

WORK- ENERGY-POWER

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The Kia Soul Exclaim Adds Pep to Its Boxy Figure



INTRODUCTION: This turbocharged engine 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 $P_{OUT} = \frac{1}{2} m v^2/t$
 $X = \text{efficiency} = P_{OUT}/P_{input}$, $X P_{INPUT} = \frac{1}{2} m v^2/t$
At Kia web site: curb weight + driver = 3232 + 160 = 3392 lb.

QUESTIONS: (a) Find car mass ?, (b) Find kinetic energy at 60 mph ?, (c) Convert 241 HP to ft. lb./s. ? (d) $X = \text{efficiency} = ?$

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

ANSWERS: (a) 106 slugs, (b) 410,432 ft. lb.,
(c) 132,550 ft. lb./s., (d) efficiency = 40.2 % , typical of turbos.

IN 2009, when the [Kia Soul](#) was introduced, it was roundly criticized as a blatant copy of the square-shaped [Scion xB](#). At the time, Toyota's youth brand had sold an average of 46,000 xBs annually over six years to coveted younger buyers, a good reason for Kia to go to the square-shaped well. The combination of practicality, affordability and hipster-hamster marketing has made the Soul so successful it's often neck and neck with the Optima as Kia's best-selling car. On track to sell more than 150,000 copies in North America for 2016, the Soul has outlived other boxes such as the Nissan Cube, the [Honda Element](#) and, of course, the xB (R.I.P. Scion). How do you improve a sales powerhouse? Well, add power of course. That is what Kia has done with the 2017 Exclaim model (or "!" in Kia-speak), dropping in a **1.6-liter turbocharged 4-cylinder engine**. This motor runs exclusively with a sure-shifting 7-speed dual-clutch automatic transmission. The lower-rung Plus (or "+") model has a standard 6-speed automatic. **At 201 horsepower and 195 pound-feet of torque, the Exclaim increases the Plus's 2-liter 4-cylinder by 40 horsepower** **(((Thus: Exclaim HP = 241 HP)))** and 45 pound-feet of torque. Consider it your hamster on speed. This is not, though, South Korea's answer to the vaunted [Volkswagen GTI](#). The German GTI is built of not just metal, glass and plastic, but a dash of magic as well. **(((The Soul is quick (0 to 60 miles an hour in about 7.7 seconds)))**, but its taller stance and numb steering keep it from being quite as nimble. Still, the Soul turbo is fun enough to fling about town. Its size is perfect for urban skirmishes, and the slightly retuned suspension keeps comfort up and body movements buttoned down.