N. GREGORY MANKIW

PRINCIPLES OF

ECONOMICS

Eighth Edition

CHAPTER

7

Consumers, Producers, and the Efficiency of Markets

Look for the answers to these questions:

- What is consumer surplus? How is it related to the demand curve?

- What is producer surplus? How is it related to the supply curve?

- Do markets produce a desirable allocation of resources? Or could the market outcome be improved upon?

Welfare Economics

- Allocation of resources refers to:
  - How much of each good is produced
  - Which producers produce it
  - Which consumers consume it
- Welfare economics
  - Studies how the allocation of resources affects economic well-being

Willingness to Pay (WTP)

- A buyer's willingness to pay for a good
  - Maximum amount the buyer will pay for that good
  - How much the buyer values the good

name	WTP
Anthony	$250
Chad	175
Flea	300
John	125

Example:
4 buyers' WTP
for an iPod

WTP and the Demand Curve

Q: If price of iPod is $200, who will buy an iPod, and what is quantity demanded?

name	WTP
Anthony	$250
Chad	175
Flea	300
John	125

A: Anthony & Flea will buy an iPod, Chad & John will not.
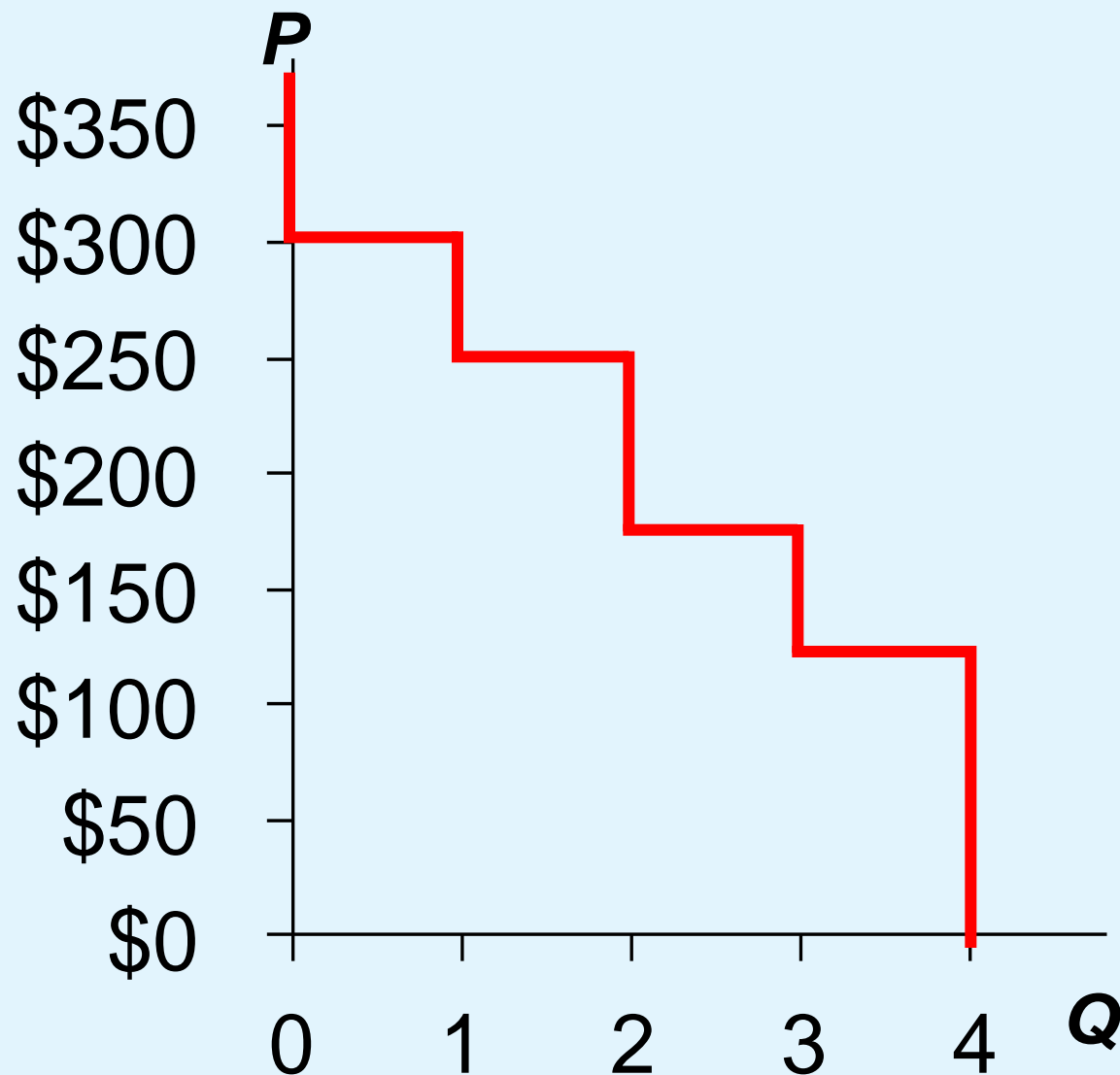
Hence, $Q^d = 2$
when P = $200.

WTP and the Demand Curve

- Derive the demand schedule:

name	WTP
Anthony	$250
Chad	175
Flea	300
John	125

P (price of iPod)	who buys	*Q^d*
$301 & up	nobody	0
251 – 300	Flea	1
176 – 250	Anthony, Flea	2
126 – 175	Chad, Anthony, Flea	3
0 – 125	John, Chad, Anthony, Flea	4

WTP and the Demand Curve

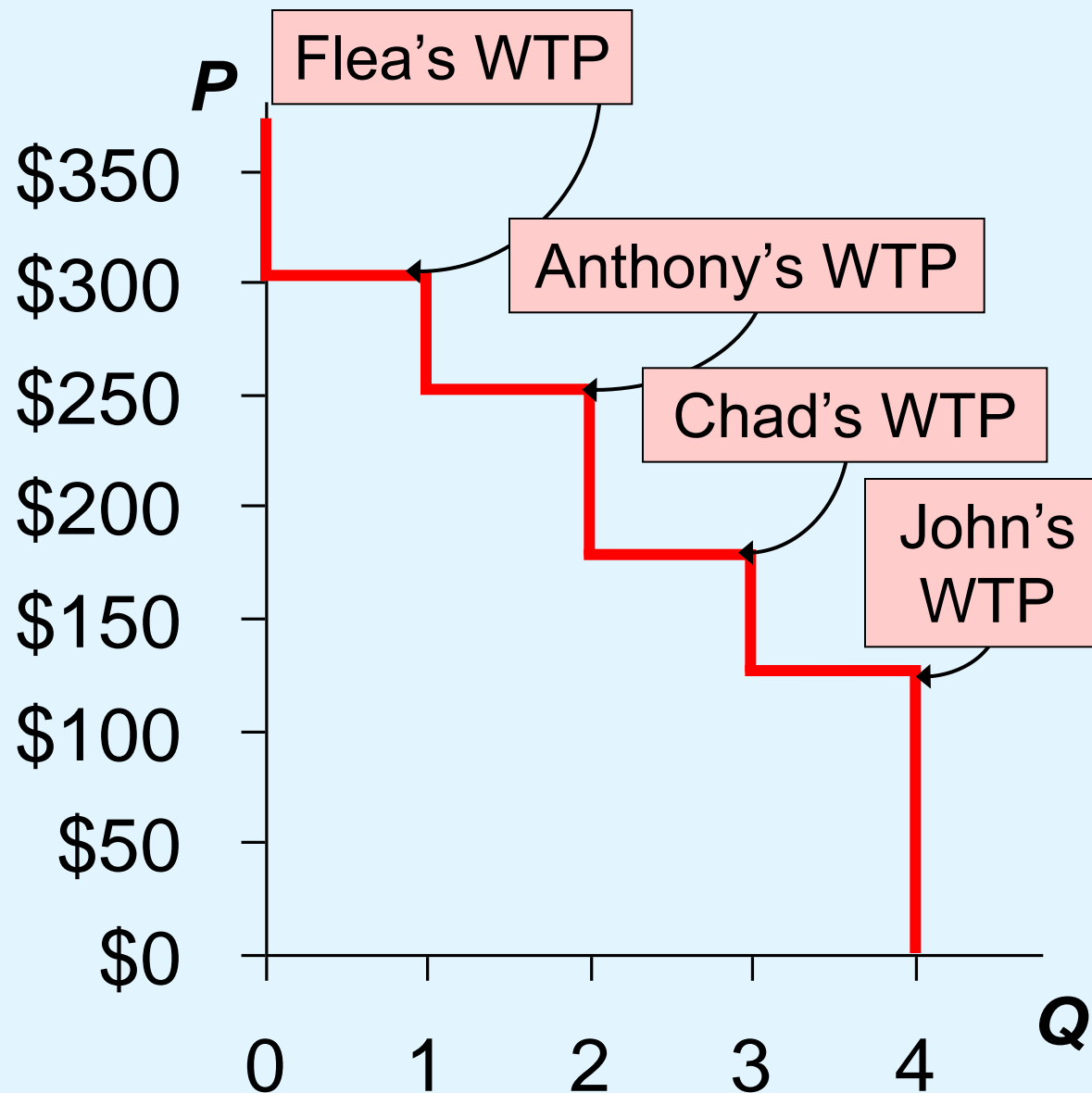| P	Q^d
$301 & up	0
251 – 300	1
176 – 250	2
126 – 175	3
0 – 125	4

About the Staircase Shape…
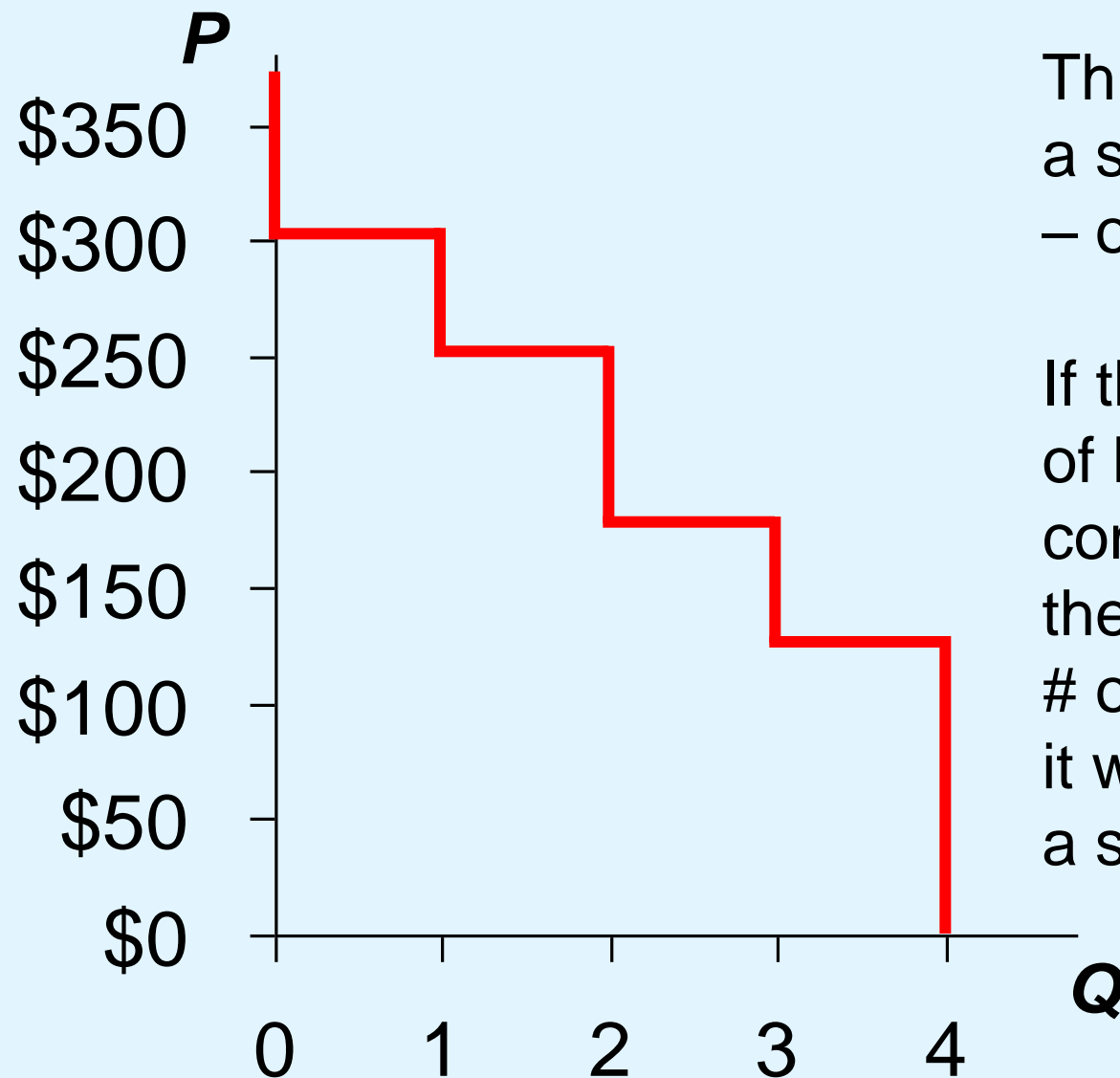
This **D** curve looks like a staircase with 4 steps – one per buyer.

If there were a huge # of buyers, as in a competitive market, there would be a huge # of very tiny steps, and it would look more like a smooth curve.

WTP and the Demand Curve

P

Flea's WTP

Anthony's WTP

Chad's WTP

John's WTP

$350
$300
$250
$200
$150
$100
$50
$0

0   1   2   3   4   **Q**

At any **Q**, the height of the **D** curve is the WTP of the *marginal buyer*, the buyer who would leave the market if **P** were any higher.

Consumer Surplus (CS)

- Consumer surplus CS = WTP − P
  - Amount a buyer is willing to pay minus the amount the buyer actually pays:

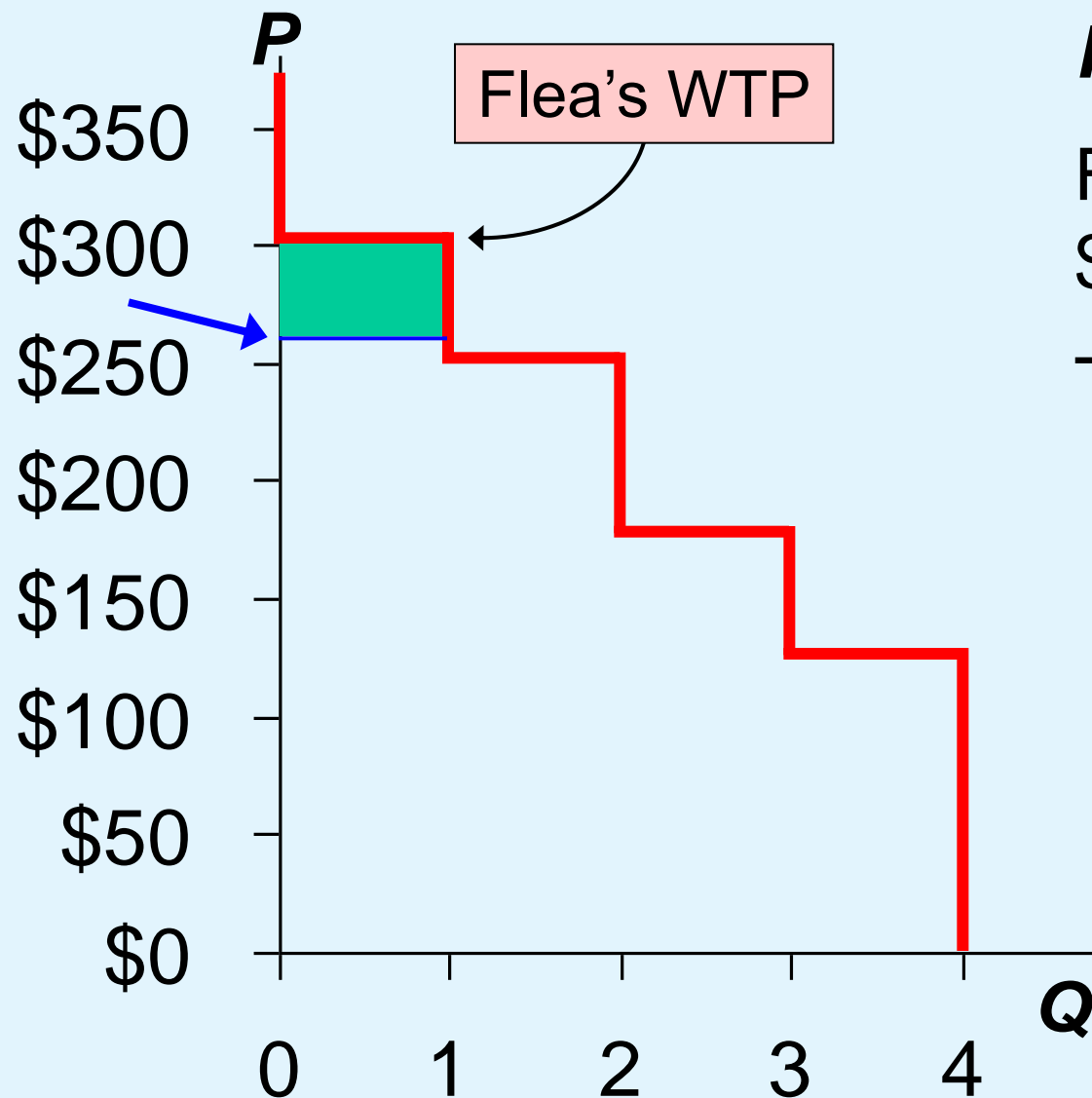| name	WTP
Anthony	$250
Chad	175
Flea	300
John	125

Suppose P = $260.

Flea's CS = $300 − 260 = $40.

The others get no CS because they do not buy an iPod at this price.

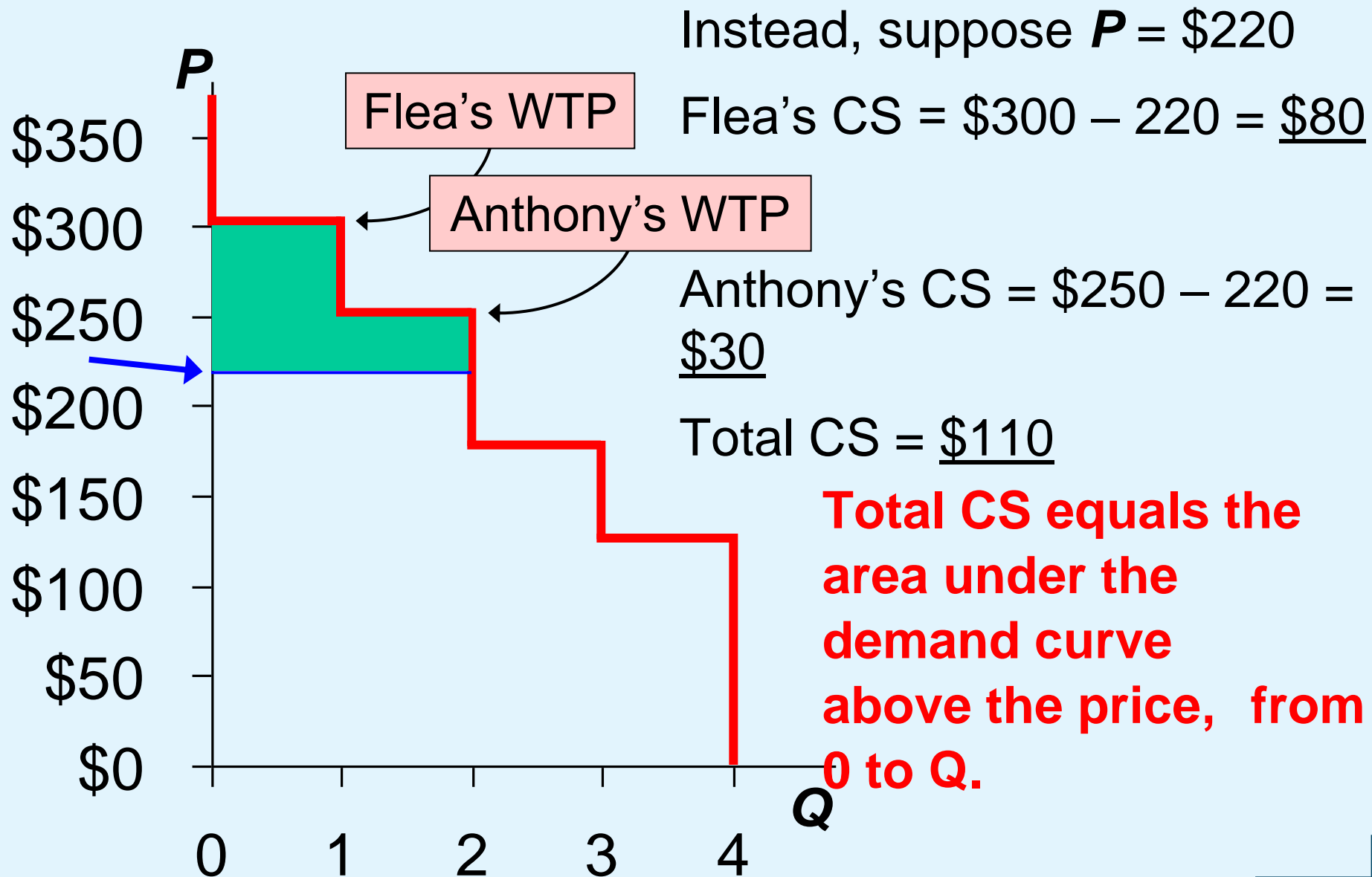*Total CS = $40.*

CS and the Demand Curve

P = $260

Flea's CS =
$300 − 260 = $40

Total CS = $40

CS and the Demand Curve

Instead, suppose **P** = $220

Flea's CS = $300 − 220 = $80

Anthony's CS = $250 − 220 = $30

Total CS = $110

Total CS equals the area under the demand curve above the price, from 0 to Q.

CS with Lots of Buyers & a Smooth D Curve

Price per pair

The demand for shoes

P

$60

50

40

30

20

10

0

At **Q** = 5 (thousand), the marginal buyer is willing to pay $50 for pair of shoes. Suppose **P** = $30. Then his consumer surplus = $20.

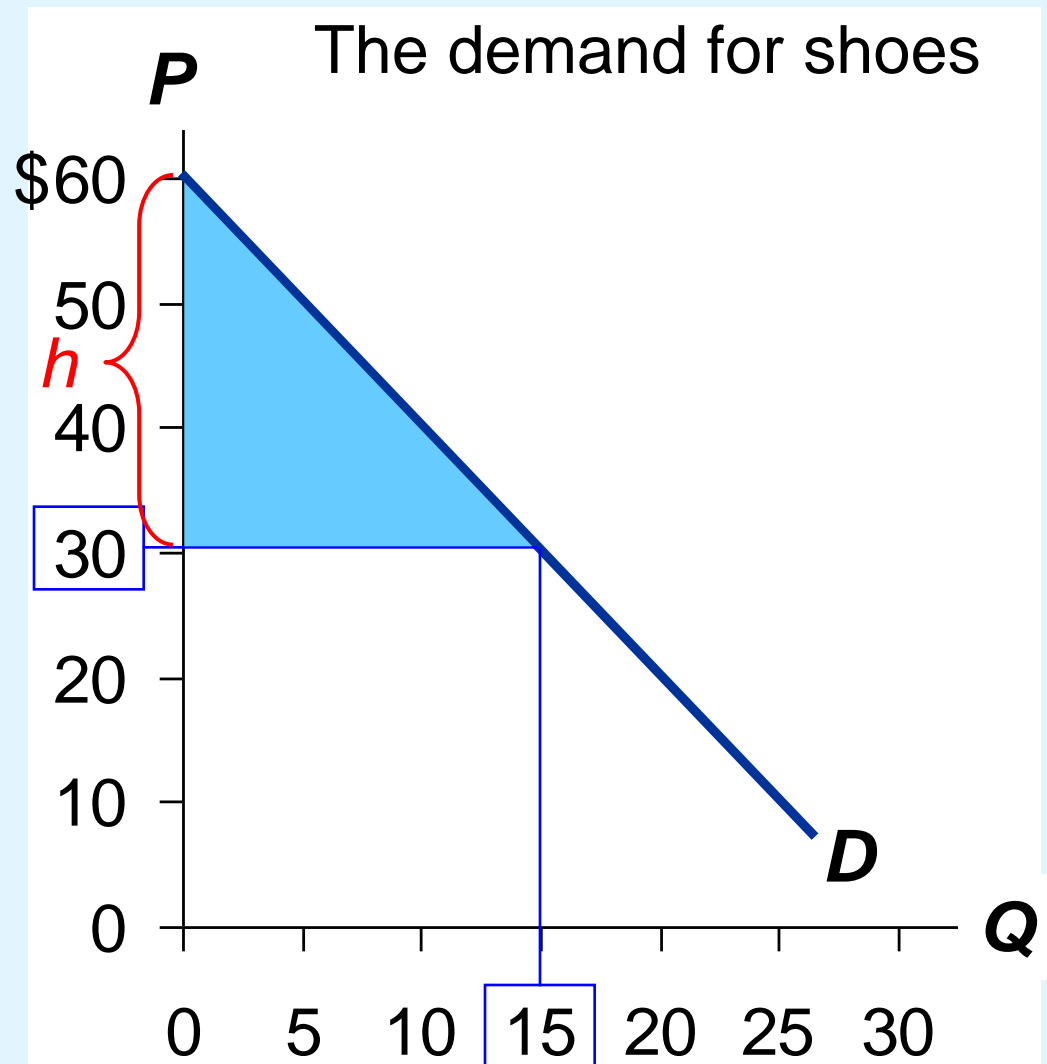1000s of pairs of shoes

D

Q

0 5 10 15 20 25 30
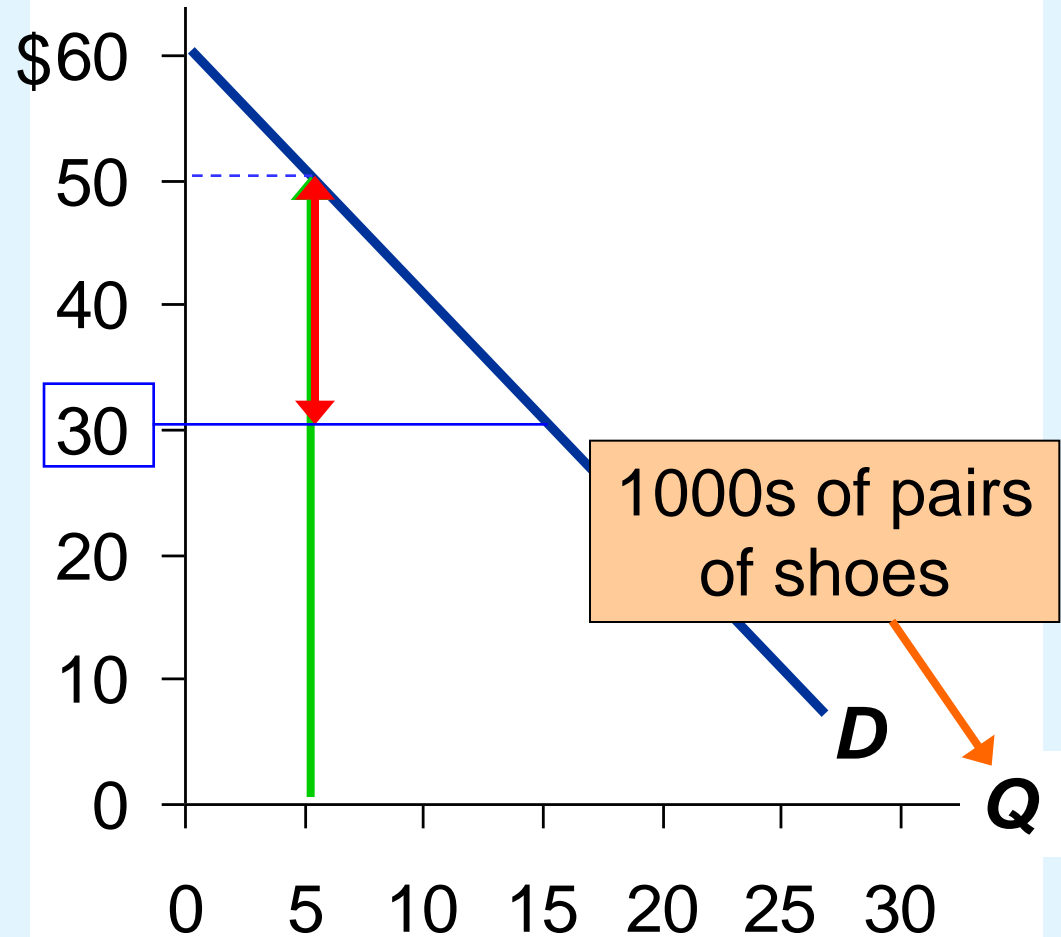
CS with Lots of Buyers & a Smooth D Curve

CS is the area between **P** and the **D** curve, from 0 to **Q**.

Recall: area of a triangle equals ½ x base x height

Height =
$60 – 30 = $30.
So,
CS = ½ x 15 x $30
= $225.

The demand for shoes

P

$60

50

h

40

30

20

10

0

D

Q

0 5 10 15 20 25 30

How a Higher Price Reduces CS

1. Fall in CS due to buyers leaving market

2. Fall in CS due to remaining buyers paying higher **P**

If **P** rises to $40,

$$CS = ½ \times 10 \times \$20 = \$100.$$

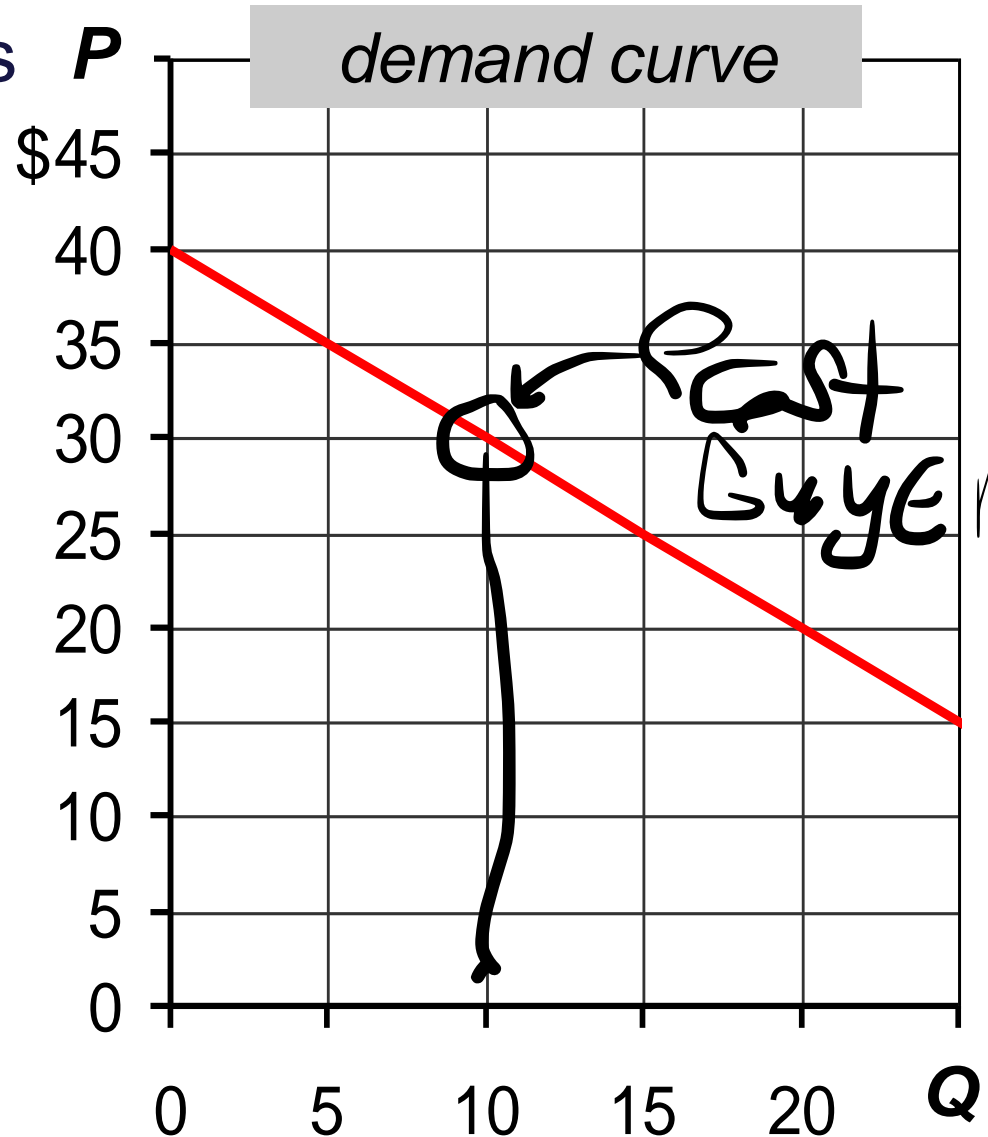Two reasons for the fall in CS.

15
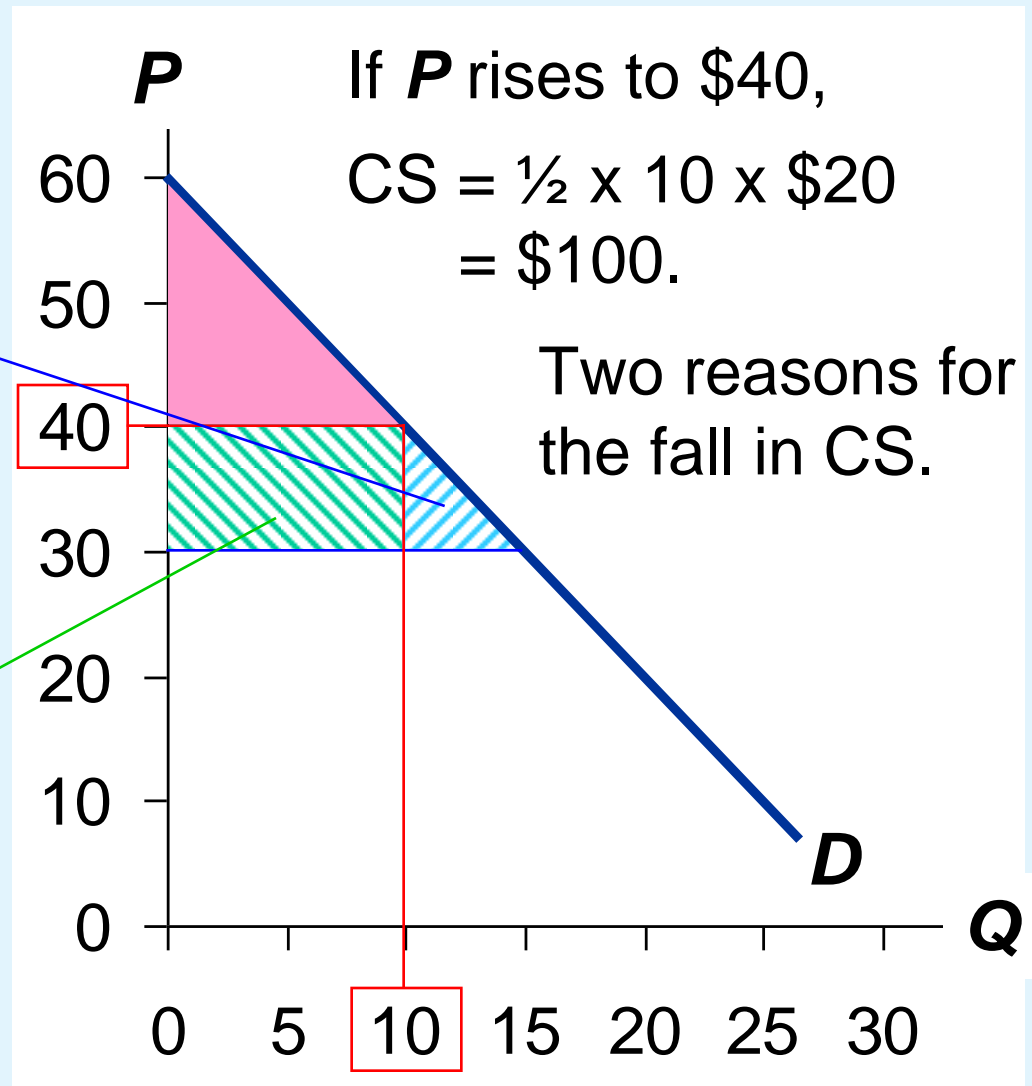
Example: Consumer surplus

A. Find marginal buyer's WTP at Q = 10.

B. Find CS for P = $30

Suppose **P** falls to $20. How much will CS increase due to…

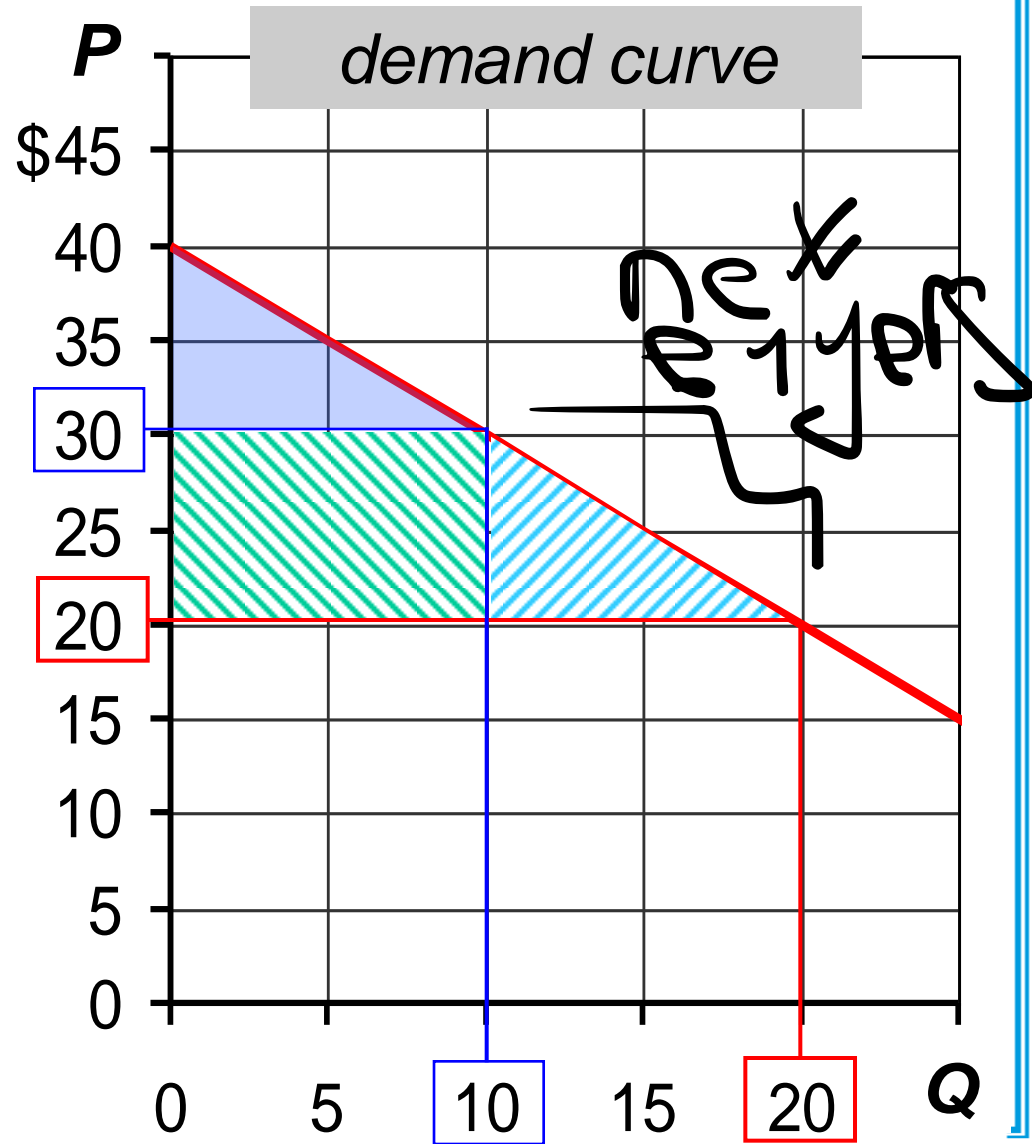C. buyers entering the market

D. existing buyers paying lower price

P

demand curve

$45
40
35
30
25
20
15
10
5
0

0   5   10   15   20   **Q**

Answers

A. At Q = 10, marginal buyer's WTP is $30.

B. CS = ½ x 10 x $10 = $50

P falls to $20.

C. CS for the additional buyers = ½ x 10 x $10 = $50

D. Increase in CS on initial 10 units = 10 x $10 = $100

P | demand curve

$45
40
35
30
25
20
15
10
5
0

0   5   10   15   20   **Q**

17

Producer Surplus

- Cost

  – Value of everything a seller must give up to produce a good

    - Measure of willingness to sell: produce and sell the good/service only if the price > cost

name	cost
Jack	$10
Janet	20
Christy	35

Example: Costs of 3 sellers in the lawn-cutting business.

Producer Surplus

- Derive the supply schedule from the cost data:

P	Q^s
$0 – 9	0
10 – 19	1
20 – 34	2
35 & up	3

name	cost
Jack	$10
Janet	20
Christy	35

Cost and the Supply Curve

P	Q^s
$0 – 9	0
10 – 19	1
20 – 34	2
35 & up	3

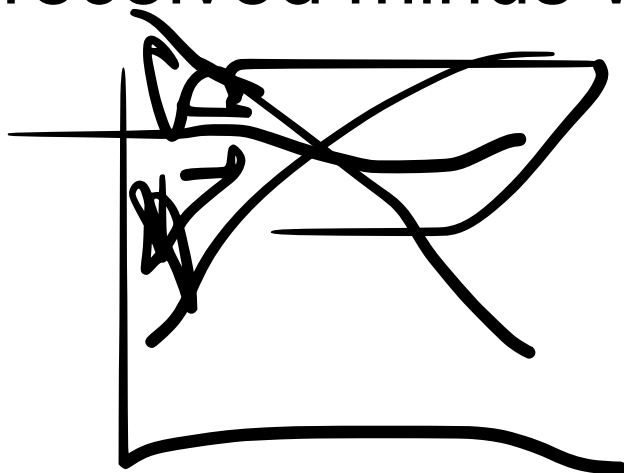# Cost and the Supply Curve
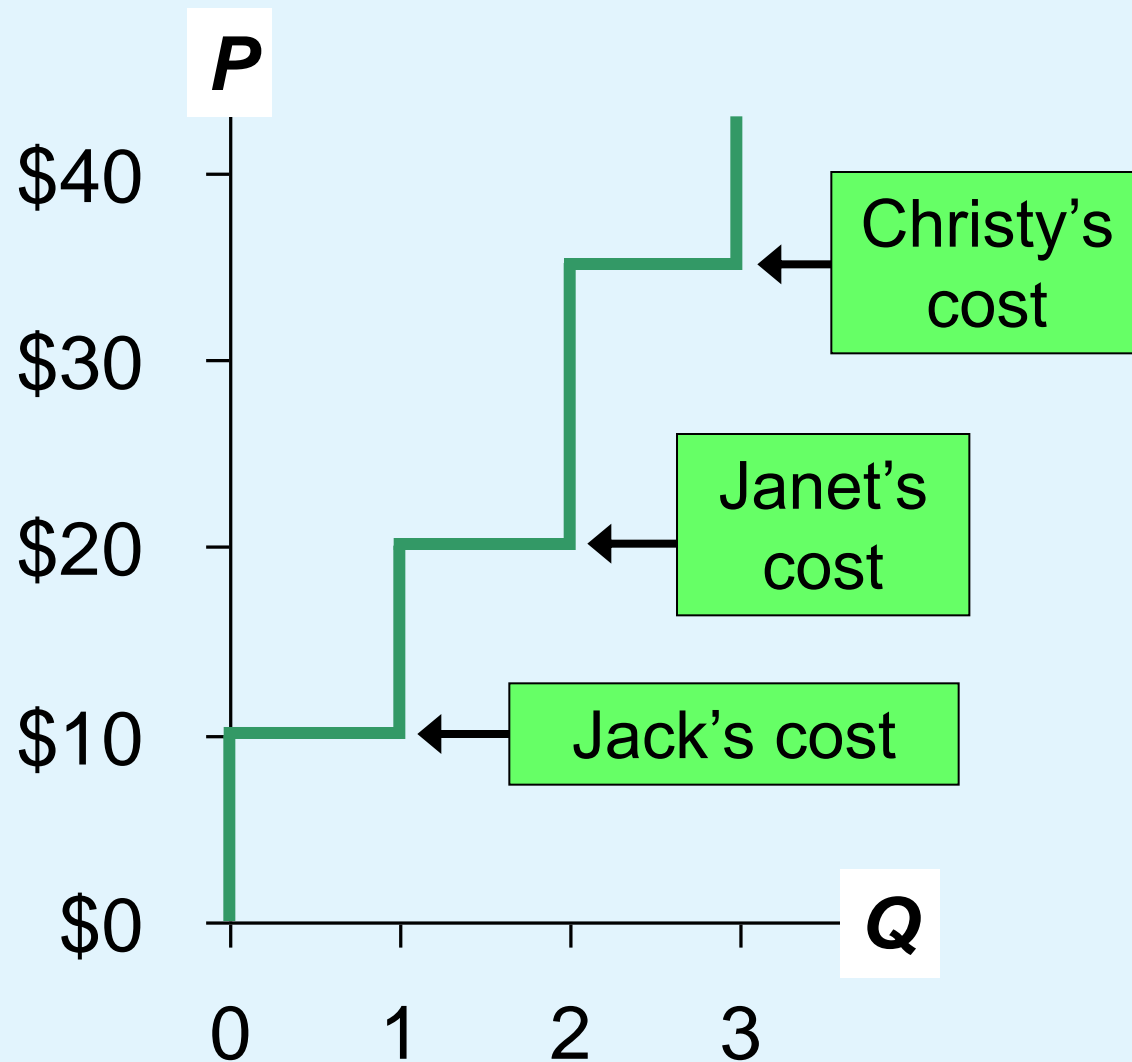
At each **Q**, the height of the **S** curve is the cost of the *marginal seller*, the seller who would leave the market if the price were any lower.
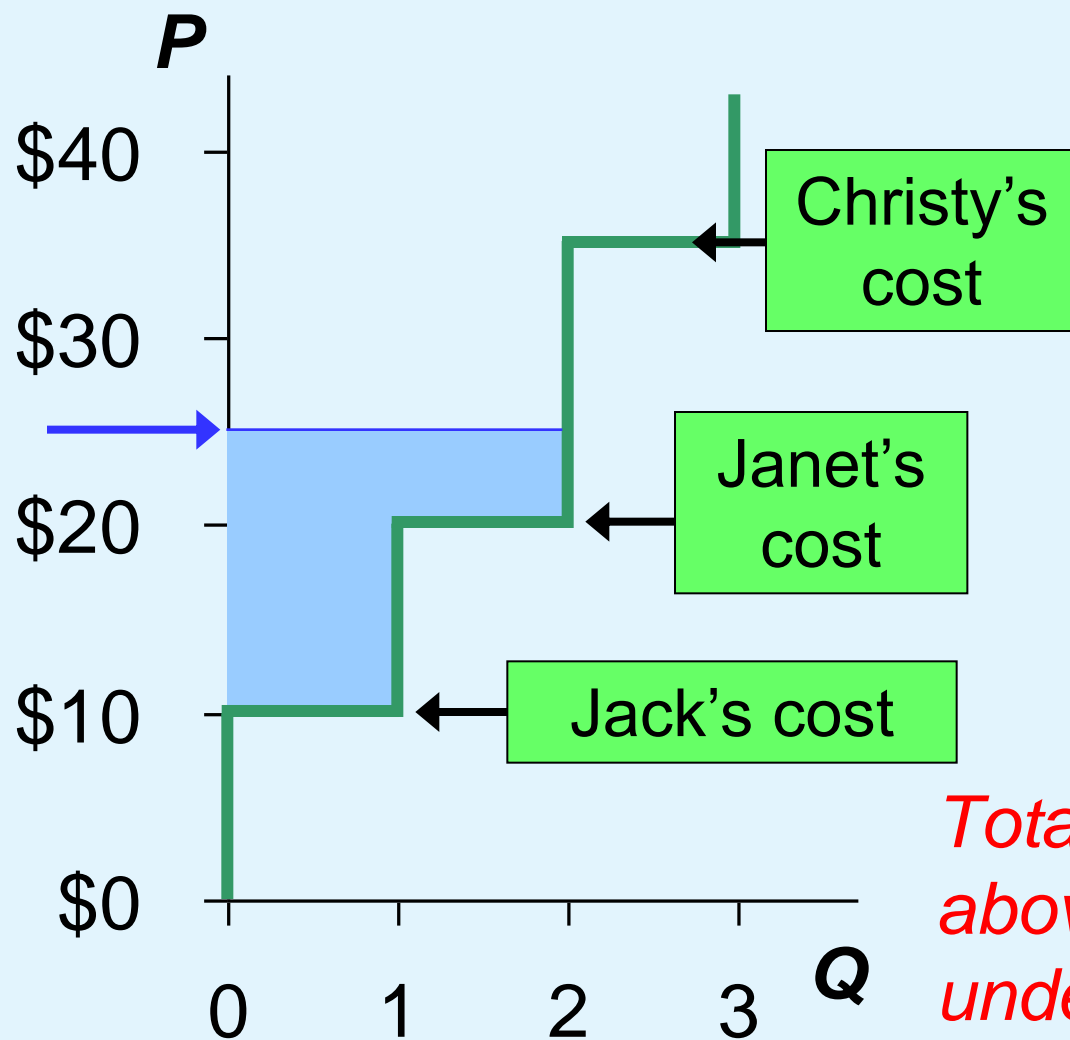
Producer Surplus

- Producer surplus, PS = P - cost
  - Amount a seller is paid for a good minus the seller's cost of providing it
  - Price received minus willingness to sell

Producer Surplus and the S Curve

PS = **P** − cost

Suppose **P** = $25.

Jack's PS = $15

Janet's PS = $5

Chrissy's PS = $0

Total PS = $20

Total PS equals the area above the supply curve under the price, from 0 to Q.

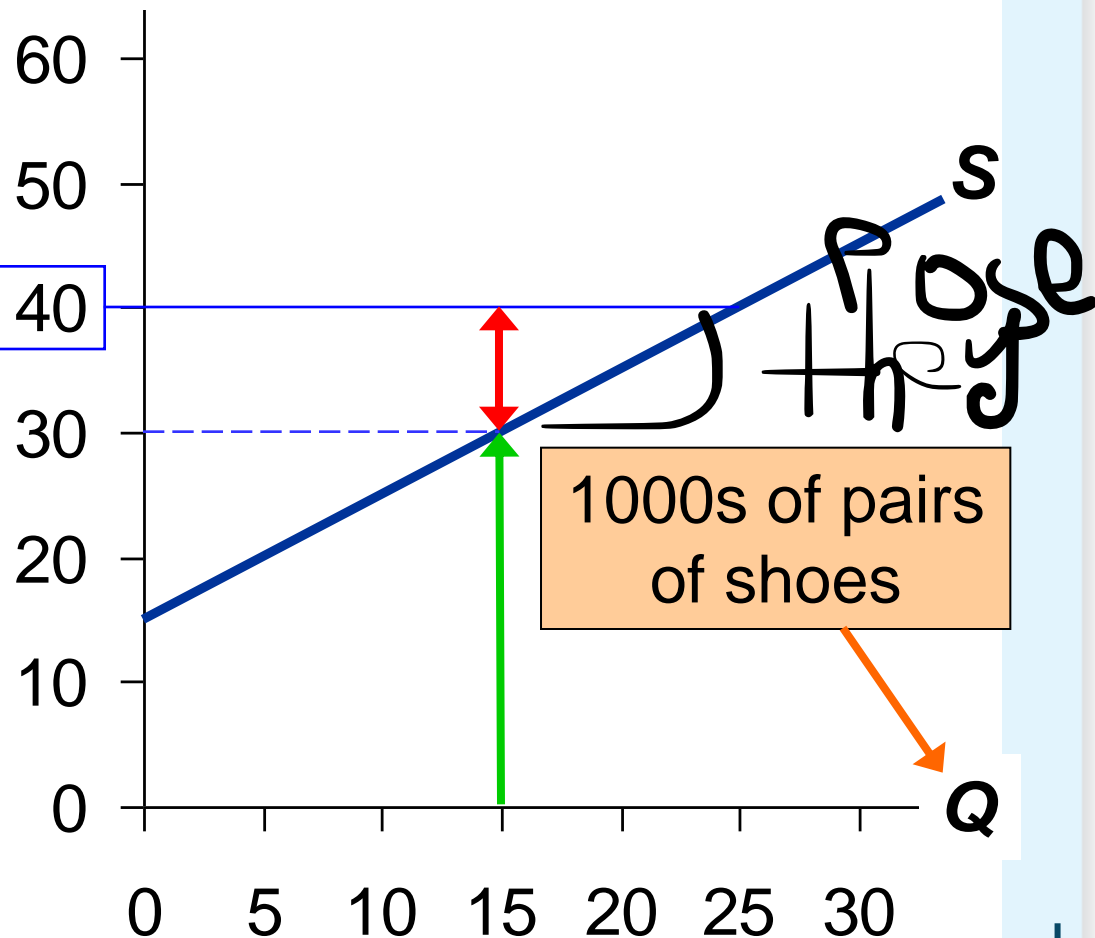# PS with Lots of Sellers & a Smooth S Curve

Price per pair

Suppose **P** = $40.

At **Q** = 15(thousand), the marginal seller's cost is $30, and her producer surplus is $10.
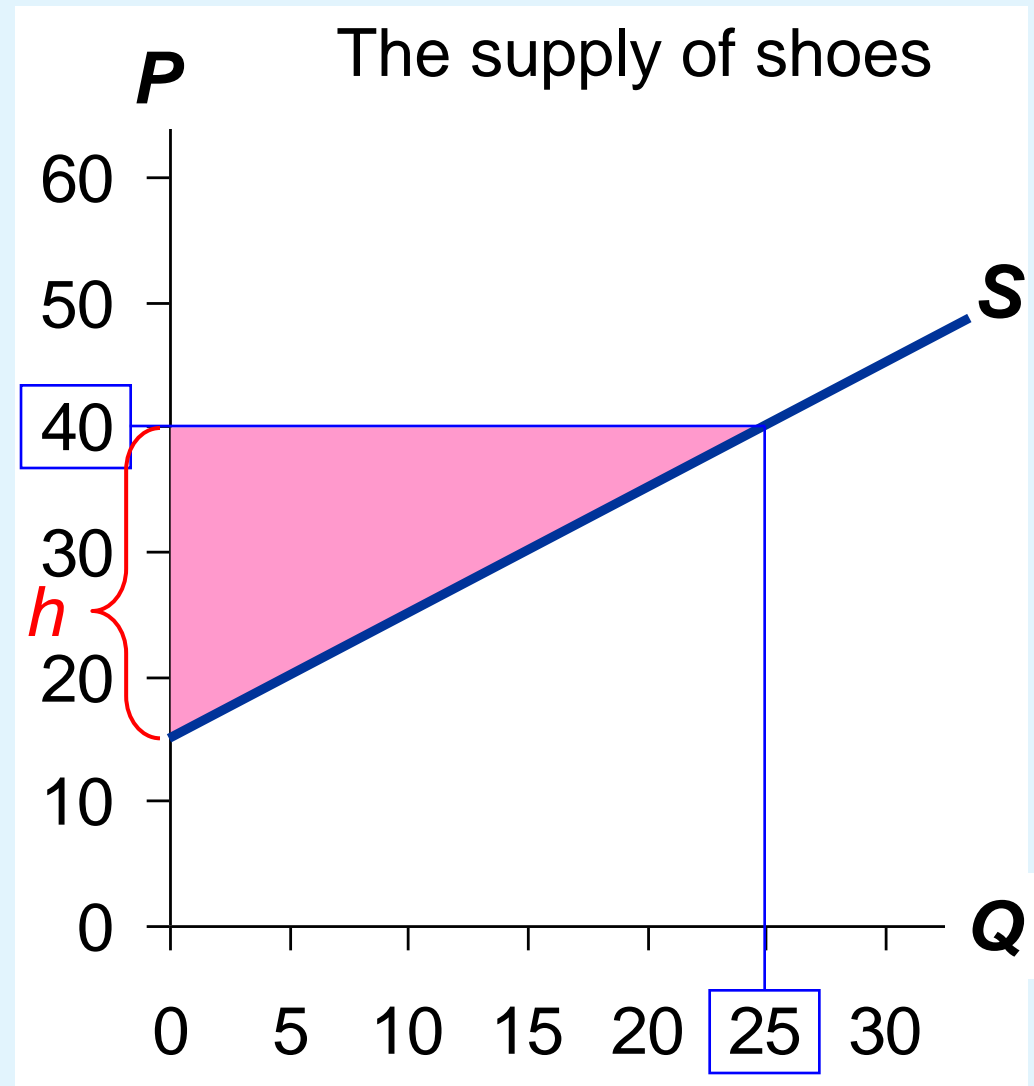
The supply of shoes

1000s of pairs of shoes

PS with Lots of Sellers & a Smooth S Curve

PS is the area between **P** and the **S** curve, from 0 to **Q**.

The height of this triangle is $40 − 15 = $25.

So,
PS = ½ x *b* x *h*
= ½ x 25 x $25
= $312.50

The supply of shoes

How a Lower Price Reduces PS

If **P** falls to $30,

PS = ½ x 15 x $15
   = <u>$112.50</u>

Two reasons for the fall in PS.

2. Fall in PS due to remaining sellers getting lower **P**

1. Fall in PS due to sellers leaving market

P

60

50

S

40

30

20

10

0

Q

0   5   10   15   20   25   30
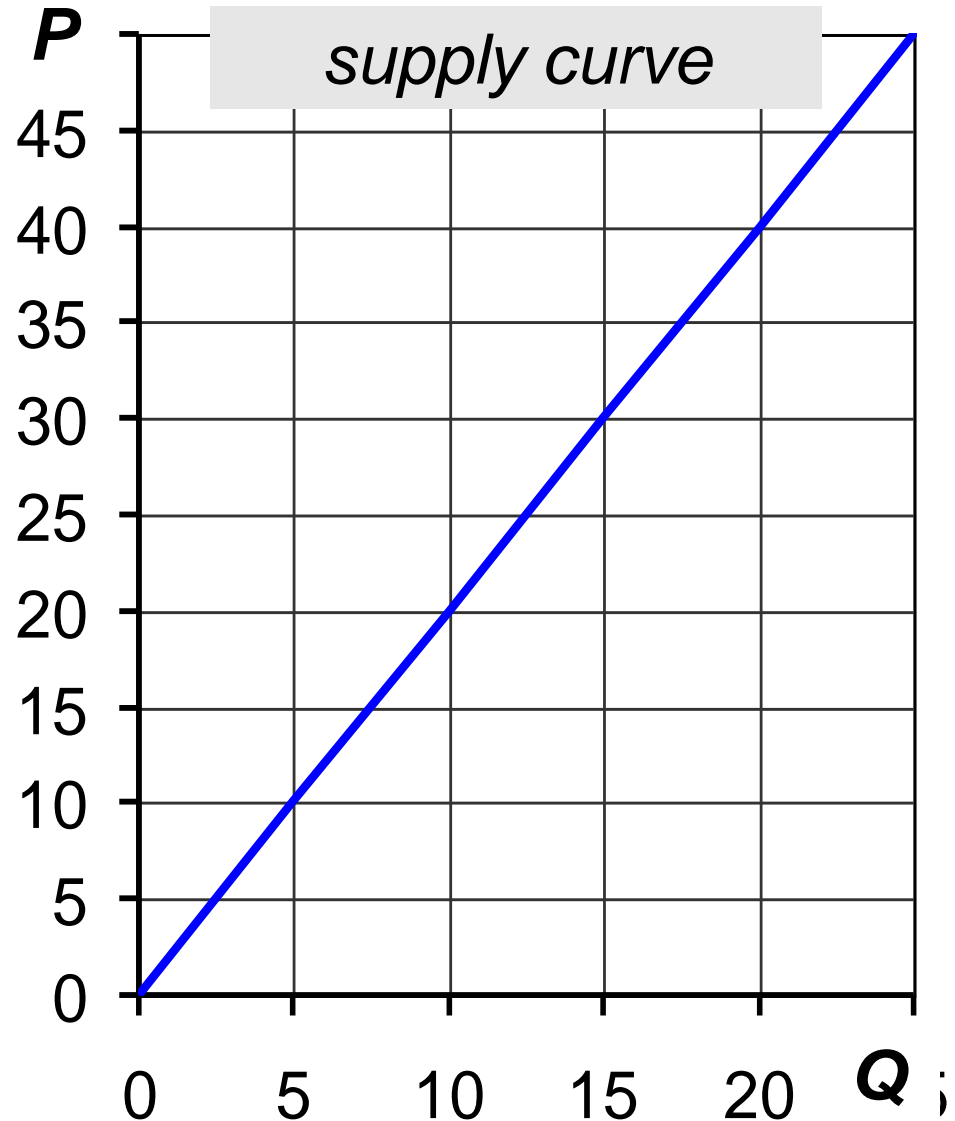
they are depr-rive
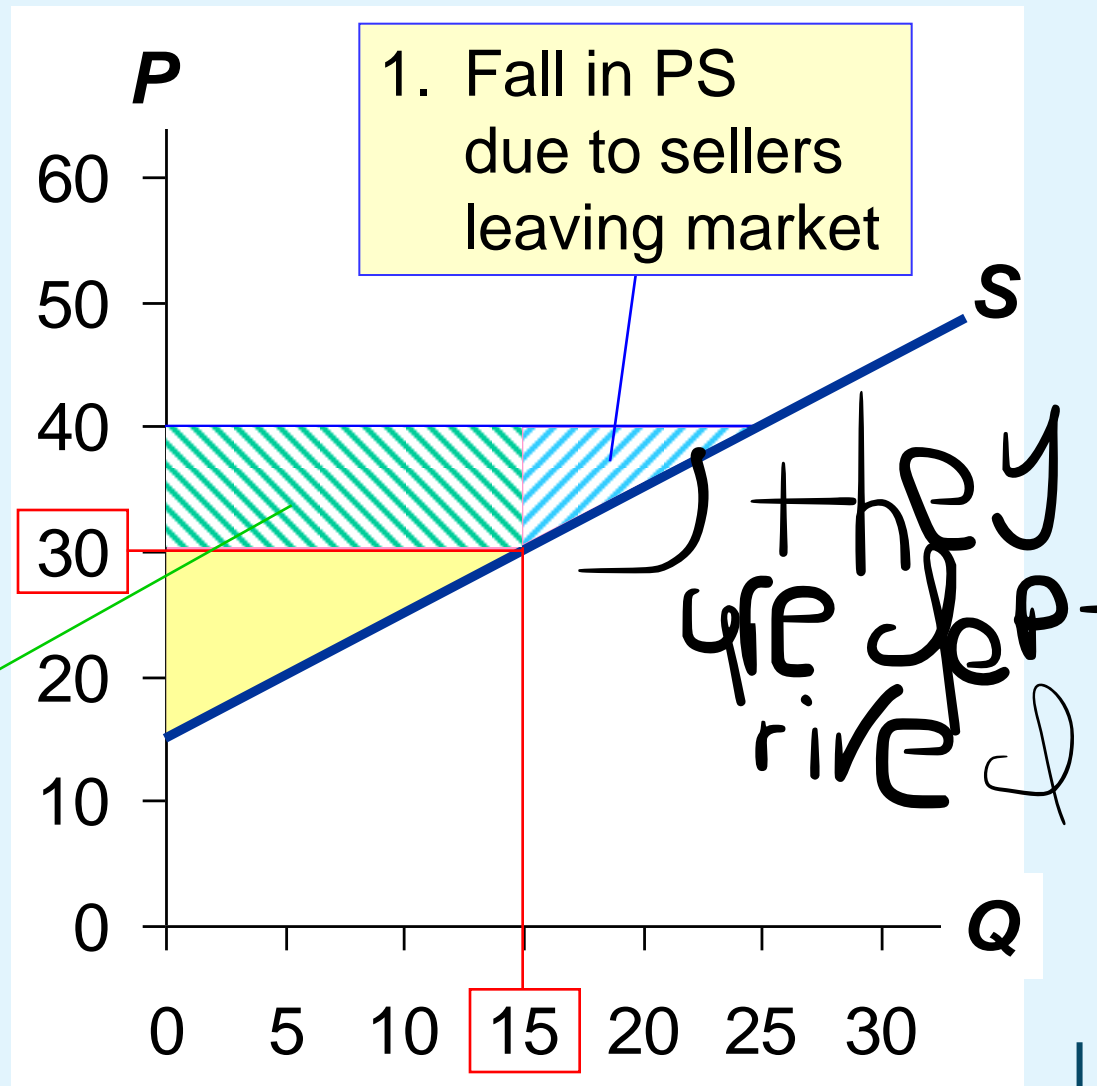
Example: Producer surplus

A. Find marginal seller's cost at Q = 10.

B. Find total PS for P = $20.

Suppose P rises to $30. Find the increase in PS due to:

C. selling 5 additional units

D. getting a higher price on the initial 10 units

supply curve
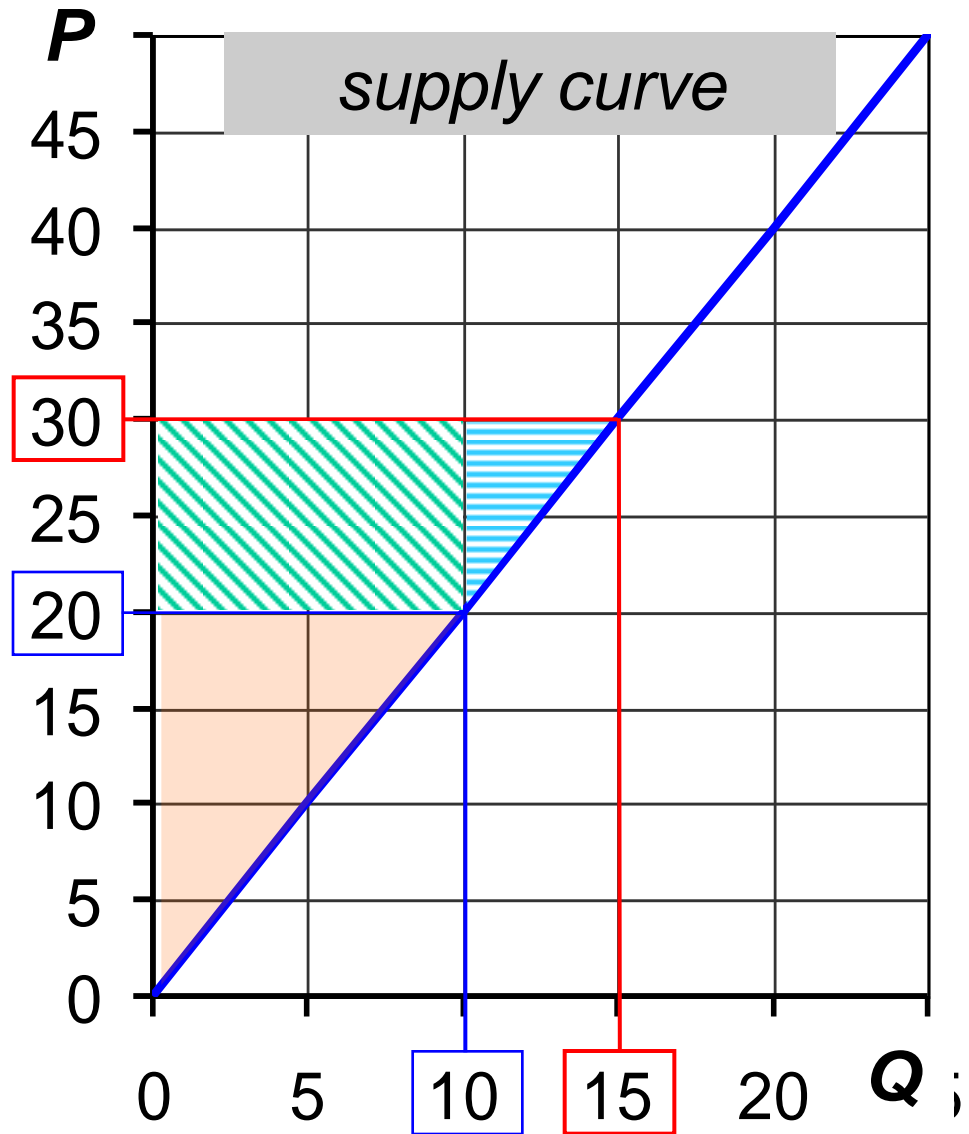
P: 45, 40, 35, 30, 25, 20, 15, 10, 5, 0

Q: 0, 5, 10, 15, 20

Producer surplus

A. At Q = 10, marginal cost = $20

B. PS = ½ x 10 x $20 = $100

P rises to $30.

C. PS on additional units = ½ x 5 x $10 = $25

D. Increase in PS on initial 10 units = 10 x $10 = $100
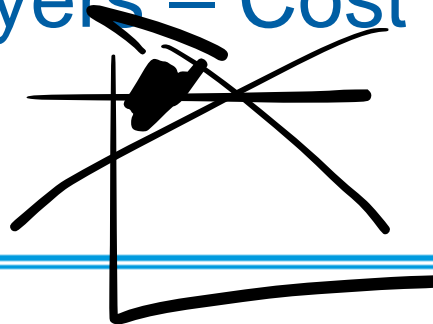

supply curve

28

Market Efficiency

- Total surplus = CS + PS
    - Consumer surplus = Value to buyers – Amount paid by buyers ρ
        - Buyers' gains from participating in the market
    - Producer surplus = Amount received by sellers – Cost to sellers ρ
        - Sellers' gains from participating in the market

Total surplus = Value to buyers – Cost to sellers

Market's Allocation of Resources

- Allocation of resources – desirable?
  - Decentralized (in a market economy)
    - Determined by interactions of many self-interested buyers and sellers
  - Total surplus – measure of society's well-being
    - To consider whether the market's allocation is efficient

Market's Allocation of Resources

- Efficient allocation of resources maximizes total surplus
  1. The goods are consumed by the buyers who value them most highly
  2. The goods are produced by the producers with the lowest costs
  3. Raising or lowering the quantity of a good would not increase total surplus
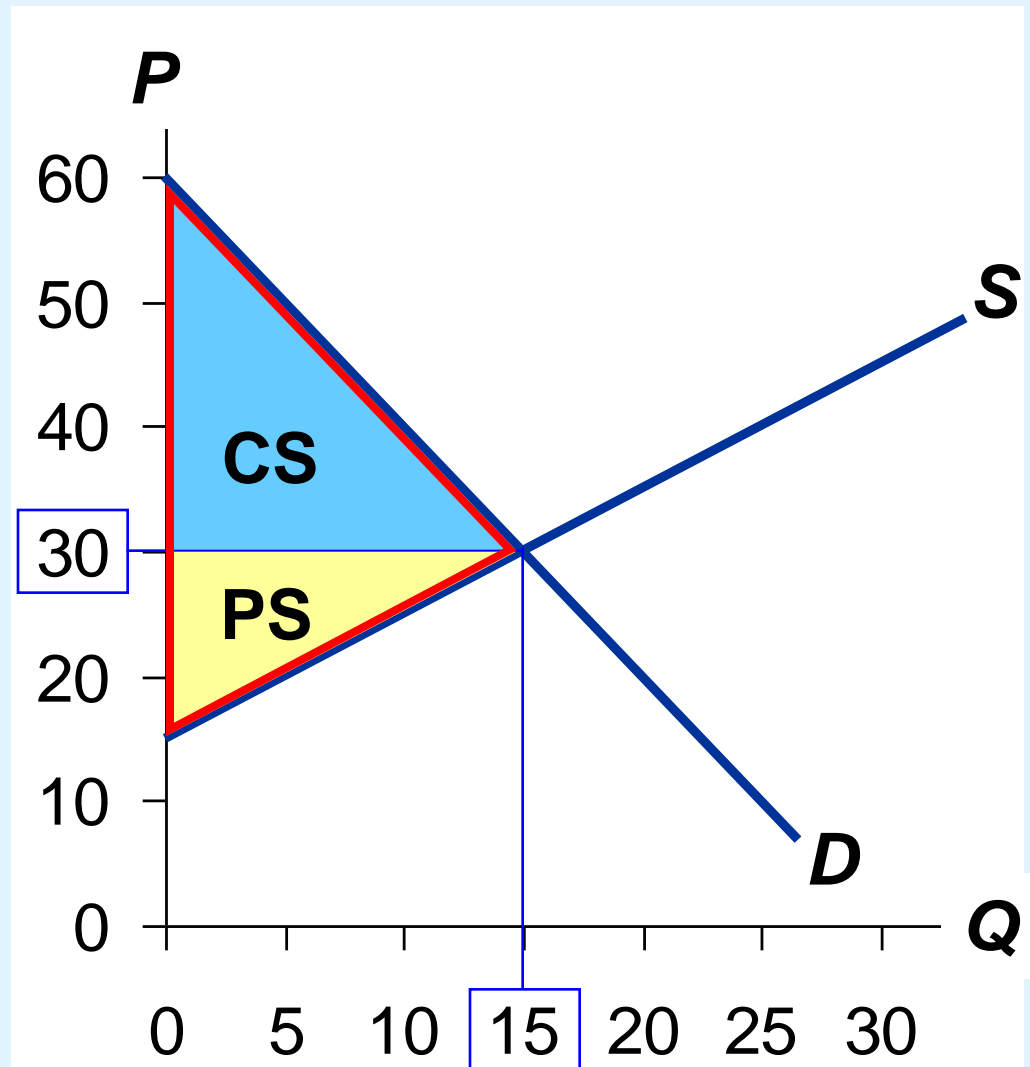
Evaluating the Market Equilibrium

Market equilibrium:
  P = $30
  Q = 15 (thousand)
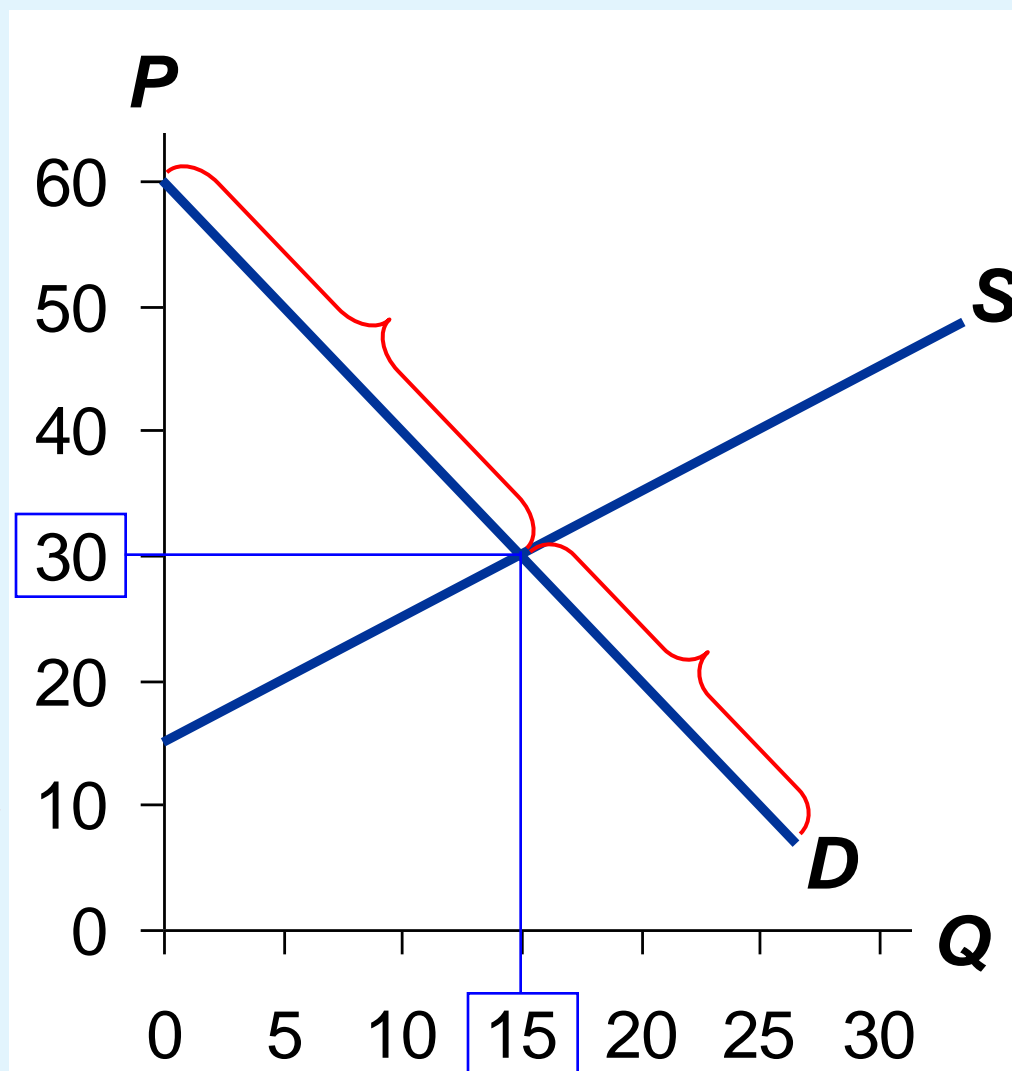Total surplus
  = CS + PS

Is the market
equilibrium efficient?

Which Buyers Consume the Good?

Every buyer whose WTP is ≥ $30 will buy.

Every buyer whose WTP is < $30 will not.

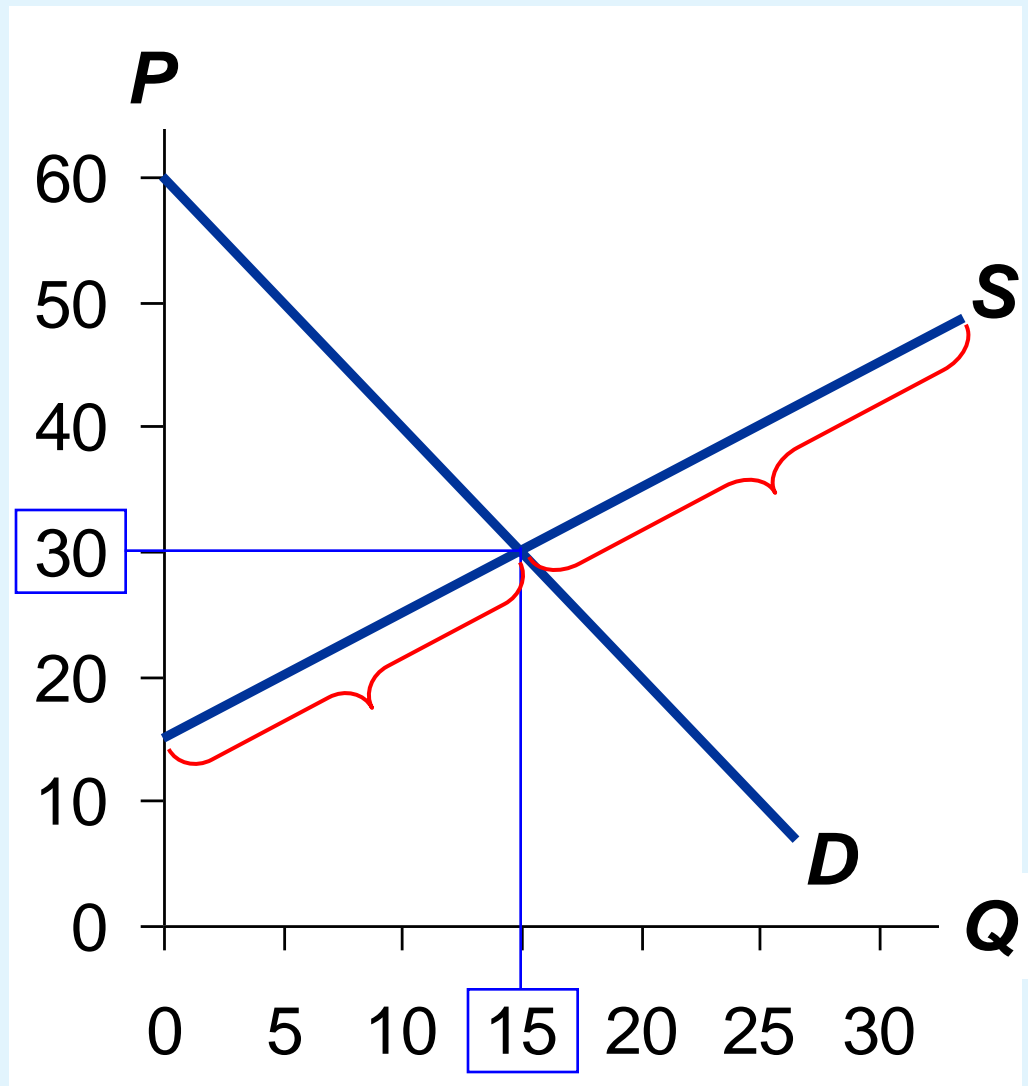*The buyers who value the good most highly are the ones who consume it.*

Which Sellers Produce the Good?

Every seller whose cost is ≤ $30 will produce the good.

Every seller whose cost is > $30 will not.

The sellers with the lowest cost produce the good.

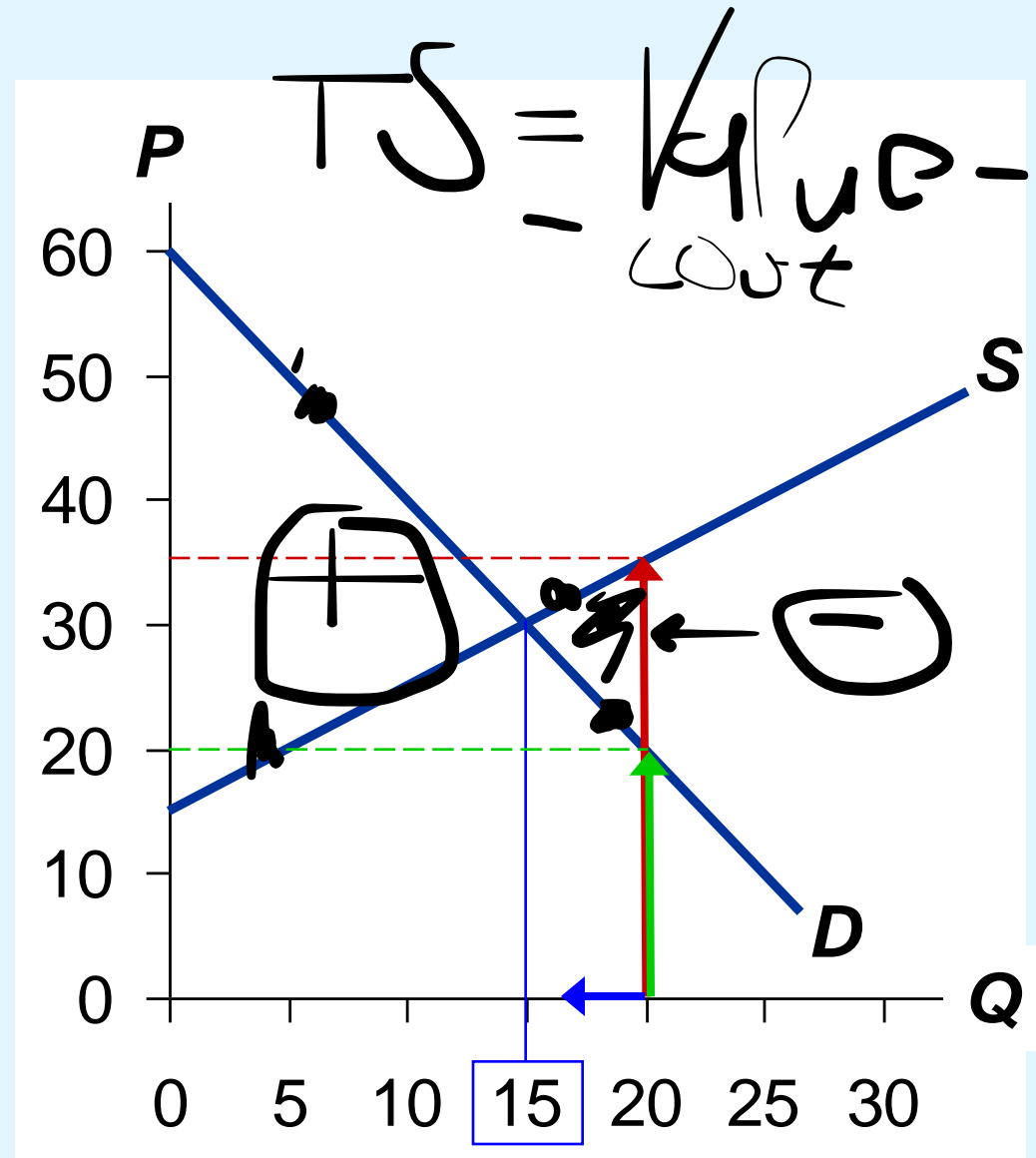# Does Equilibrium *Q* Maximize Total Surplus?

At **Q** = 20, cost of producing the marginal unit is $35

value to consumers of the marginal unit is only $20

Hence, can increase total surplus by reducing **Q**.
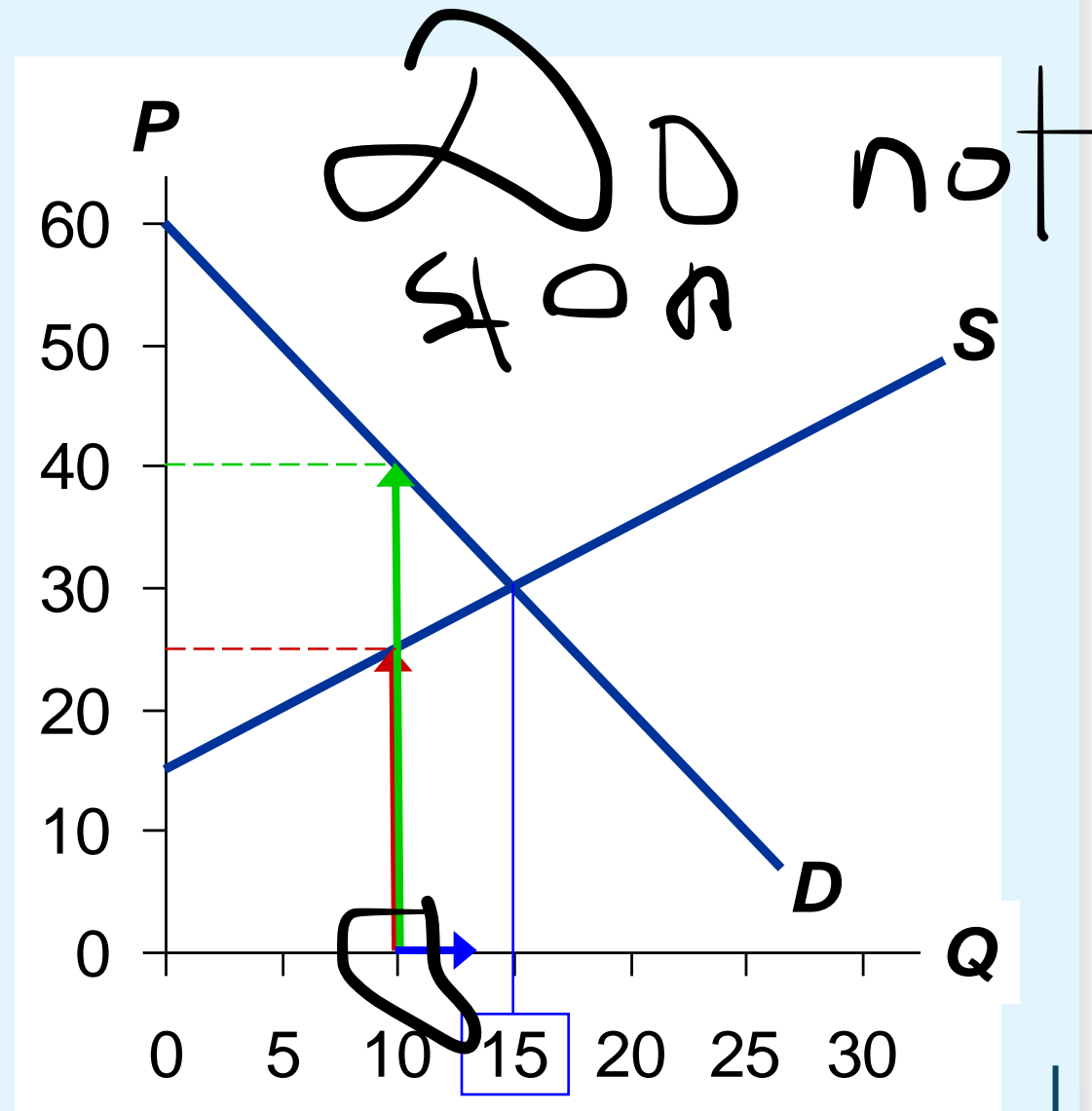
*This is true at any **Q** greater than 15.*

Does Equilibrium _Q_ Maximize Total Surplus?

At **_Q_** = 10, cost of producing the marginal unit is $25

value to consumers of the marginal unit is $40

Hence, can increase total surplus by increasing **_Q_**.

This is true at any **Q** less than 15.

Market Efficiency

- Adam Smith's invisible hand
    - Takes all the information about buyers and sellers into account
    - Guides everyone in the market to the best outcome
    - Economic efficiency
- Free markets
    - Good way to organize economic activity

Market Efficiency & Market Failure

- Forces of supply and demand
  - Allocate resources efficiently
- Assumptions about how markets work
  1. Markets are perfectly competitive
  2. Outcome in a market matters only to the buyers and sellers in that market
- When these assumptions do not hold
  - "Market equilibrium is efficient" may no longer be true

Market Efficiency & Market Failure

- Market failures
  - Market power: a single buyer or seller (small group) control market prices
    - Markets are inefficient
  - Externalities: decisions of buyers and sellers affect people who are not participants in the market at all
    - Inefficient equilibrium - from the standpoint of society as a whole

Summary

- Consumer surplus: buyers' willingness to pay for a good minus the amount they actually pay
  - Measures the benefit buyers get from participating in a market
  - Area below the *D* curve and above *P*
- Producer surplus: amount sellers receive for their goods minus their costs of production
  - Measures the benefit sellers get from participating in a market
  - Area below *P* and above the *S* curve

Summary

- An allocation of resources that maximizes total surplus is said to be efficient
  - Policymakers are concerned with the efficiency, as well as the equality, of economic outcomes.
- Equilibrium of *S* and *D* maximizes total surplus
  - The invisible hand of the marketplace leads buyers and sellers to allocate resources efficiently.
- Markets do not allocate resources efficiently in the presence of market failures (market power or externalities)