car at 60 mph?
(c) Find power output (in ft. lb./s) of car?
(d) Find power input (in ft. lb./s) of car?
(e) Find caymen car's efficiency?
(d) How does (e) compare to % efficiency in middle left?

HINTS: $K = \frac{1}{2} mv^2$, $P = W/t$, $\text{hp} = 550 \text{ ft. lb./s}$

ANSWERS: (a) 45.3 slugs, (b) ~350,900 ft. lb.
(c) ~ 74,660 ft. lb./s (d) ~ 178,750 ft. lb. /s
(e) ~ 0.42 or 42 %, (f) close!