## Problems

40.

Show the market for cigarettes in equilibrium, assuming that there are no laws banning smoking in public. Label the equilibrium private market price and quantity as Pm and Qm. Add whatever is needed to the model to show the impact of the negative externality from second-hand smoking. (Hint: In this case it is the consumers, not the sellers, who are creating the negative externality.) Label the socially optimal output and price as Pe and Qe. On the graph, shade in the deadweight loss at the market output.

41.

Refer to [Table 12.2](http://openstax.org/books/principles-microeconomics-3e/pages/12-1-the-economics-of-pollution#Table_12_02). The externality created by the refrigerator production was $100. However, once we accounted for both the private and additional external costs, the market price increased by only $50. If the external costs were $100 why did the price only increase by $50 when we accounted for all costs?

42.

[Table 12.12](#Table_12_05) shows the supply and demand conditions for a firm that will play trumpets on the streets when requested. Qs1 is the quantity supplied without social costs. Qs2 is the quantity supplied with social costs. What is the negative externality in this situation? Identify the equilibrium price and quantity when we account only for private costs, and then when we account for social costs. How does accounting for the externality affect the equilibrium price and quantity?

|  |  |  |  |
| --- | --- | --- | --- |
| P | Qd | Qs1 | Qs2 |
| $20 | 0 | 10 | 8 |
| $18 | 1 | 9 | 7 |
| $15 | 2.5 | 7.5 | 5.5 |
| $12 | 4 | 6 | 4 |
| $10 | 5 | 5 | 3 |
| $5 | 7.5 | 2.5 | 0.5 |

Table 12.12

43.

A city currently emits 16 million gallons (MG) of raw sewage into a lake that is beside the city. [Table 12.13](#Table_12_14) shows the total costs (TC) in thousands of dollars of cleaning up the sewage to different levels, together with the total benefits (TB) of doing so. Benefits include environmental, recreational, health, and industrial benefits.

|  |  |  |
| --- | --- | --- |
|  | TC | TB |
| 16 MG | Current | Current |
| 12 MG | 50 | 800 |
| 8 MG | 150 | 1300 |
| 4 MG | 500 | 1850 |
| 0 MG | 1200 | 2000 |

Table 12.13

1. Using the information in [Table 12.13](#Table_12_14), calculate the marginal costs and marginal benefits of reducing sewage emissions for this city.
2. What is the optimal level of sewage for this city? How can you tell?

44.

In the Land of Purity, there is only one form of pollution, called “gunk.” [Table 12.14](#Table_12_18) shows possible combinations of economic output and reduction of gunk, depending on what kinds of environmental regulations you choose.

|  |  |  |
| --- | --- | --- |
| *Combos* | Eco Output | Gunk Cleaned Up |
| **J** | 800 | 10% |
| **K** | 500 | 30% |
| **L** | 600 | 40% |
| **M** | 400 | 40% |
| **N** | 100 | 90% |

Table 12.14

1. Sketch a graph of a production possibility frontier with environmental quality on the horizontal axis, measured by the percentage reduction of gunk, and with the quantity of economic output on the vertical axis.
2. Which choices display productive efficiency? How can you tell?
3. Which choices show allocative efficiency? How can you tell?
4. In the choice between K and L, can you say which one is better and why?
5. In the choice between K and N, can you say which one is better, and why?
6. If you had to guess, which choice would you think is more likely to represent a command-and-control environmental policy and which choice is more likely to represent a market-oriented environmental policy, choice L or M? Why?