

# WORK-ENERGY-POWER

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**INTRODUCTION:** Honda.com says weight of this Honda is 2830 lb. Turbo gasoline engines are about 20 % more efficient than traditional gasoline engines which are about 15 – 20 % efficient. Thus, making the turbos about 40% efficient ( $0.40 = X$ ). Thus,  $X = P_{OUT}/P_{IN}$  or  $P_{OUT} = X P_{IN}$  ,

The power output goes into useful kinetic energy per unit time.  $P_{OUT} = W_{OUT} / t =$

$$X P_{IN} = [ \frac{1}{2} m V^2 ] / t$$

**QUESTIONS:** (a) Find mass of this car? (b) Convert 174 mph to ft. lb./s.? (c) Find efficiency X of this turbo Honda Civic?

**HINTS:** weight = mass X gravity,  $g = 32 \text{ ft./s.}^2$  ,  
1 HP = 550 ft. lb./s.

## The Honda Civic Touring Is Packed With Technology and Space

The 10th generation Civic corrects some of the material and design missteps of the last model and is now a formidable competitor to other cars in its class. I LEARNED to drive a manual transmission in a first-generation [Honda Civic](#) when others in my driver's ed class turned up their noses at such a puny machine. It came to the United States market in 1973 with a 50-horsepower engine. My classmates preferred training on the Oldsmobile Cutlasses and Pontiac Grand Ams. Who could have guessed those American brands would disappear and that sprout from Japan would flourish?

**Honda has wheeled out Generation 10 of its Civic**, correcting some of the material and design missteps of the last one. A new Touring model features technology that even the higher-end Accord lacked a few years ago, such as adaptive cruise control, auto braking and an aggressive assist system to keep the car in lanes. It's wired for Android Auto and Apple Car Play, too. Throw in heated leather chairs and a 450-watt sound system, and this package as tested has a price of \$27,335. Base LX models start at \$19,475 with a 2-liter, 4-cylinder engine coupled to a 6-speed manual transmission.

The **Civic Touring scoots** briskly, powered by a **(((1.5-liter turbo 4 with 174-horsepower)))** and 162 pound-foot of torque on standard-grade gas. It is rated by the E.P.A. at **31 city and 42 highway**; I got 29 miles per gallon in mostly city driving, though I tend to drive aggressively. The turbo is coupled to a continuously variable transmission that mercifully banishes most of the common elastic C.V.T. dynamics. A sport mode? Yes, but no manual-shift ability. It can go from **(((zero to 60 m.p.h. in just under seven seconds(actually 6.8 seconds at Honda.com) )))** according to Car and Driver. But drivers in rainy climates like Seattle take note: The Firestone tires don't clutch well on wet pavement.

**ANSWERS:** (a) 88.44 slugs, (b) 95,700 ft. lb./s. (d)  $X = 0.512$  or 51.2 % efficiency.

**EDITORS COMMENT:** Turbo cars are known to be 15 – 20 % more efficient than conventional gasoline engines. Obtaining > 40% efficiency for this Honda Civic fits the pattern of efficiency for turbo cars. Quite reasonable.