The data below were taken from a *Car and Driver*® road test of a 2005 Ford Mustang GT. The Mustang tested had a weight of 3526 lbs. The road testers were attempting to determine the time to achieve a given speed starting from rest and using maximum available acceleration. (Photo by A. Syed, courtesy of Stock.XCHNG images)

Time (s)	1.9	2.9	4.0	5.2	6.8	8.7	10.6	13.2	16.5	20.1	26.1
Speed (mph)	30	40	50	60	70	80	90	100	110	120	130

a.) Plot the data. Is your plot consistent with constant acceleration? Briefly explain your answer.

b.) Construct a plot of the kinetic energy of the Mustang versus time, assuming the driver weighed 160 lbs. Is your plot consistent with constant power output? Explain your answer.

c.) Find the average power devoted to accelerating the vehicle in the intervals from 30 mph to 60 mph, from 60 mph to 90 mph and from 100 mph to 130 mph. Give your answer in units of horsepower, and also give the fraction of the rated engine horsepower (300 hp for this model) that is devoted to accelerating the vehicle.

d.) The Mustang that was tested has a height of 55.4 inches and a width of 73.9 inches. Given that a standard drag coefficient for a modern car is about $C = 0.35$, and the density of air is about 1.3 kg/m^3, how much power is being used to overcome air resistance at speeds of 45 mph, 75 mph and 115 mph? (Use $F = \frac{1}{2} C \rho_{air} A v^2$ for the force of air resistance where A is the frontal area of the car.) Give your answer in hp and as a percentage of the Mustang's rated hp.

e.) If the entire rated power of the engine could be devoted to overcoming air resistance, how fast could the Mustang go?