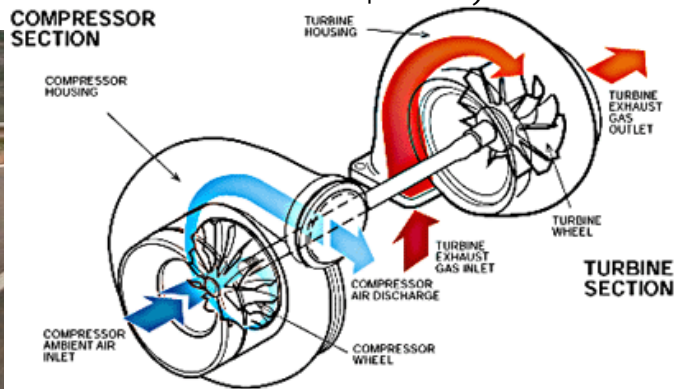


WORK-ENERGY/POWER (car energy/power) Units 10,11 , Dr John P. Cise

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2014 ASTON MARTIN RAPIDE Hooligan With Four Doors and a \$200,000 Price



INTRODUCTION: All stats/parameters in below article.

QUESTIONS: (a) Find average RPM of engine? (b) Convert average rpm to radians/s? (c) Knowing average velocity(ω) and engine torque(τ), find engine total power in ft.lb/s and HP? (d) Is HP found in (c) close to article stated HP? (e) Find mass(in slugs) of AstonMartin ? (f) Find kinetic energy(in ft. lb.) at 60 mph? (g) Find power(in ft.lb./s and HP) needed to attain 60 mph in stated 4.7s? (h) What % of total engine power went into kinetic energy? This is the engine's efficiency. This is a Turbocharged engine... more efficient than a standard engine.

HINTS: $\omega=2\pi f$, 60s/min, $P_{\text{angular}} = \tau\omega$, 550 ftlb/s = 1 HP
Weight = mg , $g = 32 \text{ ft/s}^2$, $KE=1/2mv^2$, $P = \text{Work}/\text{time}$

ANSWERS: (a) 6125 rpm, (b) 641 rad/s. (c) ~292,975 ft.lb./s. or ~ 532.7 HP, (d) ...close...within 3%, (e) ~137.8 slugs, (f) ~533,610 ft.lb. (g) ~113,524 ft.lb./s or ~206.4 hp (h) ~37.5%

On a scale that ranges from “coolly rational” on the left to “totally berserk” on the right, Aston Martin’s newly updated **Rapide S** four-door sports car is way over to starboard — just short of monster trucks and jet-powered dragsters.

There’s lunacy in each atom of its structure and overwrought emotion in every revolution of the crankshaft in its

(((550-horsepower))) 5.9-liter V-12. It’s a \$200,000-and-change car that demands to be taken on its own crazy terms. And if you can manage that, it can be wonderful. Over all, the Rapide S seems more serious and mechanical than before. It’s no longer a rolling sculpture, **it’s now a muscular beast.**

The Germans have been moving from high-revving naturally breathing V-8s to turbocharged V-8s that make their power at relatively low engine speeds. In contrast, the **Aston V-12 needs to be spun up to make power; the peak (((torque of 457 pound-foot))) comes at a thumping (((5,500 r.p.m. and maximum horsepower at 6,750 r.p.m.)))**

Car and Driver measured the Rapide S, which **(((weighs 4,410 pounds, ripping to 60 miles per hour in just 4.7 seconds)))** and blitzing the quarter mile in 13.1 seconds at 111 m.p.h. With a few options aboard, including a Bang & Olufsen stereo, the test car’s total price came to **\$223,595**. So crazy costs money. How crazy do you want to be?