

Chapter 8: The Invisible Hand in Action

Tuesday, July 13

QUESTION 1 (equilibrium price)

$$MB = 30 - 1.5Q$$

$$MC = 10 + .5Q$$

What is the price at equilibrium?

- A) 5
- B) 10
- C) 15
- D) 20
- E) 30

answer to question 1

$$MB = 30 - 1.5Q$$

$$MC = 10 + .5Q$$

What is the price at equilibrium?

A) 5

B) 10

C) 15

D) 20

E) 30

$$30 - 1.5Q = 10 + .5Q$$

$$2Q = 20$$

$$Q = 10$$

$$MB = 30 - 15 = 15$$

$$MC = 10 + 5 = 15$$

QUESTION 2 (quantity with price floor)

$$\text{MB} = 30 - 1.5Q$$

$$\text{MC} = 10 + .5Q$$

If there is a price floor (minimum price) of 21, what is the quantity bought and sold?

- A) 6**
- B) 10**
- C) 15**
- D) 20**
- E) 22**

answer to question 2

$$\text{MB} = 30 - 1.5Q$$

$$\text{MC} = 10 + .5Q$$

If there is a price floor of 21, what is the quantity bought and sold?

$$\text{MB} = 30 - 1.5Q \rightarrow 1.5Q = 30 - P$$

A) 6

$$\rightarrow Q_d = 20 - 2P/3$$

B) 10

C) 15

$$Q_d(21) = 20 - 14 = 6$$

D) 20

E) 22

$$\text{MC} = 10 + .5Q \rightarrow .5Q = P - 10$$

$$\rightarrow Q_s = 2P - 20$$

$$Q_s(21) = 42 - 20 = 22$$

QUESTION 3 (marginal benefit at new quantity)

$$\text{MB} = 30 - 1.5Q$$

$$\text{MC} = 10 + .5Q$$

If there is a price floor (minimum price) of 21, the quantity bought and sold is 6. At this quantity, what is the sellers' marginal cost?

- A) 6**
- B) 10**
- C) 13**
- D) 21**
- E) 30**

answer to question 3

$$MB = 30 - 1.5Q$$

$$MC = 10 + .5Q$$

If there is a price floor of 21, the quantity bought and sold is 6. At this quantity, what is the sellers' marginal cost?

- A) 6
- B) 10
- C) 13
- D) 21
- E) 30

$$MC = 10 + .5Q$$

$$MC = 10 + .5(6)$$

$$MC = 13$$

QUESTION 4 (deadweight loss)

$$MB = 30 - 1.5Q$$

$$MC = 10 + .5Q$$

What is the deadweight loss associated with imposing the price floor of 21?

- A) 13**
- B) 32**
- C) 4**
- D) 8**
- E) 16**

answer to question 4

$$\text{MB} = 30 - 1.5Q$$

$$\text{MC} = 10 + .5Q$$

$$\text{DWL} = .5(21-13)(4)$$

$$\text{DWL} = .5(8)(4) = 16$$

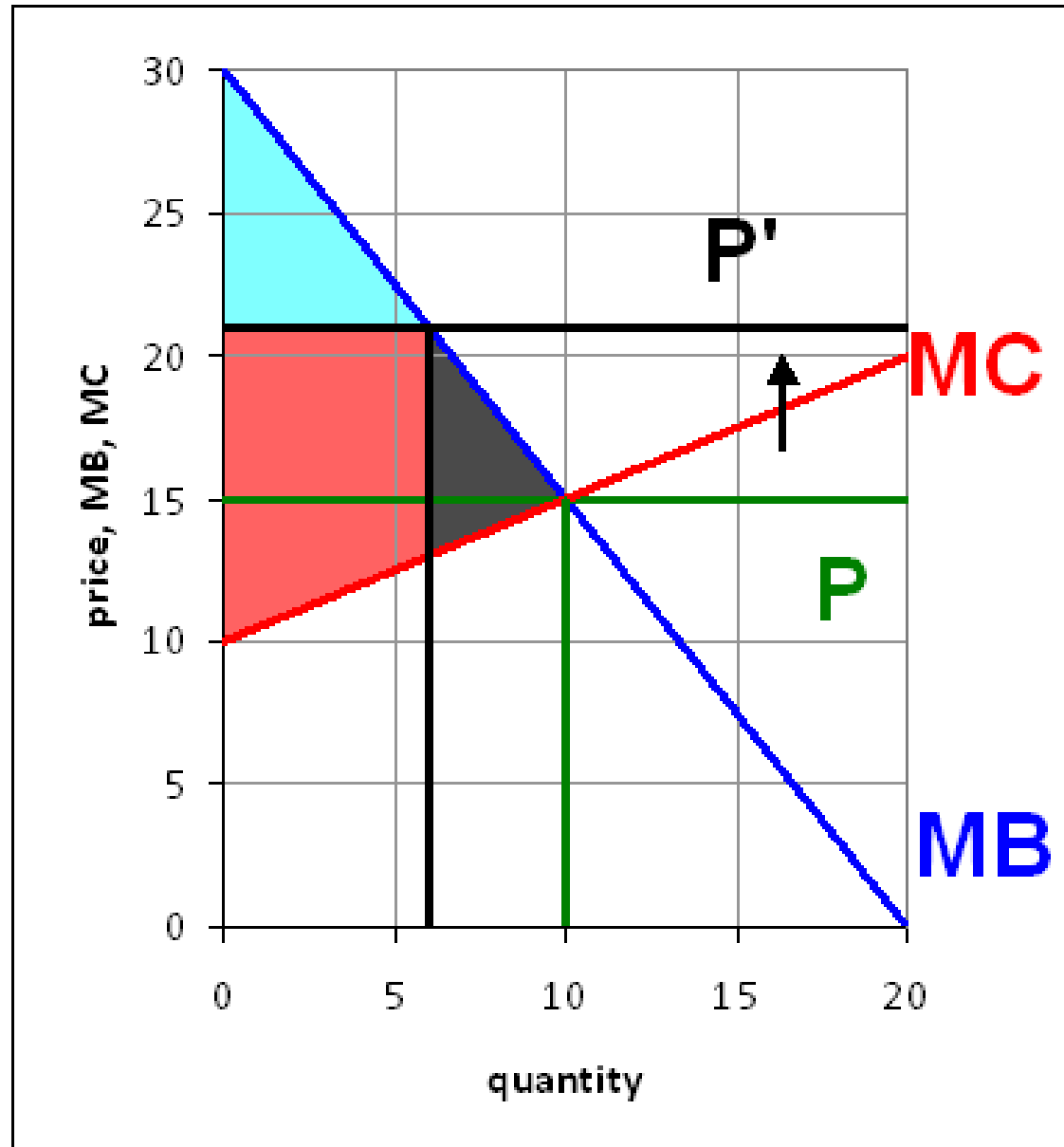
A) 13

B) 32

C) 4

D) 8

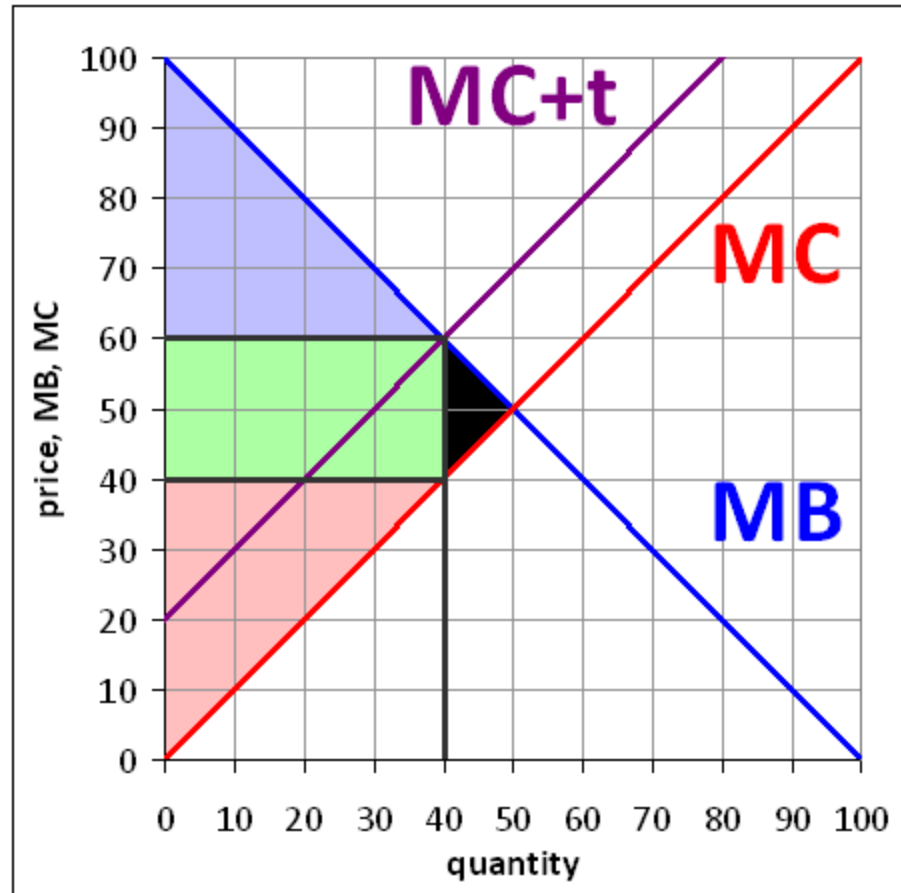
E) 16



TAXES ON EFFICIENT MARKETS

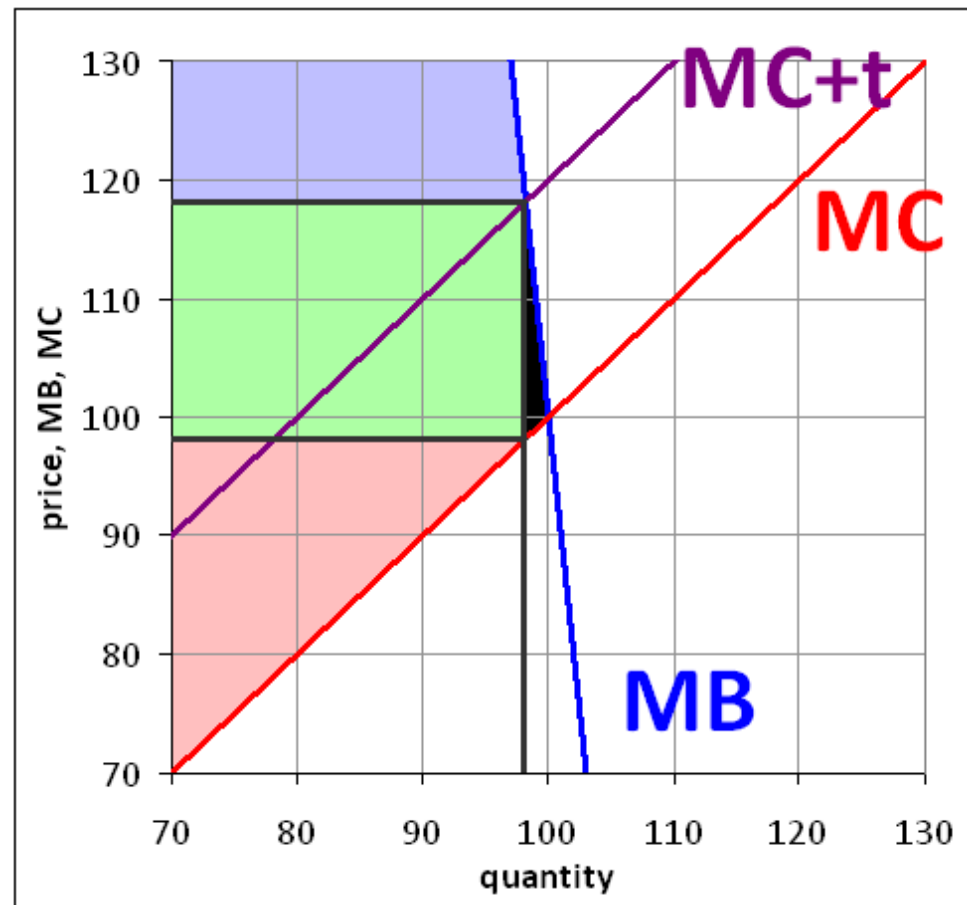
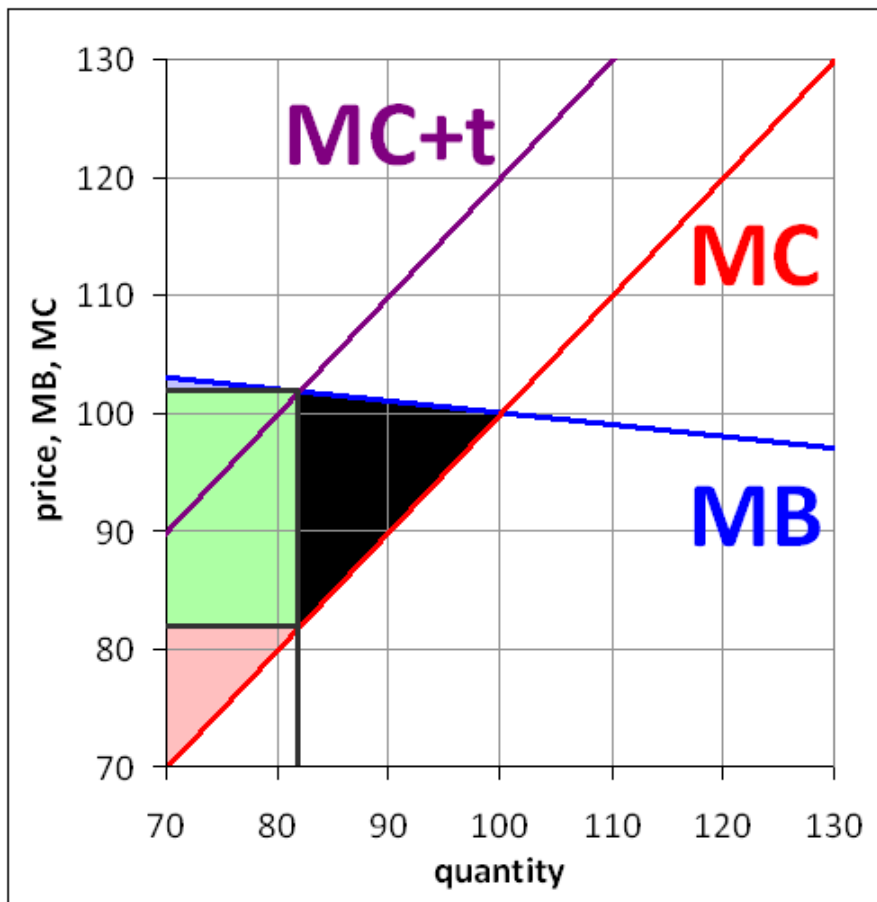
Suppose that we have an initially efficient market (perfectly competitive, with no externalities), and we apply an excise (per unit) tax.

The **blue** area shows **consumer surplus**, the **red** area shows **producer surplus**, and the **green area** shows **government revenue, G**.



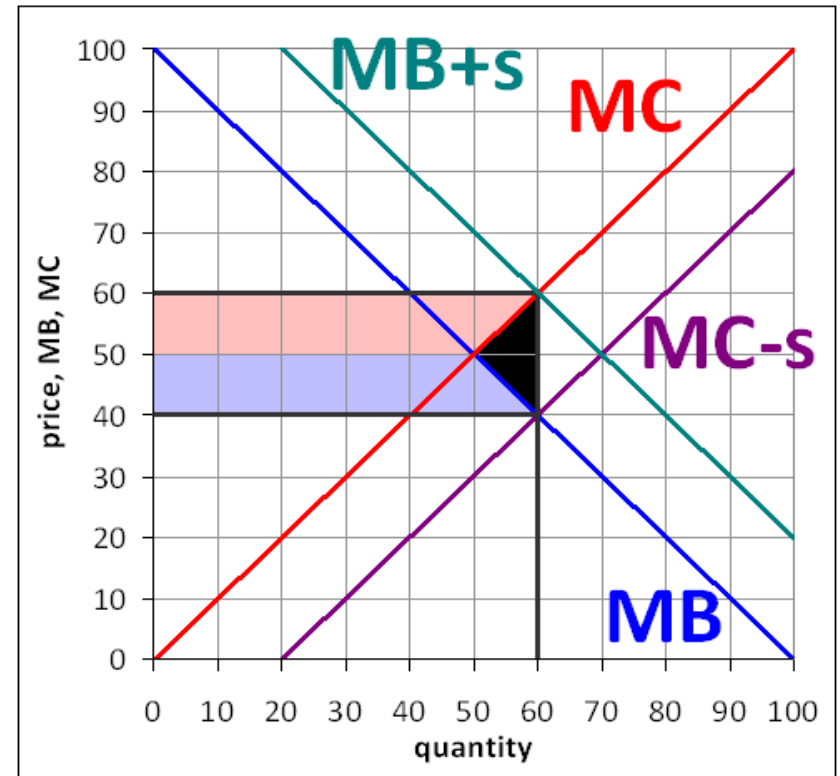
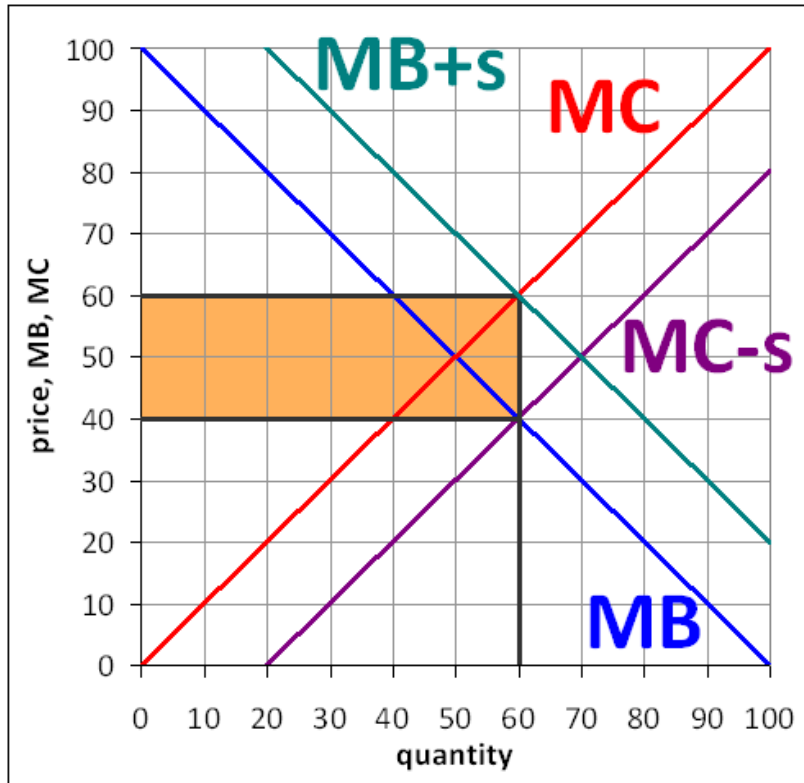
If t is the tax per unit, and Q is the quantity of the good sold, then $G = tQ$.

ELASTICITY AND DEADWEIGHT LOSS



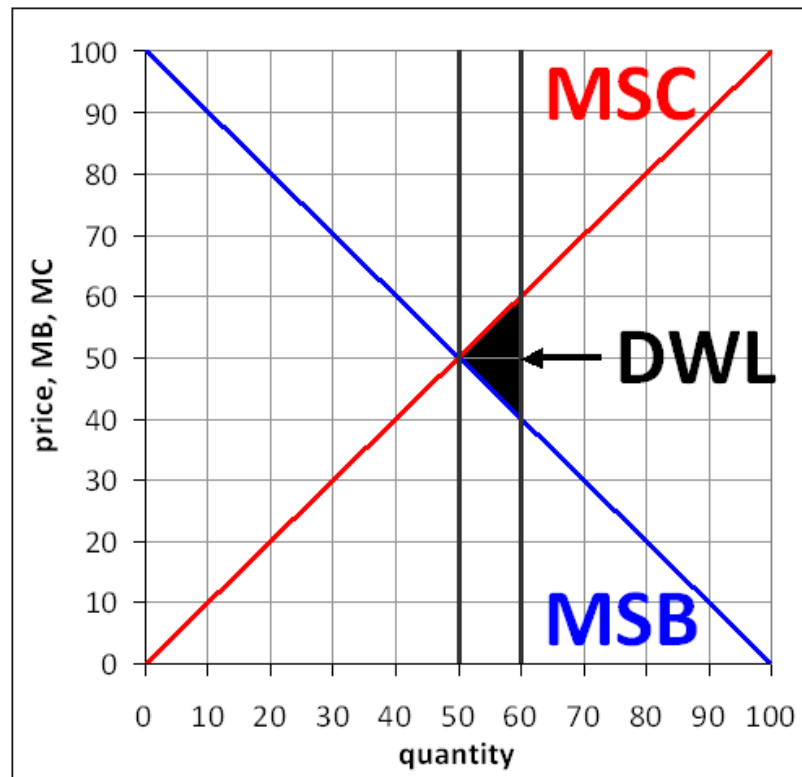
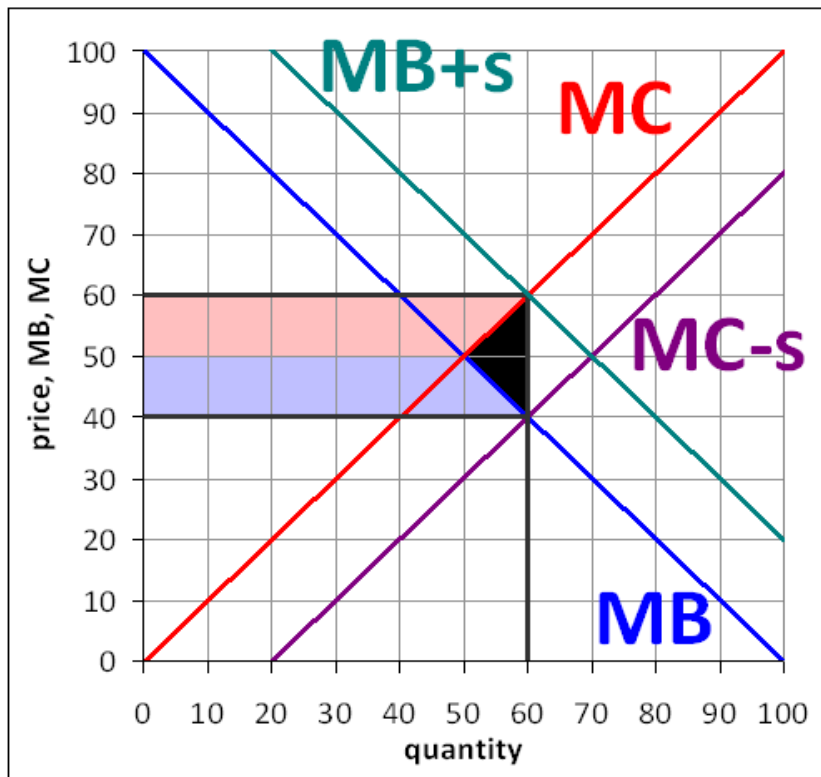
When either the supply or demand is highly elastic (sensitive to price changes), then the deadweight loss of taxation tends to be higher, as shown on the left above. If either is perfectly inelastic, then taxation has no deadweight loss.

ADDING SUBSIDIES TO EFFICIENT MARKETS



Adding a subsidy to an already-efficient market can also cause a loss in total economic surplus. Here, the orange area represents the money that the government must pay to support the subsidy, the blue area represents the gain in consumer surplus, the red area represents the gain in producer surplus, and the black area is a deadweight loss, i.e. lost government revenue that doesn't become either consumer or producer surplus.

ADDING SUBSIDIES TO EFFICIENT MARKETS



Adding a subsidy to an already-efficient market decreases surplus because you are causing the market to produce when the marginal social cost is greater than the marginal social benefit. The distance between these two defines the deadweight loss.

TAXES: ALGEBRA

First, with no tax...

$$\text{MB} = 120 - 2Q$$

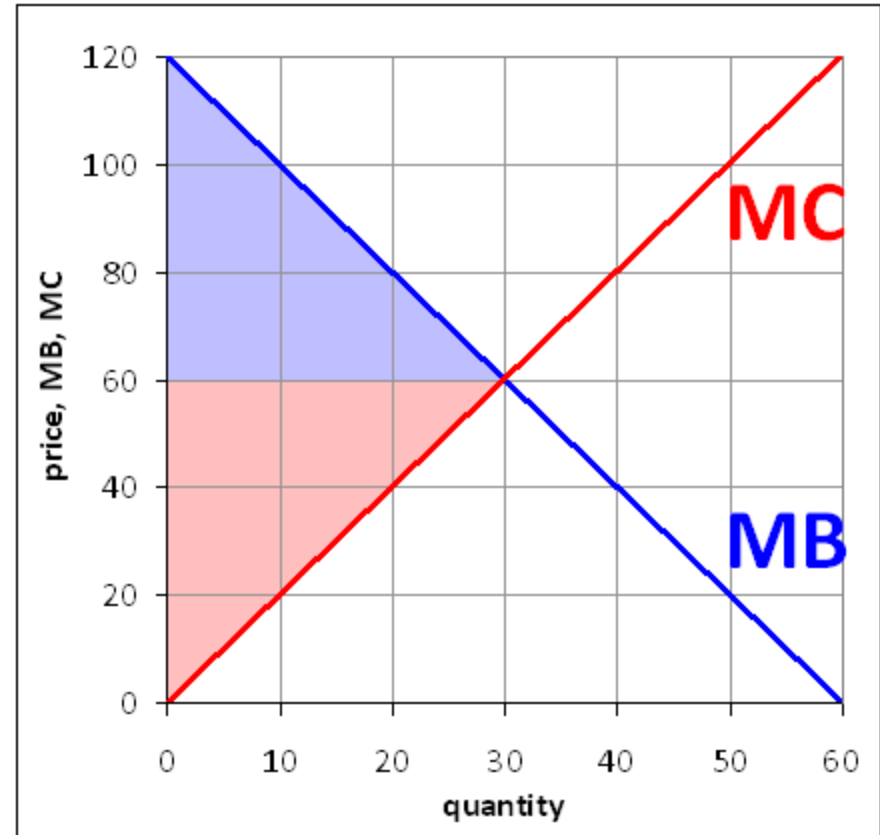
$$\text{MC} = 2Q$$

$$\begin{aligned}\text{MB} = \text{MC} &\rightarrow 120 - 2Q = 2Q \\ \rightarrow 4Q = 120 &\rightarrow Q = 30\end{aligned}$$

$$\text{CS} = (.5)(30)(60) = 900$$

$$\text{PS} = (.5)(30)(60) = 900$$

$$\text{TES} = \text{CS} + \text{PS} = 1800$$



TAXES: ALGEBRA

$$\text{MB} = 120 - 2Q$$

$$\text{MC} = 2Q$$

$$t = 40$$

$$\text{MB} = \text{MC} + t$$

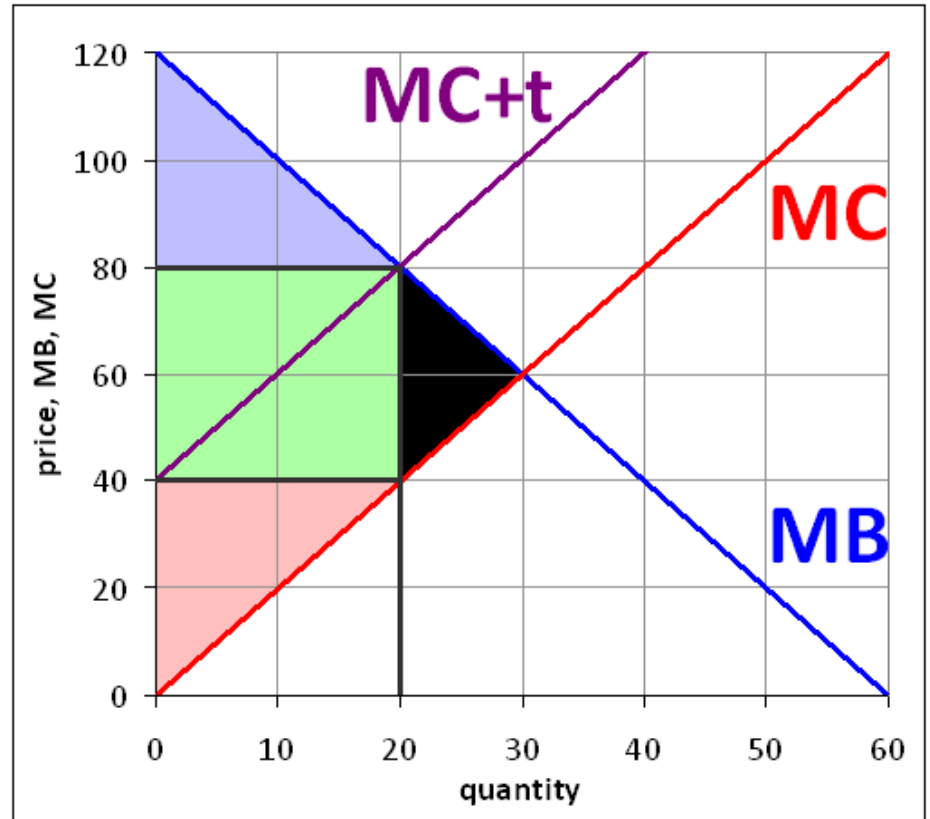
$$\rightarrow 120 - 2Q = 2Q + 40$$

$$\rightarrow 4Q = 80 \rightarrow Q = 20$$

$$\text{CS} = (.5)(20)(40) = 400$$

$$\text{PS} = (.5)(20)(40) = 400$$

$$\text{G} = tQ = (40)(20) = 800$$



With the tax of 40, $\text{TES} = \text{CS} + \text{PS} + \text{G} = 1600$.

Without the tax, TES was 1800, so $\text{DWL} = 200$.

You can also find that using $\text{DWL} = (.5)(10)(40)$, calculating the area on the graph above.

QUESTION 5 (tax, ΔQ)

$$\text{MB} = 100 - x$$

$$\text{MC} = x$$

If a tax of \$20 per unit is imposed, then how much of the good will be bought and sold in equilibrium?

A) 70

B) 80

C) 40

D) 50

E) 0

answer to question 5

$$\text{MB} = 100 - x$$

$$\text{MC} = x$$

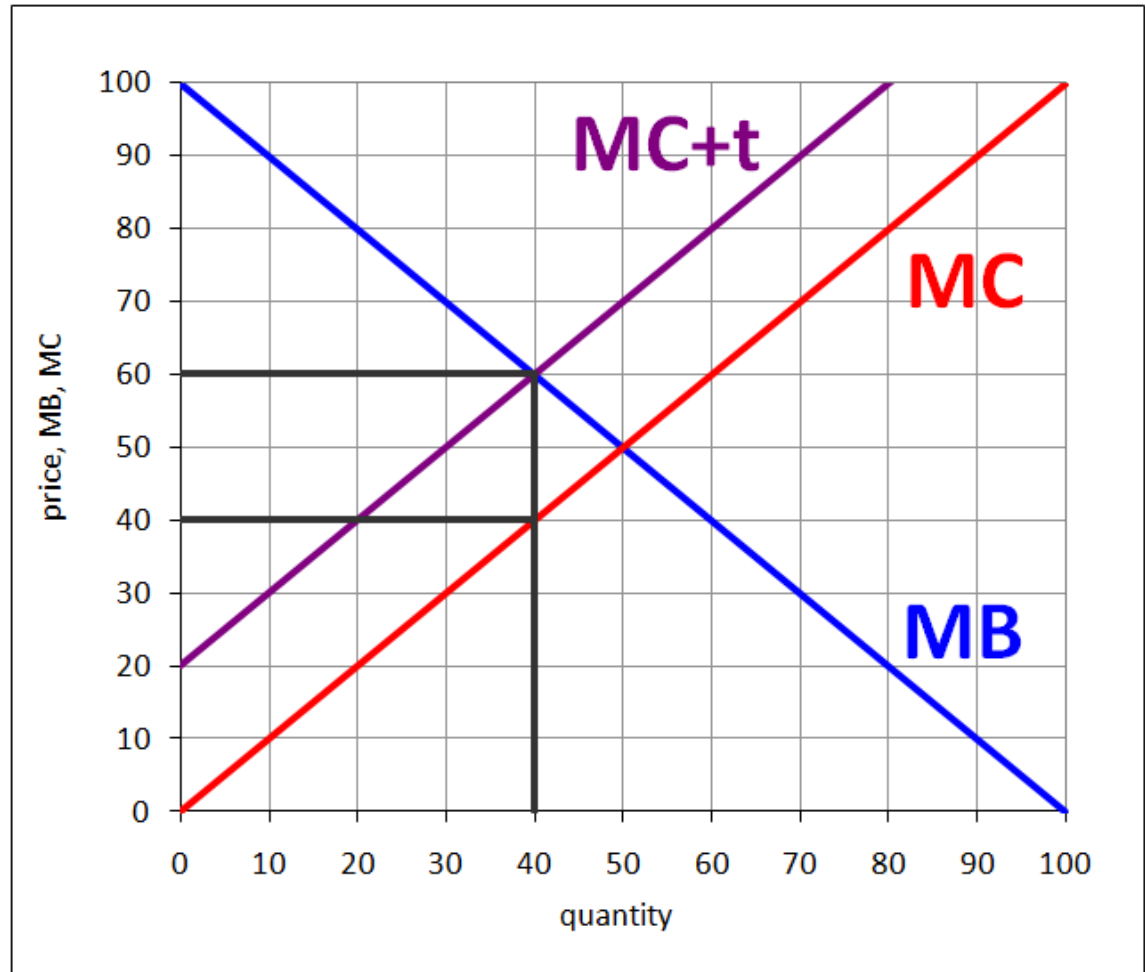
If a tax of \$20 per unit is imposed, then how much of the good will be bought and sold in equilibrium?

$$\text{MB} = \text{MC} + t$$

$$\rightarrow 100 - x = x + 20$$

$$\rightarrow 2x = 80$$

$$\rightarrow x^* = 40$$



A) 70

B) 80

C) 40

D) 50

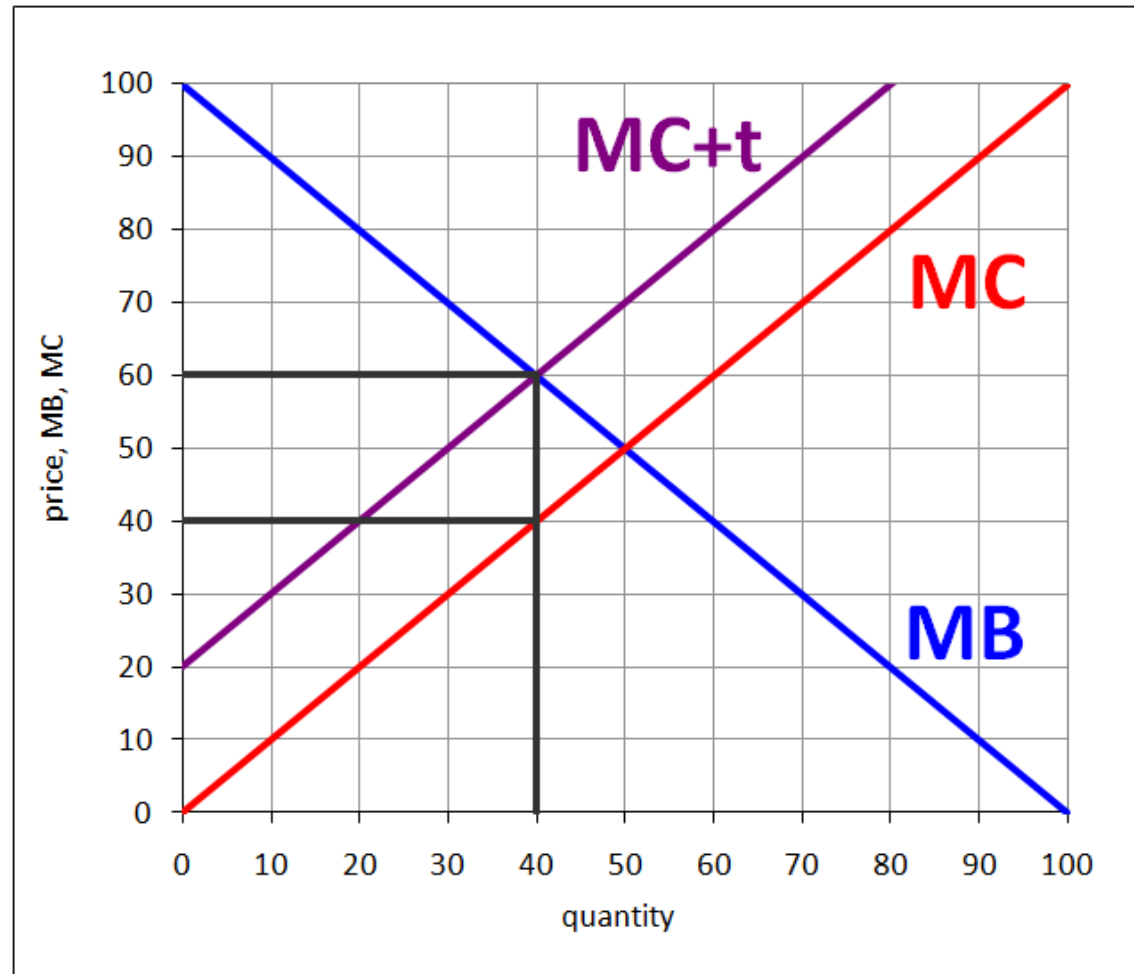
E) 0

QUESTION 6 (tax, G)

$$MB = 100 - x$$

$$MC = x$$

If a tax of \$20 per unit is imposed, then the equilibrium quantity will change from 50 to 40. How much **revenue** will the government get from the tax?



A) 800

B) 600

C) 1000

D) 2000

E) 0

answer to question 6

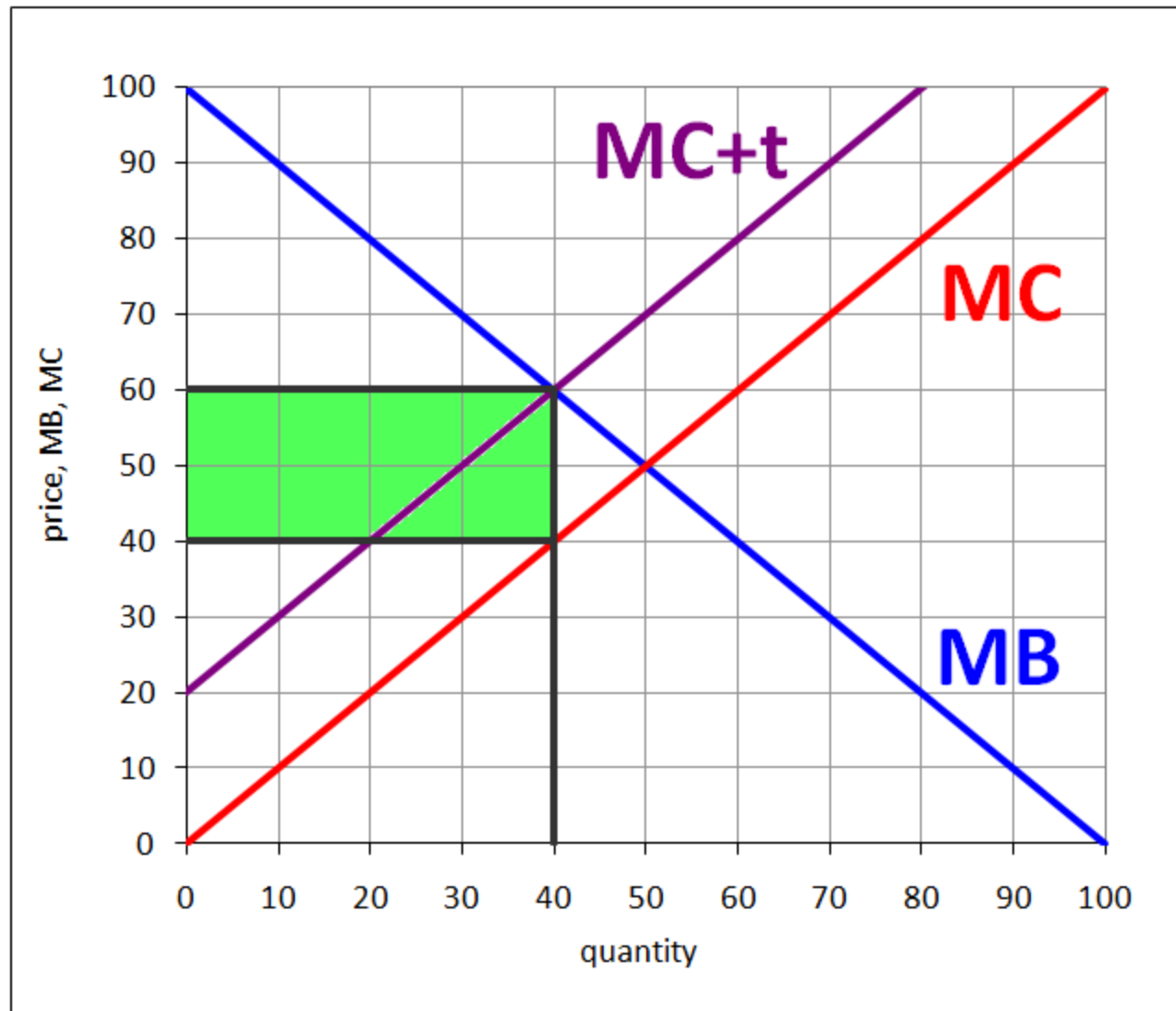
$$\text{MB} = 100 - x$$

$$\text{MC} = x$$

$$t = 20$$

$$Q = 40$$

$$G = tQ = 20 \times 40 \\ = 800$$



A) 800

B) 600

C) 1000

D) 2000

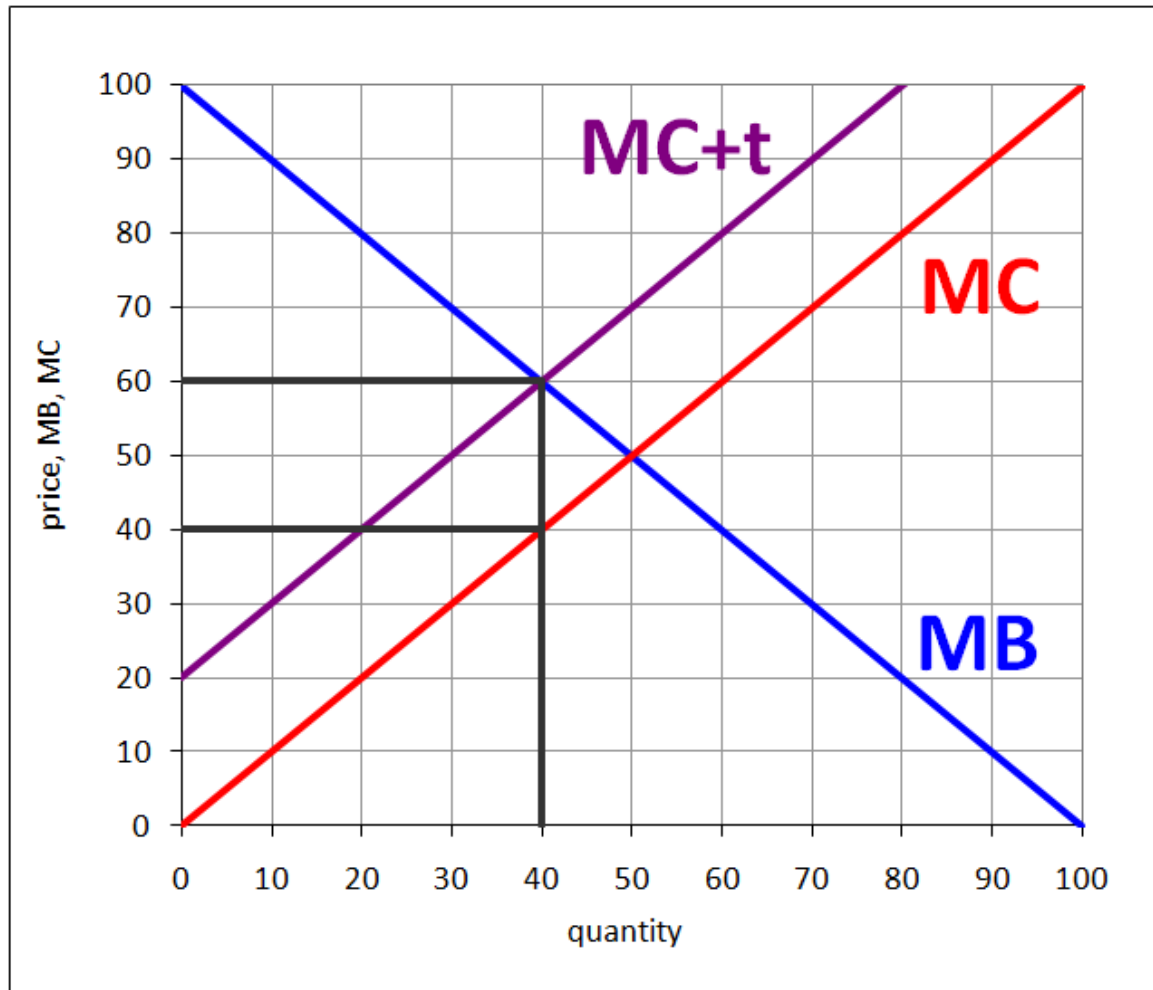
E) 0

QUESTION 7 (tax, DWL)

$$\text{MB} = 100 - x$$

$$\text{MC} = x$$

If a tax of \$20 per unit is imposed, then the equilibrium quantity will change from 50 to 40. How much **deadweight loss** will result from the tax? (That is, by how much will TES decrease in this market?)



A) 400

B) 480

C) 100

D) 240

E) 140

answer to question 7

$$\text{MB} = 100 - x$$

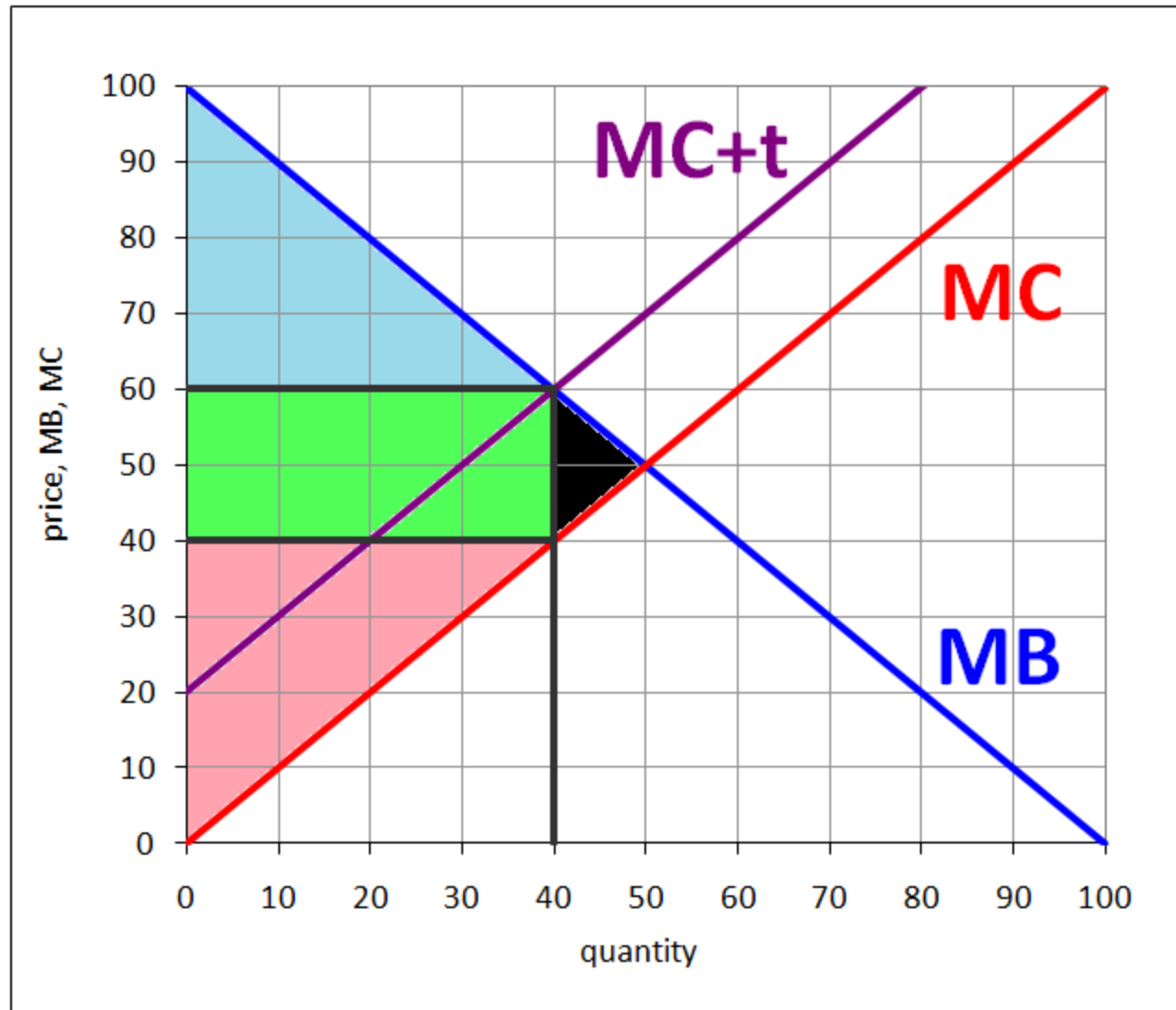
$$\text{MC} = x$$

$$t = 20$$

$\Delta Q = 10$ (changed from 50 to 40)

$$\text{DWL} = (.5)(10)(20)$$

$$\text{DWL} = 100$$



A) 400

B) 480

C) 100

D) 240

E) 140

ECONOMIC PROFIT

Accounting profit = total revenue – explicit costs

Economic profit = total revenue – explicit costs – implicit costs

For example, a firm has...

revenue = 400 per year, explicit costs = 250 per year, and is using capital that is worth 1000. The interest rate is 10% per year.

Accounting profit = 400 – 250 = 150

Economic profit = 400 – 250 – ?

ECONOMIC PROFIT

For example, a firm has **revenue = 400 per year**, **explicit costs = 250 per year**, and is using capital that is worth 1000. The interest rate is 10% per year.

$$\text{Accounting profit} = 400 - 250 = 150$$

$$\text{Economic profit} = 400 - 250 - ?$$

If the firm's owners sell the capital and loan the money to someone at the prevailing interest rate, they will get 100 per year. Thus, implicit costs are **100**.

$$\text{Economic profit} = 400 - 250 - 100 = 50$$

QUESTION 5 (economic profit)

A firm has **revenue = 900 per year**, **explicit costs = 600 per year**, and is using capital that is worth 1000. The interest rate is 5% per year.

What is the firm's **economic profit**?

- A) 0
- B) 200
- C) 250
- D) 300
- E) 900

answer to question 5

A firm has **revenue = 900 per year**, **explicit costs = 600 per year**, and is using capital that is worth **1000**. The interest rate is **5% per year**.

What is the firm's **economic profit**?

A) 0

B) 200

C) 250

D) 300

E) 900

$$\text{Implicit costs} = (1000)(.05) = 50$$

$$\text{Economic profit} = 900 - 600 - 50 = 250$$

QUESTION 5 (economic profit)

I own a small business.

My total revenue is **200** per year.

I pay my employees **150** per year.

The capital that I use to run the business could be sold for 600.

The interest rate is 5% per year.

I work full time at running the business; if I wasn't doing that, I'd be able to get another job that paid 40 per year.

What is my **economic profit** (per year)?

A) 200

B) 50

C) 10

D) -20

E) -590

answer to question 5

My total revenue is **200** per year.

I pay my employees **150** per year.

The capital that I use to run the business could be sold for 600. The interest rate is 5% per year. **An implicit cost of $(600)(.05) = 30$**

I work full time at running the business; if I wasn't doing that, I'd be able to get another job that paid **40** per year.

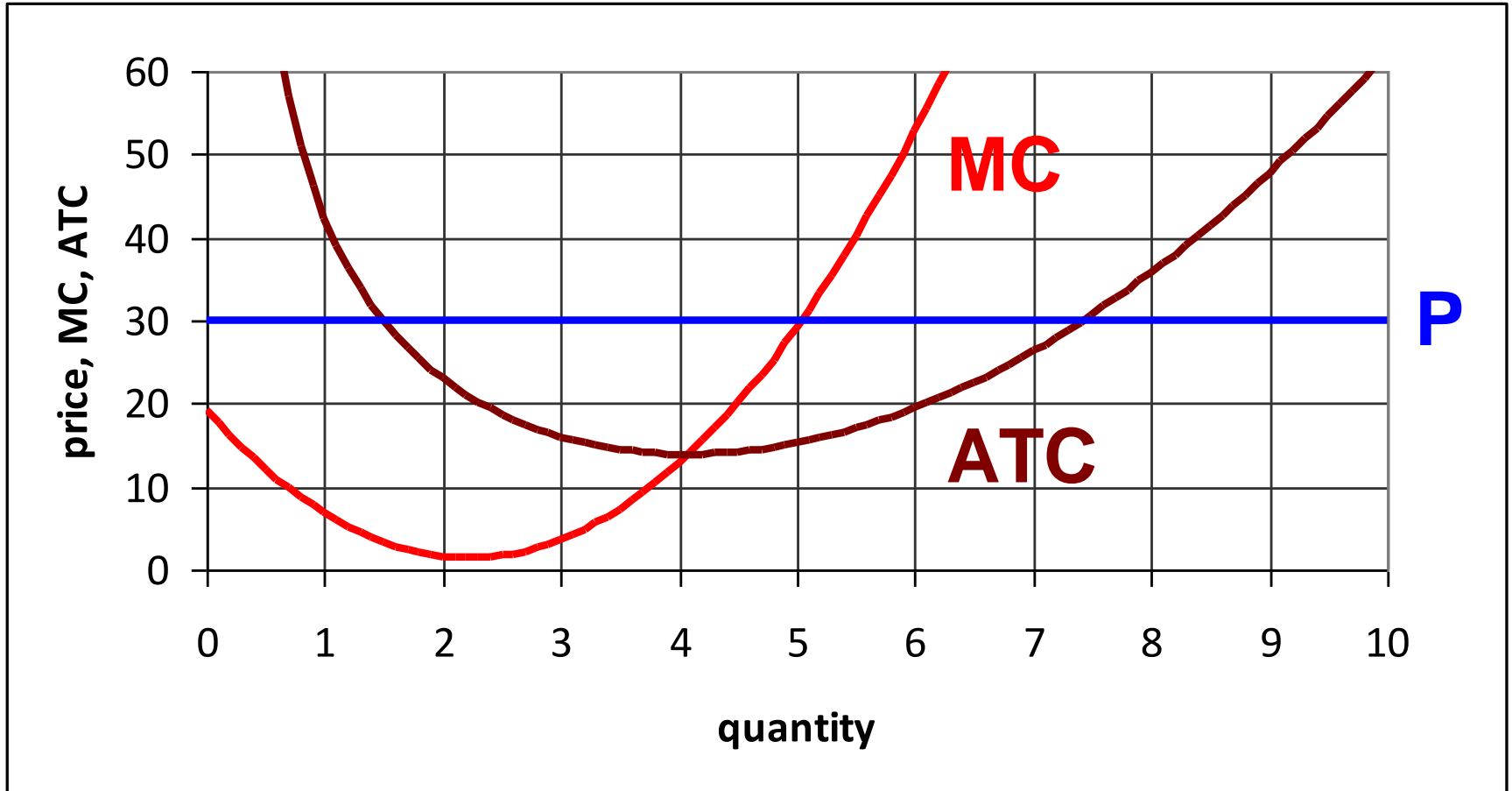
$$AP = \text{rev} - \text{exp.costs} = 200 - 150 = 50$$

$$EP = \text{rev} - \text{exp.costs} - \text{imp.costs}$$

$$EP = 200 - 150 - (30 + 40) = -20$$

D) -20

QUESTION 6 (optimal supply, with fixed cost)



Judging by the graph above, the firm will choose to supply a quantity close to...

A) 1.5

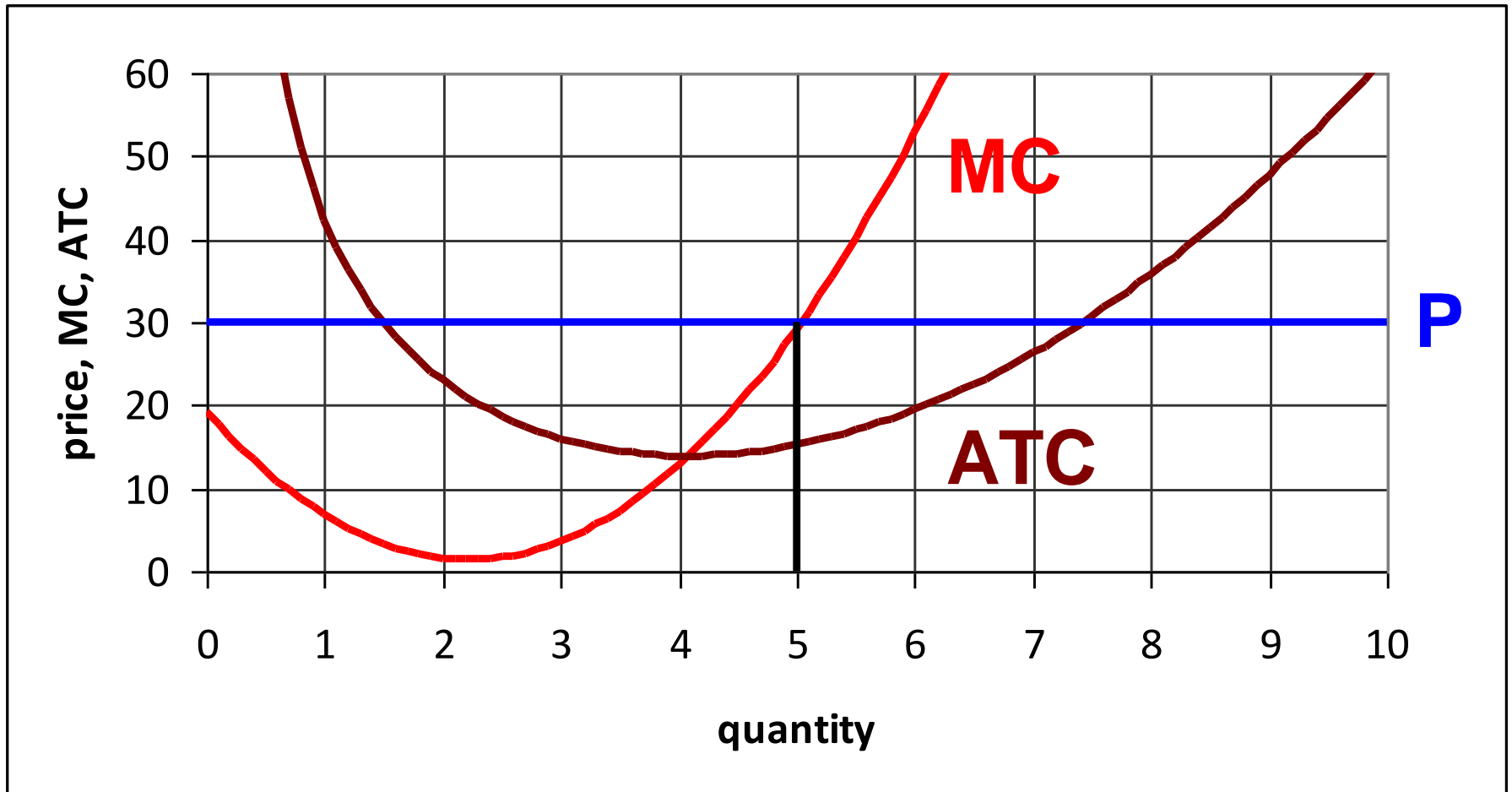
B) 2

C) 4

D) 5

E) 7.5

answer to question 6



Judging by the graph above, the firm will choose to supply a quantity close to...

A) 1.5

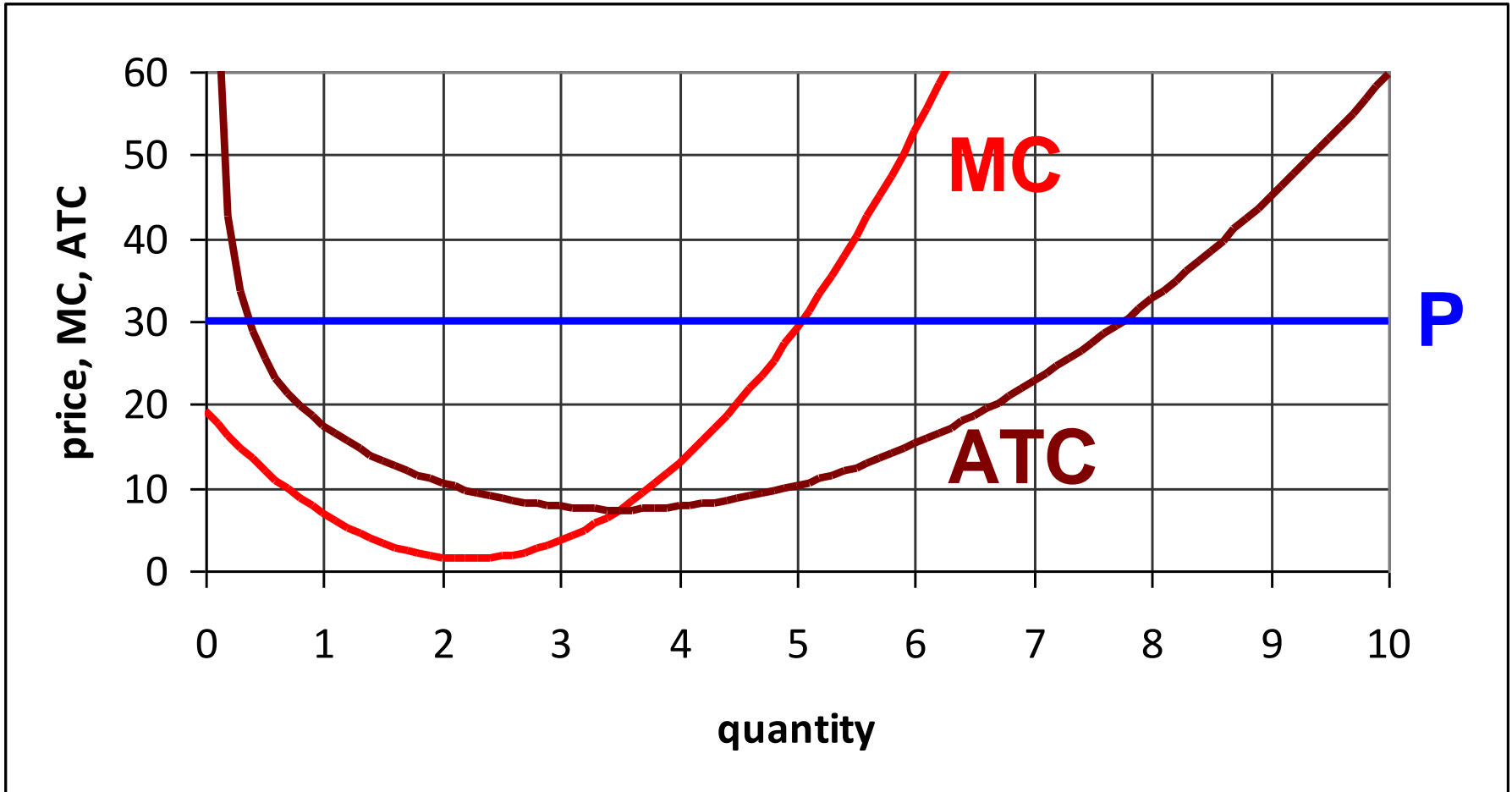
B) 2

C) 4

D) 5

E) 7.5

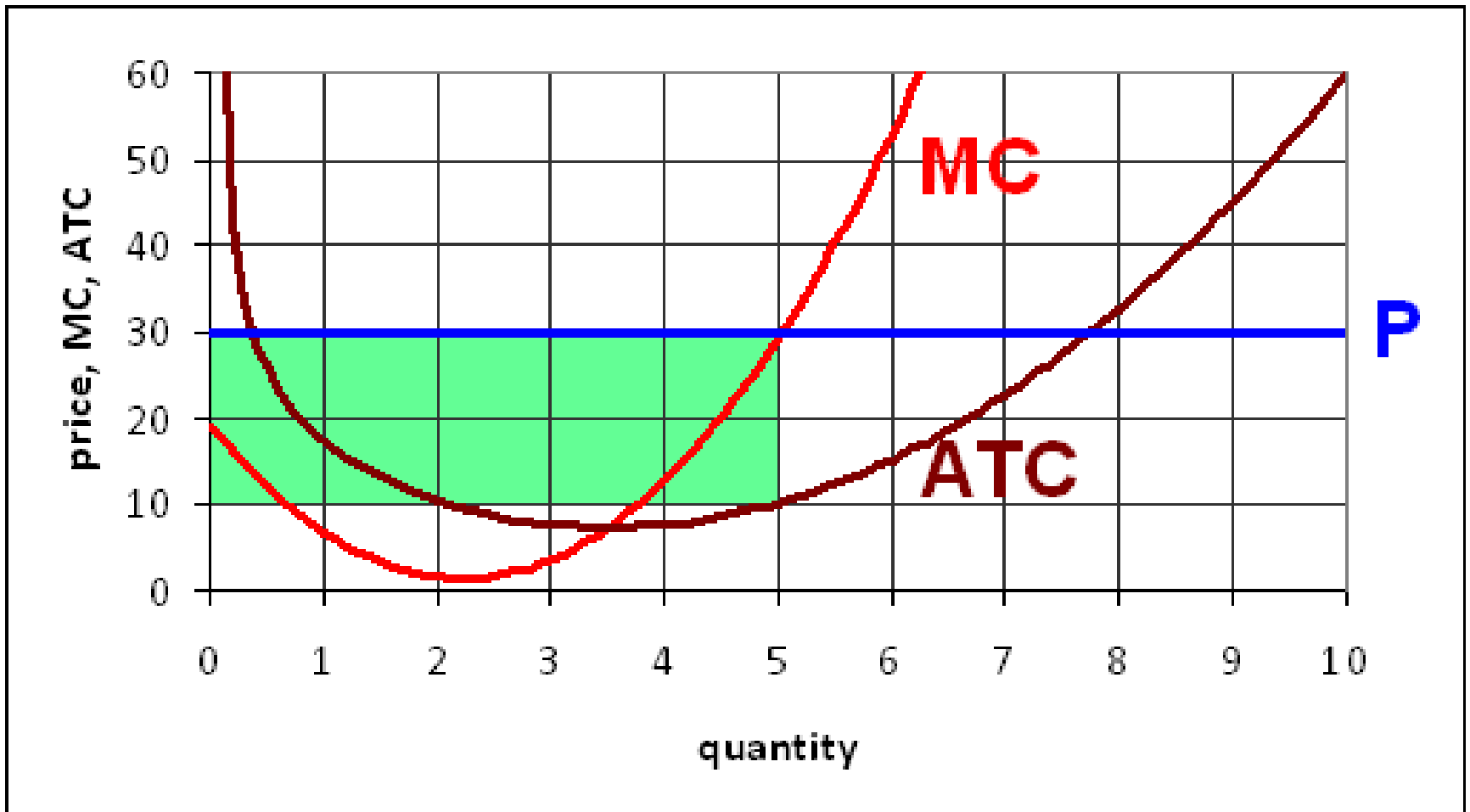
QUESTION 7 (finding profit graphically)



Judging by the graph above, the most profit the firm can get is approximately...

- A) 5 B) 80 C) 100 D) 150 E) 300**

answer to question 7



$$\Pi = P \times Q - TC = P \times Q - ATC \times Q = Q \times (P - ATC)$$

$$\Pi \approx 5 \times (30 - 10) = 100$$

A) 5

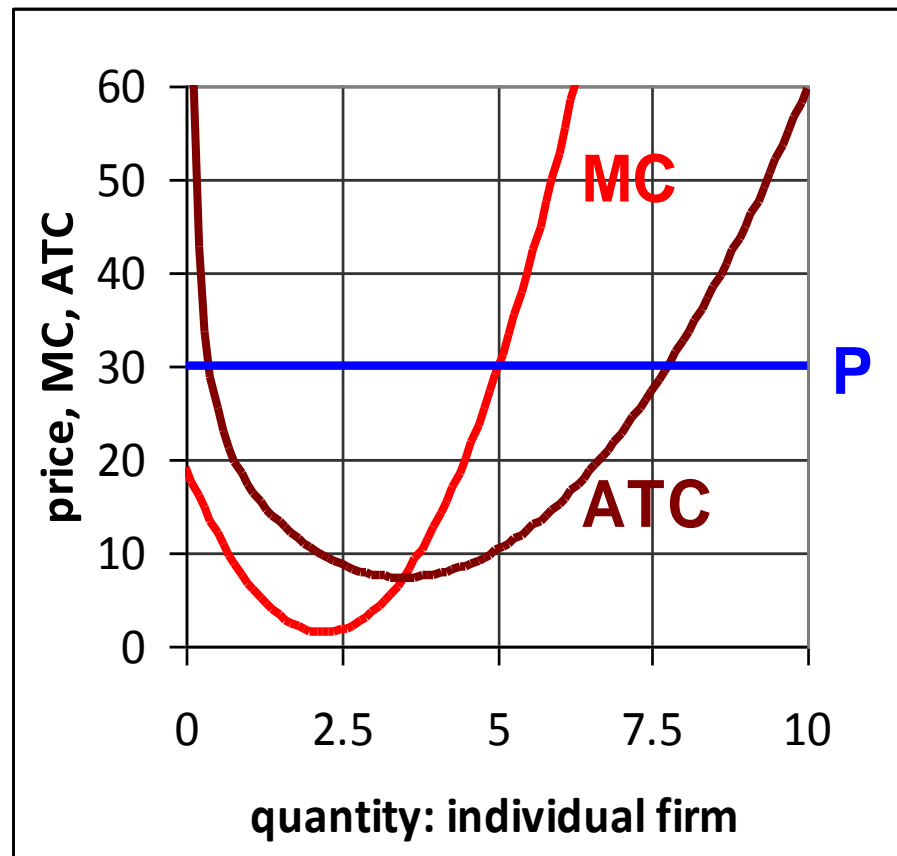
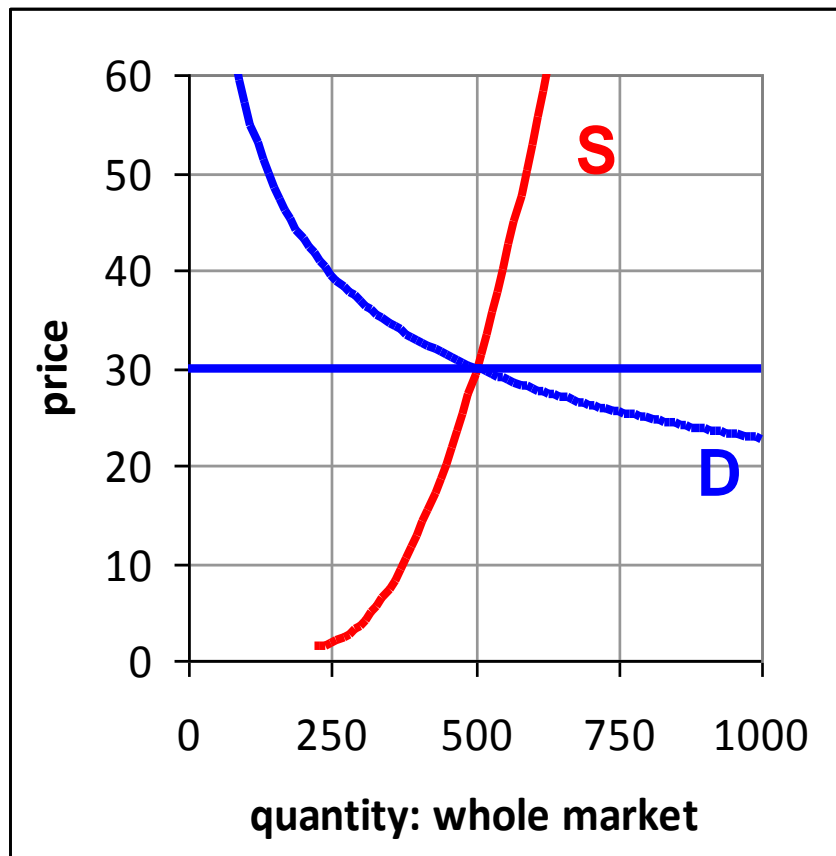
B) 80

C) 100

D) 150

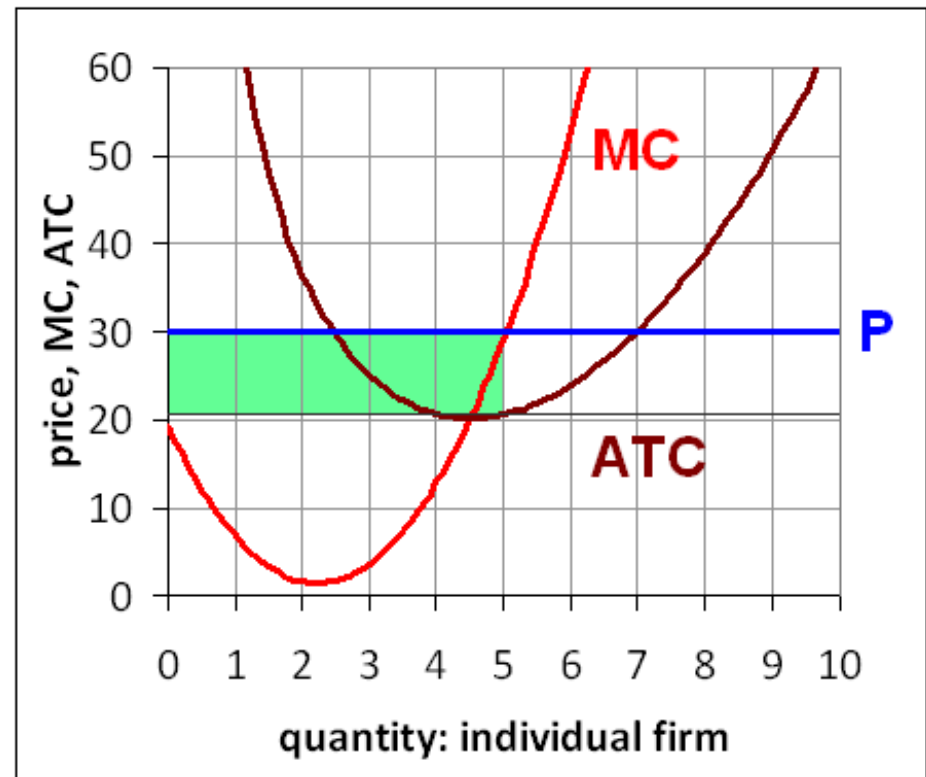
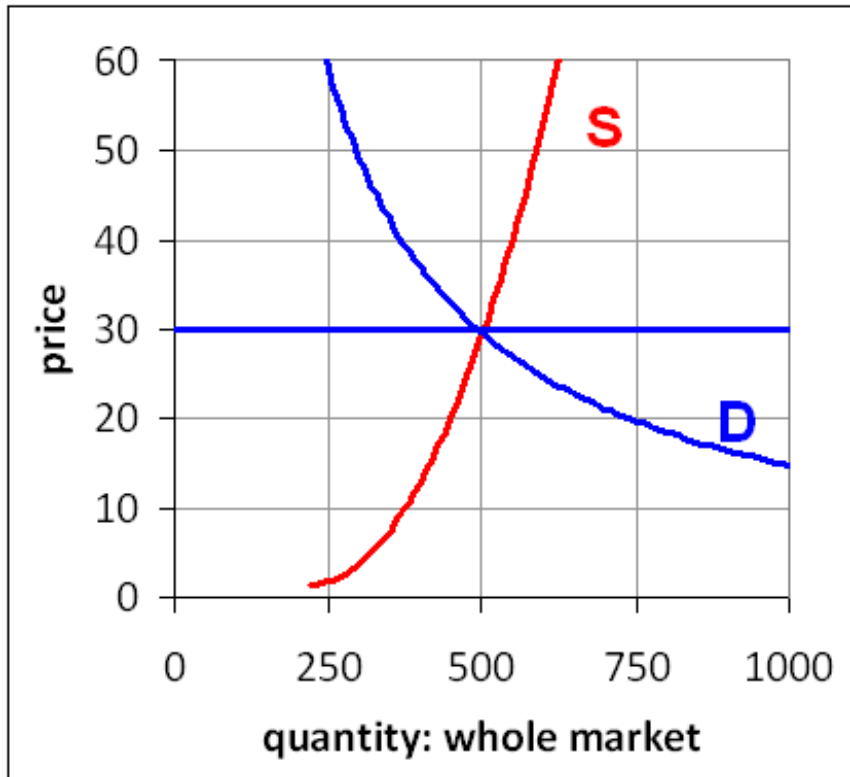
E) 300

MARKET SUPPLY AND DEMAND



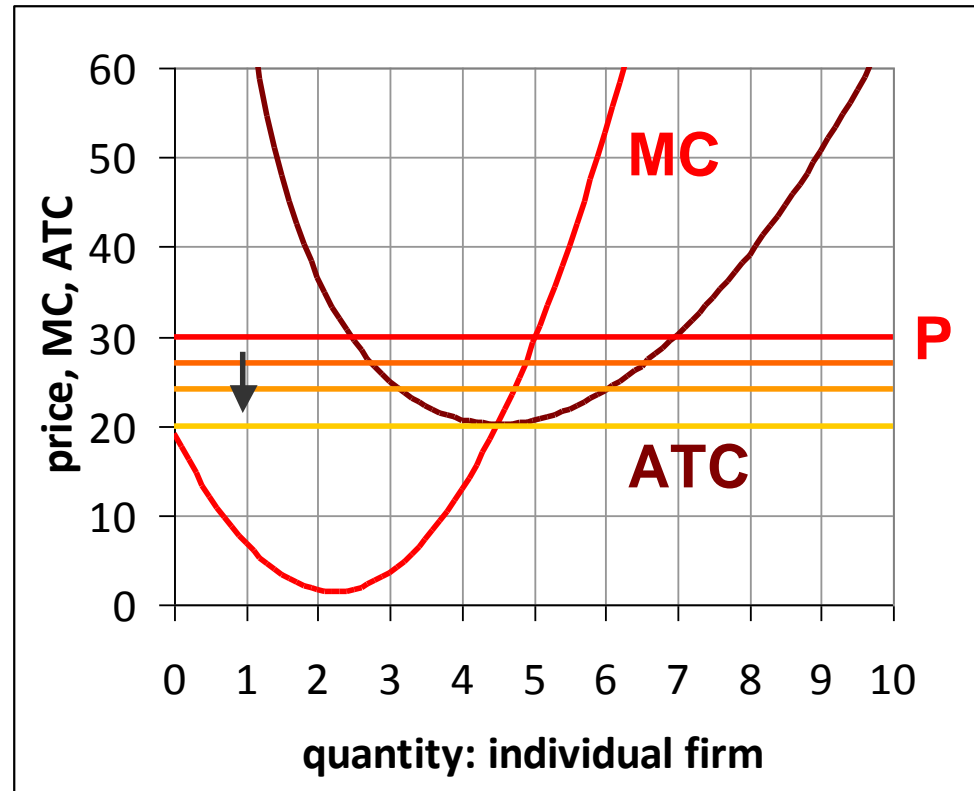
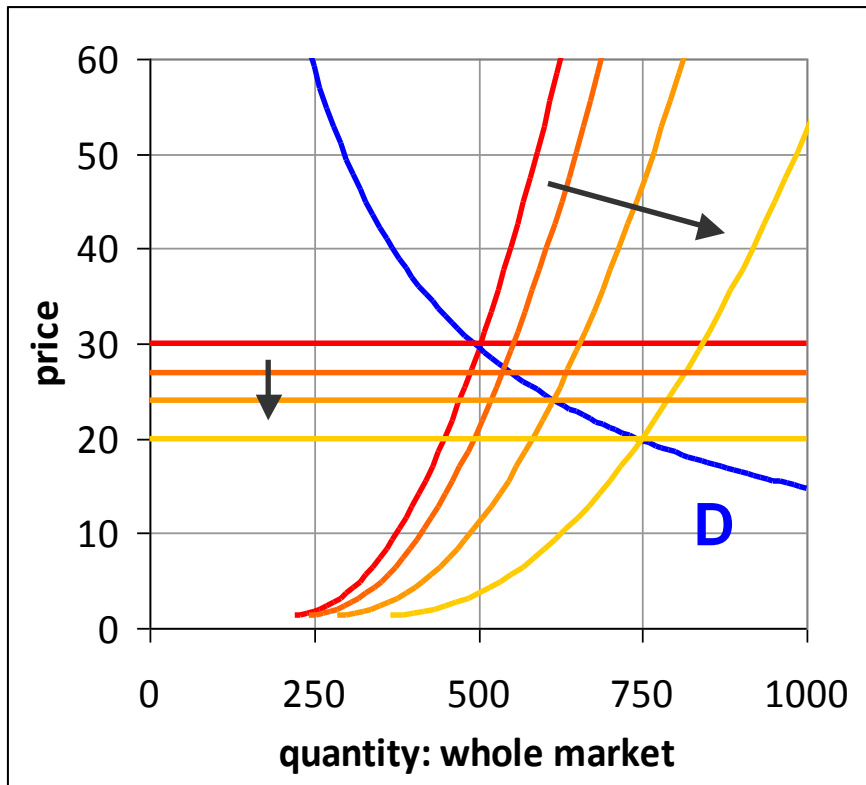
The price is decided by market-wide supply and demand. By assumption, the individual competitive firm takes this price as given.

PROFIT AND ENTRY



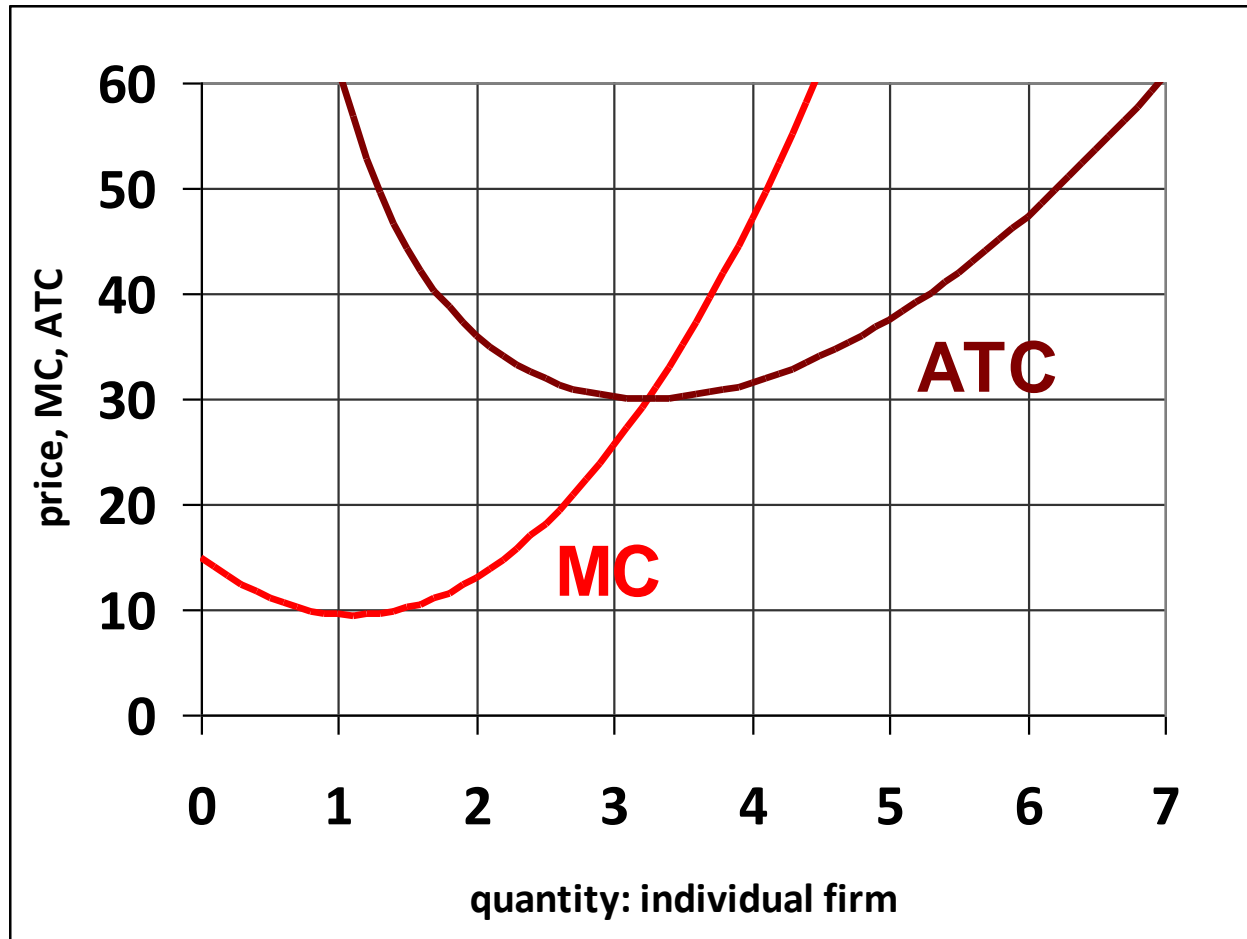
Because each of the firms has positive profit, then **more firms will choose to enter the market, provided that there is **free entry**.**

PROFIT AND ENTRY



As more firms enter, the supply curve shifts outward, and thus the market-wide price decreases. This continues until each of the firms is earning zero profit, i.e. until the price is equal to the minimum of their ATC curve.

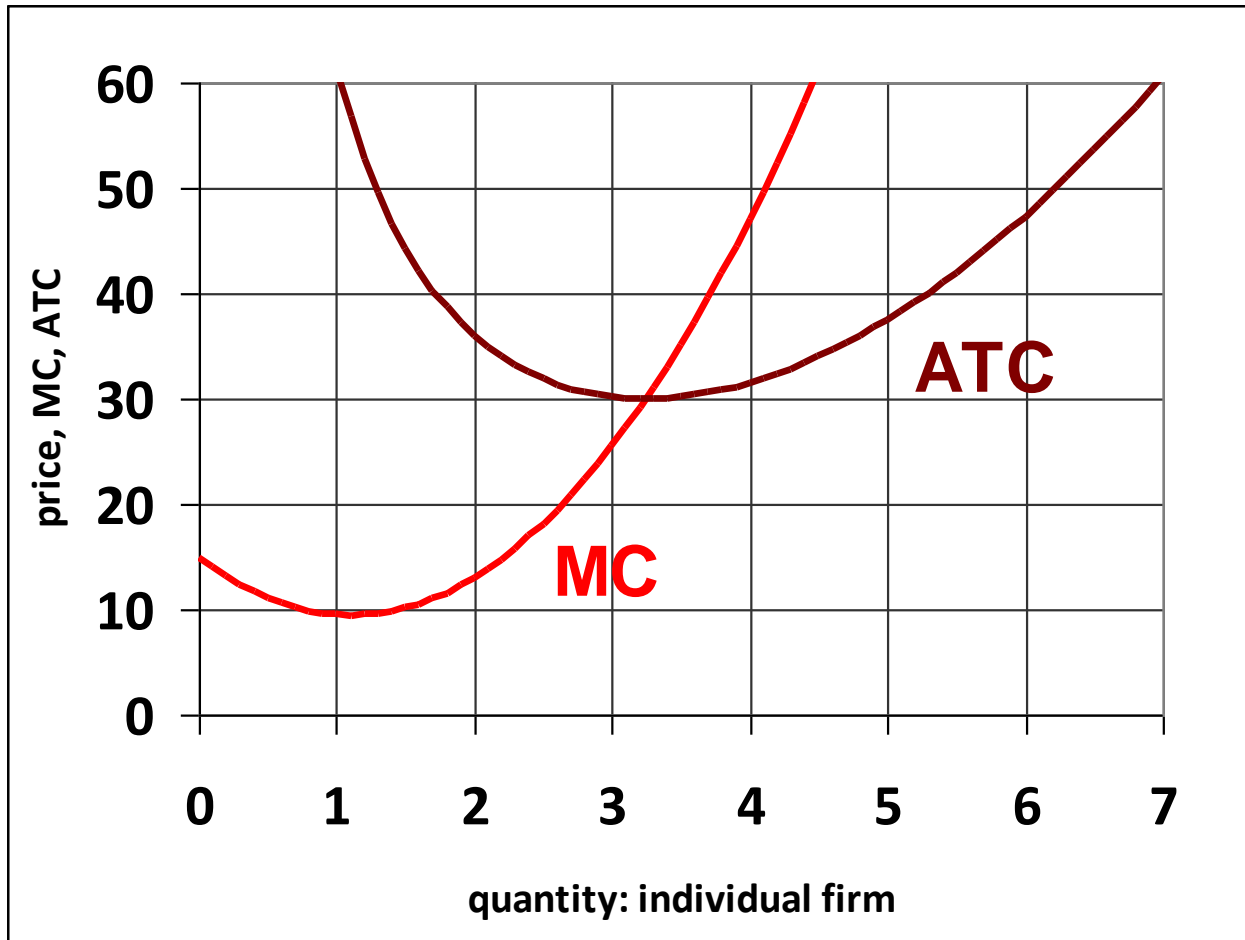
QUESTION 8 (long run equilibrium price)



If all potential firms in a market have cost structures as shown above, then (assuming free entry) the long run equilibrium price should be approximately...

- A) 10 B) 3.2 C) 30 D) 1.2 E) 40**

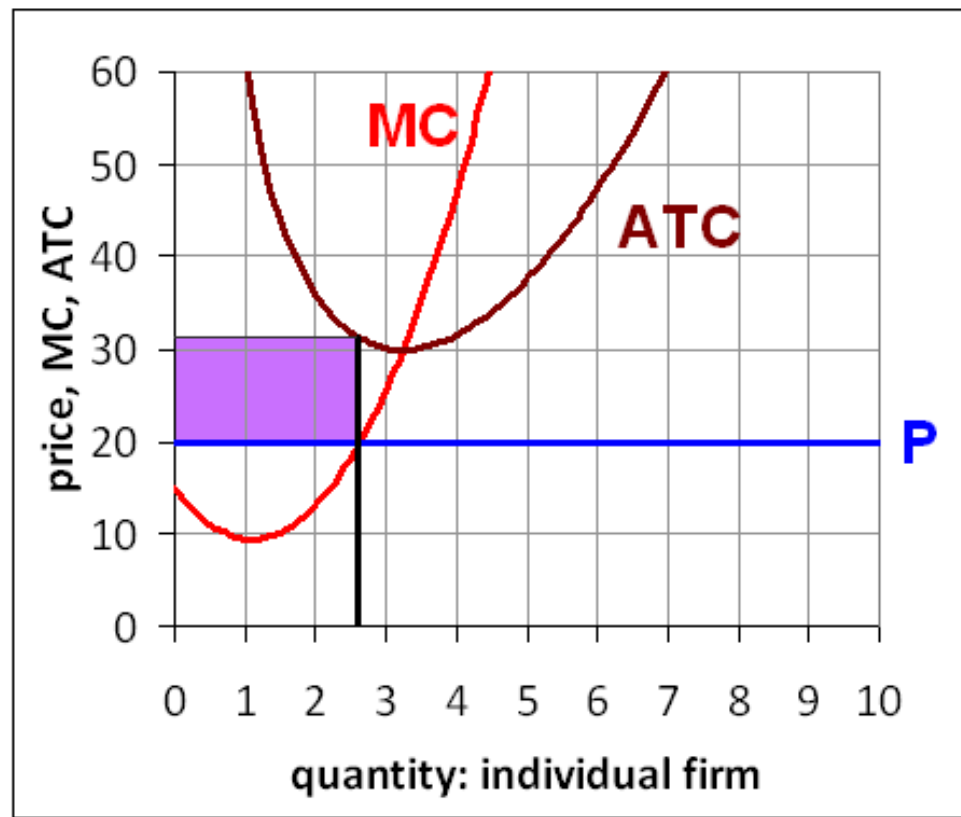
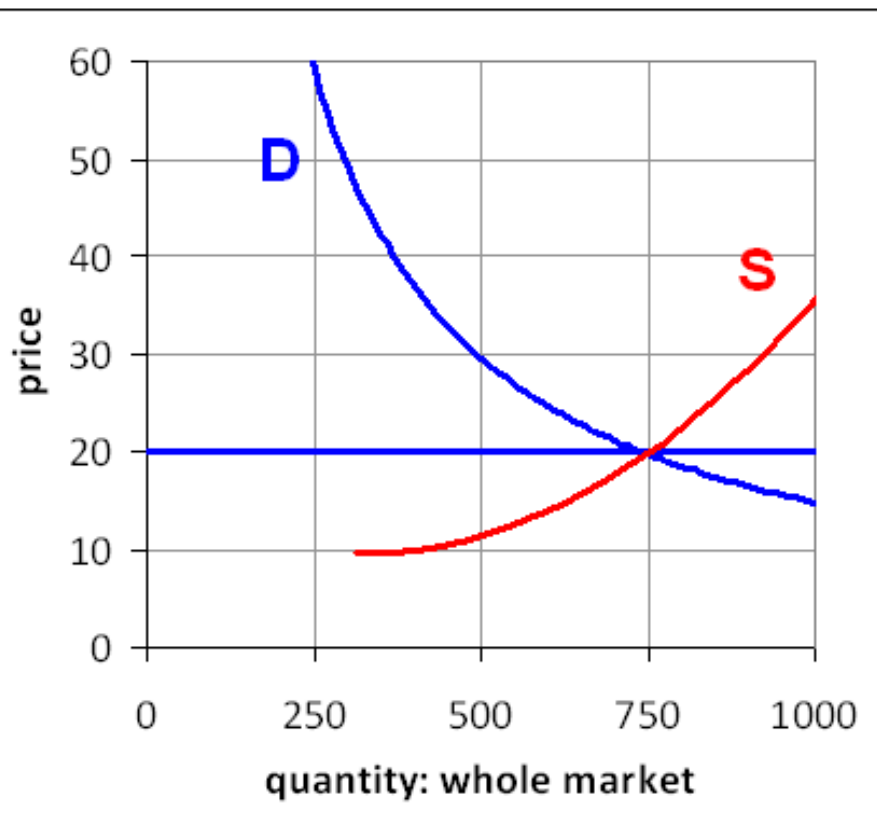
answer to question 8



If all potential firms in a market have cost structures as shown above, then (assuming free entry) the long run equilibrium price should be approximately...

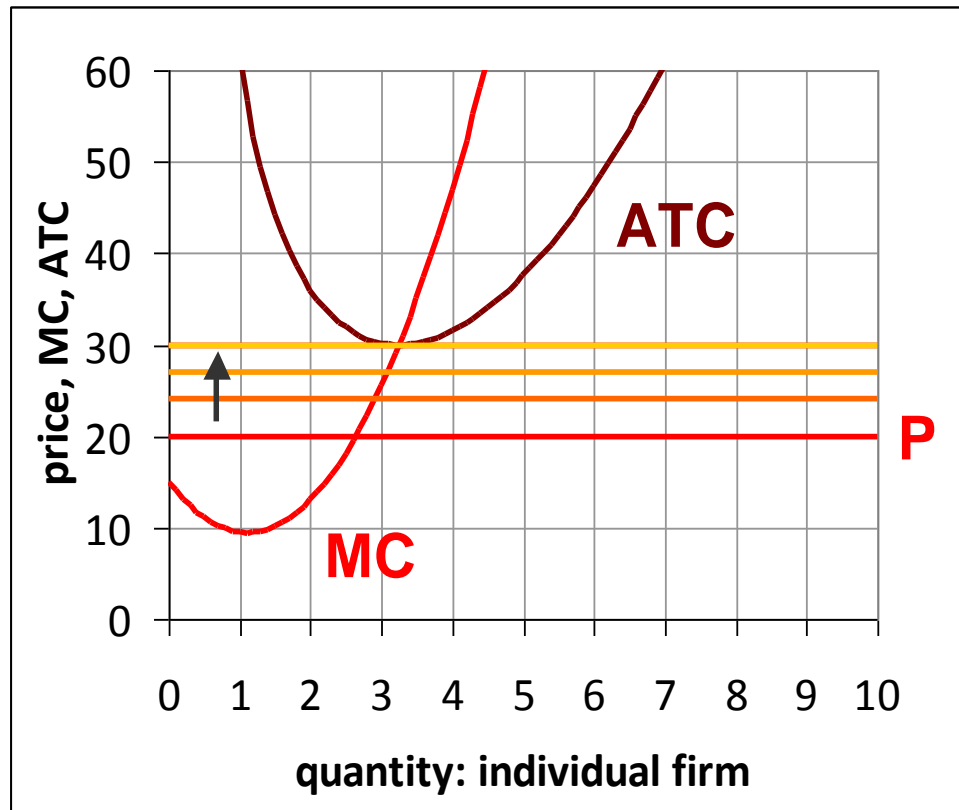
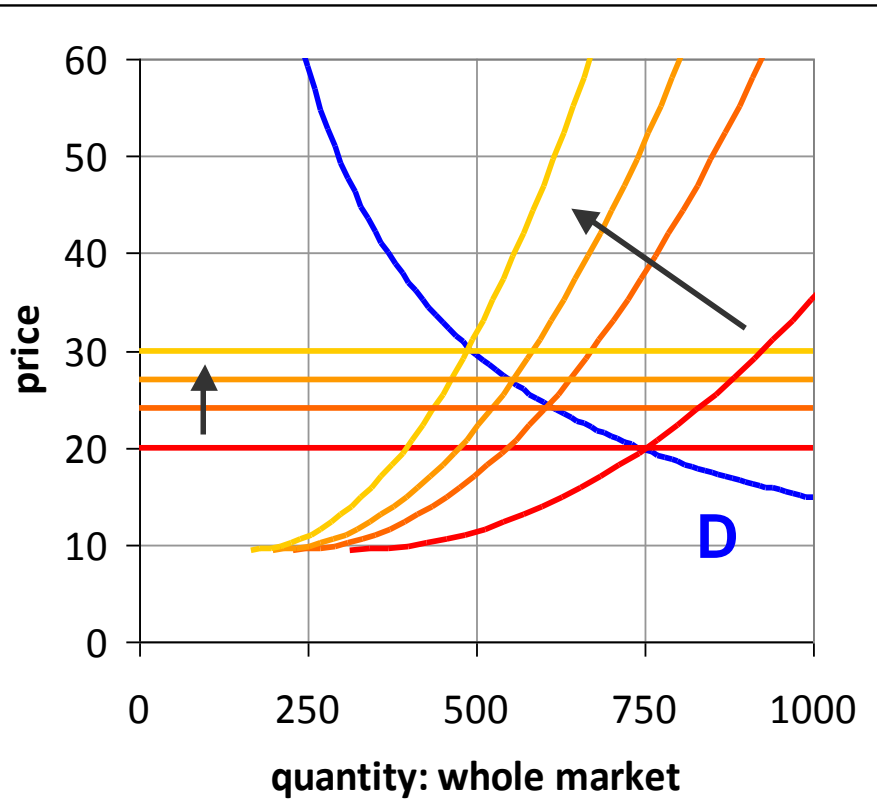
- A) 10 B) 3.2 C) 30 D) 1.2 E) 40**

LOSS AND EXIT



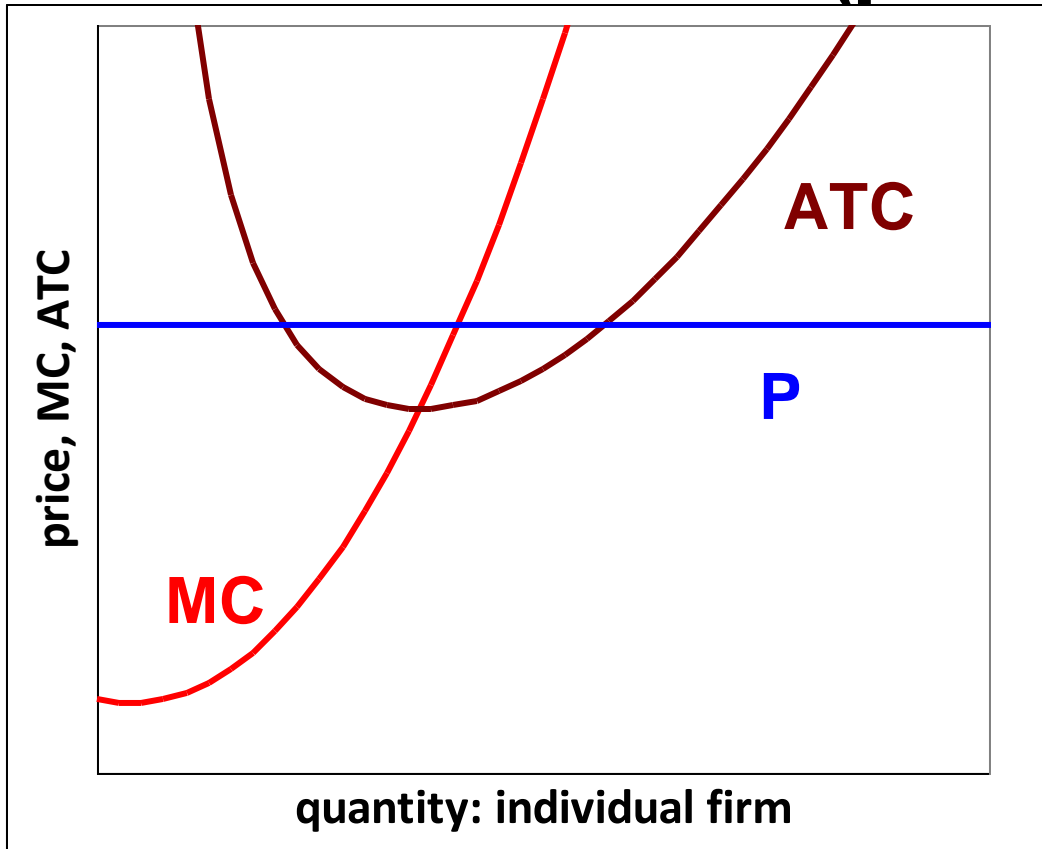
In this case, each of the firms has negative profit, so some of the firms will choose to leave the market.

LOSS AND EXIT



As firms exit, the supply curve shifts inward, and thus the market-wide price increases. Again, this continues until each of the firms is earning zero profit, i.e. until the price is equal to the minimum of their ATC curves.

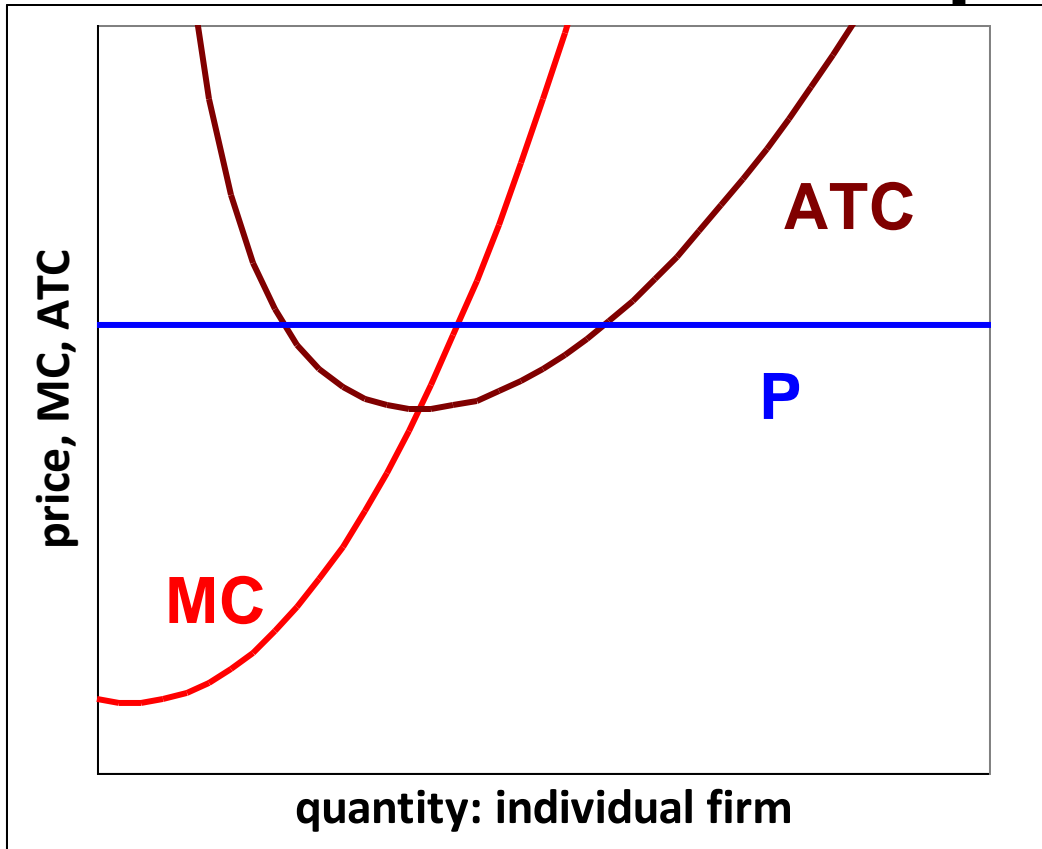
QUESTION 9 (profits or losses?)



According to this graph, firms' profits are _____, and therefore firms will probably _____.

- A) negative; enter** **B) negative; exit**
C) zero; neither **D) positive; enter**
E) positive; exit

answer to question 9



According to this graph, firms' profits are _____, and therefore firms will probably _____.

A) negative; enter

B) negative; exit

C) zero; neither

D) positive; enter

E) positive; exit

TWO FUNCTIONS OF PRICE

Definitions from the book...

rationing function of price: to distribute scarce goods to those consumers who value them most highly

allocative function of price: to direct resources away from overcrowded markets and toward markets that are underserved

