

Fuel Economy Sheet

(Assigned: 16 November 2007 • Due: Monday 3 December 2007)

Use the data you have entered on Worksheet 1 (part 4) and find the following:

- 1.) Find the distance traveled on your tank of gas:

$$\underline{\hspace{2cm}} \text{ miles} - \underline{\hspace{2cm}} \text{ miles} = \underline{\hspace{2cm}} \text{ miles}$$

ODOMETER 2<sup>ND</sup> FILL      ODOMETER 1<sup>ST</sup> FILL      MILES TRAVELED

- 2.) Use the number of gallons pumped on your 2
- <sup>nd</sup>
- fill and find the m.p.g.:

$$\underline{\hspace{2cm}} \text{ miles} \div \underline{\hspace{2cm}} \text{ gallons} = \underline{\hspace{2cm}} \text{ m.p.g.}$$

- 3.) Find the energy content of the gasoline you used:

$$\underline{\hspace{2cm}} \text{ gallons} \times 1.32 \times 10^8 \text{ J/gal.gas} = \underline{\hspace{2cm}} \text{ J}$$

- 4.) Find the approximate number of seconds driving on this tank of gas:

$$\underline{\hspace{2cm}} \text{ minutes} \times 60 \text{ seconds/minute} = \underline{\hspace{2cm}} \text{ seconds}$$

- 5.) Find the Power available from the gasoline used on this tank of gas:

$$\underline{\hspace{2cm}} \text{ J} \div \underline{\hspace{2cm}} \text{ seconds} = \underline{\hspace{2cm}} \text{ Watts}$$

- 6.) Convert the Power from Watts to horsepower:

$$\underline{\hspace{2cm}} \text{ Watts} \div 746 \text{ Watts/h.p.} = \underline{\hspace{2cm}} \text{ h.p.}^\dagger$$

- 7.) Compare this horsepower to the maximum horsepower of your car.

- 8.) Compare this horsepower to the 15 to 50 h.p. needed to cruise at speed.

<sup>†</sup> Note: This horsepower will NOT be correct, which affects the answers to (7) and (8). Why? (Your grade does not depend on answering this question, but you should think about it! This material will be covered when we do Thermodynamics.)

Force • Work • Power Sheet

(Assigned: 16 November 2007 • Due: Monday 3 December 2007)

Use the data you have entered on Worksheet 1 (parts 1 and 2) and find the following:

- 1.) Convert the vehicle's weight to a mass:

$$\underline{\hspace{2cm}} \text{ lbs} \div (2.2 \text{ lbs/kg}) = \underline{\hspace{2cm}} \text{ kg}$$

- 2.) Convert the vehicle's speed from acceleration run:

$$\underline{\hspace{2cm}} \text{ miles/hour} \times \left( \frac{1 \text{ hour}}{3600 \text{ sec}} \right) \times \left( \frac{1609 \text{ meters}}{1 \text{ mile}} \right) = \underline{\hspace{2cm}} \text{ m/s}$$

- 3.) Find the average acceleration of your vehicle:

$$\underline{\hspace{2cm}} \text{ m/s} \div \underline{\hspace{2cm}} \text{ seconds} = \underline{\hspace{2cm}} \text{ m/s}^2$$

- 4.) Find the average Force needed to accelerate your vehicle:

$$F = \underline{\hspace{2cm}} \text{ N}$$

- 5.) Find the distance traveled from rest to max speed:

$$d = \underline{\hspace{2cm}} \text{ meters}$$

- 6.) Find the Work needed to accelerate the car:

$$W = \underline{\hspace{2cm}} \text{ J}$$

- 7.) Find the average Power to accelerate the car:

$$P = \underline{\hspace{2cm}} \text{ Watts}$$

- 8.) Convert the car's maximum Power:

$$\underline{\hspace{2cm}} \text{ h.p.} \times 746 \text{ Watts/hp} = \underline{\hspace{2cm}} \text{ Watts}$$

- 9.) Is (7)
- $\leq$
- (8) ?

## Average Speed Sheet

(Assigned: 16 November 2007 • Due: Monday 3 December 2007)

Use the data you have entered on Worksheet 1 (part 3) and find the following:

1.) Find the distance traveled on your trip:

$$\underline{\hspace{2cm}} \text{ miles} - \underline{\hspace{2cm}} \text{ miles} = \underline{\hspace{2cm}} \text{ miles}$$

ODOMETER END                      ODOMETER START                      MILES TRAVELED

2.) Find the clock time traveled on your trip:  Estimate?

\_\_\_\_\_ hours : \_\_\_\_\_ minutes

- \_\_\_\_\_ hours : \_\_\_\_\_ minutes

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\_\_\_\_\_ hours : \_\_\_\_\_ minutes

3.) Convert the time to seconds:

$$( \underline{\hspace{2cm}} \text{ hours} \times 3600 \text{ sec/hour} ) + ( \underline{\hspace{2cm}} \text{ min} \times 60 \text{ sec/min} ) =$$

\_\_\_\_\_ seconds

4.) Adjust (3) by subtracting approximate seconds for any stops:

$$\underline{\hspace{2cm}} \text{ seconds} - \underline{\hspace{2cm}} \text{ seconds} = \underline{\hspace{2cm}} \text{ seconds}$$

FROM (3)

STOPS

ADJUSTED TIME

5.) Average Speed in miles per hour:\*

$$( \underline{\hspace{2cm}} \text{ miles} \times 3600 \text{ sec/hour} )$$

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$$= \underline{\hspace{2cm}} \text{ m.p.h.}$$

( \_\_\_\_\_ sec )

6.) Average Speed in meters per second:

$$( \underline{\hspace{2cm}} \text{ miles} \times 1609 \text{ meters/mile} )$$

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$$= \underline{\hspace{2cm}} \text{ m/s}$$

( \_\_\_\_\_ sec )

7.) If you had to adjust the values in (4), recalculate (5) and (6) using the TOTAL time, including the time stopped. Should these speeds be higher or lower?

8.) Consider the route that this trip represents. What was the typical speed limit for this trip? Compare your values from (5)-(7) to this value here.

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\* Parts 5 and 6 are EQUATIONS. The big line means DIVIDE. Somehow no one figures this out (grin).