

**One Wedge from Improving Cars' Fuel Efficiency from 30 to 60 miles per gallon**  
(passed out Feb 19, due Feb 21)

**Definitions and Assumptions:**

One "Wedge" is defined as eliminating 1 GTC of carbon emissions per year by the year 2050

One GTC is 1 billion metric tons of C (a billion is 1,000 million)

One metric ton is 1,000 kilograms (kg); 1 kg of C is the same as 3.67 kg of CO<sub>2</sub>

Assume that burning a gallon of gasoline releases	8.8 kg of CO <sub>2</sub>
Assume that "overhead emissions" for gasoline add:	25%
Assume that Fuel Efficiency in a Business As Usual Scenario:	30 mpg
Assume that Fuel Efficiency with One Wedge:	60 mpg

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**Question One:** How much CO<sub>2</sub> emissions must be eliminated by the year 2050 to get one wedge?

\_\_\_\_\_ billion kilograms/year

**Question Two:** Suppose the "wedge" is achieved totally by reduced consumption of gasoline. What is the required reduction in annual gasoline use by the year 2050? (Don't forget to count the extra 25% "overhead emissions" associated with gasoline.)

\_\_\_\_\_ billion gallons/year

**Question Three:** Suppose there will be 2,000 million vehicles in use in 2050 and they will each be driven 10,000 miles per years. What is the total, annual travel by all vehicles in 2050?

\_\_\_\_\_ billion miles/year

**Question Four:** Suppose the vehicles' average fuel efficiency in a "Business As Usual" scenario is **30 mpg**. How much gasoline would be consumed in 2050 in this scenario?

\_\_\_\_\_ billion gallons/year

**Question Five:** What much gasoline would be consumed if there were "One Wedge" improvement?

\_\_\_\_\_ billions of gallons/year

**Question Six:** Suppose the "One Wedge" of improvement is achieved entirely by an increase in the fuel efficiency of the vehicles. What is the average fuel efficiency of the vehicles in operation in 2050?

\_\_\_\_\_ miles per gallon