

# WORK-ENERGY/POWER/NEWTON'S 2<sup>ND</sup> Unit 10,11

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& NYTimes September 30,2011 by Lawrence Ulrich Please send Dr Cise an e-mail on how you used this application.

BEHIND THE WHEEL | 2011 BENTLEY MULSANNE

## A Threat to the Job Security of White-Glove Chauffeurs



**OUTSIZED** The Bentley Mulsanne is enormous and weighs about three tons, but still manages 0-60 in 5.1 seconds. [More Photos »](#)

**INTRODUCTION:** This is a huge 6000 lb. car which goes from 0-60 mph in 5.1 s with a 505 HP engine. **QUESTIONS:** (a) Find the mass of this car? (b) Find the kinetic energy of this car at 60 mph? (c) What is the average power(in ft lb/s & HP) for this car as it goes from 0-60 mph in 5.1 s? (Note: Car engines are not 100% efficient. Car engines are much less than 100% efficient). (d) Find the acceleration from 0-60 mph in 5.1 s? (e) Find the average force needed to accelerate this car from 0-60 mph in 5.1s ? (f) Find the distance this car travels from 0-60 mph in 5.1 s? (g) Find the average work this car's engine did in the first 5.1 s (h) With the answer to question (g) find the power output of the car engine? (i) Knowing the torque and rpm of the engine listed below find the engine Power in ft lb/s and HP? **HINTS:** 60 mph = 88 ft/s ,  $P = W/t$  ,  $P = F v$  ,  $P = ( F x)/t$  , Angular power =  $P = (\text{torque}) \times (\text{angular velocity})$   
**ANSWERS:** (a) 187.5 slugs (b) 726,000 ft lb (c) 142,353 ft lb/s or ~ 258.82 HP (d) 17.25 ft/s<sup>2</sup> (e) 3235.3 lb (f) 224.4 ft (g) ~726,000 ft lb (h) ~ 142,353 ft lb/s or ~ 258.82 HP (i)~ 137,811 ft lb/s or ~ 250.6 HP

THE Bentley Mulsanne, it turns out, is a pleasant car to drive. I can hear the snorts already: "Excuse me? Bentley's **flagship costs \$330,000.** I should hope it's pleasing." While this new Bentley would still seem misplaced on the Mulsanne for which it is named — the straightaway on the Le Mans racing circuit — its surprisingly able handling **and top speed of 184 miles per hour** make it the rare ultraluxury chariot that encourages you to drop the Champagne flute and grab the reins. The Mulsanne is an enormous car, **weighing almost 6,000 pounds** and measuring nearly 220 inches in length, some seven inches more than the aging Arnage it replaces. What Bentley calls its first ground-up design in more than 80 years — neither a modified Rolls-Royce nor a VW-based car like the Continental GT — keeps its traditional engine size of 6.75 liters. With twin turbochargers, the V-8's **505 horsepower** **urge the Mulsanne to 60 m.p.h. in just 5.1 seconds.**

The **engine's torque has reached biblical proportions: 752 pound-feet fully available at just 1,750 r.p.m.**

The Mulsanne covers ground like a fairy-tale giant, quicker and nimbler than you expect. You feel its prodigious momentum, yet there's no clumsiness; an adjustable air suspension keeps the car flat and poised through curves. The car might seem unstoppable, but huge brakes halt this dreadnought in surprisingly short order.