Self Test
Perfect Competition and the Coal Industry

Click on True or False to test your knowledge of the chapter.

Remember for questions requiring the use of models to answer, it is often helpful to draw a graph so you can picture what is going on in the market.

1. **True** **False** The fundamental problem in economics is to allocate scarce resources across competing uses.

2. **True** **False** Allocating goods, services, and resources is only done by private markets.

3. **True** **False** In a perfectly competitive market, producers have control over the market price but consumers have no control over the market price.

4. **True** **False** Economists tend to always prefer the private market for the allocation of goods, services, and resources.

5. **True** **False** Exxon Coal U.S.A, Inc. is the largest US coal producer

6. **True** **False** Lignite is the coal form with the highest energy content

7. **True** **False** Long wall mining can be used when a coal seam is narrow and irregular.

8. **True** **False** About one third of the world's electricity is generated by coal.

Use the following competitive model of the coal market to answer the following three questions.

Qd = 100 - 2Pc + 0.5Psb - 3Pcm + 0.1Y

Qs = -10 + 2Pc - 1Pk - 0.2Pl - 0.4Pnr

Where: Pc = the price of coal,

Psb = the price of a substitute to coal such as natural gas = 15,

Pcm = a complement to gas consumption such as a gas boiler or gas range = 10,

Y = a measure of economic activity = 100,

Pk = the price of capital = 2,

Pl = the price of labor = 3,

Pnr = the price of other natural resources used in production of coal = 5.

9. **True** **False** The inverse supply equation at the above variable values is Pc = 7.3 - 0.5Qs.

10. **True** **False** Equilibrium price and quantity in the above model are Pc= 25.525, Q = 36.450.

11. **True** **False** If income increased in this market, it would increase demand, increase price, and increase supply.

12. **True** **False** Suppose the U.S. Fed tightened the money supply to raise interest rates and choke off inflation. If this raised the cost of capital, it would decrease supply, raise price, and lower quantity demanded.

13. **True** **False** If the price of capital increased lowering supply and income increased raising demand, then price would increase but the direction of the quantity change would be uncertain.

14. **True** **False** In a market where Qd = 87.5 - 2Pc and Qs = -14.6 + 2Pc, there would be excess supply below equilibrium price. This excess supply would drive prices down further and the market would be unstable.

15. **True** **False** Suppose Qd = 87.5 - 2Pc and Qs = -14.6 + 2Pc, at a price of 30, there would be excess quantity demanded of 17.9 units.

16. **True** **False** Let Qd = 87.5 - 2P and Qs = -14.6 + 2P. One way to a minimum price of $30 would be for the government to buy 17.9 units.

17. **True** **False** Quantity of coal demanded is positively related to the number of buyers and negatively related to the price of coal.

18. **True** **False** If Qd = 87.5 - 2Pc and Qs = -14.6 + 2Pc, then the elasticity of supply at equilibrium price is about 1.40.

19. **True** **False** If Qd = 87.5 - 2Pc and Qs = -14.6 + 2Pc, then the elasticity of demand at equilibrium price is about 1.40.

20. **True** **False** Let Qd = 115 - 2Pc + 0.1 Y, Y = 100, with equilibrium price and quantity of Pc_e = 44.274, Qe = 36.45. The income elasticity of demand at equilibrium price suggests that oil is a luxury good.

21. **True** **False** Let Qd = 80 - 2Pc + 0.5 Psb, Psb =15 with equilibrium price and quantity of Pc_e= 25.525, Qe = 36.45. The cross price elasticity of demand for oil with respect to the price of a substitute at equilibrium is about 0.21.

22. **True** **False** Suppose the price elasticity of demand for natural gas is -0.6. If the price of natural gas falls by 10% in France, the quantity demanded of natural gas would increase by 6%.

23. **True** **False** Suppose gas consumption in France is 38 billion cubic meters a year and the income elasticity of demand for gas is 0.5. If income in France fell by 1%, you would forecast demand for natural gas in France to be 39 billion cubic meters per year.

Use the following information to answer the next four questions. The consumption of natural gas in France is 38 billion cubic meters a year, the price is 750 FF per 1000 cubic meters, and France's income is 8 trillion FF per year. The own price elasticity of natural gas in France is -0.6 and the income elasticity of demand is 0.5.

24. **True** **False** A linear demand for natural gas compatible with the above information would be Q = 41.8 - 0.03P + 2.375Y.

25. **True** **False** A multiplicative or a log linear demand for natural gas in France would be $Q = 22.18P^{-0.6}Y^{0.5}$

26. **True** **False** If your demand equation is Q = 2 - 3lnP + 4Y, then your own price elasticity of demand is -3/Q.

27. **True** **False** You want to analyze a tax and need a demand equation of the form Qd = a + bP and a supply equation of the form Qs = c + dP. You have found a study that gives the price elasticity of demand and supply of coal as -0.5 and +0.6,respectively . The current consumption of coal in the U.S. is about 1 billion short tons and the average price for bituminous coal is about

$25 per short ton. Your demand and supply equations would be Qd = 1.5 - 0.02P and Qs = 0.4 + 0.024P.

28. **True** **False** A positive cross price elasticity of demand implies that goods are complements.

29. **True** **False** You would expect the household cross price demand elasticity between natural gas and electricity to be positive.

30. **True** **False** Energy consumption adjusts over time in a variety of ways. As income or production (Y) increases, we expect that energy consumption will increase. As economies evolve and industrialize, there may be a relative shift in the economy towards more energy intensive sectors such as heavy manufacturing. We will calculate this production share of sector *i* (S_i) as the production in sector *i* (Y_i) divided by total production or $S_i = Y_i/Y$. Once industrialized, economies may then shift relatively more of their activities to the less energy intensive service sector. In addition, there may be technology change in each sector changing the energy intensity in each sector. Energy intensity in sector i is measured as energy consumption over income (E_i/Y_i). Suppose you have the following two sector economy, Y and E are total production and total energy consumption while Y_i and E_i are production and energy consumption in sector *i*.

	Y	Y_1	Y_2	E	E_1	E_2
2000	100	40	60	27	12	15
2010	200	50	150	70	40	30

Sector 2 is the larger sector, the faster growing sector, and the least energy intensive sector.

31. **True** **False** If energy demand is $\ln(Q) = a - bP$, then the price elasticity is $\varepsilon_p = -bP$.

32. **True** **False** There are about 0.907 metric tonnes per short ton. If the U.S. consumes around a billion metric tonnes of coal a year, it consumes about 0.907 billion short tons per year.

33. **True** **False** Coking coal is more valuable than thermal coal.

34. **True** **False** If nominal income is $800 in 2012 and $820 in 2013 and the CPI is 100 in 2012 and 103 in 2013, real income has not increased from 2012 to 2013.