

### Study Question—Production and Costs

1. Bob Inc. has production function  $Q = \min[20L, 5K]$ . Labor costs \$12 per unit and capital costs \$20 per unit.

a) Indicate coordinates (L, K) of 3 points on Bob Inc.'s isoquant for  $Q = 1000$ .

b) Calculate the cost-minimizing use of K and L, and total costs at the cost-minimizing point.

c) Indicate coordinates (L, K) of 3 points on Bob Inc.'s isocost line, given total costs and current prices for L and K.

d) Suppose that the costs per unit of L rises to \$24. How does this affect Bob Inc.'s cost-minimizing strategy for  $Q = 1000$ ?

2. Tina Inc. has production function  $Q = 20L + 5K$ . Labor costs \$12 per unit and capital costs \$20 per unit.

a) Indicate coordinates (L, K) of 3 points on Tina Inc.'s isoquant for  $Q = 1000$ .

b) Calculate the cost-minimizing use of K and L, and total costs at the cost-minimizing point.

c) Indicate coordinates (L, K) of 3 points on Tina Inc.'s isocost line, given total costs and current prices for L and K.

d) Suppose that the costs per unit of K falls to \$2. How does this affect Tina Inc.'s cost-minimizing strategy for  $Q = 1000$ ?

3. Paul Inc. has production function  $Q = L^8K^2$ . Labor costs \$12 per unit and capital costs \$20 per unit.

a) Indicate coordinates (L, K) of 3 points on Paul Inc.'s isoquant for  $Q = 1000$ .

1. Bob Inc. has production function  $Q = \min[20L, 5K]$ . Labor costs \$12 per unit and capital costs \$20 per unit.

a) Indicate coordinates (L, K) of 3 points on Bob Inc.'s isoquant for  $Q = 1000$ .

$(50, 200)$   $(50, 300000)$   $(400000000000, 200)$  etc.

b) Calculate the cost-minimizing use of K and L, and total costs at the cost-minimizing point.

*Costs are minimized at the kink on Bob's L-shaped Leontief isoquant—at  $L = 50$  and  $K = 200$*

*total costs are  $\$12(50) + \$20(200) = \$4600$*

c) Indicate coordinates (L, K) of 3 points on Bob Inc's isocost line, given total costs and current prices for L and K.

*Bob's isocost includes all combinations of L and K that cost \$4600. This includes the points  $(50, 200)$   $(383.33333, 0)$  and  $(0, 230)$*

d) Suppose that the costs per unit of L rises to \$24. How does this affect Bob Inc's cost-minimizing strategy for  $Q = 1000$ ?

*Since the point of the kink is always Bob's cost-minimizing point regardless of factor prices, Bob will still hire 50 units of L and 200 units of K, though his total costs will rise.*

2. Tina Inc. has production function  $Q = 20L + 5K$ . Labor costs \$12 per unit and capital costs \$20 per unit.

a) Indicate coordinates (L, K) of 3 points on Tina Inc.'s isoquant for  $Q = 1000$ .

$(50, 0)$   $(0, 200)$   $(25, 100)$  etc.

b) Calculate the cost-minimizing use of K and L, and total costs at the cost-minimizing point.

*Labor is a much better deal. Not only is it more productive but it is also cheaper. Tina will hire only labor, needing 50 units of it to produce  $Q = 1000$ .*

*Total costs are  $\$12(50) = \$600$*

c) Indicate coordinates (L, K) of 3 points on Tina Inc's isocost line, given total costs and current prices for L and K.

*Tina's isocost includes all combinations of L and K that cost \$600. This includes the points  $(50, 0)$   $(0, 30)$   $(25, 15)$  etc.*

d) Suppose that the costs per unit of K falls to \$2. How does this affect Tina Inc's cost-minimizing strategy for  $Q = 1000$ ?

*Yes. Each K is only  $\frac{1}{4}$  as productive as each L, but now each K is  $\frac{1}{6}$  the cost of each L, making K the better choice. Now Tina hires only K, needing 200 units to produce  $Q = 1000$ . Her total costs are  $\$2(200) = \$400$ .*

3. Paul Inc. has production function  $Q = L^{\frac{1}{8}}K^2$ . Labor costs \$12 per unit and capital costs \$20 per unit.

a) Indicate coordinates (L, K) of 3 points on Paul Inc.'s isoquant for  $Q = 1000$ .

*I used a spreadsheet to come up with these 3 points:*

*(1000, 1000)      (500, 16000)      (1189.25, 500)*