

Exercise MS-255

Computing a change in producer surplus

The Economic Skills Project

1 Problem

Problem

Given the willingness to accept curve and prices below, compute the change in producer surplus, ΔPS , when the price the producer receives rises from P_1 to P_2 .

- $WTA = 100 + \frac{1}{5}Q$
- $P_1 = \$200$
- $P_2 = \$250$

2 Answer

Answer

Here's the numerical solution:

- $\Delta PS = \$31,250$

3 Method

Solution method

Here's one approach:

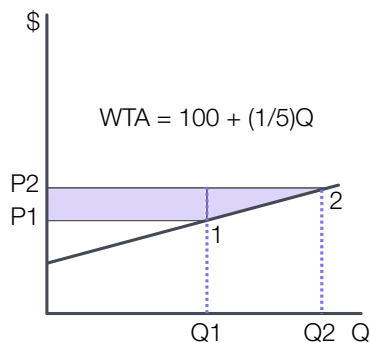
1. Draw the graph with variables for P_1 , P_2 , Q_1 and Q_2 .
2. Compute Q_1 and Q_2 .
3. Draw the graph with numerical P_1 , P_2 , Q_1 and Q_2 .
4. Compute the area of the trapezoid between P_1 and P_2 .

4 Solution

4.1 Step 1

Draw the graph with variables for P_1 , P_2 , Q_1 and Q_2

Here's how it looks:



4.2 Step 2

Compute Q_1 and Q_2

First solve for supply as a function of the price:

- $P = WTA = 100 + \frac{1}{5}Q$
- $\frac{1}{5}Q = P - 100$
- $Q = 5(P - 100) = 5P - 500$

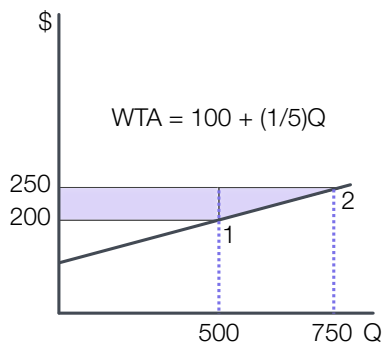
Now find Q_1 and Q_2 by inserting P_1 and P_2 :

- $Q_1 = 5(200) - 500 = 500$
- $Q_2 = 5(250) - 500 = 750$

4.3 Step 3

Draw the graph with numerical P_1 , P_2 , Q_1 and Q_2

The change in producer surplus, ΔPS , will be a gain equal to the shaded area below. It's a gain because P_2 is higher than P_1 so the supplier is better off.



4.4 Step 4

Compute the area of the trapezoid between P_1 and P_2

Computing it using the formula for the area of a trapezoid with bases b_1 and b_2 and height h :

- $\Delta PS = \frac{(b_1 + b_2)}{2} \cdot h = \frac{(500 + 750)}{2} \cdot 50 = \$31,250$

Alternatively, ΔPS can be computed by summing the area of the rectangle and the triangle:

- $\Delta PS = \$50 \cdot 500 + \frac{1}{2} \cdot \$50 \cdot 250 = \$31,250$

Everything checks - done!