

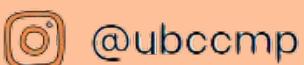
CMP

# COMMERCE MENTORSHIP PROGRAM

## MIDTERM REVIEW SESSION

### ECON 101

Prepared by: Jessalyn Sin

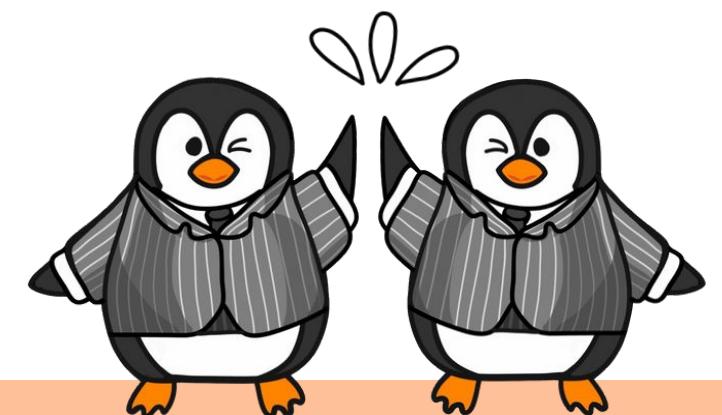


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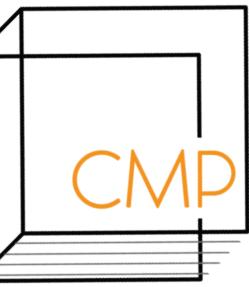
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<http://cmp.cus.ca>



commerce  
undergraduate  
society

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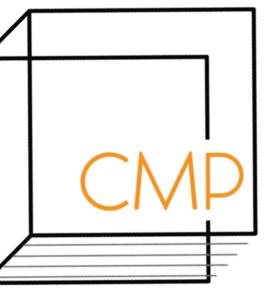


1. What is Economics
2. PPF, Gains from Trade
3. Demand & Supply
4. Elasticity
5. Surplus & Efficiency
6. Global Market in Action
7. **Government Actions in Market**
8. Output & Costs
9. Utility & Demand



*May or may not pertain to your midterm depending on who's your professor*

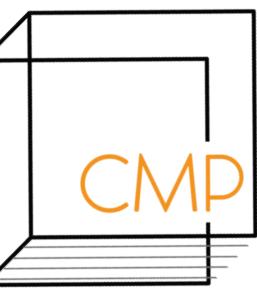




# 1. What is Economics

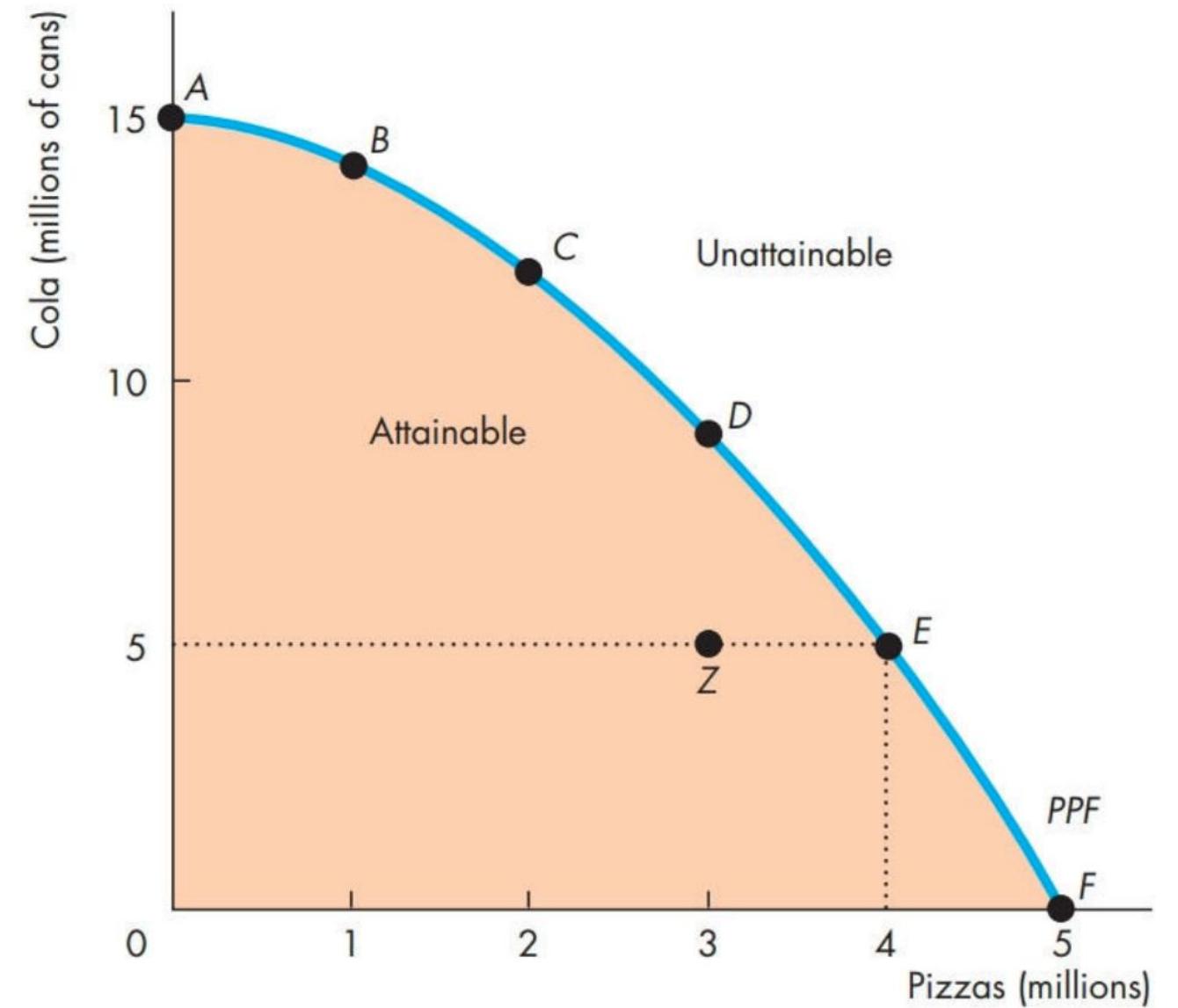
- **Economics:** social science that studies the choices individual people, businesses, government, and societies make to cope with scarcity
    - based on **scarcity:** our inability to get everything we want due to limited resources
    - leads to **trade-offs:** must give up 1 thing if you want another
  - **Microeconomics:** focuses on the choices people and businesses make
- 
- **2 economic questions:**
    1. What, how, for whom to produce?
    2. When does self-interest promote social interest?

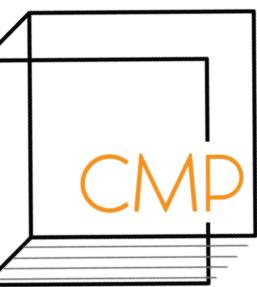




## 2. PPF

- **Production possibilities frontier (PPF):** the boundary between the combos of goods/services that can & can't be produced
  - all points on the curve are **production efficient:** goods/services are produced at the lowest possible cost
- assumes:
  - an economy only produces 2 goods at a time
  - **ceteris paribus:** other factors remain the same
- **Opportunity cost (OC):** next BEST alternative given up in order to get something else
  - OC of good A = # of good B





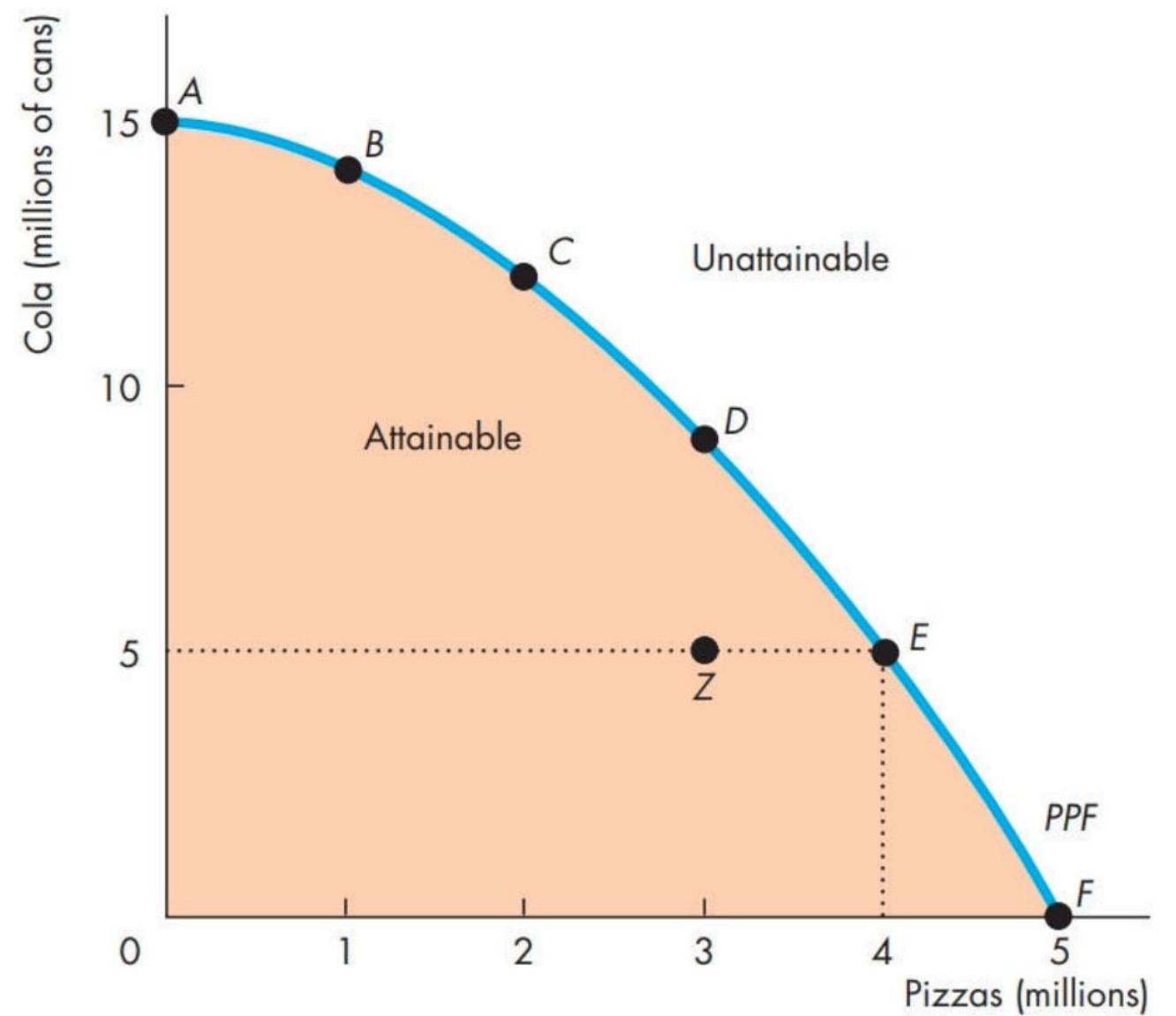
## 2. PPF

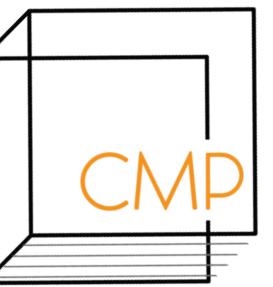
Q1: Explain why the PPF curves outwards (concave shape)?

Because resources aren't equally productive in all activities. For example, factory workers are skilled at making coke, but they may know nothing about making pizza. As we ask more of them to make pizza, the quantity of coke would decrease a lot but the quantity of pizza would only increase slightly. The more we shift resources to do tasks they aren't good at, the less productive they are and opportunity costs increase.

Q2: How can the PPF be pushed outwards?

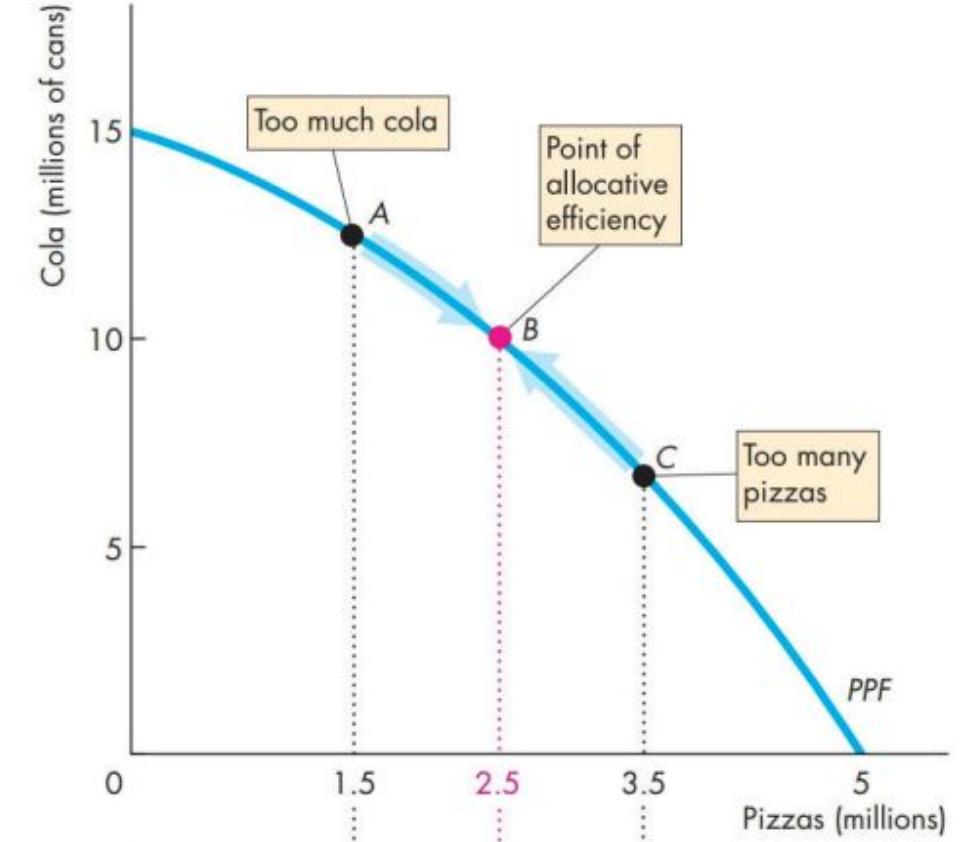
By having technological change and accumulating more capital, which increases the amount of resources available.



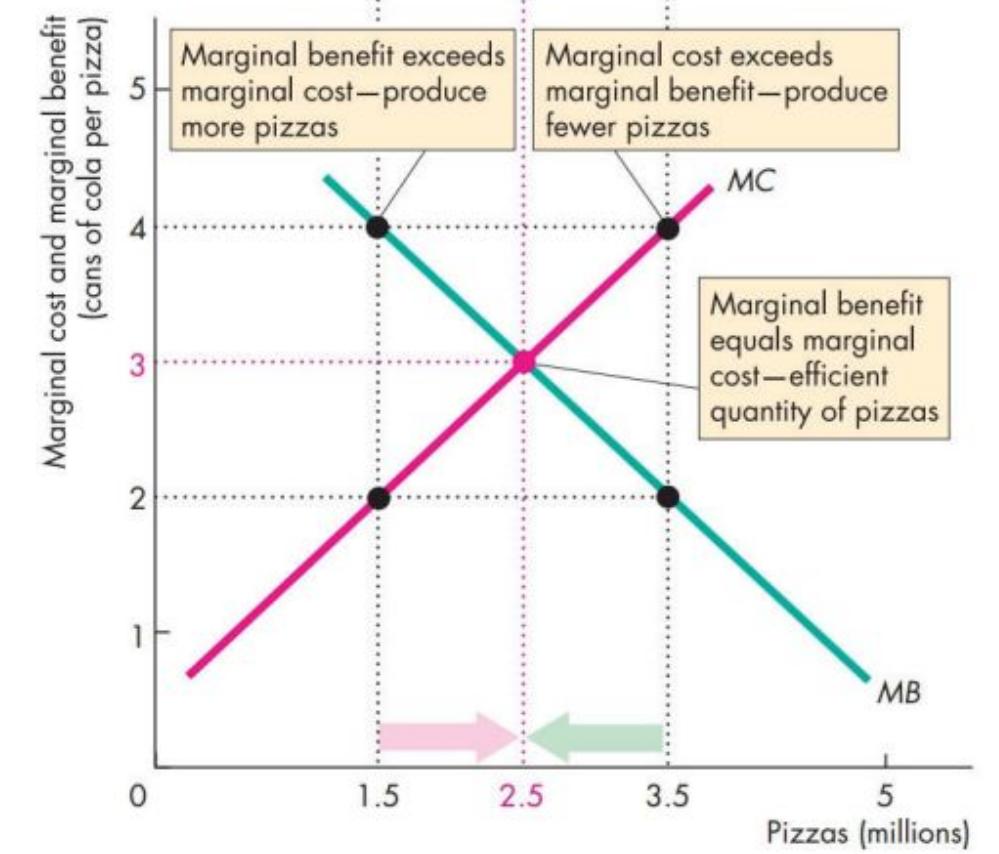


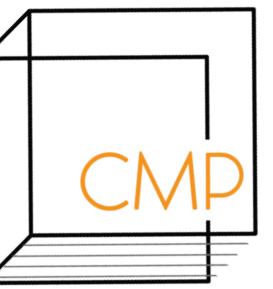
## 2. PPF - Using Resources Efficiently

- **Marginal cost (MC)**: OC of producing 1 additional unit
- **Marginal benefit (MB)**: benefit from consuming 1 additional unit
  - measured by people's willingness to pay for that additional unit
  - the more we consume it, the lower the marginal benefit we receive
- **allocative efficiency**: when you can't move more of 1 good without giving up another good that gives more benefit
  - $MC = MB \rightarrow$  producing the most efficient combination of the 2 goods, at **equilibrium (EQM)**



(a) On the PPF





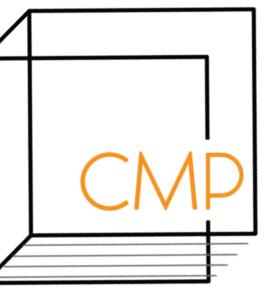
## 2. Gains From Trade

- **absolute advantage:** when a person is *more productive* than everyone else
- **comparative advantage:** when a person performs an activity at a *lower OC* than everyone else
  - comparative advantage > specialization > trade
  - **trading price:** Seller's OC  $\leq P_{\text{good}} \leq$  Buyer's OC

### Steps to Approaching Gains from Trade Problems:

1. Calculate the OCs
2. Determine who has a lower OC for each good > they will specialize in what they have a comparative advantage in
3. Determine the trading price: Seller's OC  $\leq P_{\text{good}} \leq$  Buyer's OC
4. Gains from trade = # of goods<sub>before trade</sub> – # of goods<sub>after trade</sub>





## 2. Gains From Trade

Q3: Carl and Chelsea bake muffins and cookies for 1 hour on Saturdays. Carl can either bake 5 muffins or 50 cookies in 1 hour while Chelsea can bake 20 muffins or 40 cookies.

a. Who has an absolute advantage in muffin production? In cookie production?

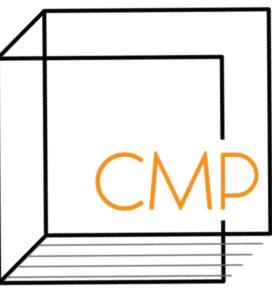
Chelsea has an absolute advantage in muffin production. Carl has an absolute advantage in cookie production.

b. Who has a comparative advantage in muffin production? In cookie production?

Chelsea has a comparative advantage in muffin production. Carl has a comparative advantage in cookie production.

	OC of 1 muffin	OC of 1 cookie
Carl	<u>50 cookies</u> = 10 cookies 5 muffins	<u>5 muffins</u> = 0.1 muffins 50 cookies
Chelsea	<u>40 cookies</u> = 2 cookies 20 muffins	<u>20 muffins</u> = 0.5 muffins 40 cookies





## 2. Gains From Trade

- c. Assume they decided to specialize and trade, if Chelsea offers to sell Carl 1 muffin for 15 cookies, would Carl accept the trade? If not, what price range would be acceptable to both of them?

Seller's OC  $\leq P_{\text{good}}$   $\leq$  Buyer's OC

Chelsea's OC  $\leq P_{\text{muffin}}$   $\leq$  Carl's OC

2 cookies  $\leq P_{\text{muffin}}$   $\leq$  10 cookies

Trade would only occur if the price for muffins is between 2 and 10 cookies. Since the price Chelsea offered isn't in that range, Carl wouldn't accept the trade.

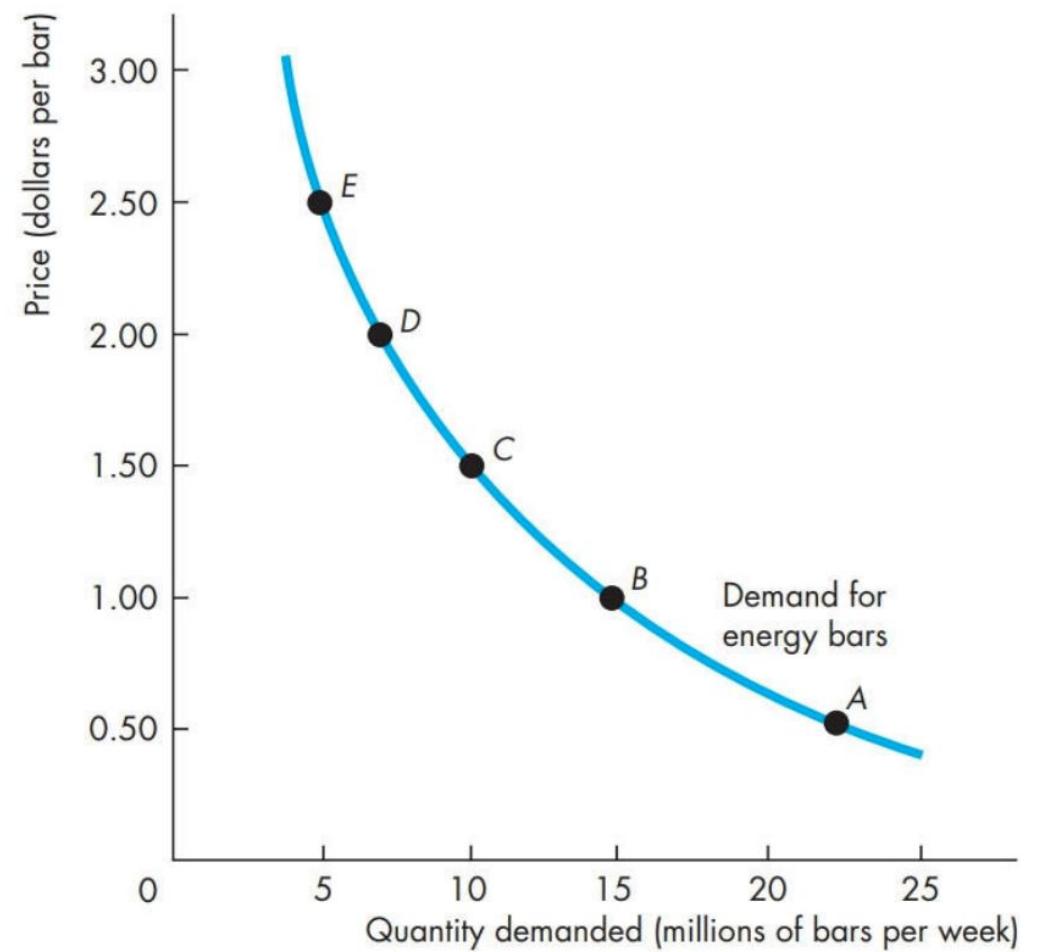
	OC of 1 muffin	OC of 1 cookie
Carl	<u>50 cookies</u> = 10 cookies 5 muffins	<u>5 muffins</u> = 0.1 muffins 50 cookies
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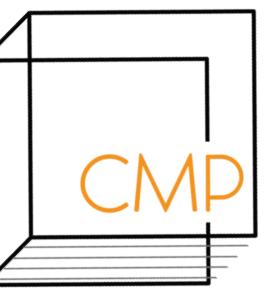


### 3. Demand & Supply - Demand

- **Demand:** when a person wants something, can afford it, and plan on buying it
  - **Quantity demanded (Qd):** amount a person plans to buy at a specific price
  - **Law of Demand:** if price increases, Qd decreases
- Shifts:
  1.  $P_{\text{related goods}}$  (complementary goods, substitute goods)
  2.  $P_{\text{expected future}}$
  3. Income
  4. Future income
  5. Population
  6. Preference

**FIGURE 3.1** The Demand Curve

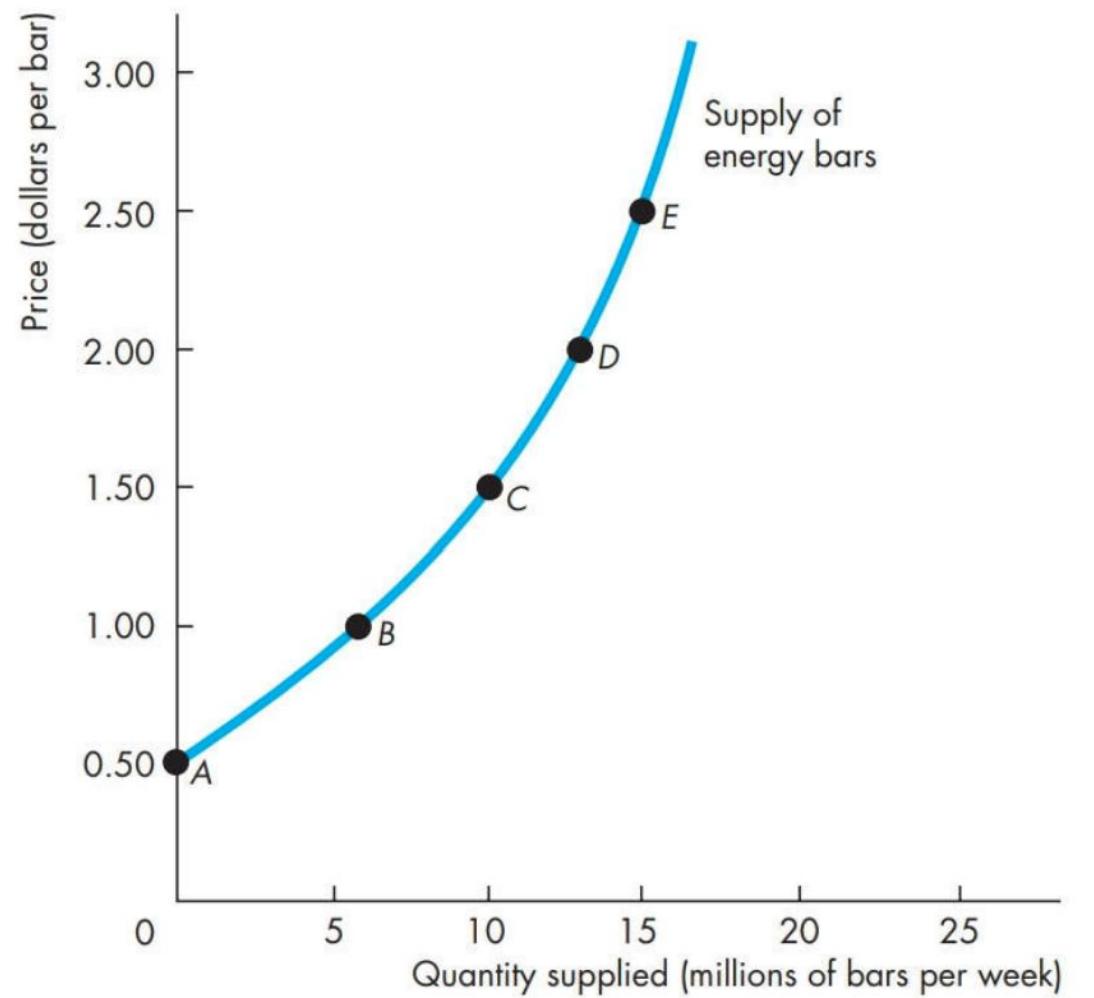


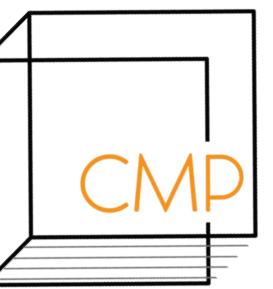


### 3. Demand & Supply - Supply

- **Supply:** when a firm have the technology and resources to produce, can make profit from it, and plan on producing and selling
  - **Quantity supplied (Q<sub>s</sub>):** amount a firm would produce at a specific price
  - **Law of Supply:** if price increases, Q<sub>s</sub> increases
- Shifts:
  1. P<sub>factors of production</sub>
  2. P<sub>related goods produced</sub>
  3. P<sub>expected future</sub>
  4. Number of suppliers
  5. Technology
  6. State of Nature

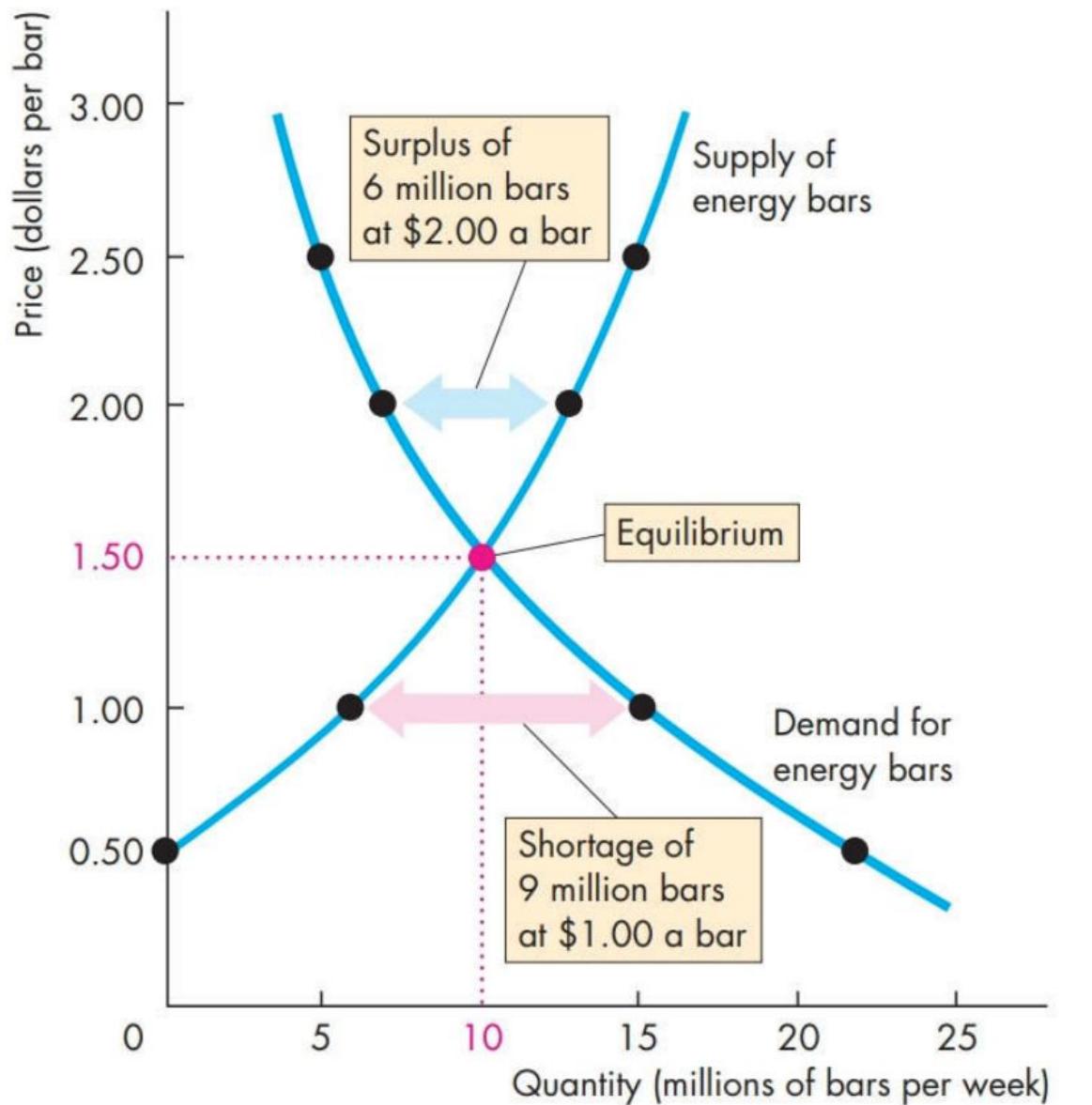
**FIGURE 3.4** The Supply Curve

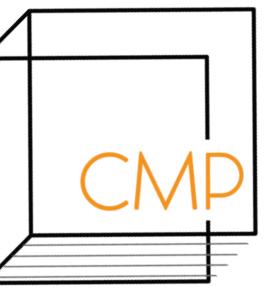




### 3. Demand & Supply - EQM

- **market equilibrium:** occurs when demand equals supply
- Steps to Solving EQM:
  1. Equate the demand and supply equations
  2. Solve the system of equations
  3. Pluck the solved P or Q back into either of the demand or supply functions to solve for the other unknown





### 3. Demand & Supply

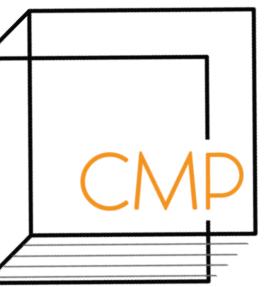
**Q4:** The prices for vests in CMP Land fell, as a result...

- a) the supply curve will shift right
- b) the supply curve will shift left
- c) **Q<sub>s</sub> will decrease**
- d) Q<sub>s</sub> will increase

**Q5:** Tea is a substitute good of coffee, and cream is a complementary good of coffee. If the price for coffee increased, the demand for tea will \_\_\_\_\_, and the demand for cream will \_\_\_\_\_.

- a) **increase, decrease**
- b) decrease, increase
- c) decrease, remain the same
- d) remain the same, remain the same

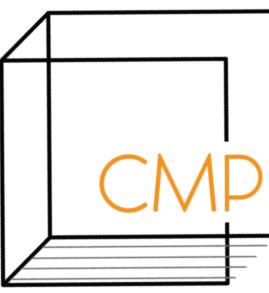




## 4. Elasticity - $ed$ , $es$

	<b>Price elasticity of demand</b>	<b>Price elasticity of supply</b>
Definition	how responsive $Q_d$ is to a change in $P$	how responsive $Q_s$ is to a change in $P$
Formula	$ed = \frac{\% \Delta Q_d}{\% \Delta P} = \frac{(\Delta Q_d / Q_{d_{avg}})}{(\Delta P / P_{avg})}$	$\circ \ es = \frac{\% \Delta Q_s}{\% \Delta P} = \frac{(\Delta Q_s / Q_{s_{avg}})}{(\Delta P / P_{avg})}$
Factors that Influence it	<ul style="list-style-type: none"><li>• closeness of substitutes</li><li>• proportion of income spent on good</li><li>• time elapsed since price change</li></ul>	<ul style="list-style-type: none"><li>• resource substitution possibilities</li><li>• time frame for supply decision</li></ul>





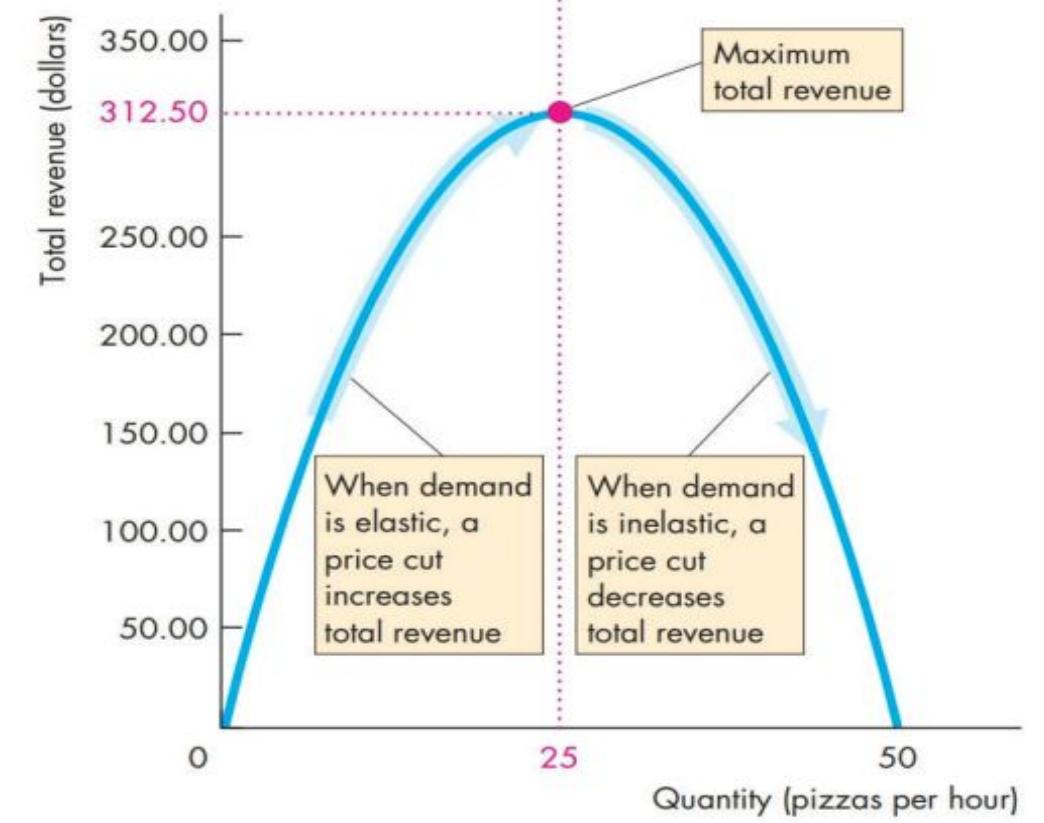
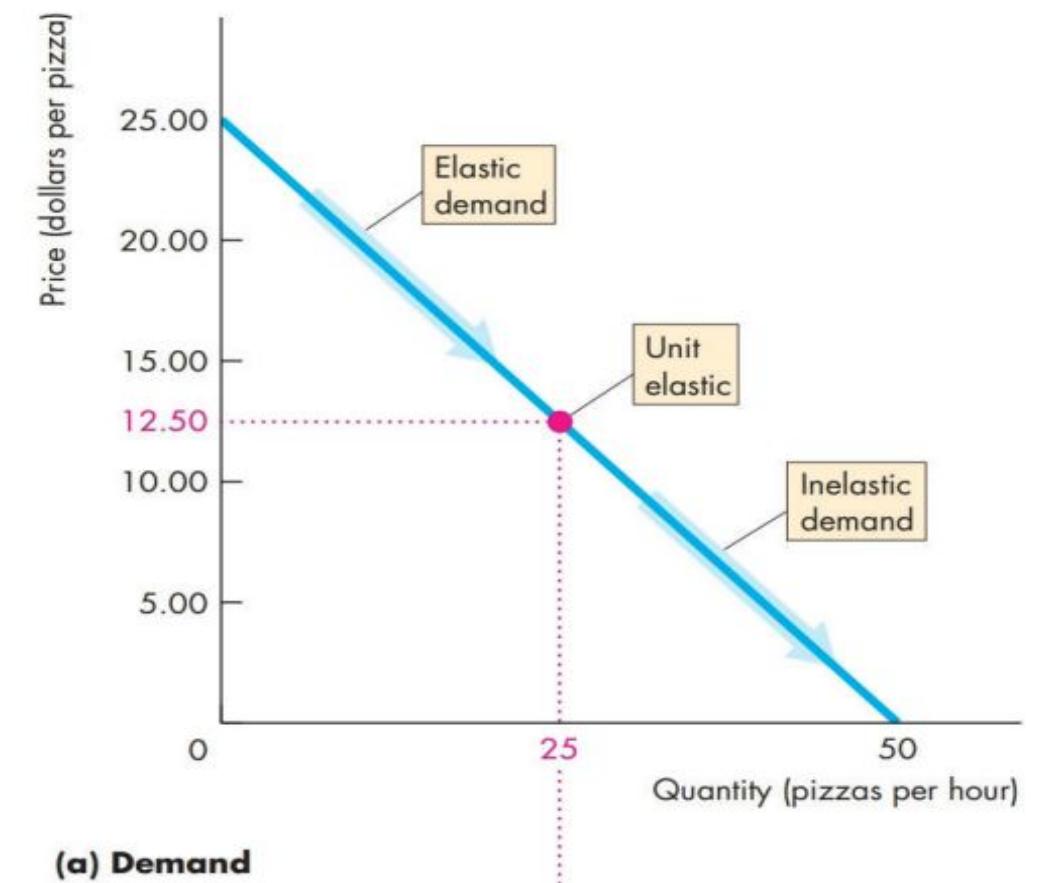
## 4. Elasticity - 5 Types of Ed

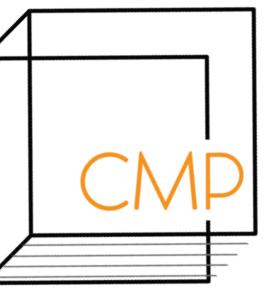
	<b>perfectly inelastic</b>	<b>inelastic</b>	<b>unit elastic</b>	<b>elastic</b>	<b>perfectly elastic</b>
Definition	Qd stays the same regardless of P	Qd reacts little to P changes	Qd changes in the same proportion as the change in P	Qd reacts alot to P changes	Qd changes by an infinitely large amount when P changes
ed range	$ed = 0$	$ed <  1 $	$ed =  1 $	$ed >  1 $	$ed =  \infty $
graph					
examples	<ul style="list-style-type: none"> <li>• insulin</li> </ul>	<ul style="list-style-type: none"> <li>• food</li> <li>• shelter</li> </ul>		<ul style="list-style-type: none"> <li>• cars</li> <li>• furnitures</li> </ul>	<ul style="list-style-type: none"> <li>• 2 soft drinks side-by-side in a vending machine</li> </ul>



## 4. Elasticity - Total Revenue (TR)

- $ed = \text{elastic}$ 
  - upper half of a linear demand curve
  - decrease price to maximize TR
- $ed = \text{inelastic}$ 
  - lower half of a linear demand curve
  - increase price to maximize TR
- $ed = \text{unit elastic}$ 
  - midpoint of a linear demand curve
  - maximizes TR

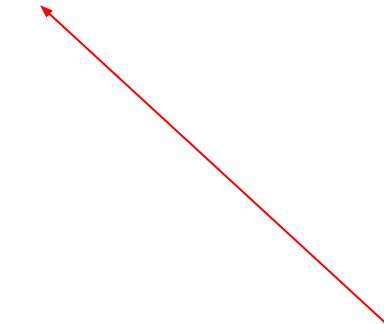




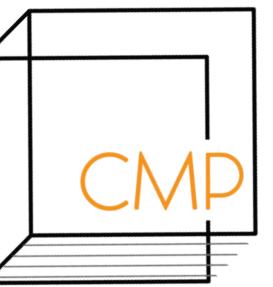
## 4. Elasticity - Total Revenue (TR)

**Q6:** The demand function for cough candies is  $P = -Q_d + 25$ . If the current price is \$12.50, how much should we change the price to maximize total revenue?

- a) decrease by \$4.25
- b) increase by \$3.50
- c) increase by \$2.50
- d) this price already maximizes profit.

- 
- midpoint of a linear demand curve maximizes total revenue
  - that point is when the price is divided by 2, which is \$12.50





## 4. Elasticity - More Elasticity

- **cross elasticity:** how responsive demand for a good is when  $P_{\text{substitute or complement}}$  changes
  - $ec = \frac{\% \Delta Q_d}{\% \Delta P_{\text{sub/complement}}}$
  - $ec < 0 \rightarrow \text{complement good}$ : it's used with the good
  - $ec > 0 \rightarrow \text{substitute good}$ : it can be used to replace the good
- **income elasticity:** how responsive demand for a good is when income changes
  - $ei = \frac{\% \Delta Q_d}{\% \Delta \text{income}}$
  - $ei \geq 1 \rightarrow \text{income elastic, normal good}$ : demand for it rises when income rises
  - $0 < ei < 1 \rightarrow \text{income inelastic, normal good}$
  - $ei < 0 \rightarrow \text{depends, inferior good}$ : demand for it drops when income rises



## 4. Elasticity

**Q7:** When the price for a bucket hat was \$25, the Qd was 30. When the price fell to \$20, Qd rose to 34. What's the price elasticity of demand?

- a) -1.3
- b) 1.50
- c) **-0.56**
- d) -0.90

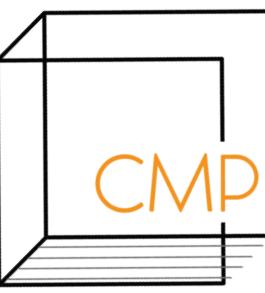
$$ed = \frac{\% \Delta Q_d}{\% \Delta P} = \frac{(4/32)}{(-5/22.5)} = -0.56$$

**Q8:** The income elasticity of blue mountain coffee beans is 1.5. That means it's a \_\_\_\_ good, and it's \_\_\_\_.

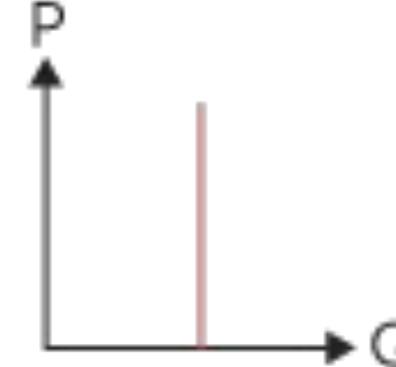
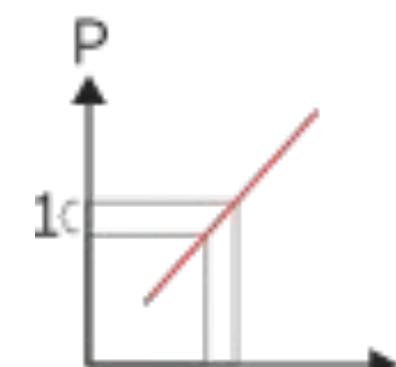
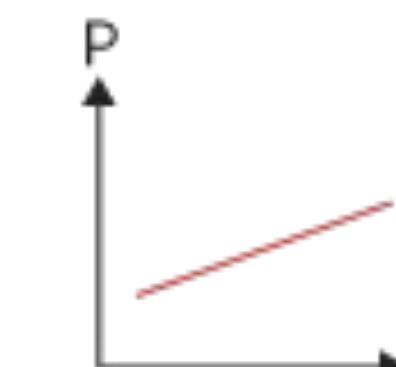
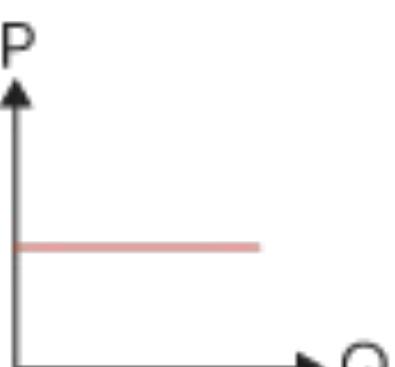
- a) inferior, income unit elastic
- b) **normal, income elastic**
- c) substitute, income elastic
- d) complementary, income inelastic

positive ei → normal good  
 $ei > |1|$  → income elastic

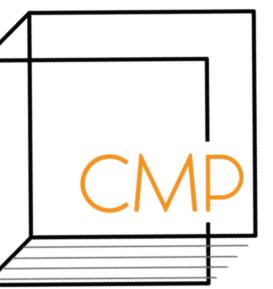




## 4. Elasticity - 5 Types of Es

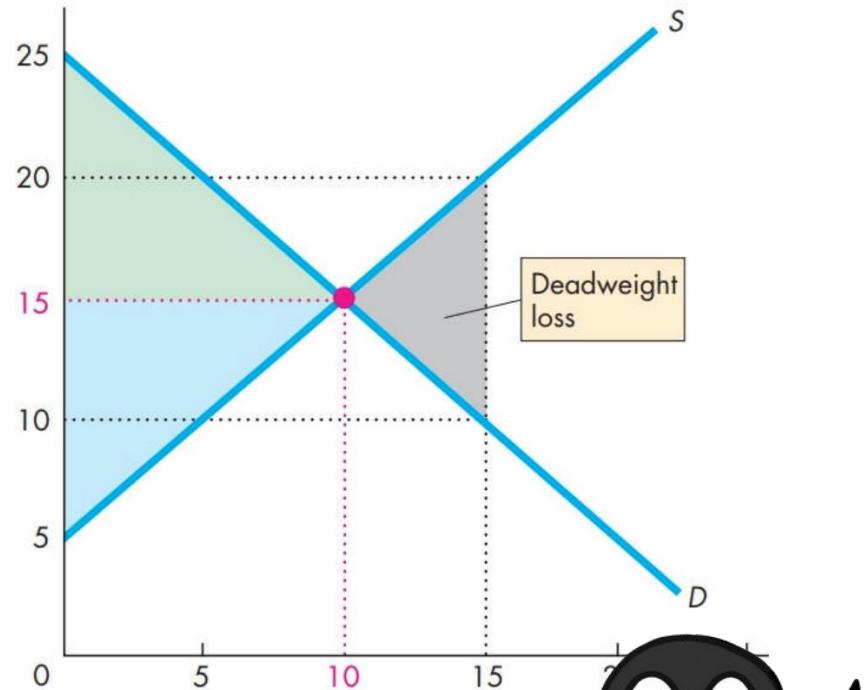
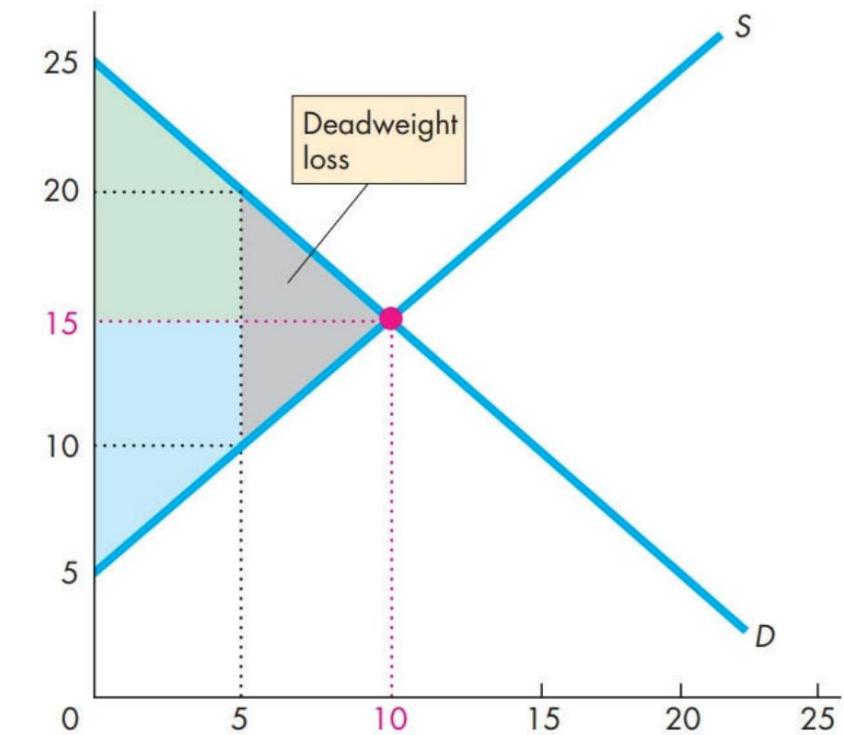
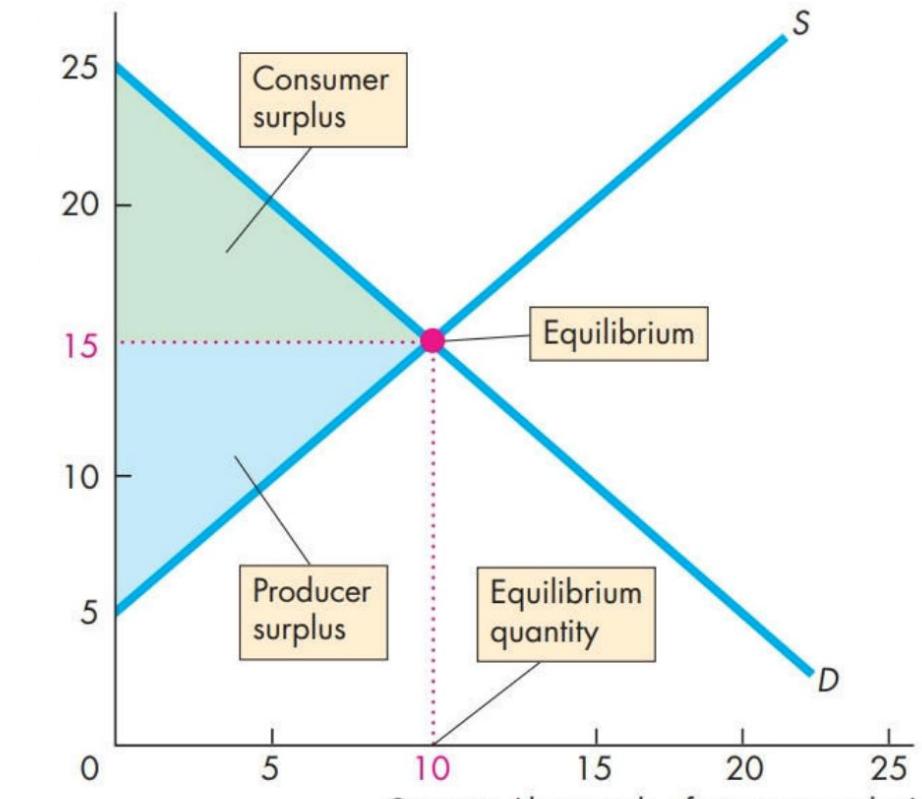
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Definition	Q <sub>s</sub> stays the same regardless of P	Q <sub>s</sub> reacts little to P changes	when a linear supply curve passes through the origin	Q <sub>s</sub> reacts a lot to P changes	When the supplier is willing to sell any quantity at a specific P
es range	$es = 0$	$es <  1 $	$es =  1 $	$es >  1 $	$es = \infty$
graph					
examples	<ul style="list-style-type: none"> <li>• Van Gogh painting</li> </ul>				<ul style="list-style-type: none"> <li>• goods that are produced in many countries</li> </ul>

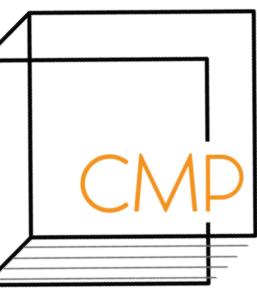




# 5. Surplus & Efficiency

- **consumer surplus (CS):** excess \$ saved
  - what you're willing to pay > what you actually pay
- **producer surplus (PS):** excess \$ received
  - what you actually receive > what you expected
- when not at EQM:
  - inefficient
  - **deadweight loss (DWL):** amount of lost surplus

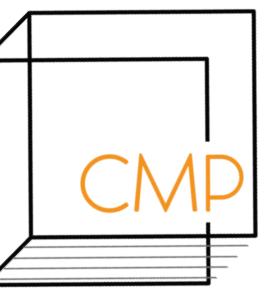




# 6. Global Market in Action

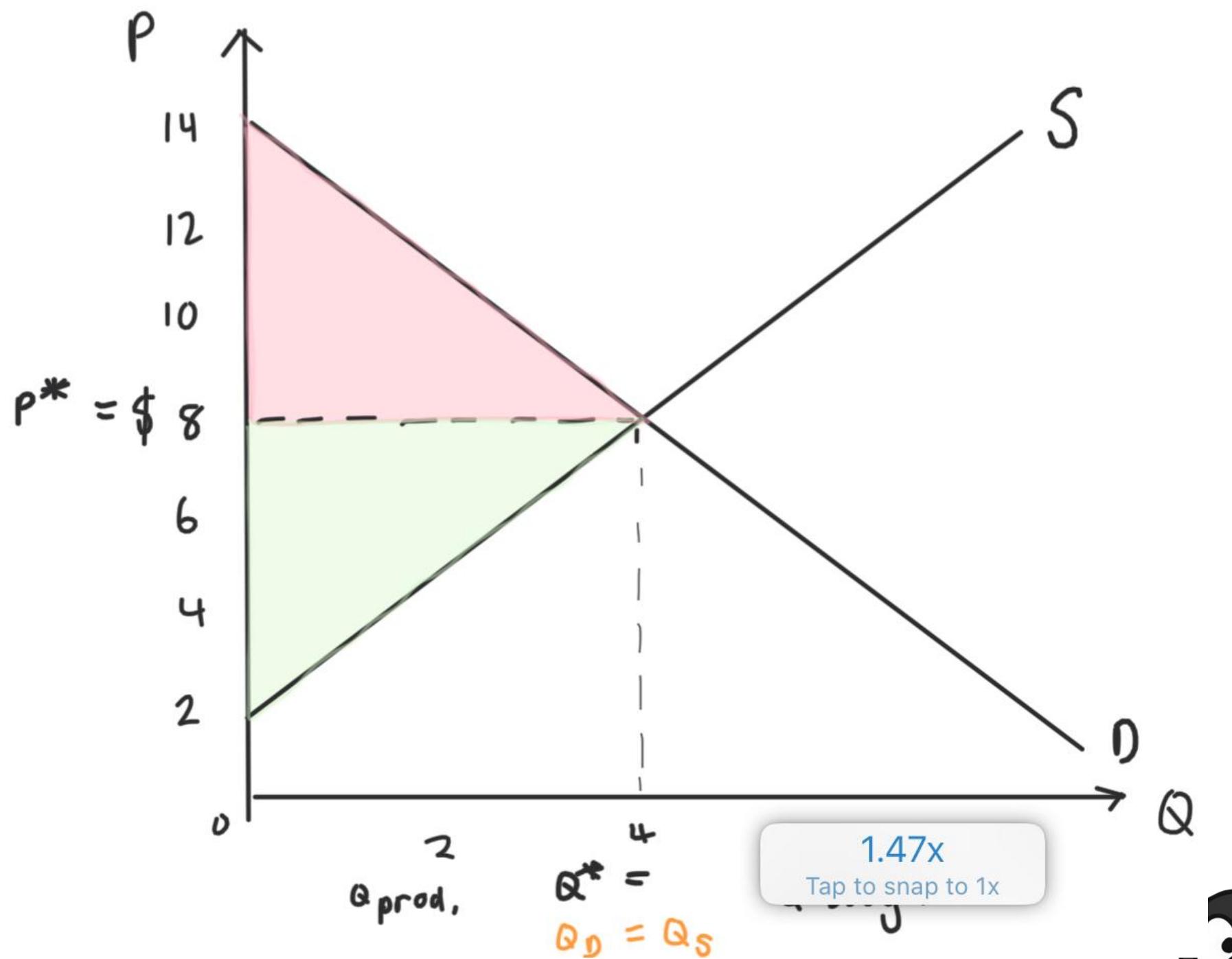
- **national comparative advantage** (a nation can produce a good/service at a lower OC than any other nation) > trade
  - **imports**: buy goods/services from other countries
  - **exports**: sell goods/services to other countries
- 6 Possible Situations:
  1. No trade
  2. Free trade where the world price ( $P_w$ ) is *below* the EQM price ( $P^*$ )
  3. Free trade where the world price ( $P_w$ ) is *above* the EQM price ( $P^*$ )
  4. Tariffs
  5. Import Quota
  6. Export Subsidy





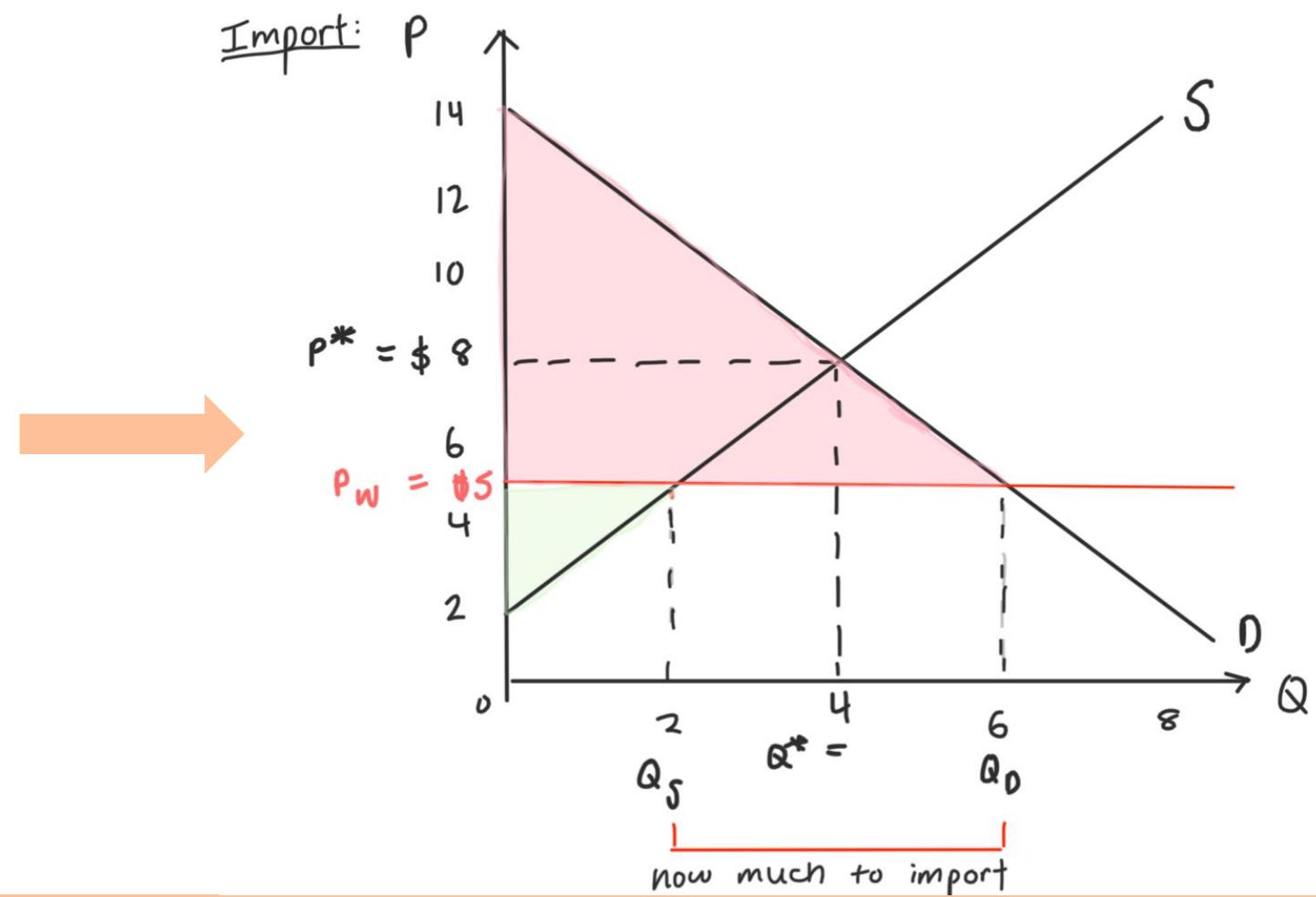
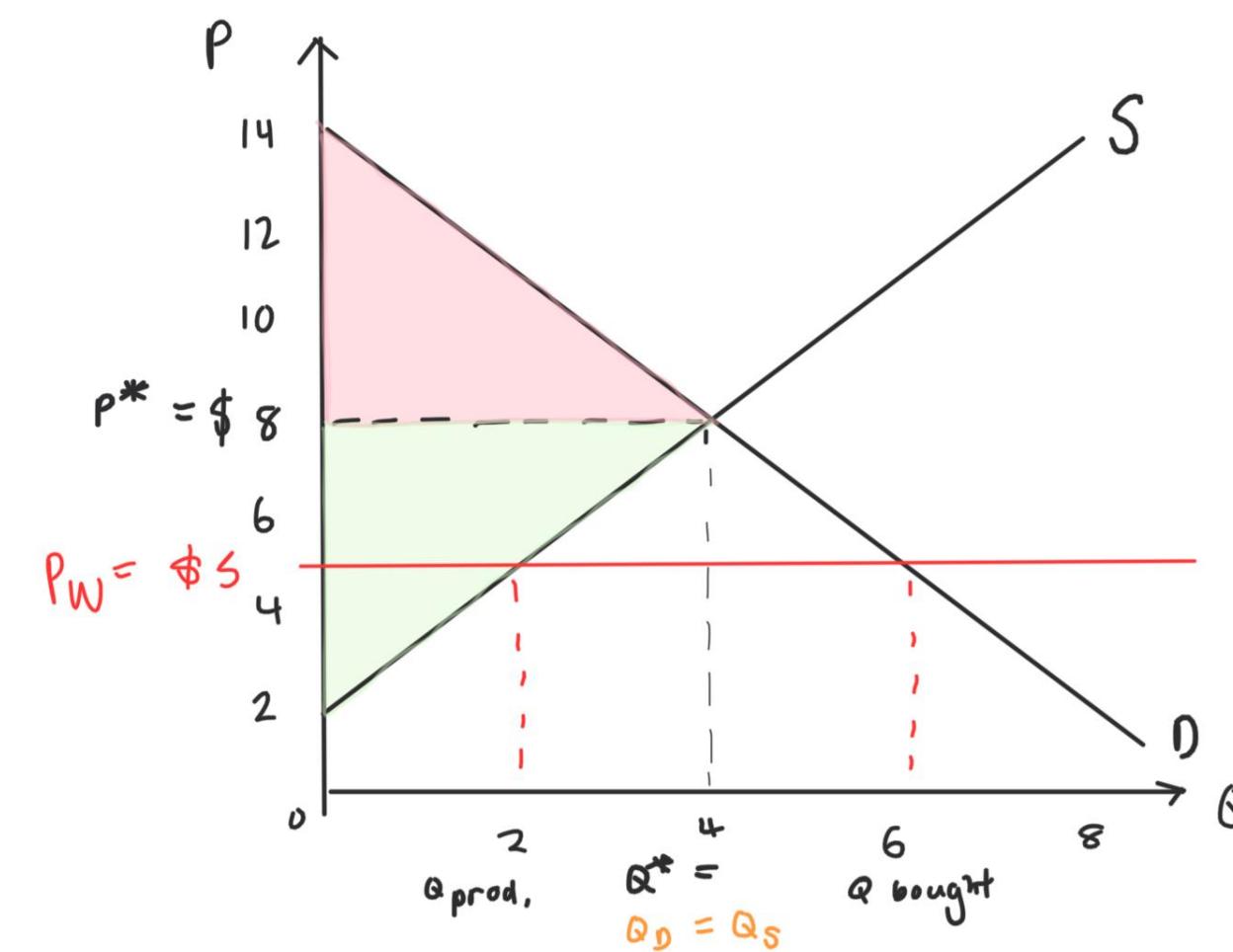
## 6. Global Market in Action - No Trade

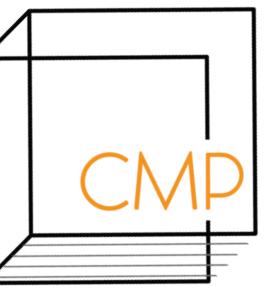
- Eg. Consider the Canadian domestic jeans market:
  - at first, the market is at EQM
  - no trade
  - $P^* = \$8$ ,  $Q^* = 4$



## 6. Global Market in Action - Import

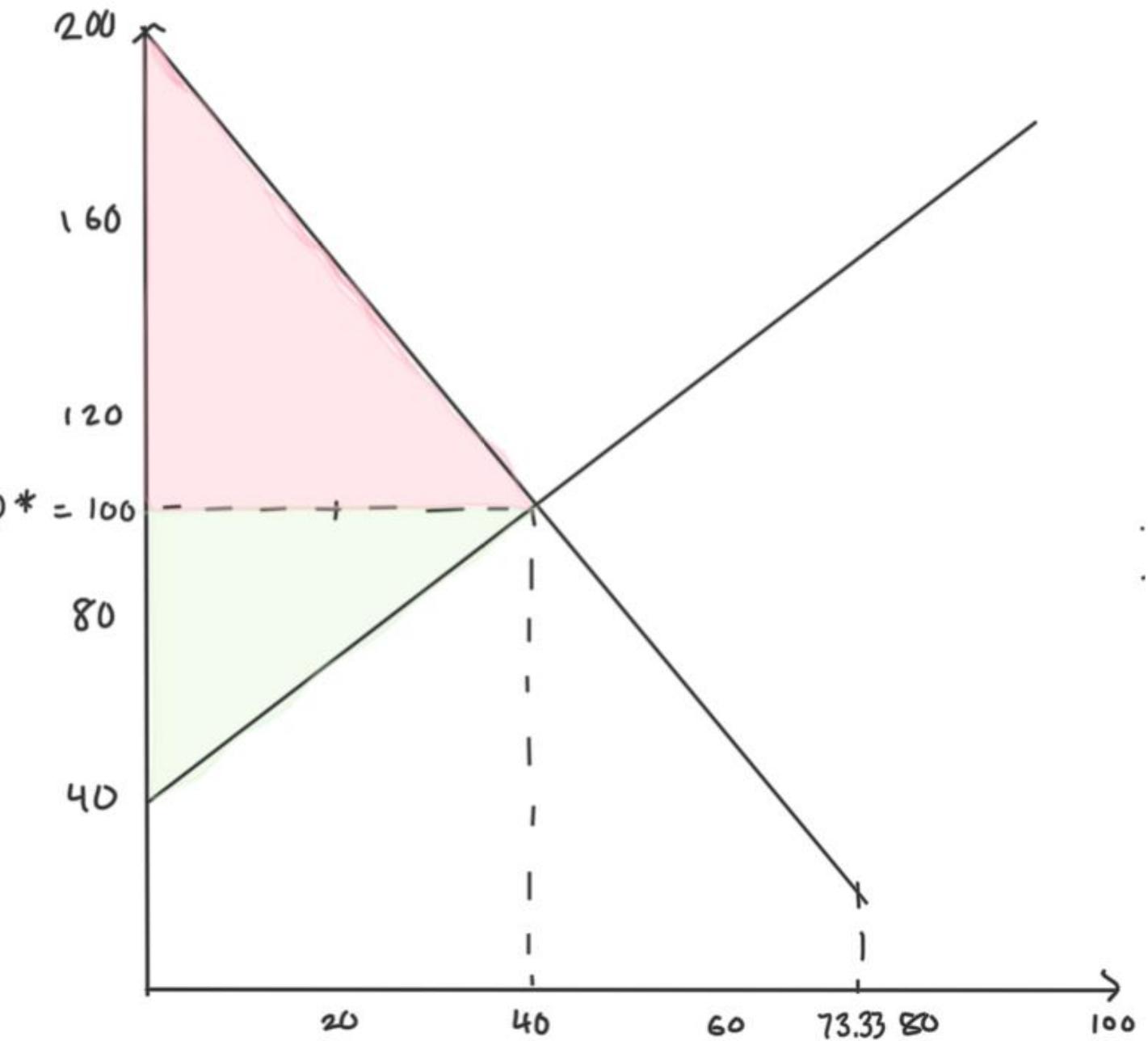
- Eg. Consider the Canadian domestic jeans market:
  - $P_w = \$5$  which is *lower* than  $P^*$
  - Now, the price for a pair of jeans is determined by the world market not Canadian market
  - $D > S \rightarrow$  shortage  $\rightarrow$  import





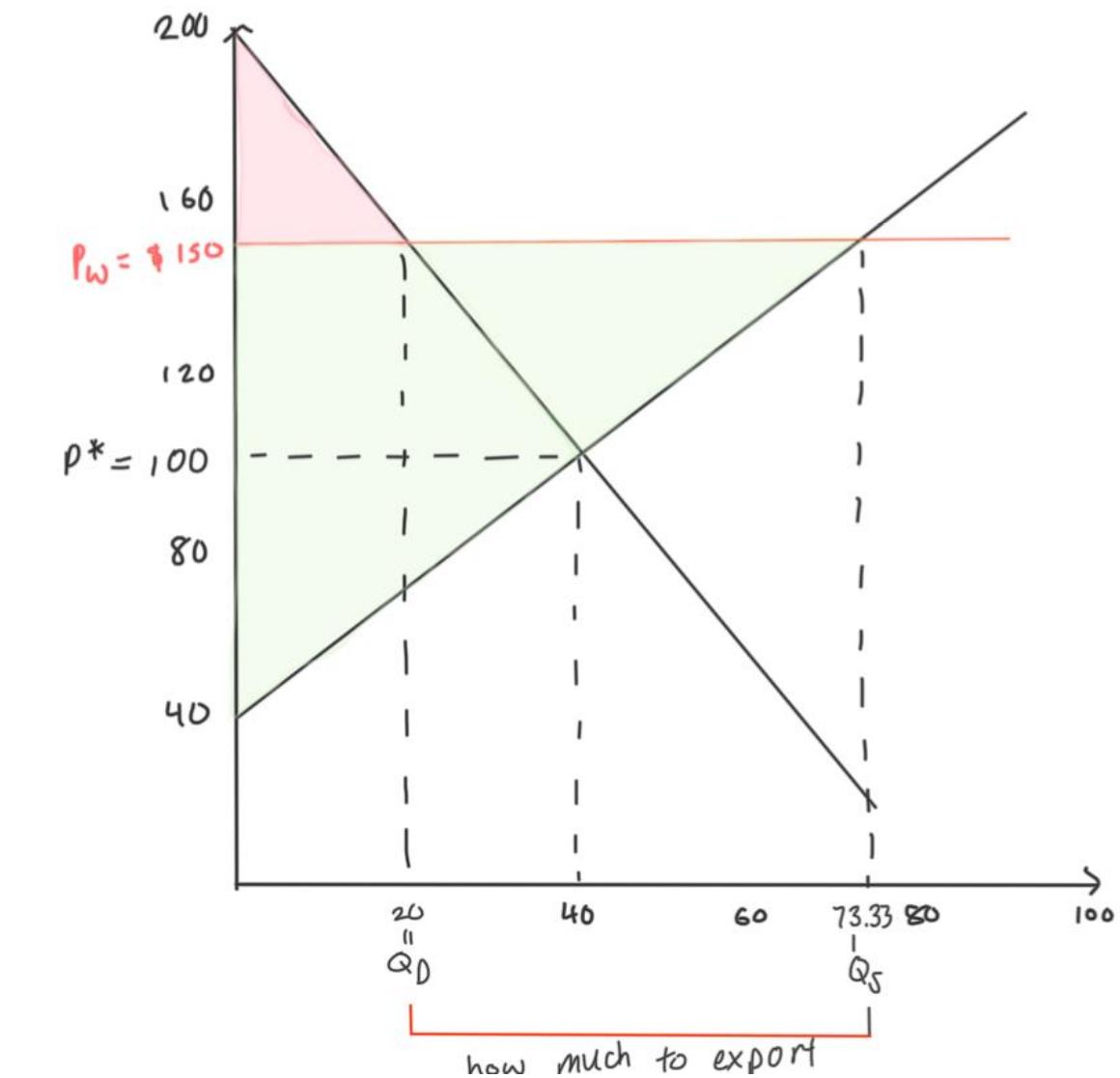
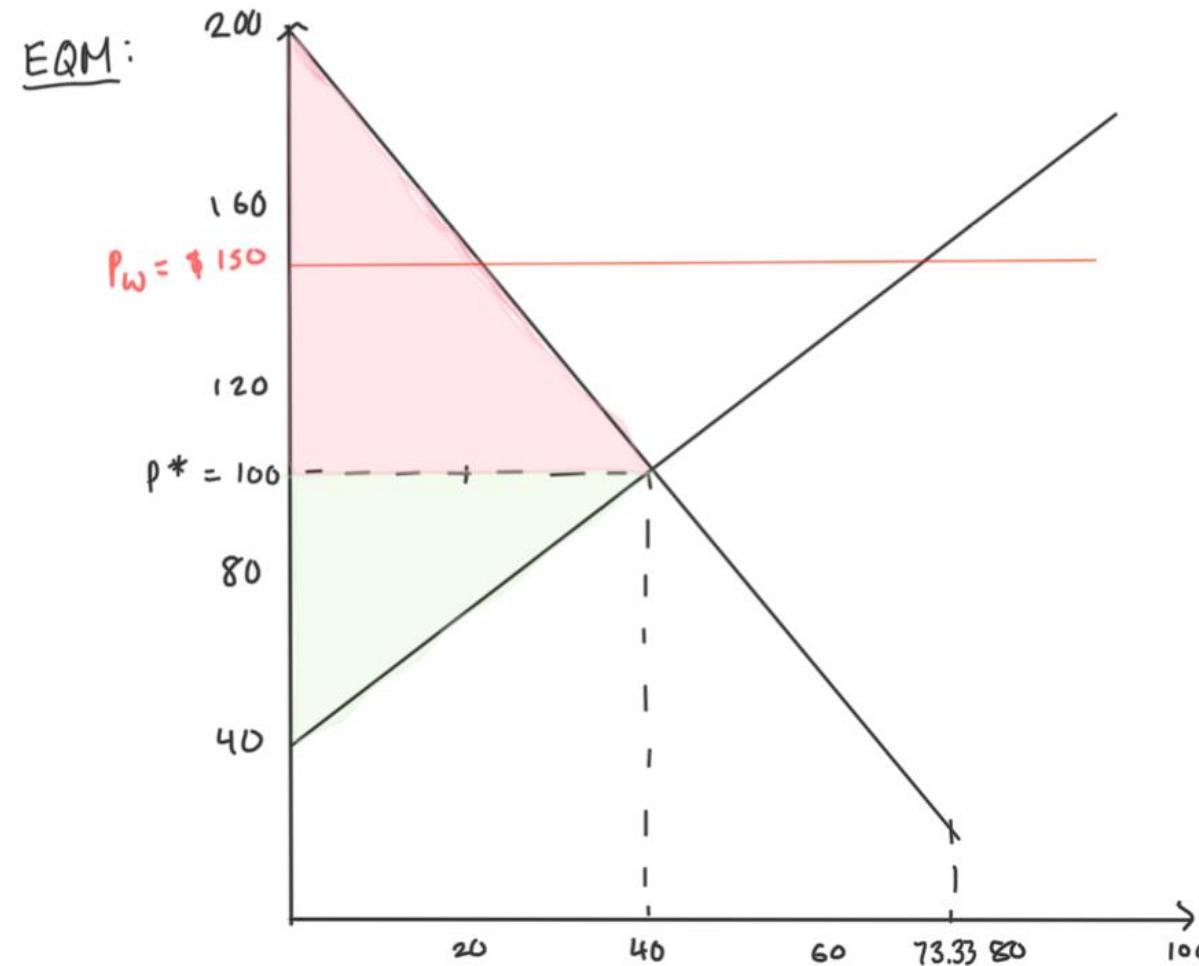
## 6. Global Market in Action - No Trade

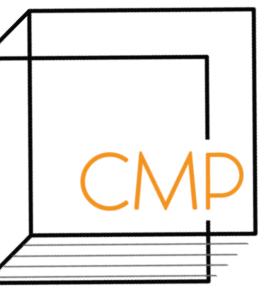
- Eg. Consider the Canadian domestic regional jet market:
  - at first, the market is at EQM
  - no trade
  - $P^* = \$100$ ,  $Q^* = 40$



# 6. Global Market in Action - Export

- Eg. Consider the Canadian domestic regional jet market:
  - However, Canadians suppliers realize that the  $P_w = \$150$  which is HIGHER than  $P^*$
  - Now, the price for a jet is determined by the world market not Canadian market
  - $S > D \rightarrow$  surplus  $\rightarrow$  **export**





## 6. Global Market in Action - Imports & Exports

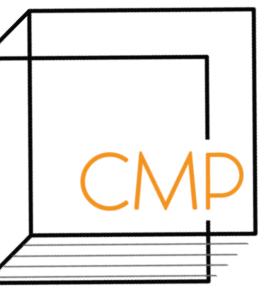
**Q9:** Who (Canada or rest of the world) has comparative advantage in jeans production? What about regional jet production?

- Since  $P_w$  for jeans is lower than  $P^*$  in the Canadian domestic market, then the rest of the world must have a comparative advantage in jean production.
- Since  $P_w$  for regional jets is higher than  $P^*$ , then Canada must have a comparative advantage in regional jet production.

**Q10:** Who (Canadian producer or consumers) gains and who loses in the jeans market? What about in the regional jet market?

- In the jeans market, consumers gain because CS increased and Canadian producers lose because PS decreased.
- In the regional jet market, Canadian producers gain because PS increased and consumers lose because CS decreased.

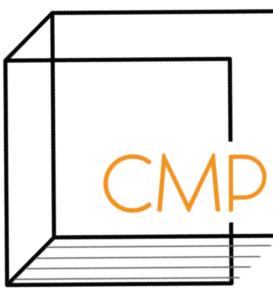




## 6. Global Market in Action - Tariffs on Imports

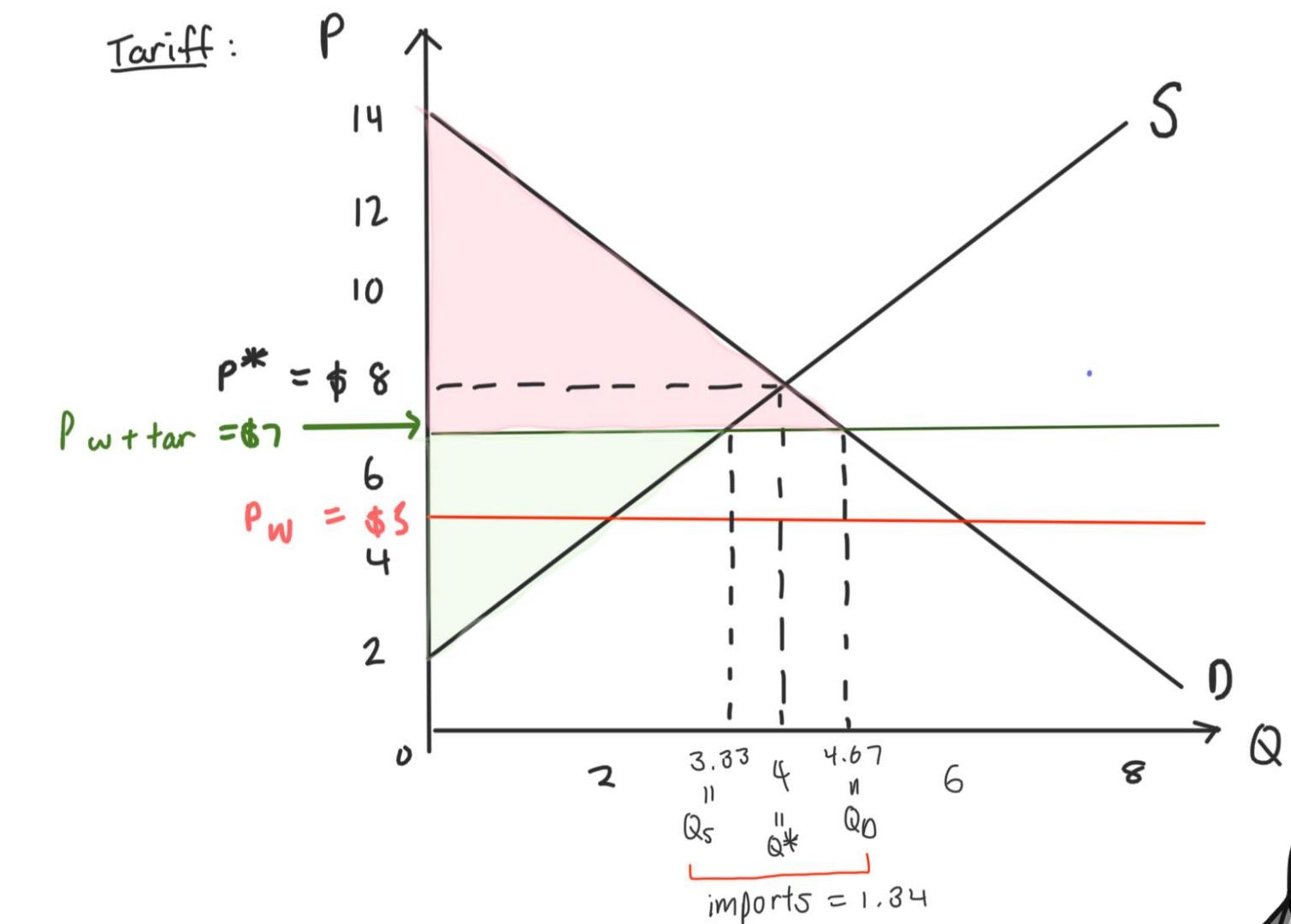
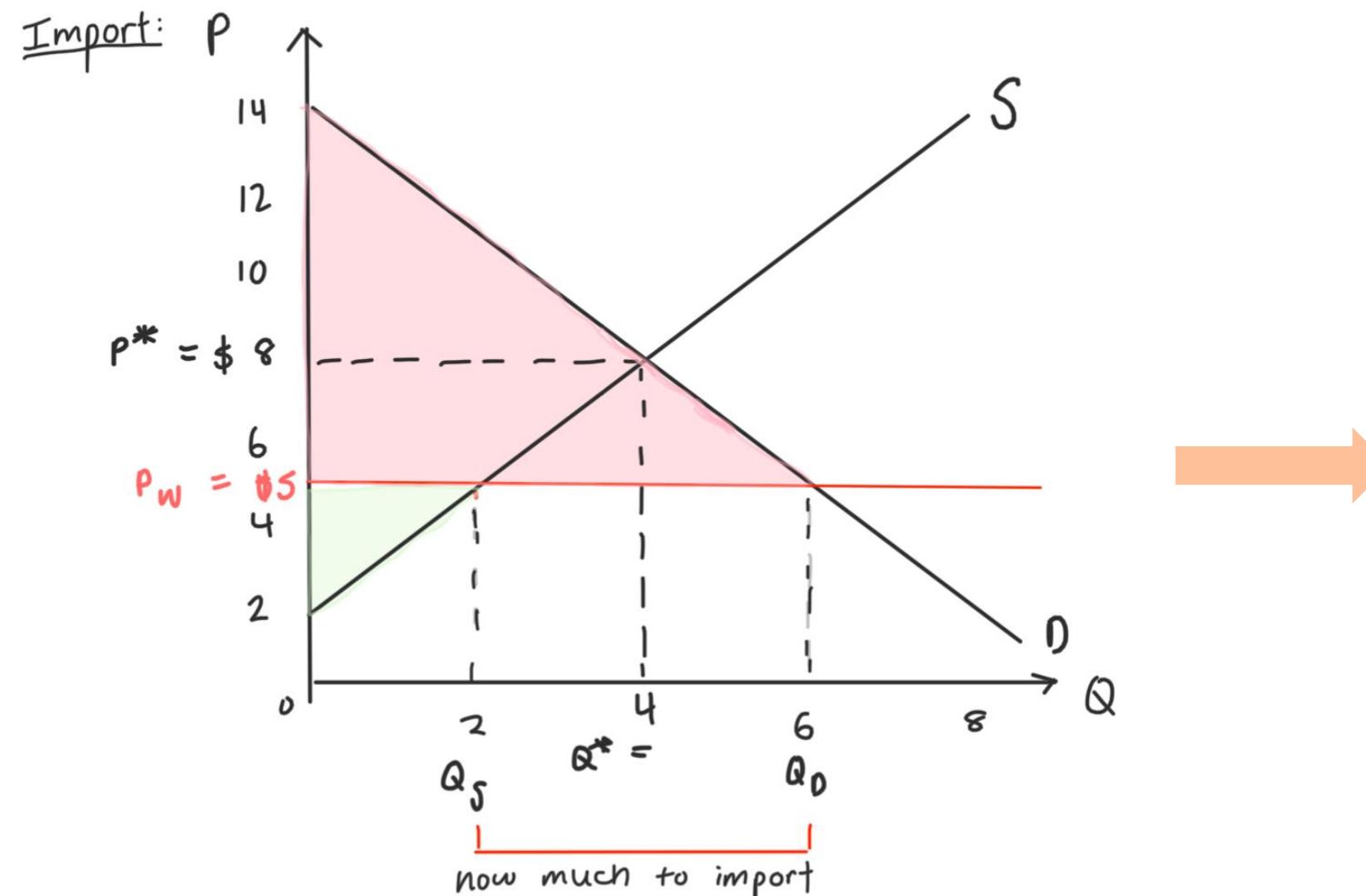
- **tariffs:** a tax on goods imposed by the importing country when imported goods enters the country
  - allows the government to earn revenue on imports
  - increases the cost of imports > decreases quantity imported and encourages consumers to buy from domestic producers > recover some PS for producers but leads to DWL

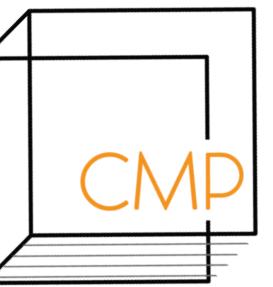




## 6. Global Market in Action - Tariffs on Imports

- Eg. Consider the Canadian domestic jeans market again:
  - government decides to impose a \$2 tariff/ pair of jeans >  $P_w$  increases by \$2 > Canadians import less because it's more expensive to import now





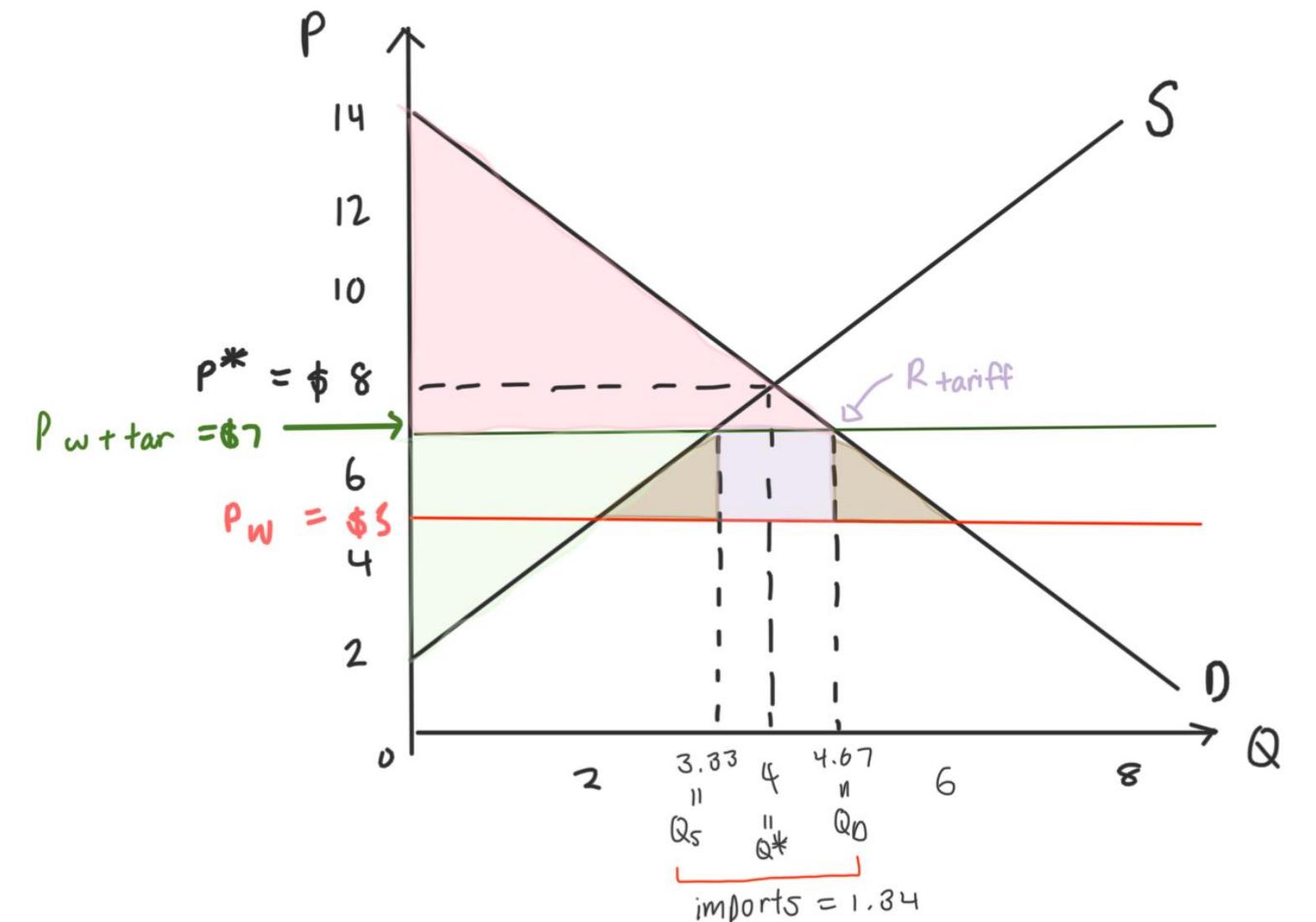
## 6. Global Market in Action - Tariffs on Imports

Q11: Is imposing a tariff efficient? If not, what's the total DWL and where are they on the graph?

- It's inefficient because it raises price and decreases quantity
- $DWL = \frac{1}{2} (7-5)(3.33-2) + \frac{1}{2} (7-5)(6-4.67) = \$2.66$
- DWL are represented by the 2 brown triangles

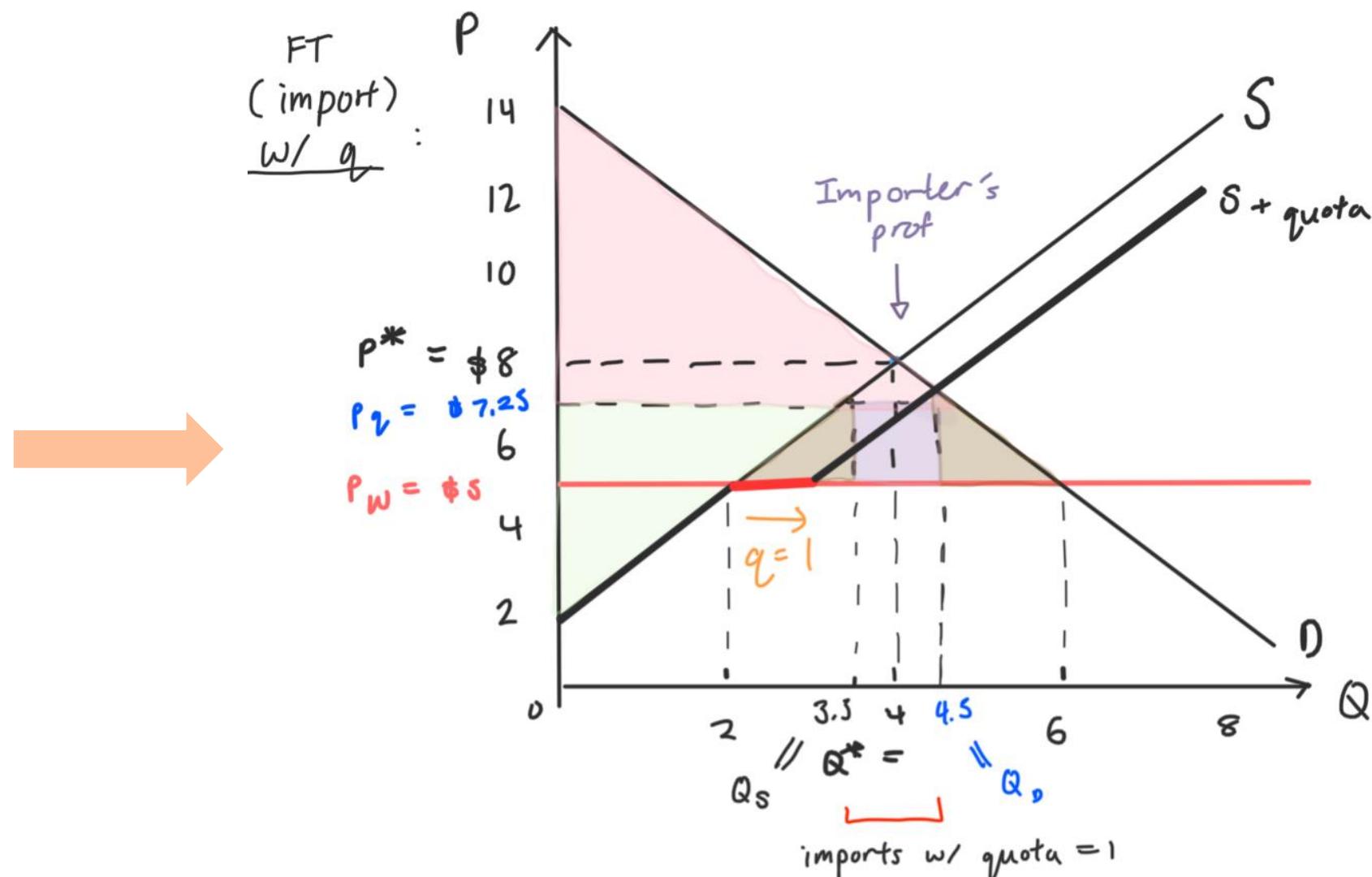
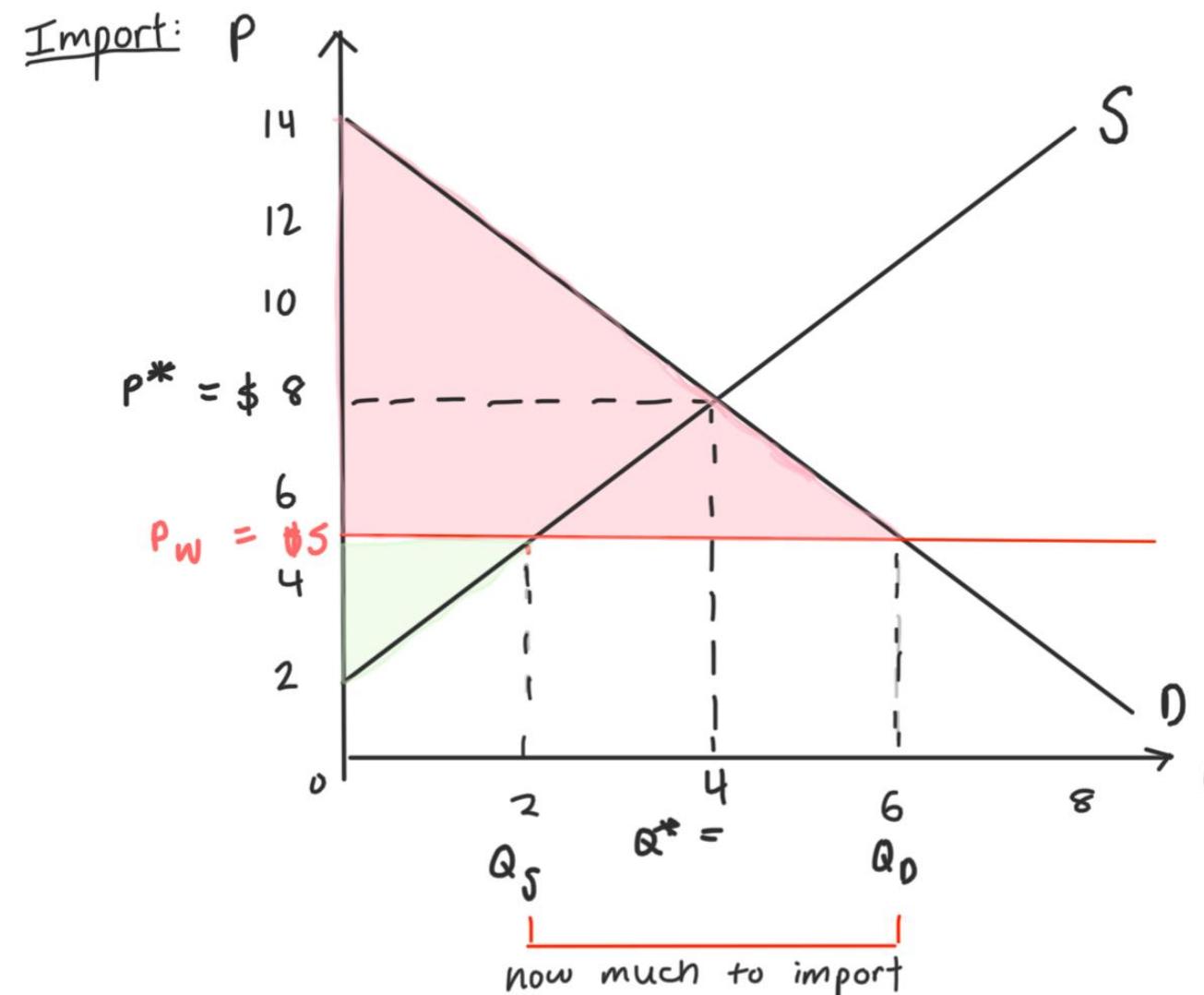
Q12: How much revenue does the government collect from tariffs?

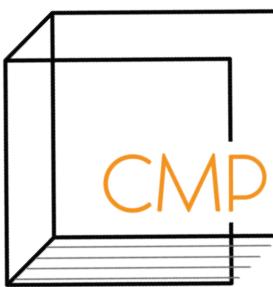
- Tariff revenue =  $(7-5)(4.67-3.33) = \$2.68$



# 6. Global Market in Action - Quota on Imports

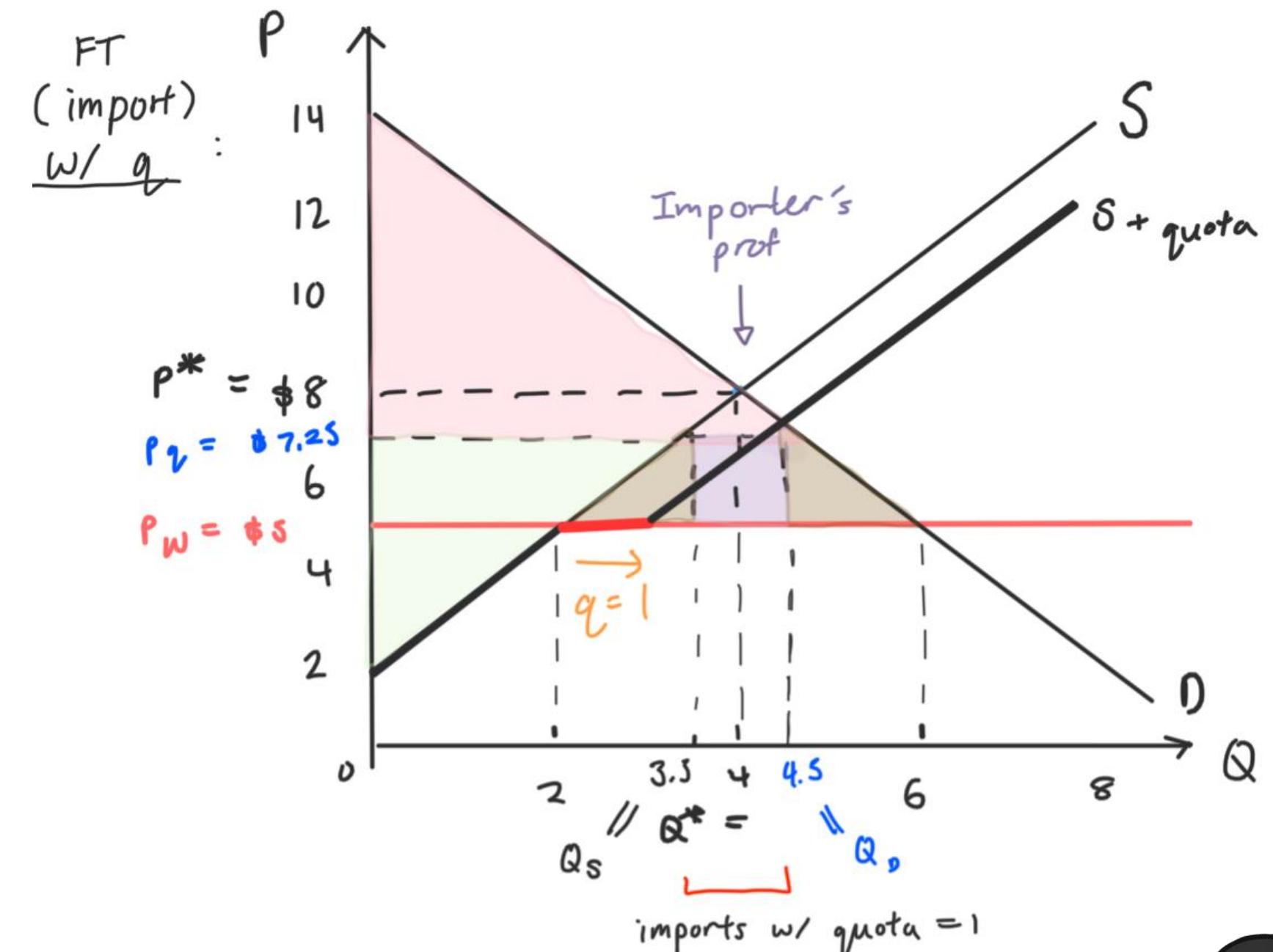
- **import quota:** limits the maximum amount of goods that can be imported
- Eg. Consider the Canadian domestic jeans market again:
  - Instead of a tariff, the government imposes an import quota where ONLY 1 pair of jeans can be imported

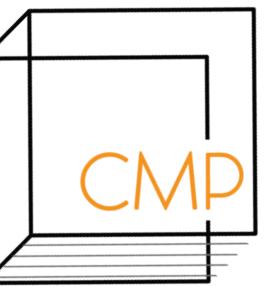




## 6. Global Market in Action - Quota on Imports

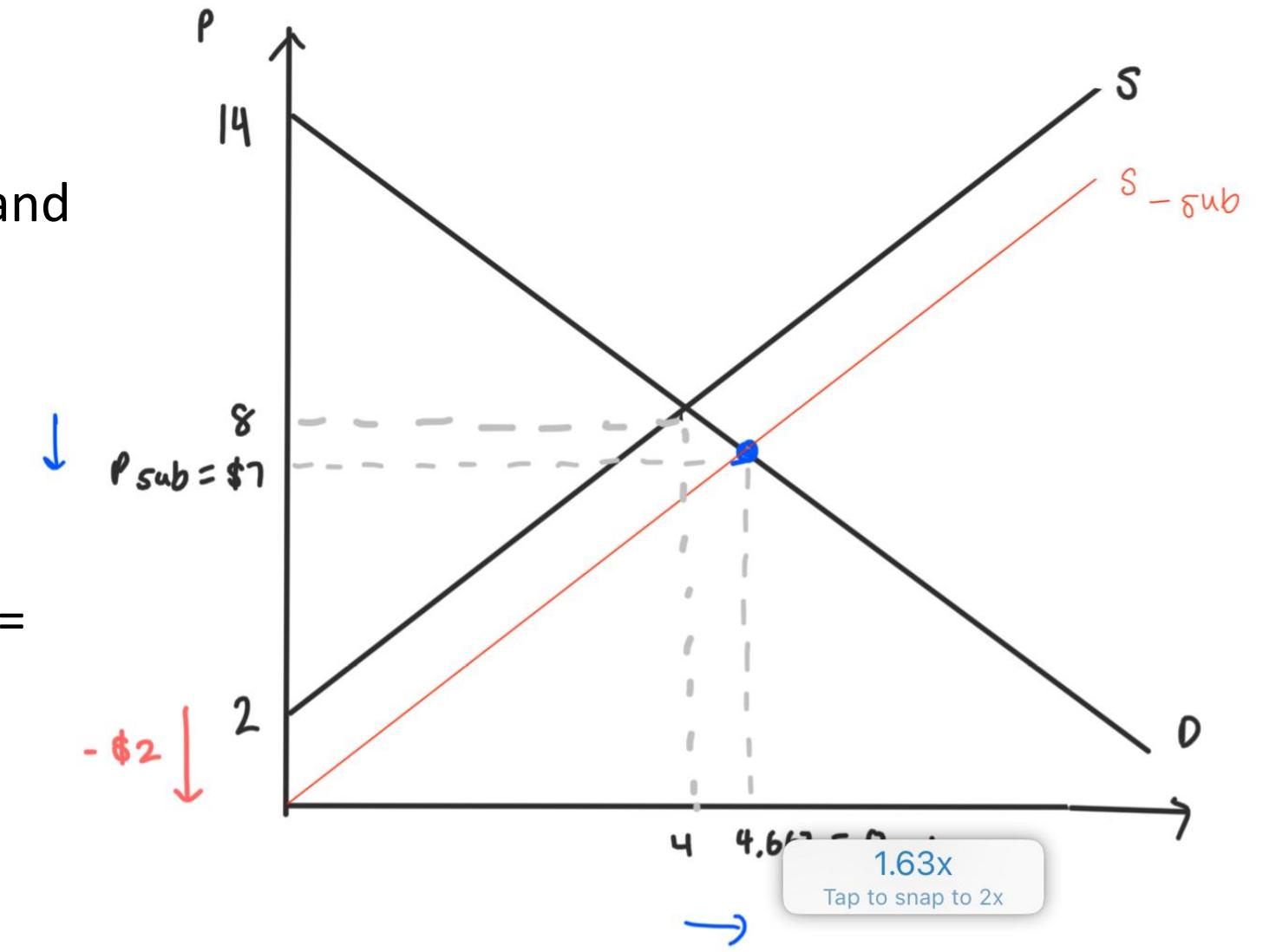
- the supply curve becomes ***S+quota***
- Eg. if the supply function is  $Q_s = 0.67P - 1.33$ ,
  - when  $P < P_w \rightarrow Q_s = 0.67P - 1.33$
  - when  $P \geq P_w \rightarrow Q_s = 0.67P - 1.33 + 1$
- the new price that Canadians will pay for imports would now be the intersection point between the demand curve and ***S+quota*** curve
- the importer's profit = (quota)( $P_q - P_w$ )
- DWL

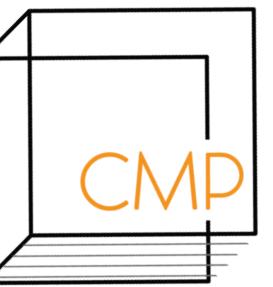




## 6. Global Market in Action - Subsidy on Exports

- **export subsidy:** when the government pays the domestic producer of the exported good
  - decreases P, increases Q
  - domestic producer gains, but overproduction in the domestic economy and underproduction in the rest of the world → DWL
- Eg. Consider the wood market
  - government pays lumberjacks a subsidy of \$2/ log
  - costs decrease > supply curve shifts to ***S-sub*** > producing more than  $Q^* = 4$  > overproduction > export
    - S:  $P = 1.5Q_s + 2$
    - ***S-sub***:  $P = 1.5Q_s + 2 - 2$





## 6. Global Market in Action - Quota, Export Subsidy

**Q13:** The supply function for the cheese market is  $P = 1.5Q_s + 2$ , and the demand function is  $P = -3Q_d + 5$ . If a **quota of 3** is imposed, what's the new **S+quota** function?

- a)  $P = 1.5Q_s + 5$
- b)  $P = -3Q_d + 8$
- c)  $Q_s = 0.67P + 1.67$
- d)  $Q_d = 0.67P + 4.67$

- Quota has to do with  $Q_s$
- rearrange the supply function before adding the quota of 3
- $P = 1.5Q_s + 2 \rightarrow Q_s = 0.67P - 1.33 + 3 \rightarrow Q_s = 0.67P + 1.67$

**Q14:** What if a **export subsidy of \$3/ block of cheese** is imposed instead of a quota, what's the new **S-sub** function?

- a)  $P = 1.5Q_s - 1$
- b)  $P = -3Q_d + 3$
- c)  $Q_s = 0.67P - 1.67$
- d)  $Q_d = 0.67P - 1.33$

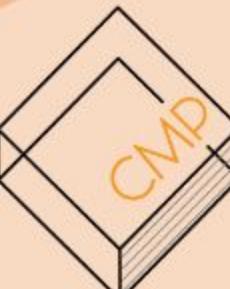
- Export subsidy has to do with  $P$
- DON't rearrange the supply function
- $P = 1.5Q_s + 2 - 3 \rightarrow P = 1.5Q_s - 1$

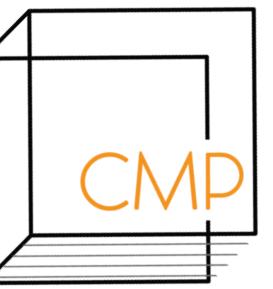


# Break Time!



We hope you have been enjoying the review session so far! When you have a chance, please fill out our survey. We appreciate your feedback. You can be entered to win a \$20 giftcard of your choice!

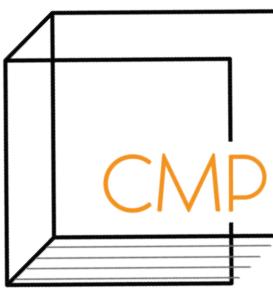




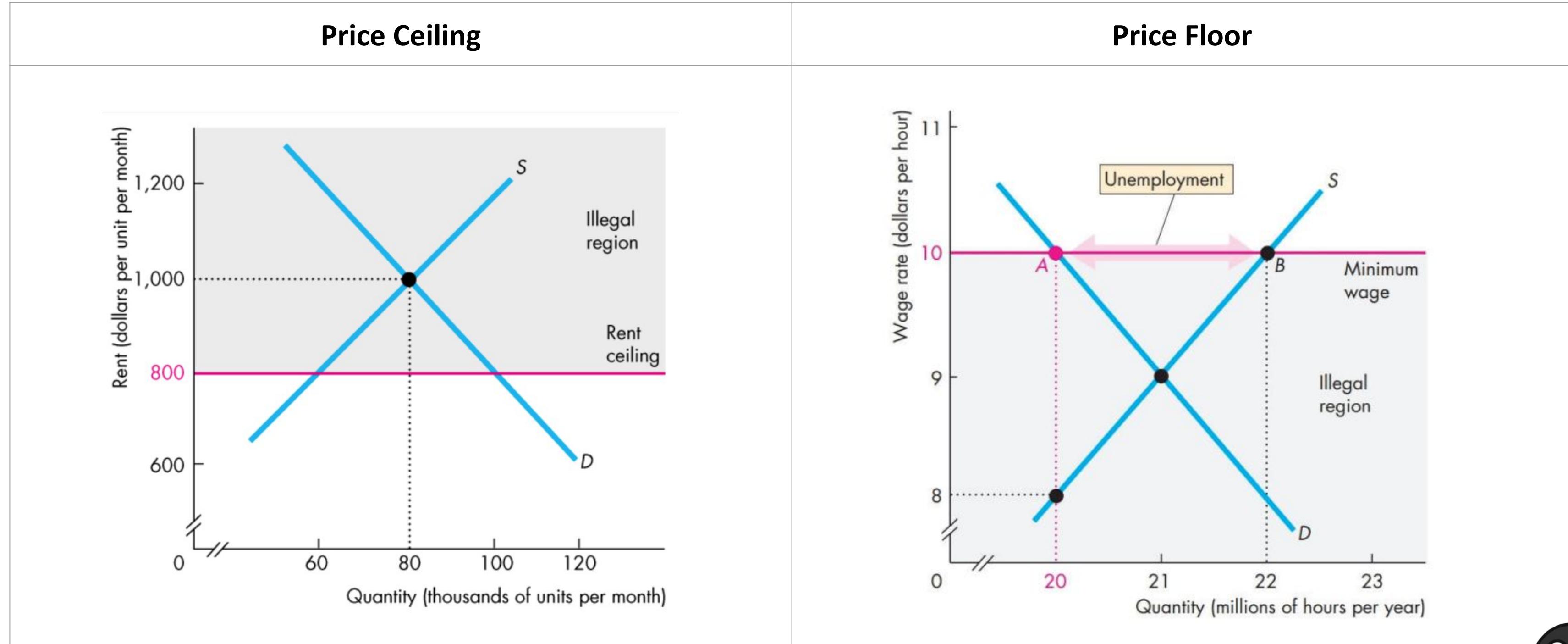
# 7. Government Actions in Market - Regulations on the Price

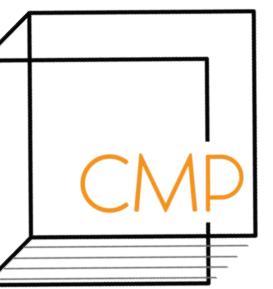
	Price Ceiling	Price Floor
Definition	when it's illegal to charge <i>above</i> a certain price	when it's illegal to charge <i>below</i> a certain price
Goal	Decrease price	Increase price
How?	Price ceiling $< P^*$	Price floor $> P^*$
Market Failure	underproduction	underproduction
Consequence	$D > S \rightarrow$ shortages	$S > D \rightarrow$ surplus
Eg.	Rent market	Labour market





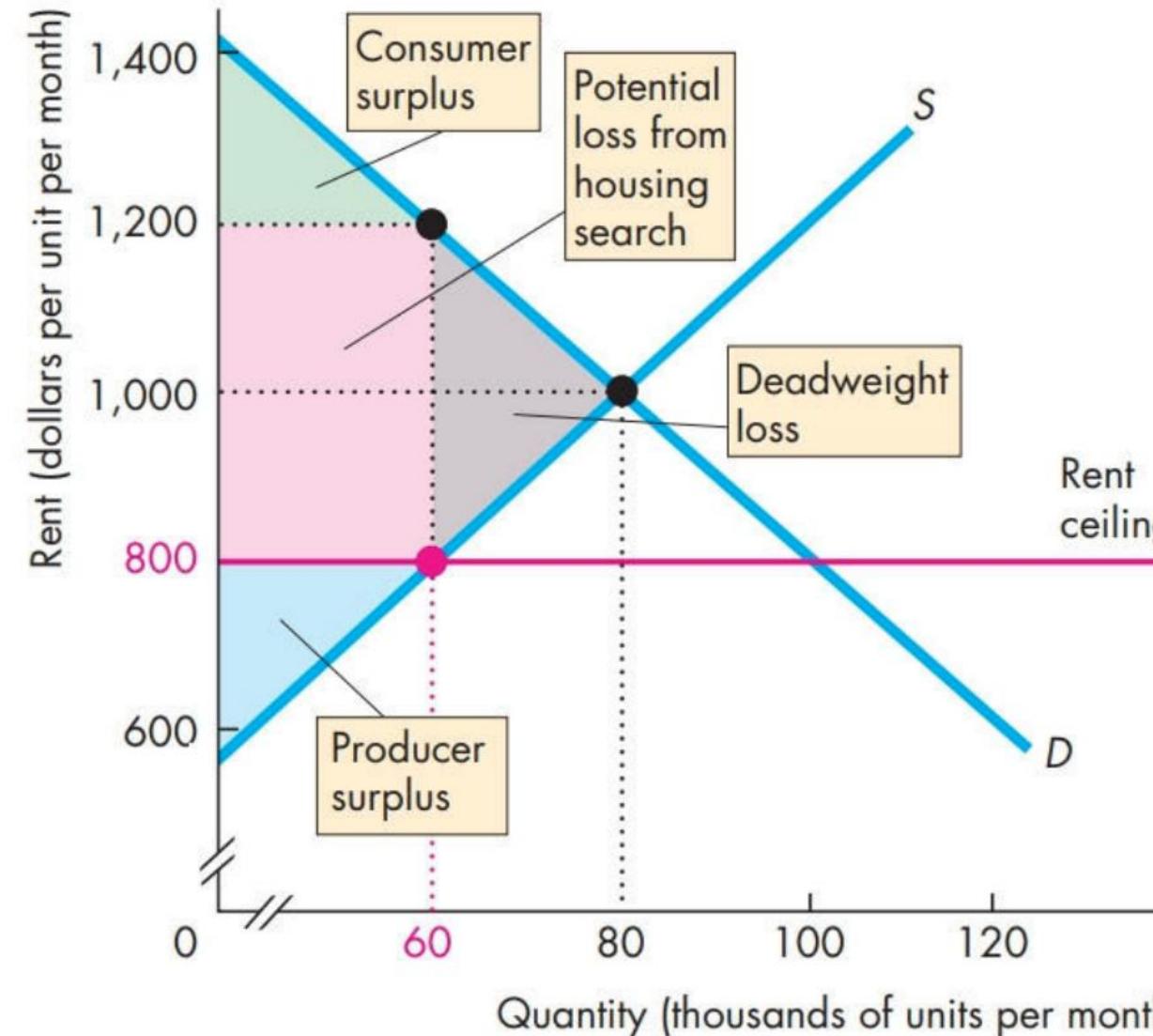
## 7. Government Actions in Market - Regulations on the Price



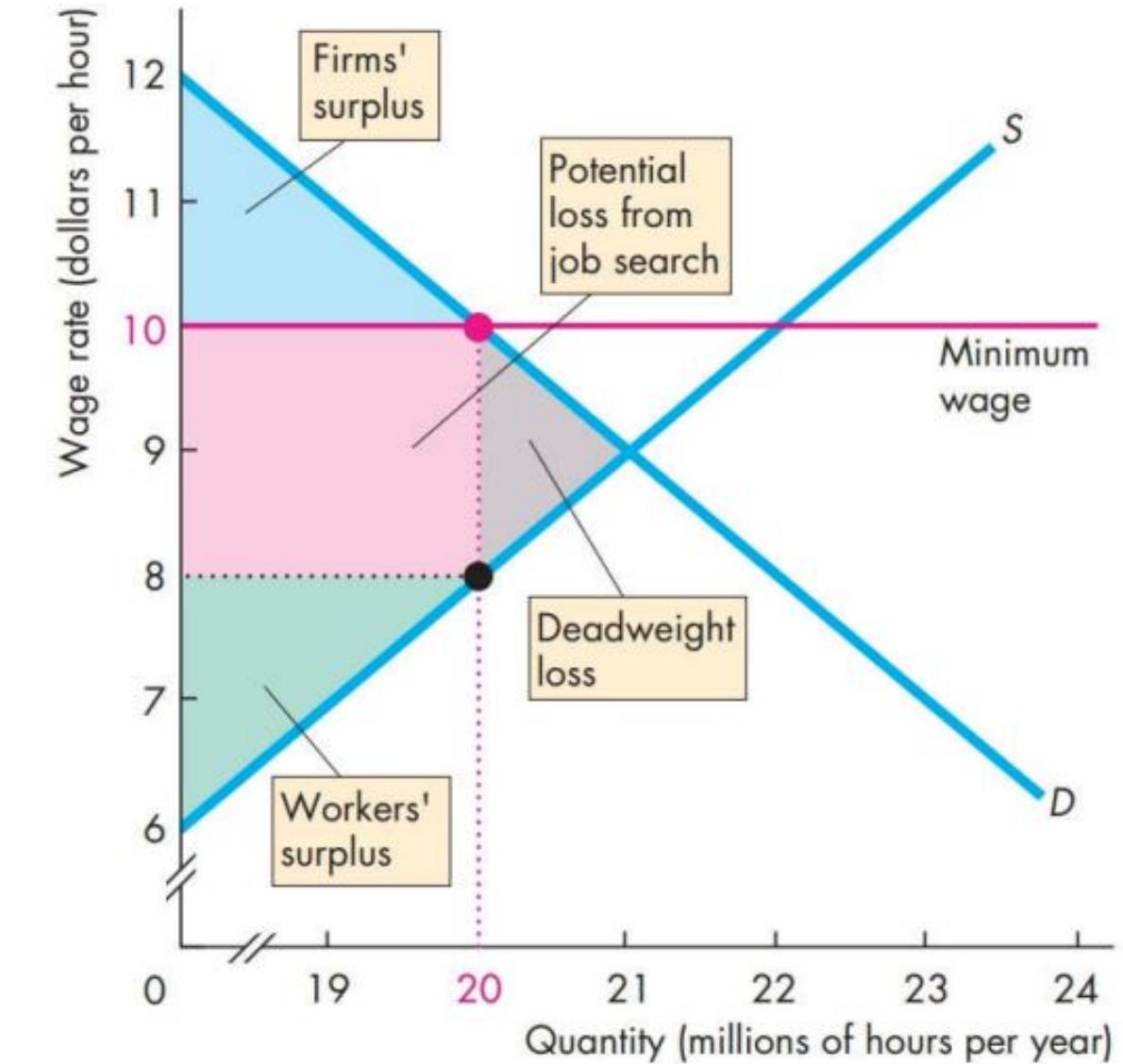


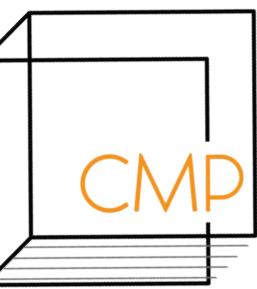
# 7. Government Actions in Market - Regulations on the Price

**Price Ceiling**



**Price Floor**



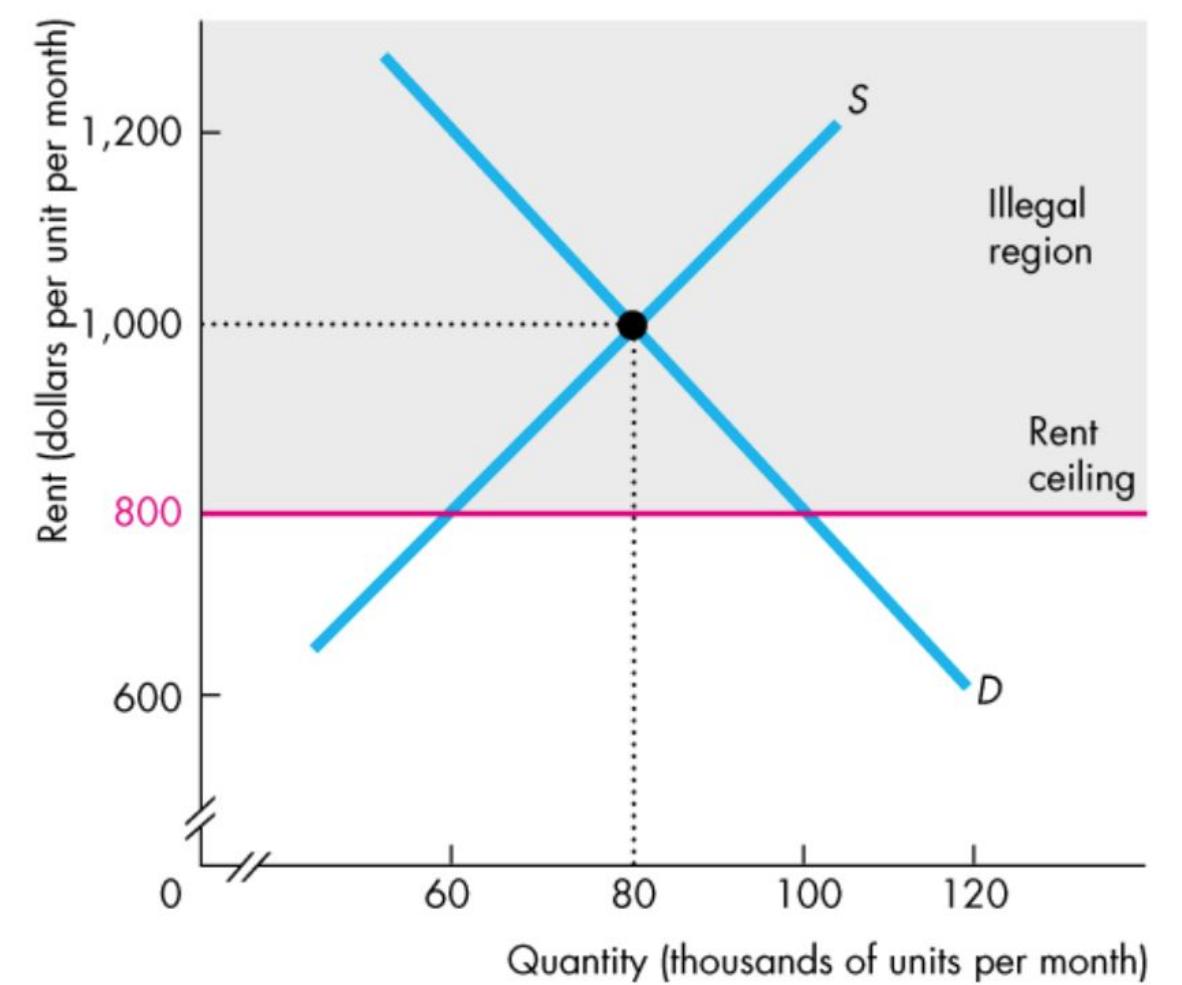


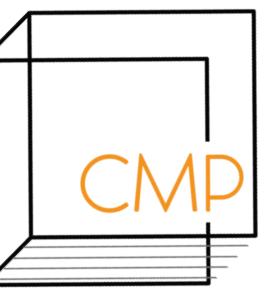
## 7. Government Actions in Market - Price Ceiling

Penny has always wanted to live alone, but the prices to rent an apartment are too expensive. Recently, she heard that a rent ceiling will be implemented and she was overjoyed at the news, thinking she'll finally be able to find and afford a home of her own.

**Q15:** Is Penny right? Would it be easier to find an apartment after the rent ceiling is implemented? Why or why not? (*Hint: Compare  $Q_d$  and  $Q_s$  at the rent ceiling price*)

- Due to the lowered rent prices:
  - $Q_d$  increased from 80 thousand to 100 thousand
  - $Q_s$  decreased from 80 thousand to 60 thousand
  - $Q_d > Q_s \rightarrow$  shortage of 40 thousand units
  - More people are looking for apartments but there are less units available.





## 7. Government Actions in Market - Price Floor

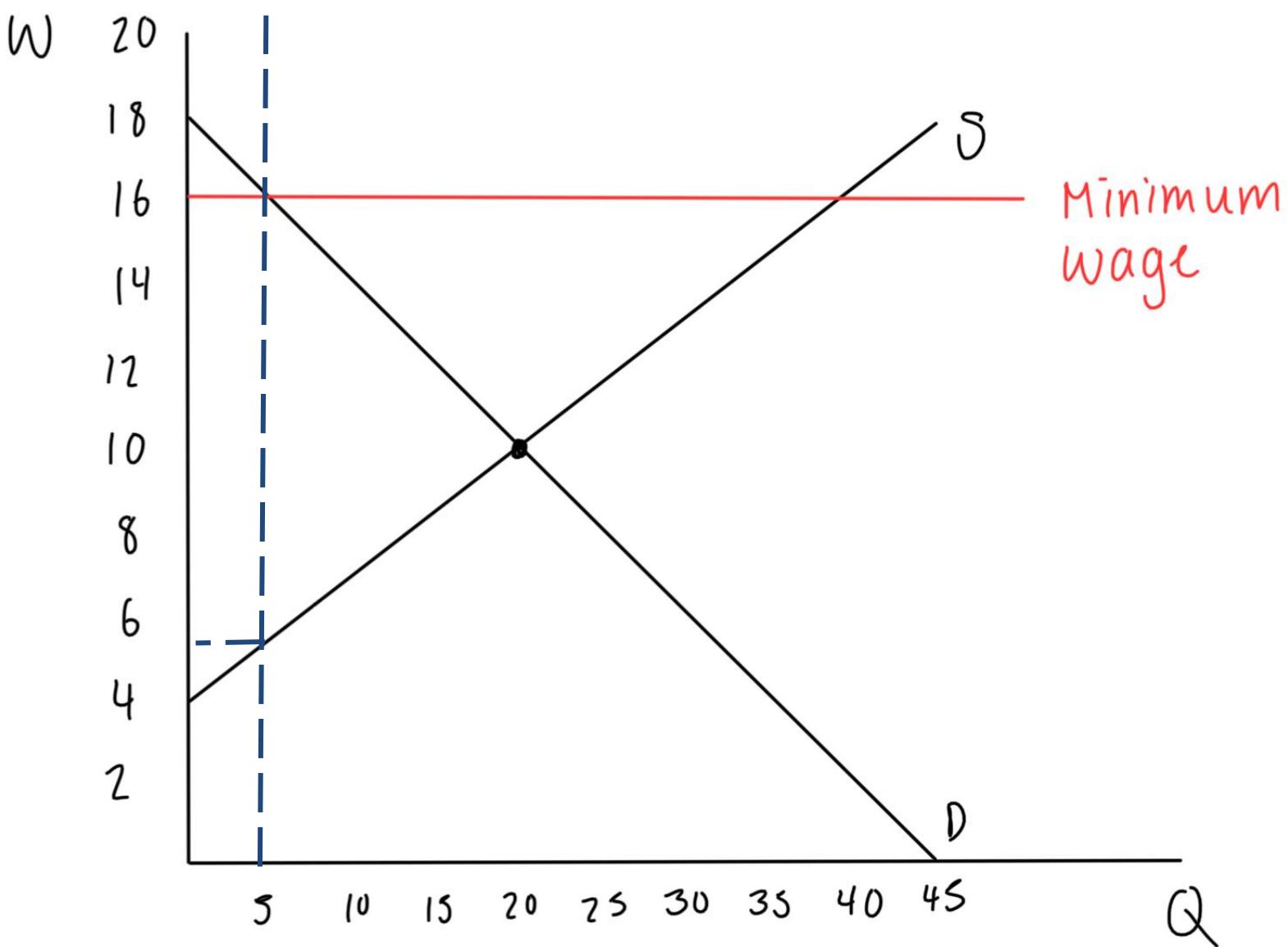
The demand function in a labour market is  $W = -0.4Q_d + 18$ , and the supply function is  $W = 0.3Q_s + 4$ . If the government implements a minimum wage of \$16/hr, answer the following questions:

**Q16:** Who's the supplier and who's the consumer of the labour market?

- Workers are the suppliers
- Employers are the consumers

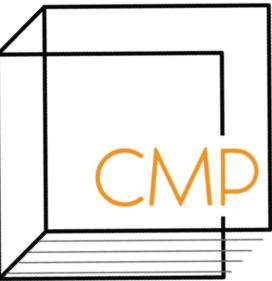
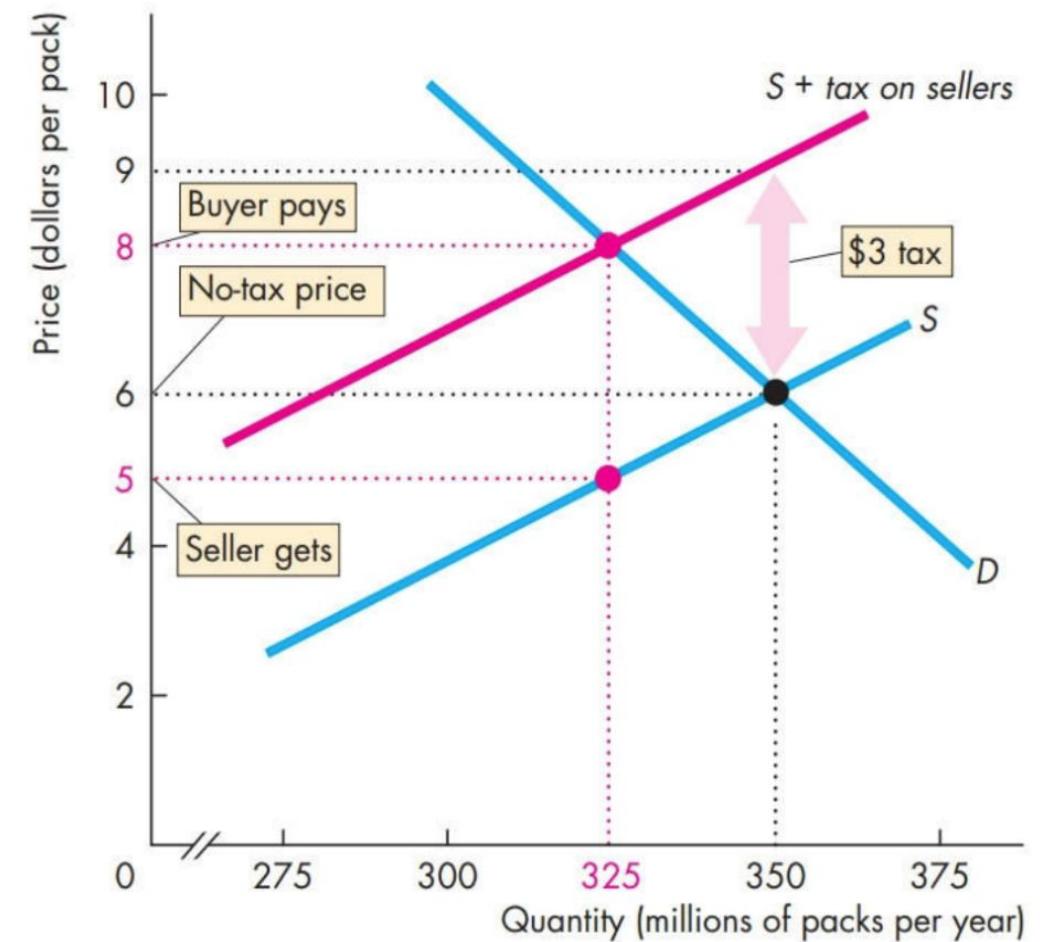
**Q17:** Calculate the CS, PS, and DWL.

- $CS = \frac{1}{2} (18-16)(5) = \$5$
- $PS = \frac{1}{2} (6-4)(5) = \$5$
- $DWL = \frac{1}{2} (16-6)(20-5) = \$75$

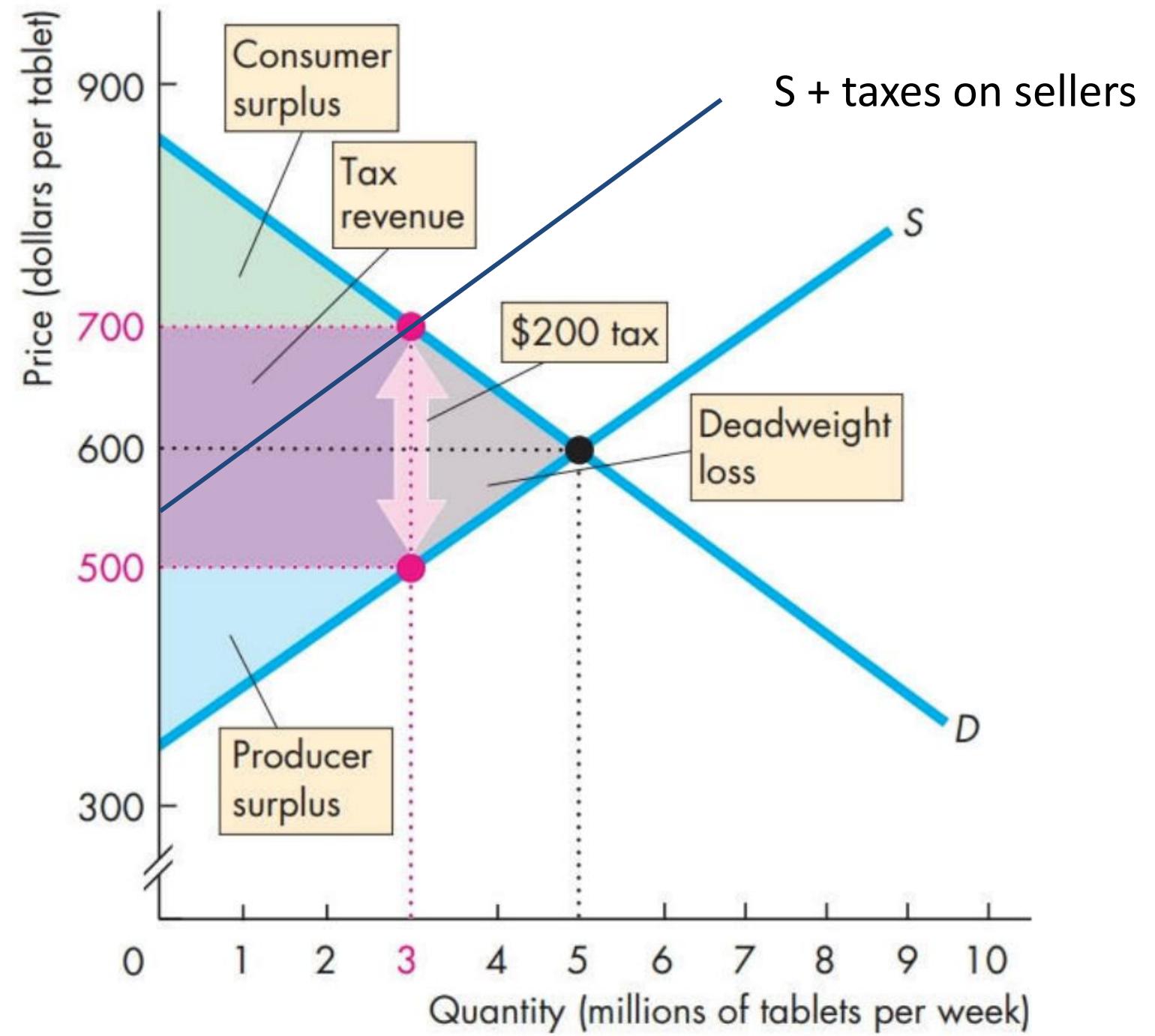


# 7. Government Actions in Market - Taxes

- **tax incidence:** division of the burden of a tax between the seller and buyer
  - increases P, decreases Q
- if taxes are imposed on the seller...
  - costs rise > supply curve shifts to *S + tax on sellers*
- if taxes are imposed on the buyer
  - the amount the buyer is willing to pay the seller decreases > demand curve shifts to *D – tax on buyers*
- No matter who the taxes are imposed on, the result is the same



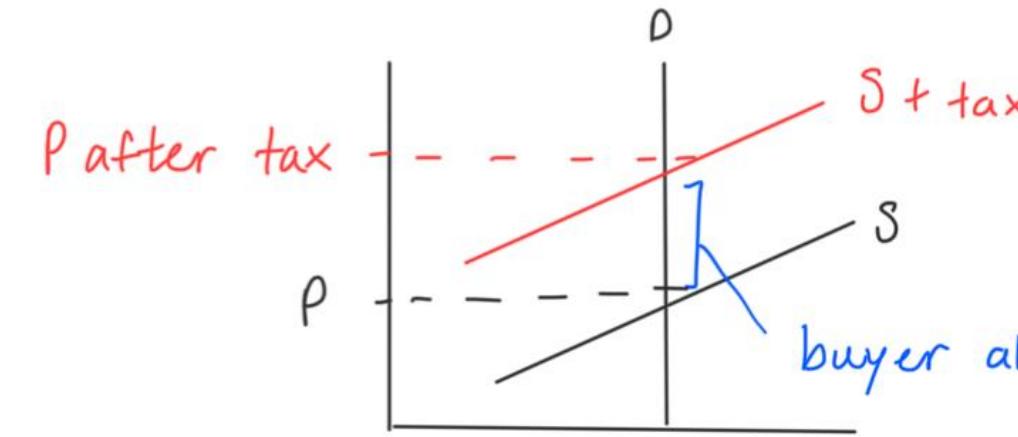
## 7. Government Actions in Market - Taxes



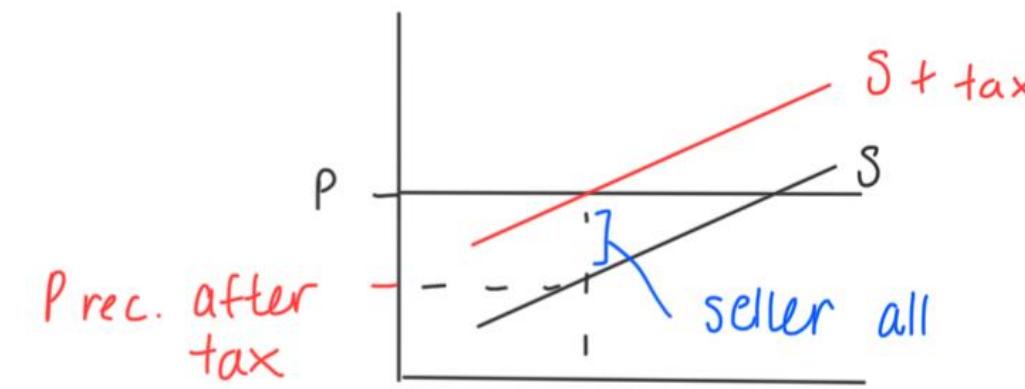
## 7. Government Actions in Market - Taxes

The more inelastic ed is, the higher the buyer's share of taxes

1) Perfectly Inel. D :

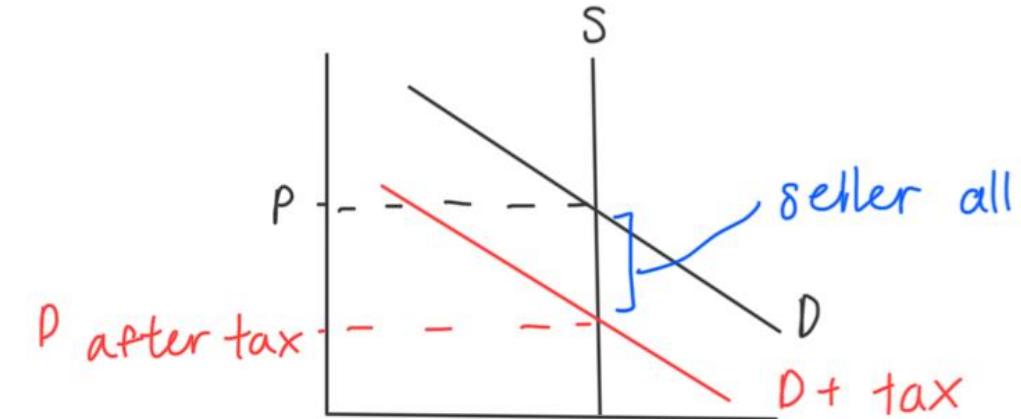


2) Perfectly El. D :

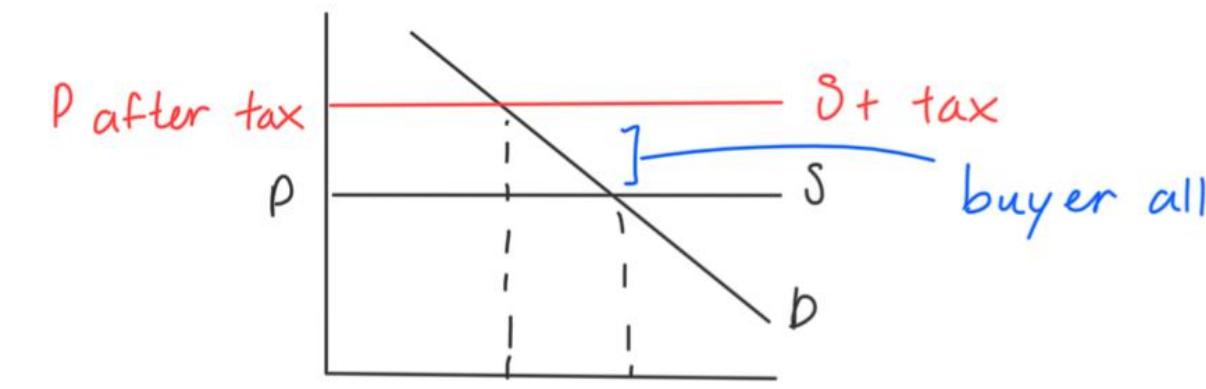


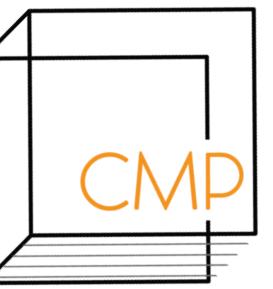
The more inelastic es is, the higher the seller's share of taxes

3) Perfectly Inel. S :



4) Perfectly El. S :





## 7. Government Actions in Market - Taxes, Production Quota, Subsidy

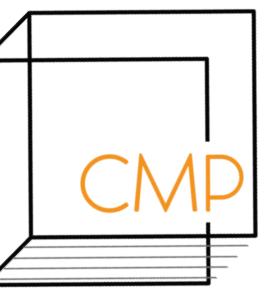
**Q18:** Goods like alcohol, cigarette and gas typically have inelastic demand. If a tax is imposed on them, who would pay more of the tax?

- a) buyer
- b) seller
- c) both will pay equal share
- d) government

**Q19:** Why do we add the tax amount to the supply function, but subtract the tax amount from the demand function?

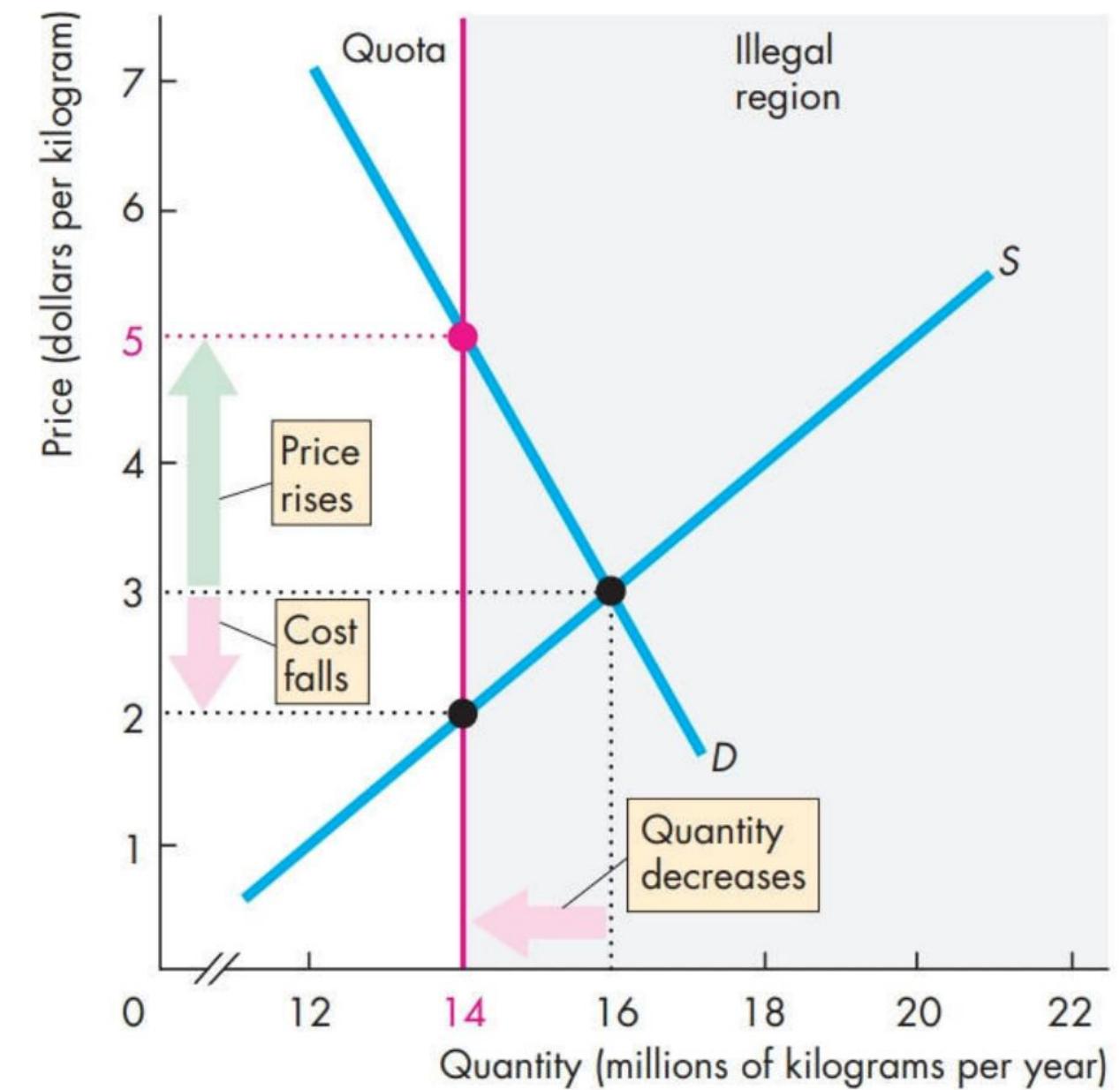
- A tax on the seller is like a rise their costs, so their supply decreases and the supply curve shifts left.
- A tax on the consumer decreases their willingness to pay the seller, so their demand decreases and the demand curve shifts left.

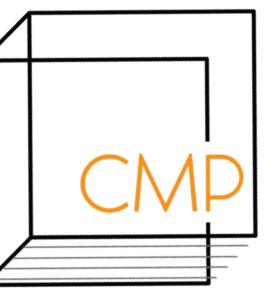




## 7. Government Actions in Market - Production Quota

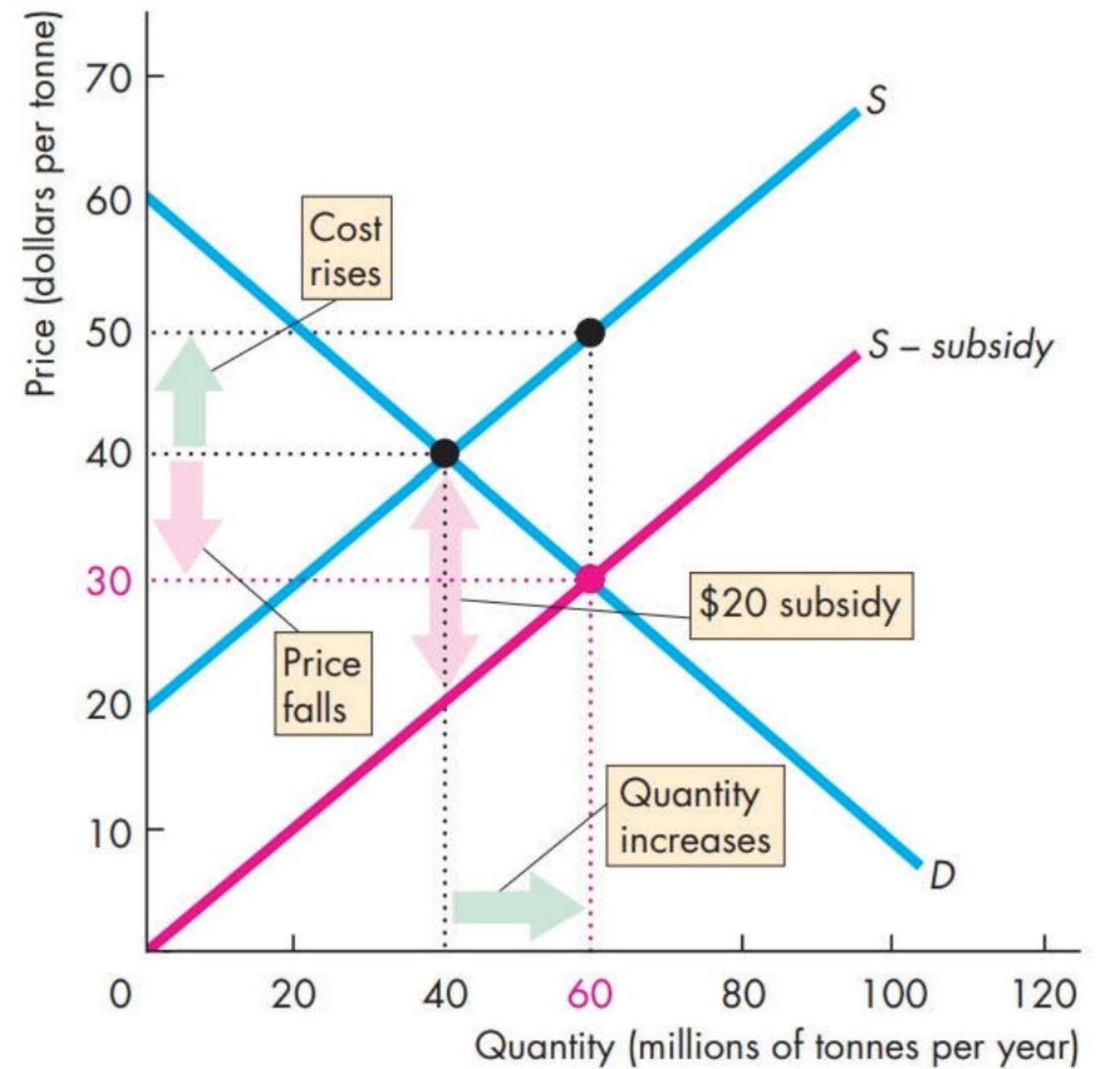
- **production quota:** limits how much can be produced
  - underproduction
  - increases P, decreases Q
  - eg. cigarette market
- effective only when the production quota  $< Q^*$

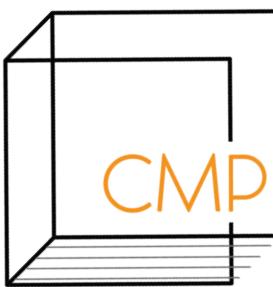




## 7. Government Actions in Market - Subsidy

- **subsidy:** when the government encourages production by sponsoring the producers
  - decreases P, increases Q
  - overproduction
- costs decrease > supply curve shifts to ***S – subsidy***
  - like a “negative tax”
- producers receive more money than before



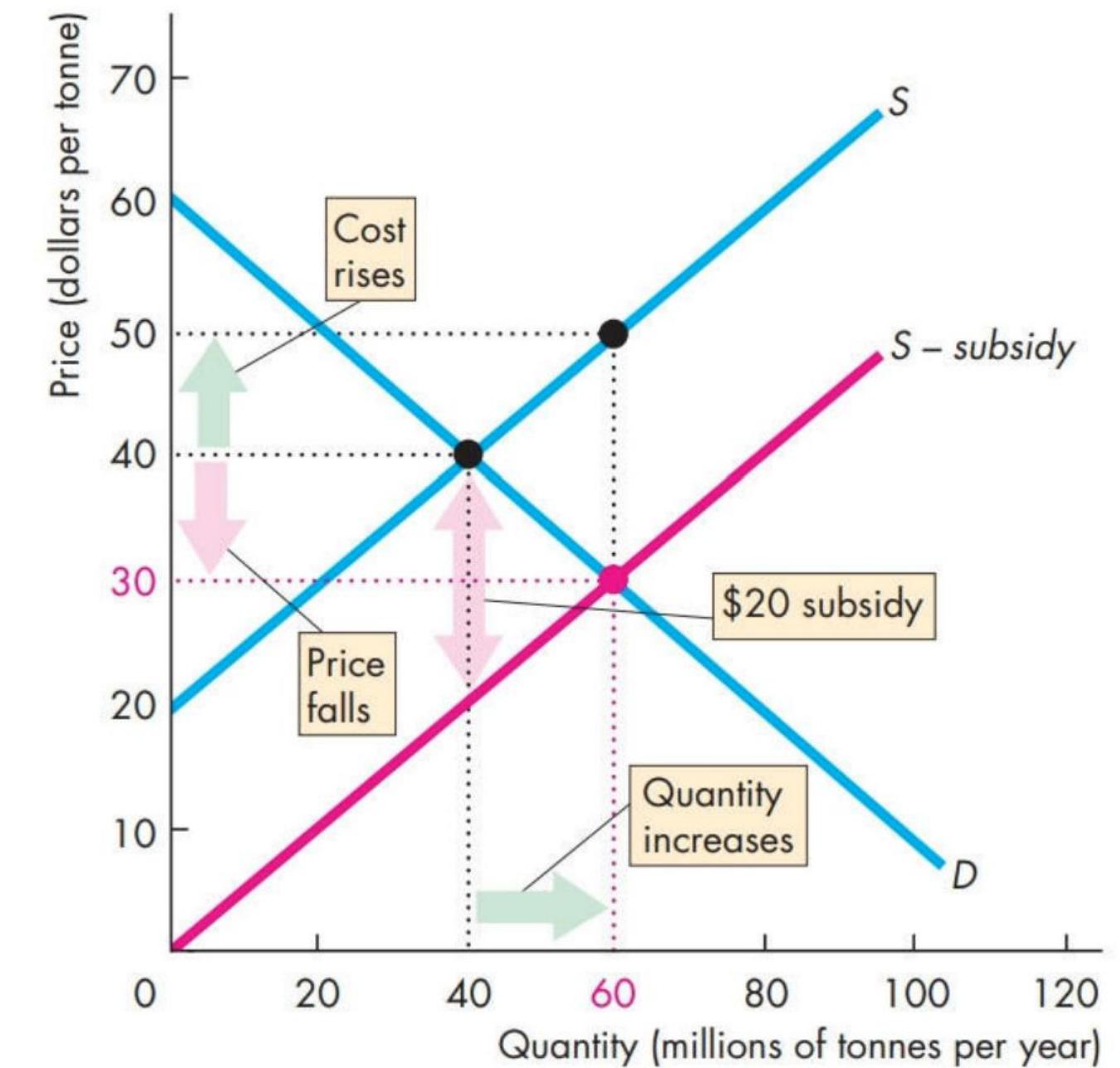


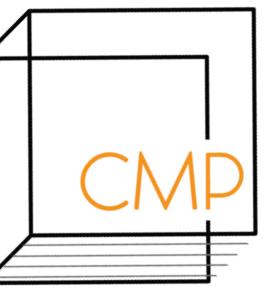
## 7. Government Actions in Market - Subsidy

**Q20:** Are producers better off as a result of a subsidy? Why or why not?

(Hint: Compare how much money they receive before and after the subsidy)

- Revenue<sub>old</sub> =  $40(40) = \$1600$
- Revenue<sub>new</sub> =  $(30+20)(60) = \$3000$
- They are better off as they receive \$1400 more revenue as a result of the subsidy. Even though P\* decreased, they still earn more revenue because they get paid by both the consumer and the government. The amount they receive in total exceeds the amount they received before.

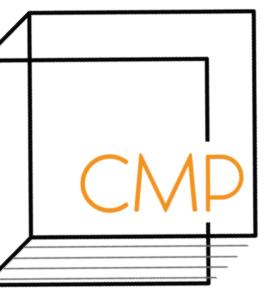




## 8. Output & Costs

- **short run (SR)**: time frame where the quantities of 1 or more resources used in production is fixed
  - eg. plant is fixed in SR, but other resources (labour, raw material) can change
  - decisions are reversible
- **long run (LR)**: time frame where the quantities of all resources used in production can vary
  - decisions are irreversible
  - **sunk cost**: cost that incurred and can't be changed, so it's irrelevant to a firm's decision-making process
    - eg. plant with no resale value, its cost is a sunk cost





## 8. Output & Costs - SR Product Curves

- since other inputs are fixed in the SR, can only increase labour to increase output

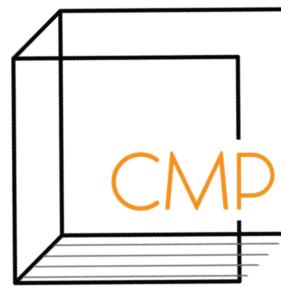
- Product Curves**

- total product (TP)**: how much output is produced in total
- marginal product (MP)**: how much output changes when there's 1 additional unit of labour
- average product (AP)**:  $\frac{\text{TP}}{\text{\# units of labour}}$

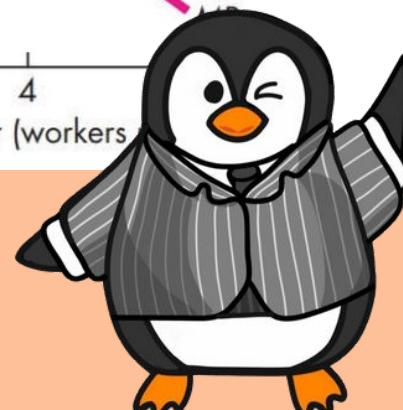
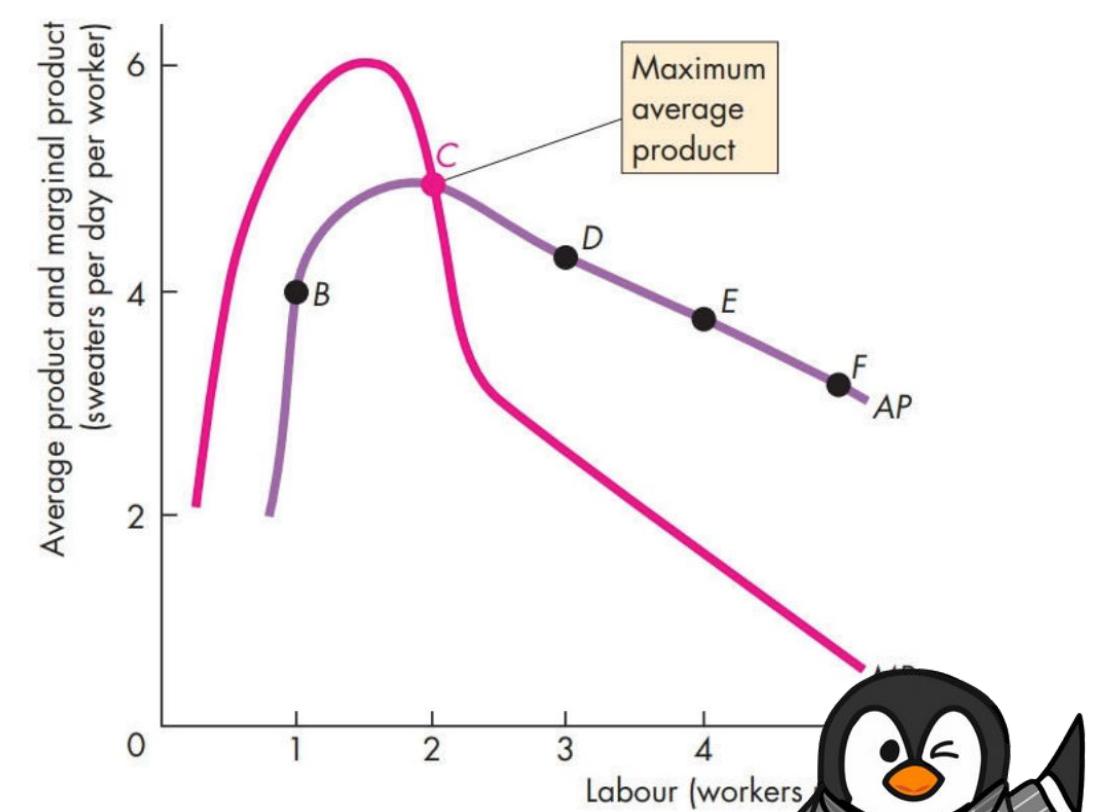
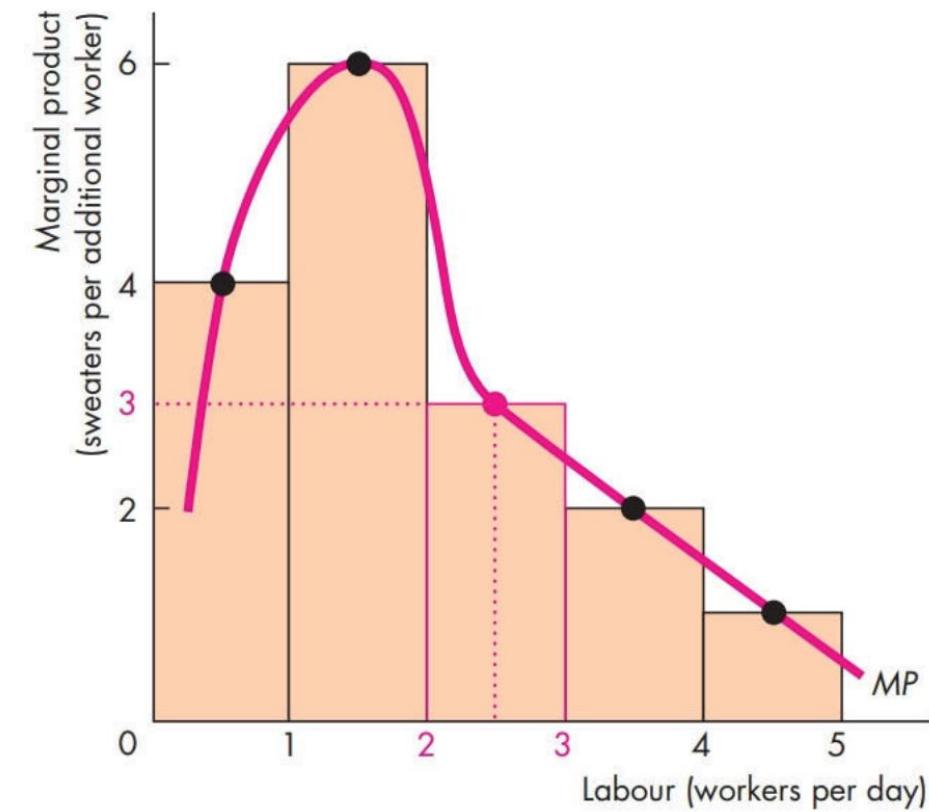
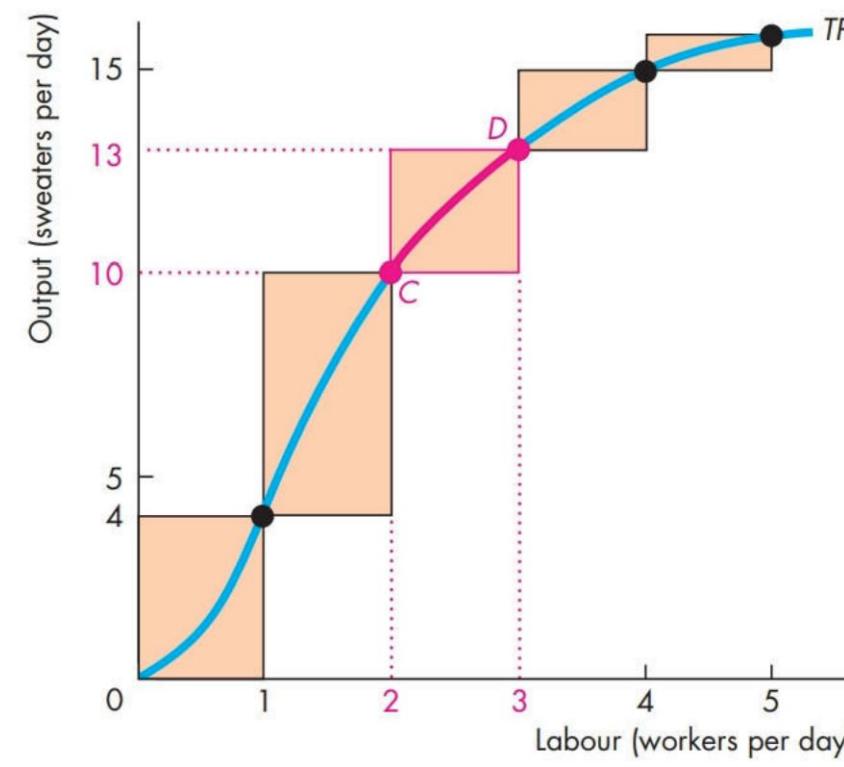
	Labour (workers per day)	Total product (sweaters per day)	Marginal product (sweaters per additional worker)	Average product (sweaters per worker)
A	0	0	..... 4	
B	1	4	..... 6	4.00
C	2	10	..... 3	5.00
D	3	13	..... 2	4.33
E	4	15	..... 1	3.75
F	5	16		3.20

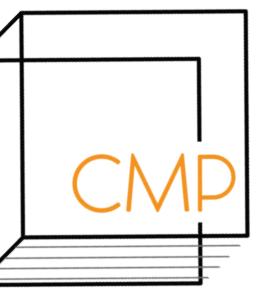


# 8. Output & Costs - TC, TFC, TVC Curves



TP	MP	AP
<ul style="list-style-type: none"> <li>TP originally increases quickly, but it eventually slows down</li> </ul>	<ul style="list-style-type: none"> <li><b>increasing marginal returns:</b> MP of the next worker &gt; MP of the previous</li> <li><b>decreasing marginal returns:</b> MP of the next worker &lt; MP of the previous</li> <li><b>law of diminishing returns:</b> MP eventually decreases as we use more variable input with fixed input</li> </ul>	<ul style="list-style-type: none"> <li>when MP &gt; AP → AP increases</li> <li>when MP &lt; AP → AP decreases</li> <li>when MP = AP → AP is at maximum</li> </ul>





## 8. Output & Costs

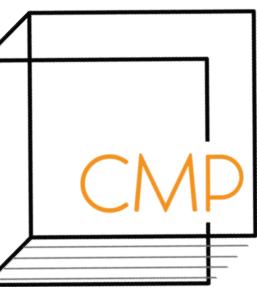
**Q21:** In the short run, \_\_\_\_ can vary:

- a) number or size of machines
- b) number of factories
- c) **number of workers**
- d) none of the above

**Q22:** Decreasing marginal returns occurs at:

- a) output level of zero
- b) **high levels of output**
- c) low levels of output
- d) when  $MP > AP$



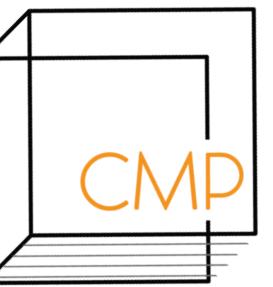


# 8. Output & Costs - SR Cost Curves

- increasing labour increases costs
- **7 Cost curves**
  - **Total Cost (TC)**: All costs
  - **Total Fixed Cost (TVC)**: cost of fixed inputs, FC is fixed
  - **Total Variable Cost (TVC)**: cost of variable inputs, VC changes when output changes
    - $TC = TFC + TVC$
  - **Average Total Cost (ATC)**:  $TC / Q$
  - **Average Total Fixed Cost (AFC)**:  $TFC / Q$
  - **Average Total Variable Cost (AVC)**:  $TVC / Q$ 
    - $ATC = AFC + AVC$
  - **Marginal Cost (MC)**: increase in TC when TP increases by 1

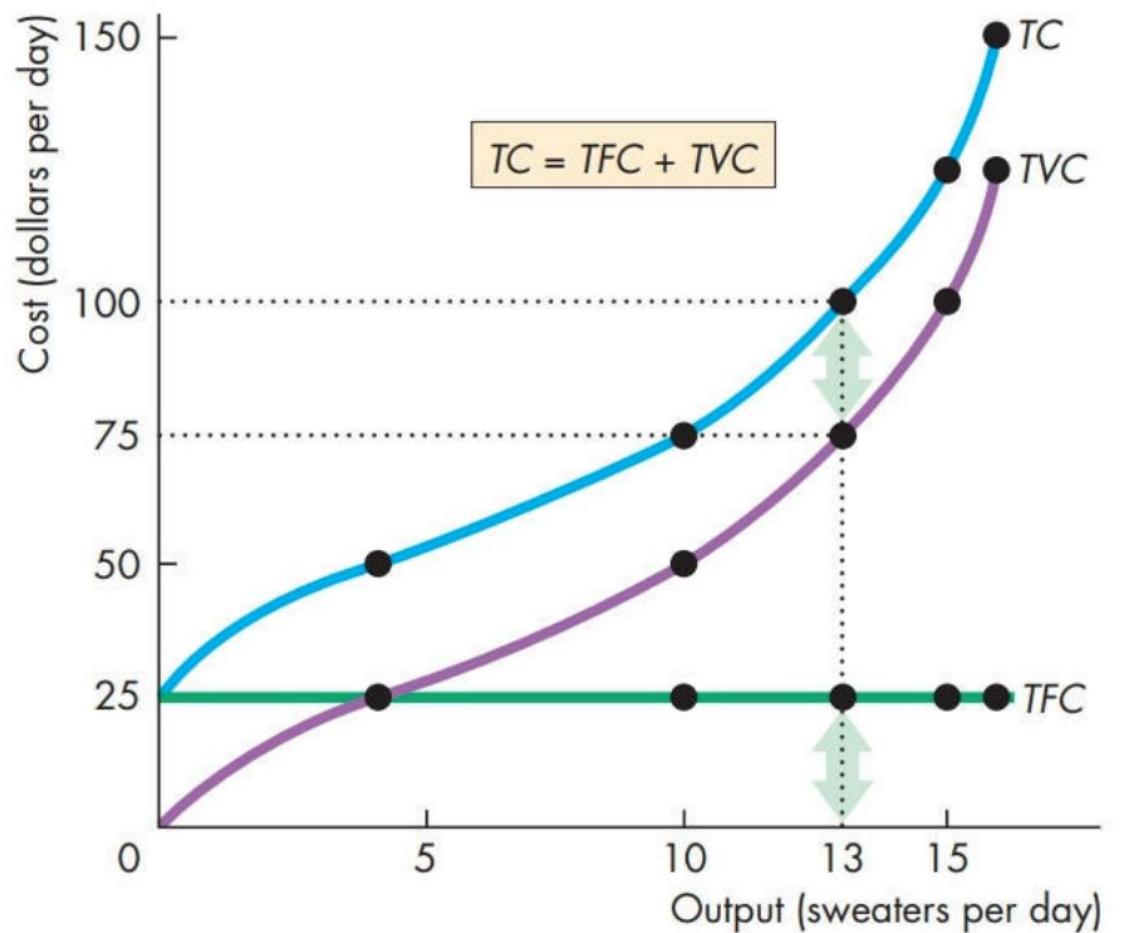
	<b>Labour (workers per day)</b>	<b>Output (sweaters per day)</b>	<b>Total fixed cost (TFC)</b>	<b>Total variable cost (TVC)</b>	<b>Total cost (TC)</b>
	<b>(dollars per day)</b>				
A	0	0	25	0	25
B	1	4	25	25	50
C	2	10	25	50	75
D	3	13	25	75	100
E	4	15	25	100	125
F	5	16	25	125	150

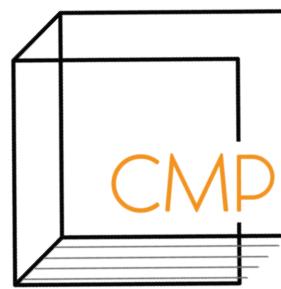




## 8. Output & Costs - TC, TFC, TVC Curves

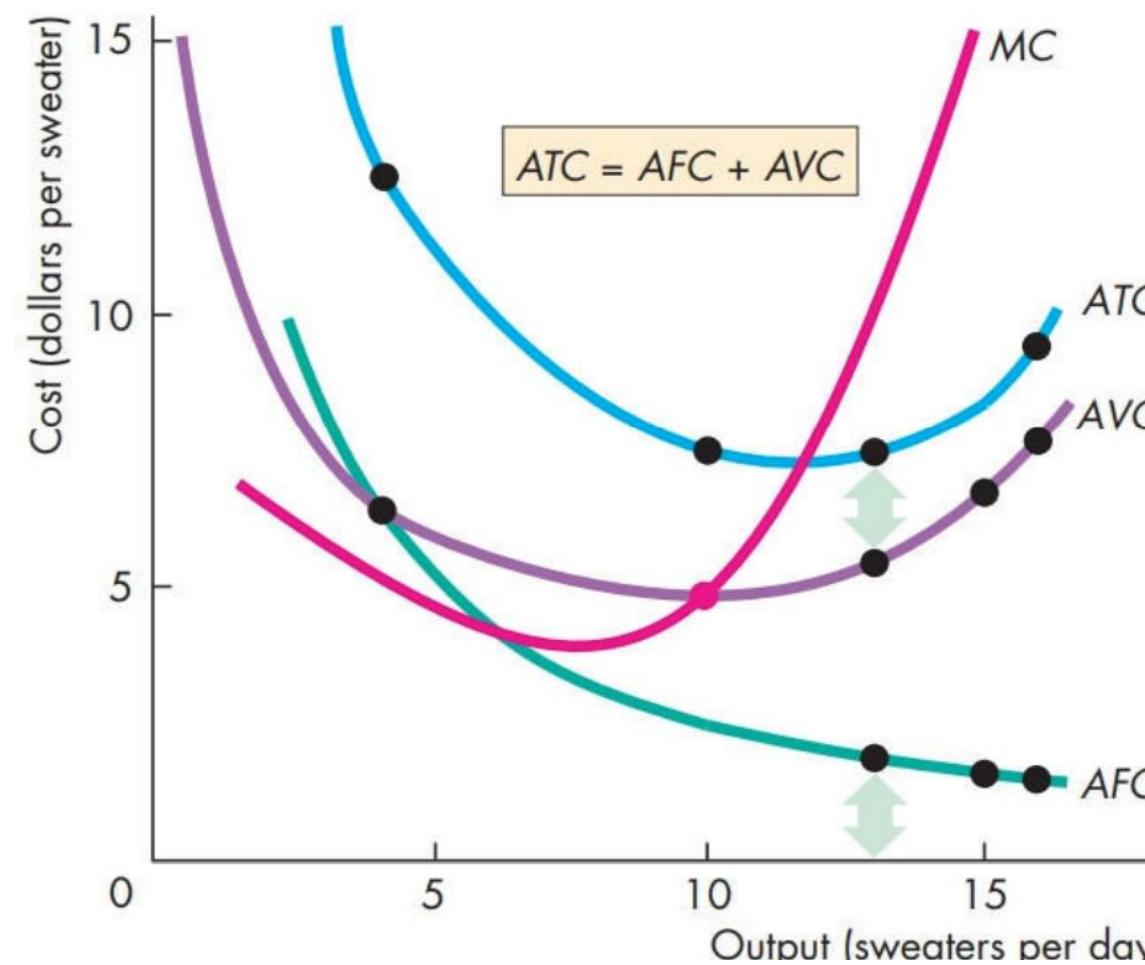
TFC	TVC	TC
<ul style="list-style-type: none"> <li>horizontal, straight line</li> <li>constant because fixed input is fixed</li> </ul>	<ul style="list-style-type: none"> <li>at low levels of output, TVC is flat because MC are decreasing</li> <li>at high levels of output, TVC is steep because MC are increasing</li> </ul>	<ul style="list-style-type: none"> <li>simply a TVC curve that's shifted up</li> <li>the distance between TC and TVC is TFV</li> </ul>





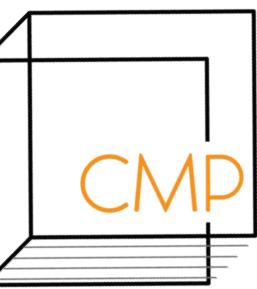
# 8. Output & Costs - ATC, AFC, AVC, MC Curves

AFC	AVC	ATC	MC
<ul style="list-style-type: none"> <li>decreases as output increases</li> </ul>	<ul style="list-style-type: none"> <li>U-shaped</li> </ul>	<ul style="list-style-type: none"> <li>U-shaped</li> <li>distance between ATC &amp; AVC is AFC, and it shortens because ATC is decreasing</li> </ul>	<ul style="list-style-type: none"> <li>decreases until a certain point before it begins increasing</li> </ul>



- MC is below AVC/ATC  $\rightarrow$  AVC/ATC is decreasing
- MC is above AVC/ATC  $\rightarrow$  AVC/ATC is increasing
- MC = AVC/ATC  $\rightarrow$  AVC/ATC is at minimum





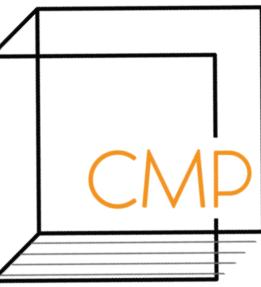
## 8. Output & Costs - Cost Curves

**Q23:** When  $MC = AVC$ ,

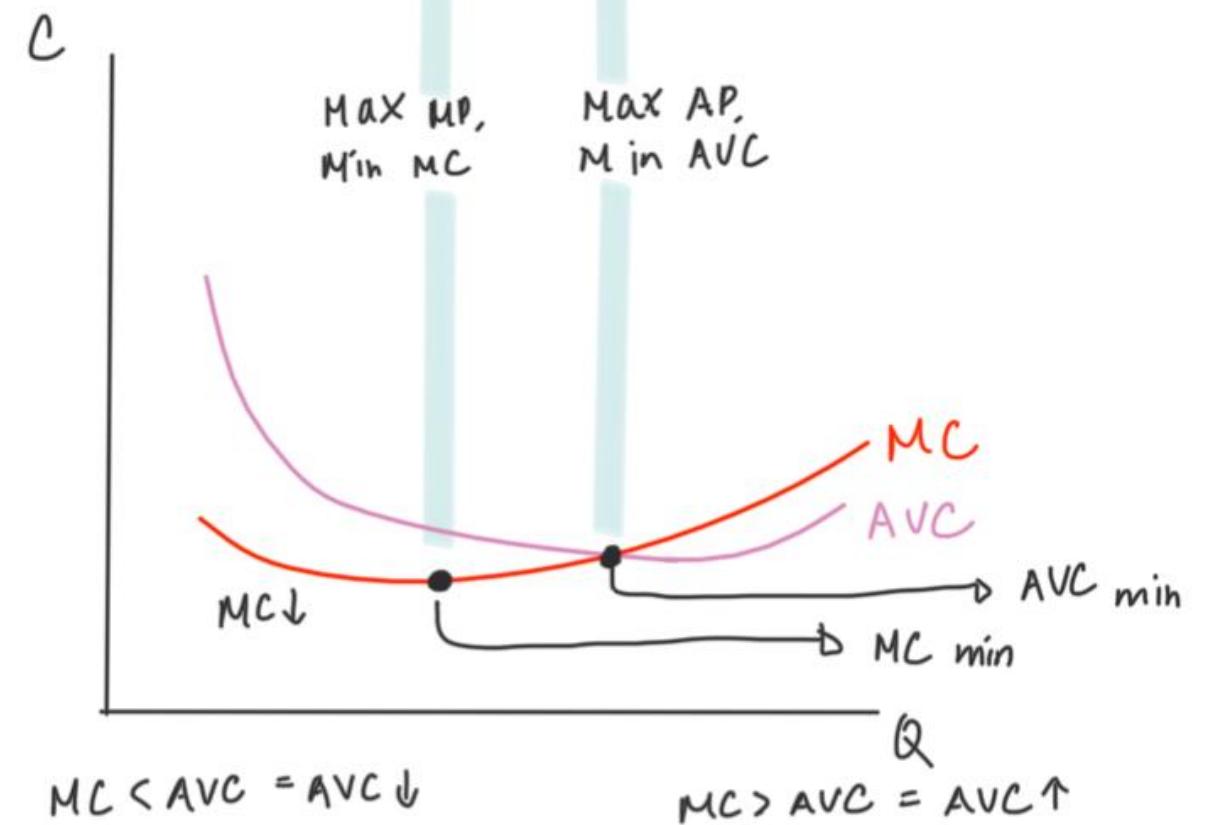
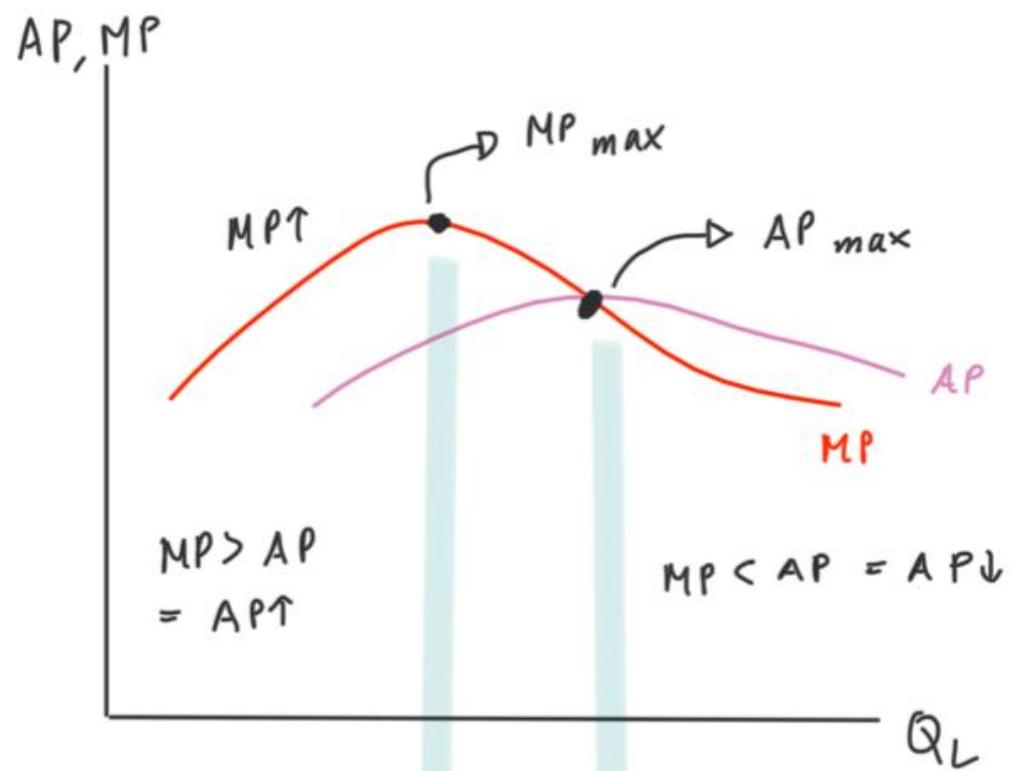
- a)  $AVC$  is at maximum
- b)  $AVC$  is at minimum
- c)  $ATC$  is at maximum
- d)  $ATC$  is at minimum



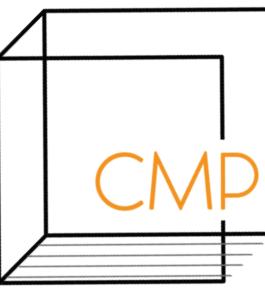
## 8. Output & Costs - MP/AP vs. MC/AC Curves



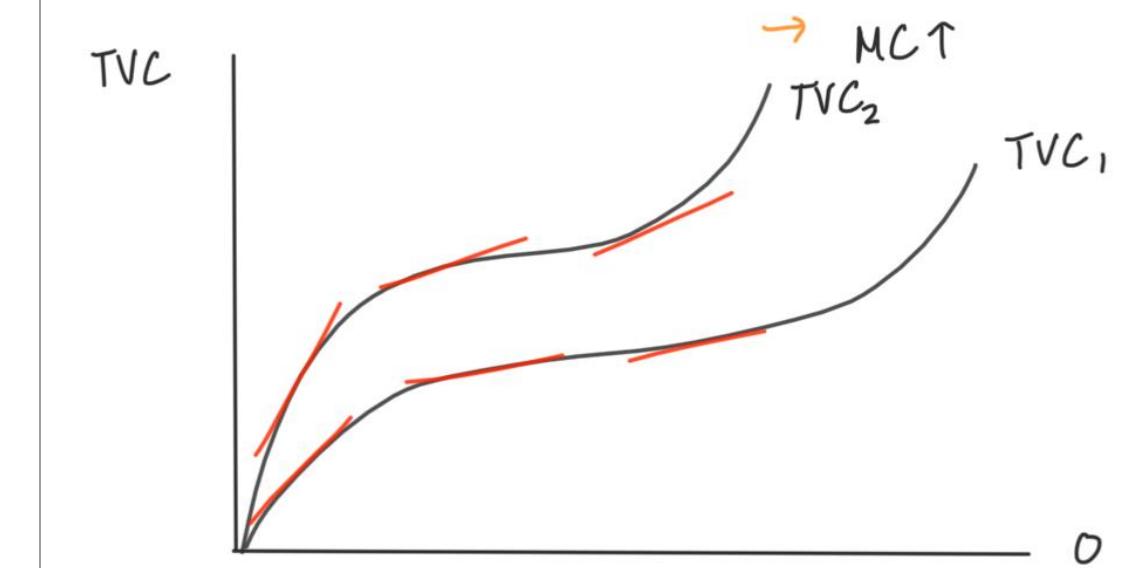
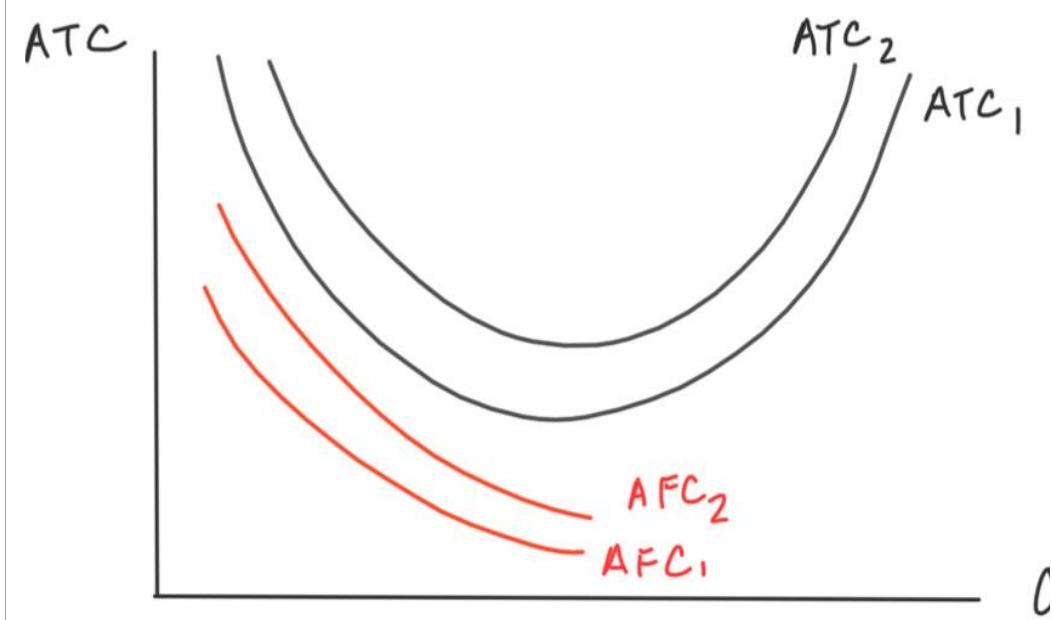
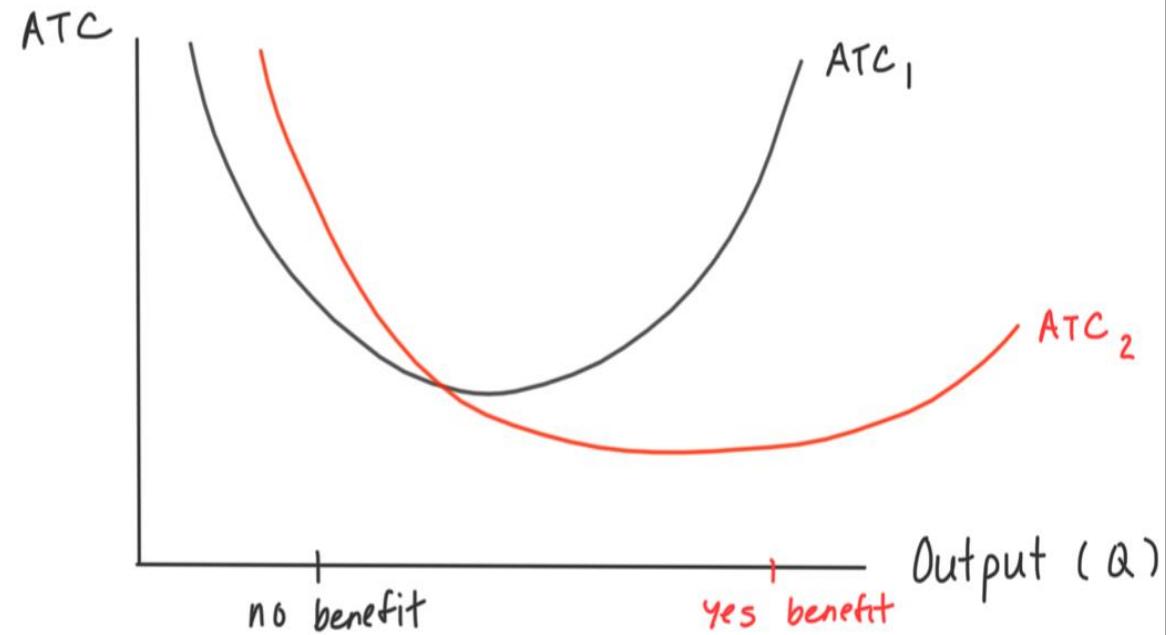
- MP is at max  $\rightarrow$  MC is at min
- AP is at max  $\rightarrow$  AVC is at min

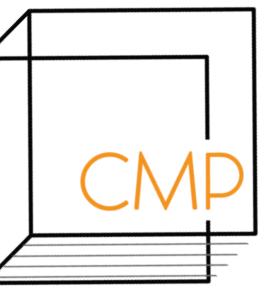


# 8. Output & Costs - Shifts in Cost Curves



Technological Advances	Price of Fixed Factors	Price of Variable Factors
<ul style="list-style-type: none"> <li>capital cost rises <math>&gt;</math> AFC rises but AVC drops</li> <li>at low level of output, ATC is high</li> <li>at high level of output, ATC is low</li> </ul>	<ul style="list-style-type: none"> <li>price of fixed factors rises <math>&gt;</math> TFC rises <math>&gt;</math> AFC rises <math>&gt;</math> ATC rises</li> <li>TVC, AVC, MC = same</li> </ul>	<ul style="list-style-type: none"> <li>price of variable factors rises <math>&gt;</math> TVC rises <math>&gt;</math> AVC rises <math>&gt;</math> ATC rises</li> <li>steeper tangents means higher MC</li> </ul>





## 8. Output & Costs - Cost Curves

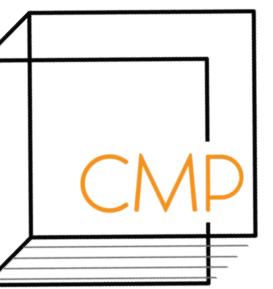
**Q24:** When MP is rising,

- a) AP is at maximum
- b) MP < AP
- c) MC is decreasing
- d) AVC is rising

**Q25:** When a technology change that improves productivity occurs, which is FALSE?

- a) AFC increases but AVC decreases
- b) capital costs rises
- c) It's more beneficial to produce high output levels because ATC is lower there
- d) It's more beneficial to produce low output levels because ATC is lower there



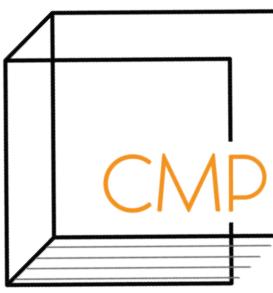


## 8. Output & Costs - LR

- all inputs and all costs are variable
- **marginal product of capital:** the increase in output when capital increases by 1 unit (labour constant)
  - **Diminishing marginal returns to capital:** MP increases quickly at first, but it eventually slows down as we keep increasing the plant size
- each plant has their own cost curve

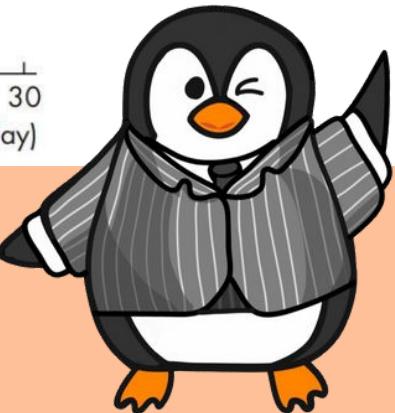
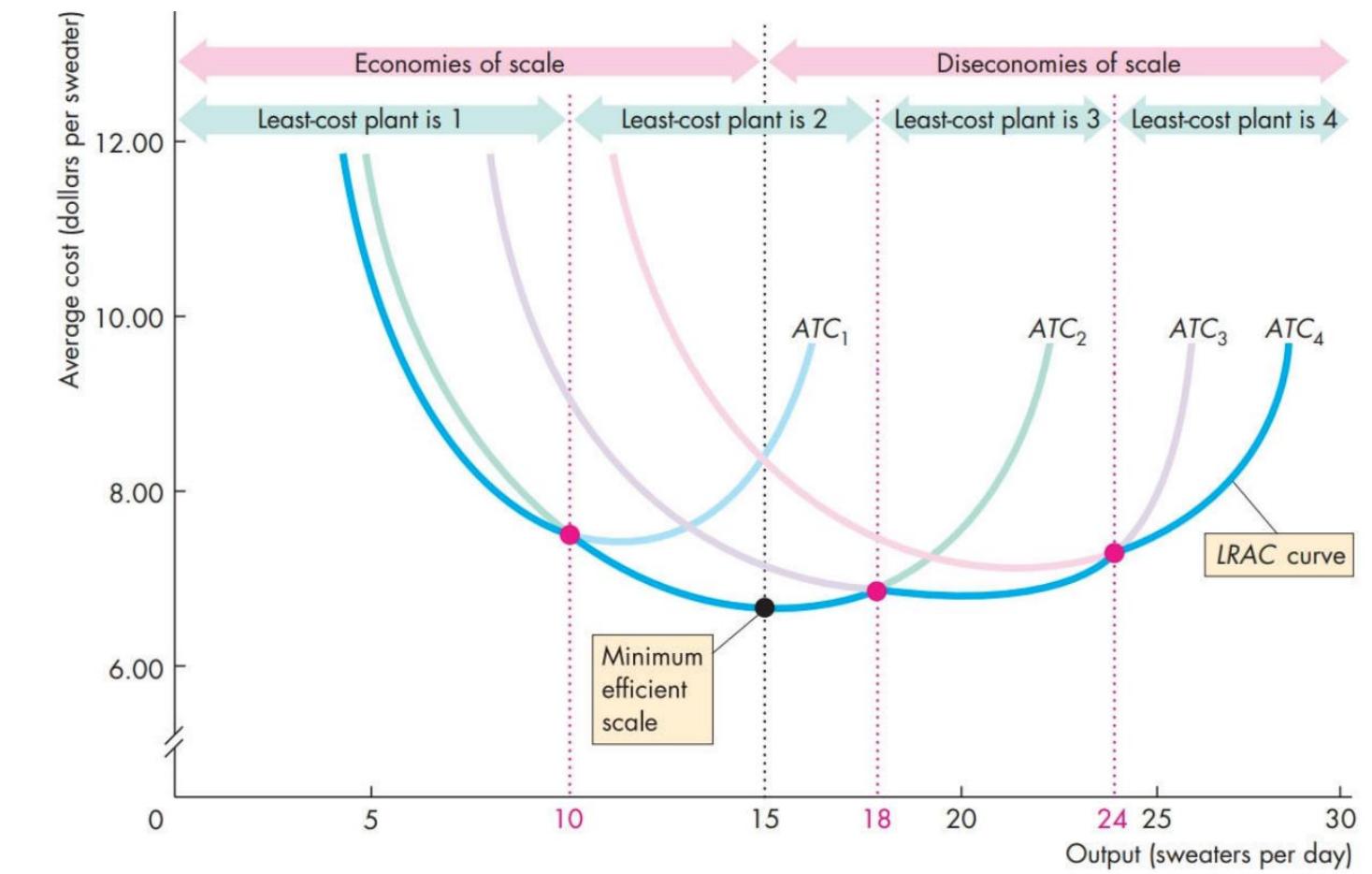
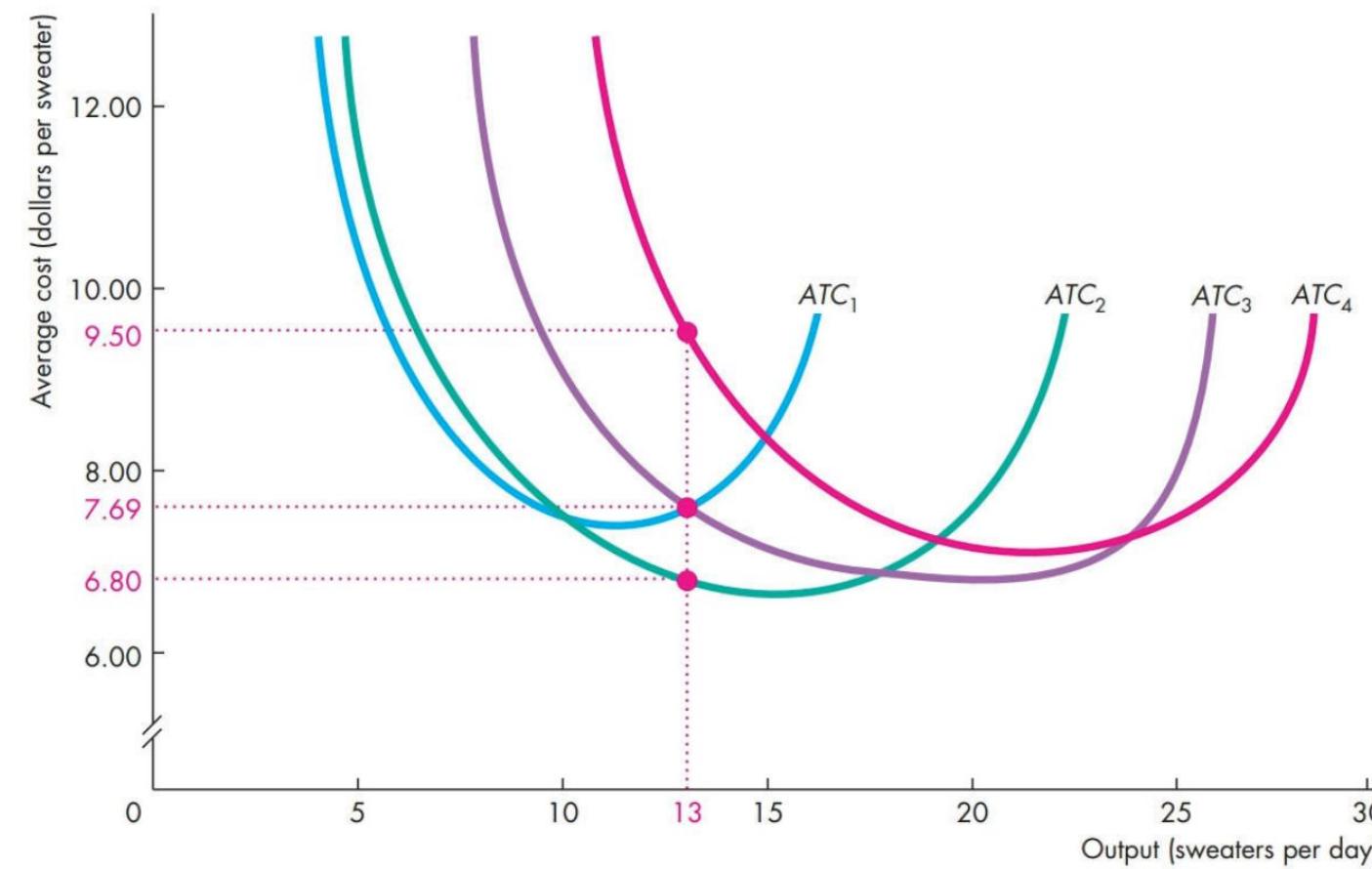
Labor (workers per day)	Output (sweaters per day)			
	Plant 1	Plant 2	Plant 3	Plant 4
1	4	10	13	15
2	10	15	18	20
3	13	18	22	24
4	15	20	24	26
5	16	21	25	27
Knitting machines		1	2	3
				4

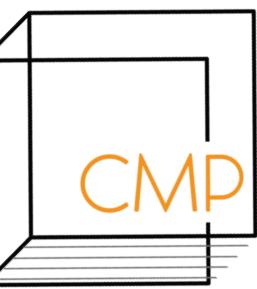




## 8. Output & Costs - LRAC

- **Long run average cost (LRAC) curve:** made up of the lowest ATC for each output level
- **economies of scale:** ATC decreases as output increases
- **diseconomies of scale:** ATC increases as output increases
- **constant returns to scale:** ATC is the same as output increases
- **minimum efficient scale:** lowest point on the LRAC curve





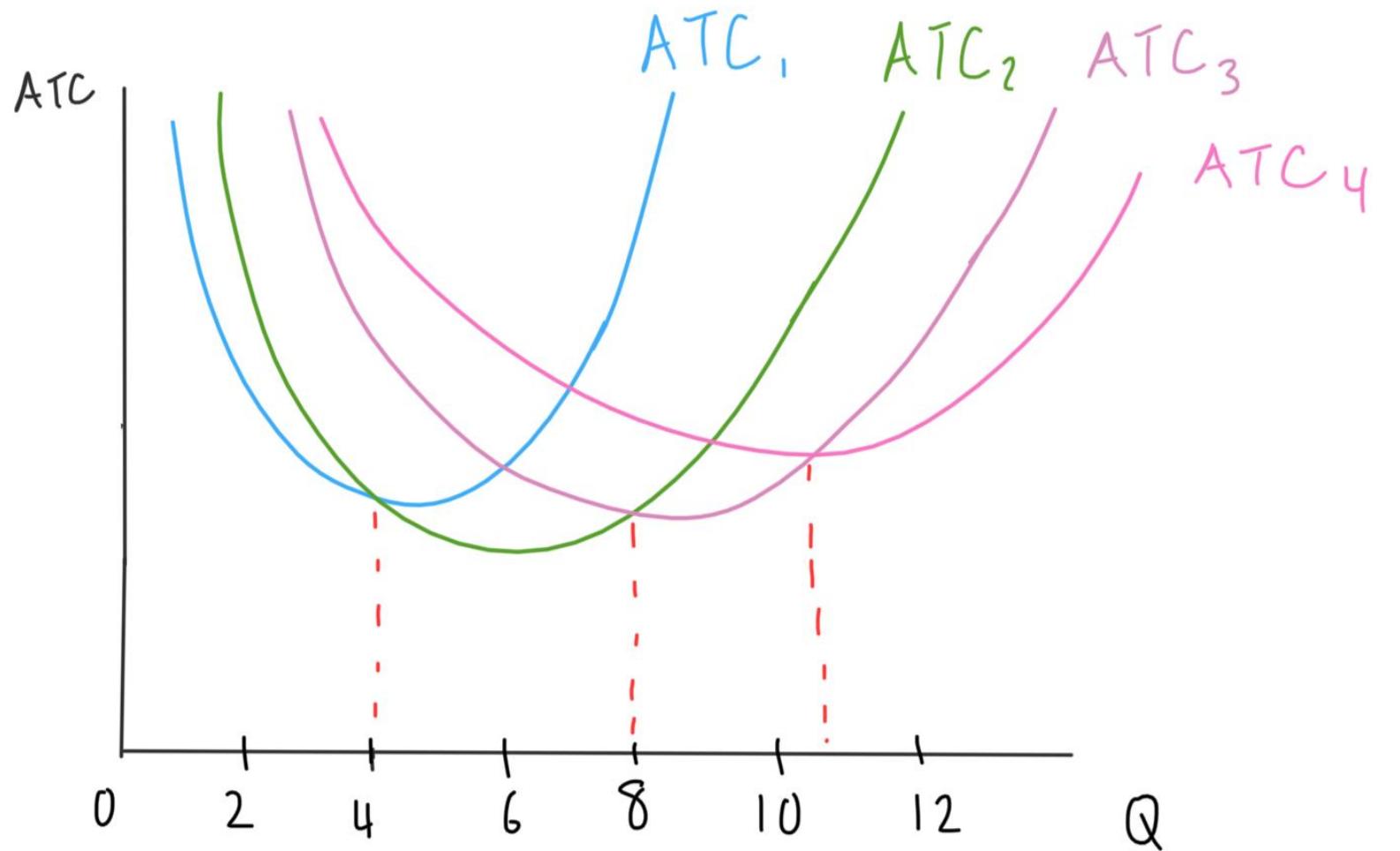
## 8. Output & Costs - Cost Curves

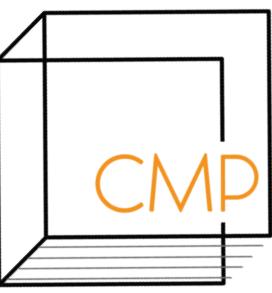
**Q26:** At an output level of 10 units, which plant would achieve the lowest ATC?

- a) Plant 1
- b) Plant 2
- c) **Plant 3**
- d) Plant 4

**Q27:** At the output level of 6, there is

- a) economies of scale
- b) diseconomies of scale
- c) constant economies of scale
- d) **minimum efficient scale**

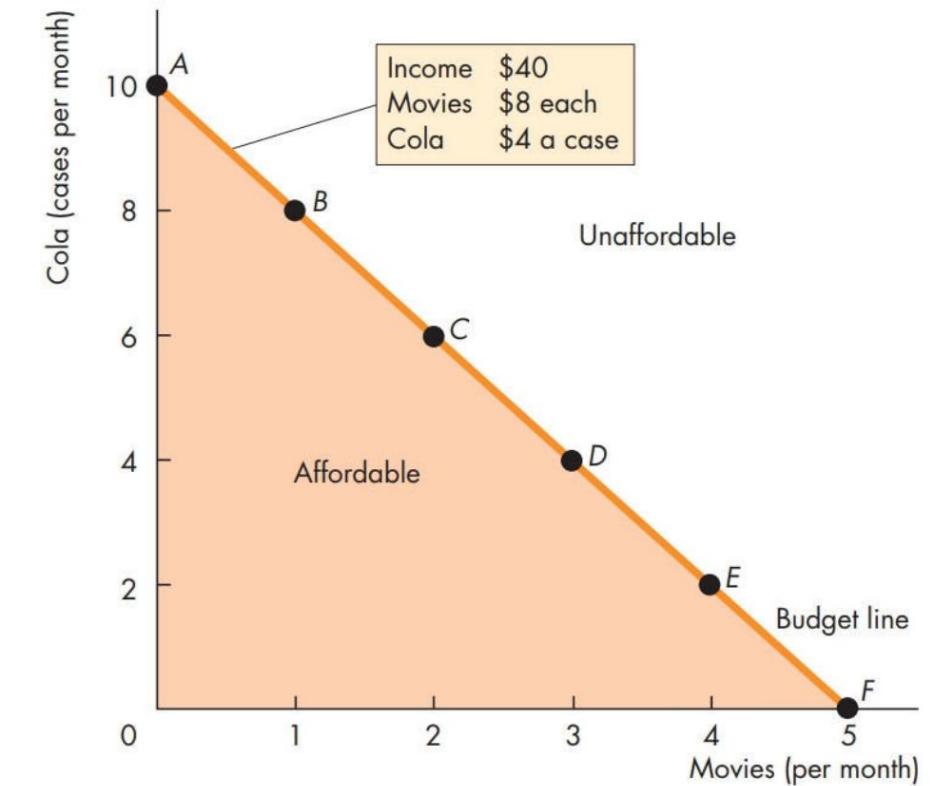




# 9. Utility & Demand - Consumption Possibilities

- **consumption possibilities:** all of the things that you can buy
  - limited by income and prices of the goods/services
  - **budget line:** shows the boundary between the combinations of goods/services that a household can and can't afford to buy
  - changes when income or prices change

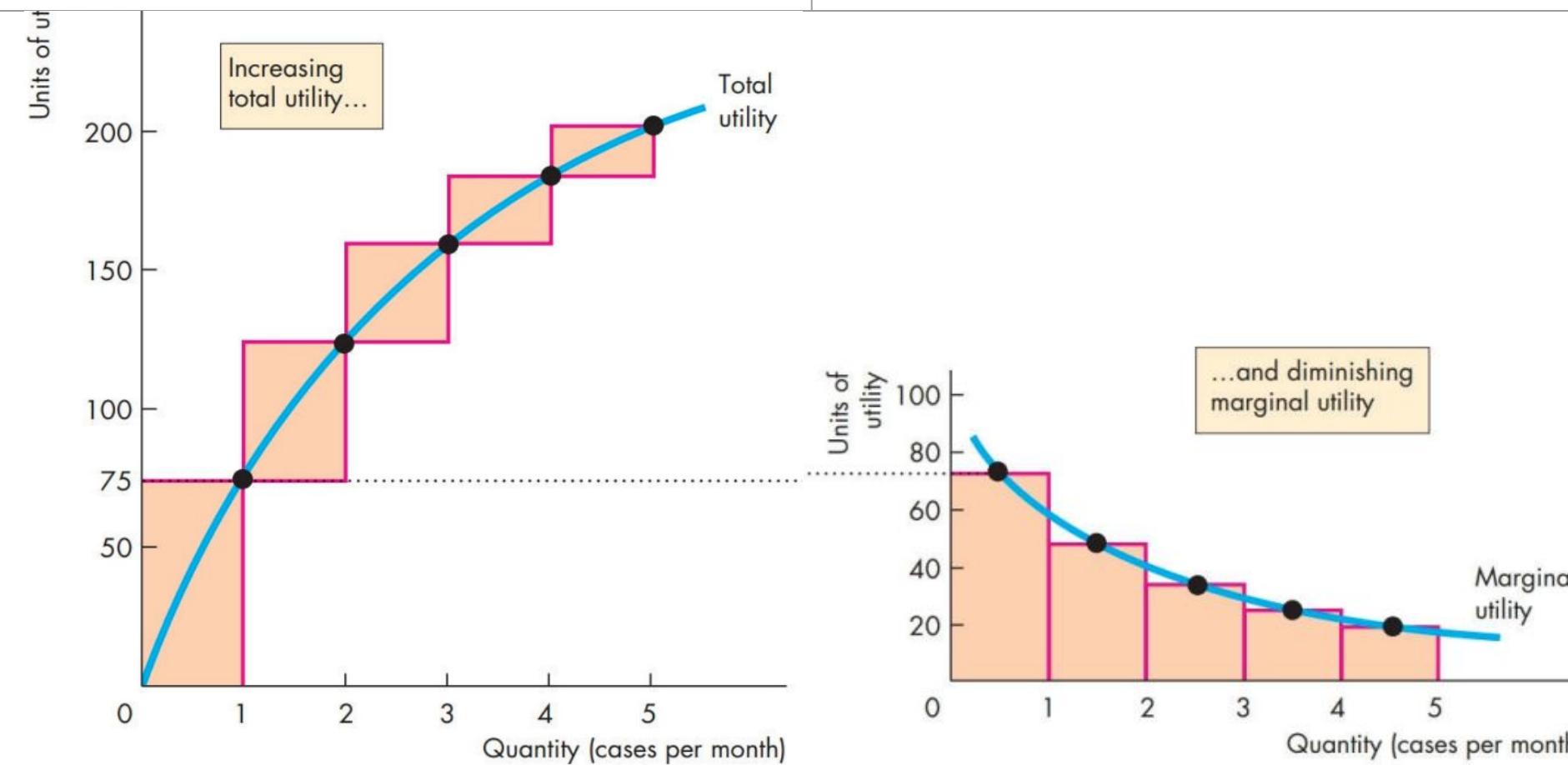
Possibility	Quantity	Movies		Cola	
		Expenditure (dollars)	Cases	Expenditure (dollars)	Cases
A	0	0	10	40	
B	1	8	8	32	
<b>C</b>	<b>2</b>	<b>16</b>	<b>6</b>	<b>24</b>	
D	3	24	4	16	
E	4	32	2	8	
F	5	40	0	0	

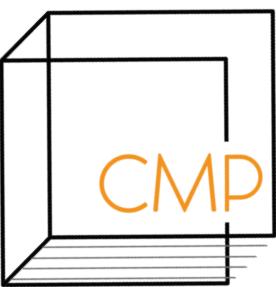


# 9. Utility & Demand - Utility

- **preferences:** consumer's likes and dislikes
- **utility:** benefit or satisfaction a person gets from consuming goods/services

Total Utility (TU)	Marginal Utility (MU)
<ul style="list-style-type: none"> <li>● increases as consumption increases</li> <li>● at levels of consumption, TU increases by less each time</li> </ul>	<ul style="list-style-type: none"> <li>● how much TU changes when 1 more unit of a good is consumed</li> <li>● <b>diminishing marginal utility:</b> MU decreases as consumption increases</li> </ul>

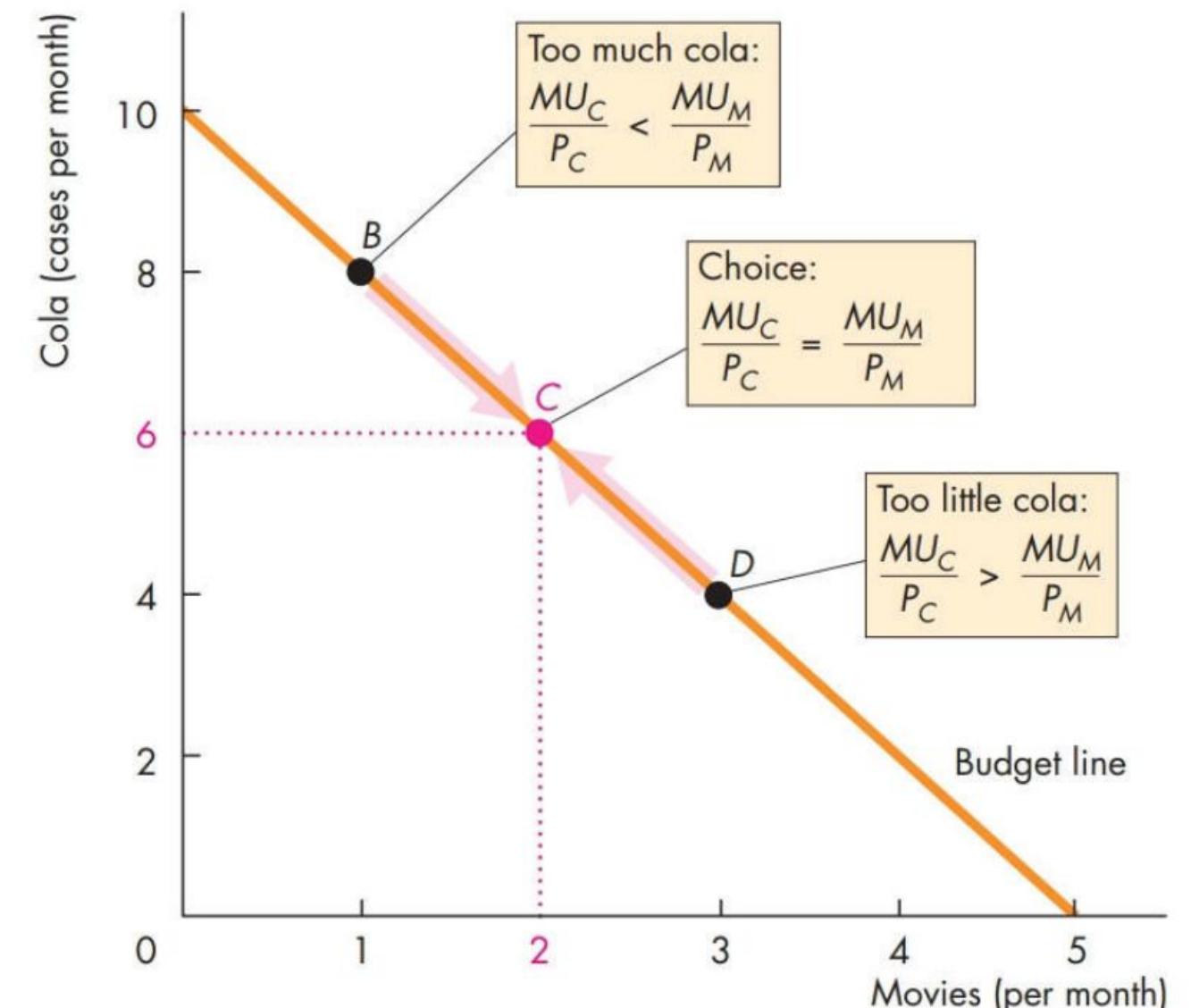


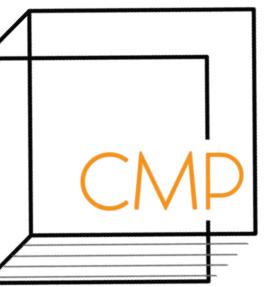


# 9. Utility & Demand - Utility-Maximizing Choice

## Steps:

1. Find the Just-Affordable Combinations (shown by the consumer's budget line)
2. Find the TU for each Just-Affordable Combination
3. Find the consumer EQM
  - **consumer EQM:** when the consumer allocated their income in a way that maximizes their total utility
  - **marginal utility per dollar:** how much TU increases when I spend 1 more dollar on the good/service
    - MU of the good/ Price of the good
  - utility is maximized when
    - all income is spent
    - $\frac{MU_1}{P_1} = \frac{MU_2}{P_2}$





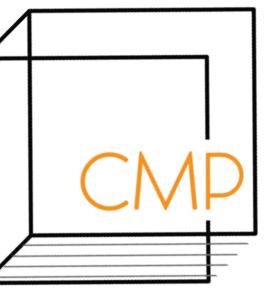
## 9. Utility & Demand - Utility-Maximizing Choice

**Q28:** Given the table, fill in the column, MUy/\$. Which combination of bubble tea and yogurt maximizes utility and how do you know?

Combination C because that's where MU<sub>b</sub>/\$ and MU<sub>y</sub>/\$ are equal.

	Bubble Tea (\$10)			Yoghurt (\$4)		
	Q <sub>b</sub>	MU <sub>b</sub>	MU <sub>b</sub> /\$	Q <sub>y</sub>	MU <sub>y</sub>	MU <sub>y</sub> /\$
A	1	70	$\frac{70}{10} = 7$	6	2	$\frac{2}{4} = 0.50$
B	2	40	$\frac{40}{10} = 4$	5	6	$\frac{6}{4} = 1.50$
C	3	20	$\frac{20}{10} = 2$	4	8	$\frac{8}{4} = 2$





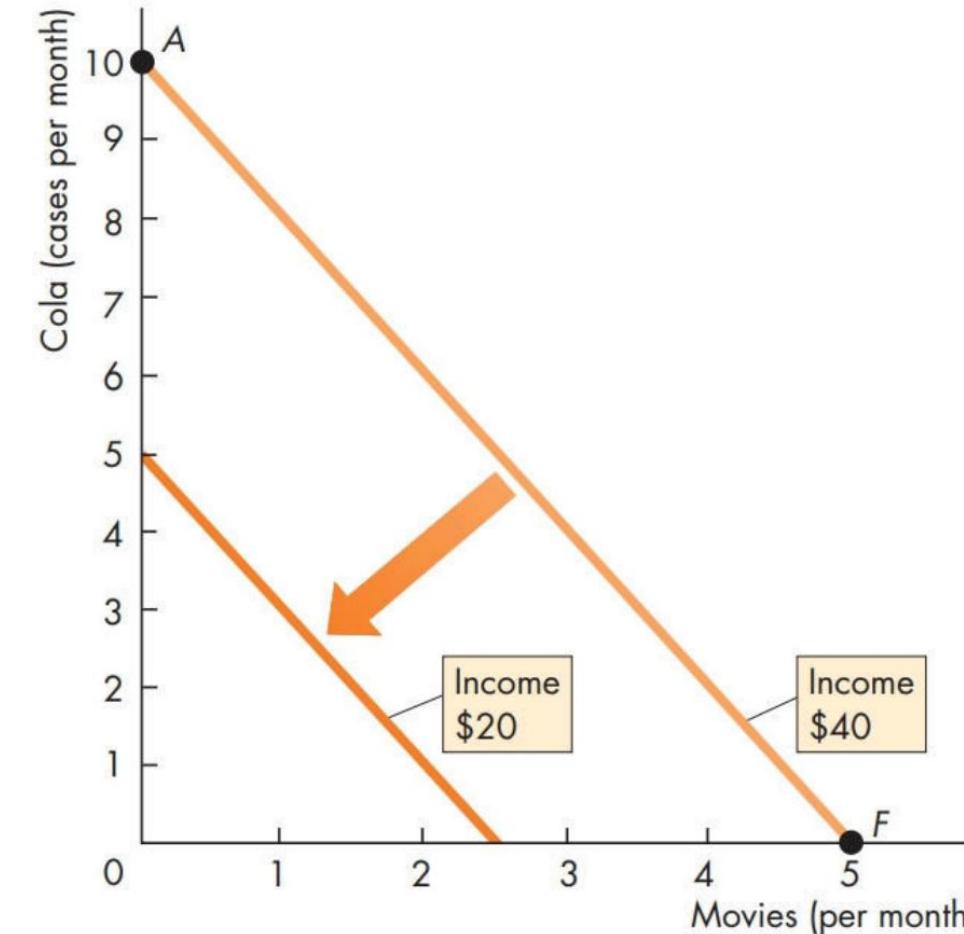
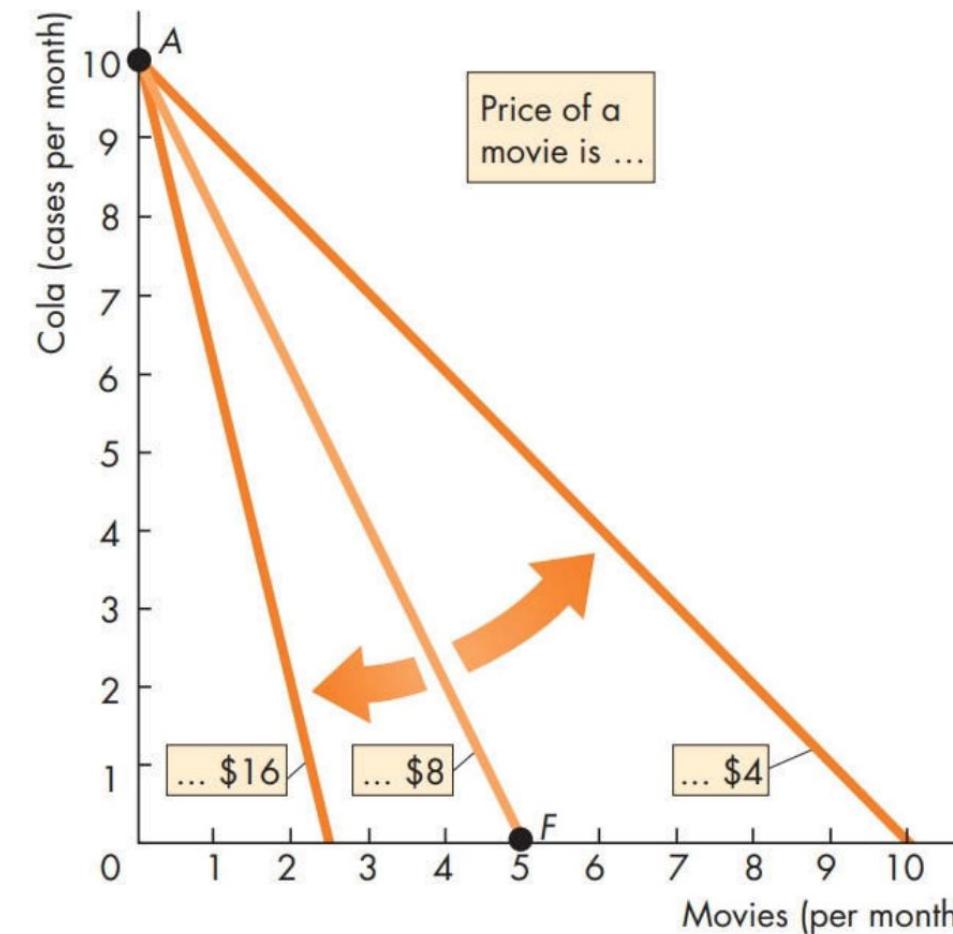
## 9. Utility & Demand - Real Income, Relative Price

- **real income:** income expressed as a quantity of goods that the household can afford to buy
  - real income =  $Y/P$  of a good
  - eg. if income is \$50 and a granola bar is \$2, the real income in terms of granola bars is 25 granola bars
- **relative price:** price of good 1/ price of good 2
  - eg. If a movie ticket is \$8 and a granola bar is \$2, the relative price of a granola bar is 4 movie tickets



# 9. Utility & Demand - Changes to the Budget Line

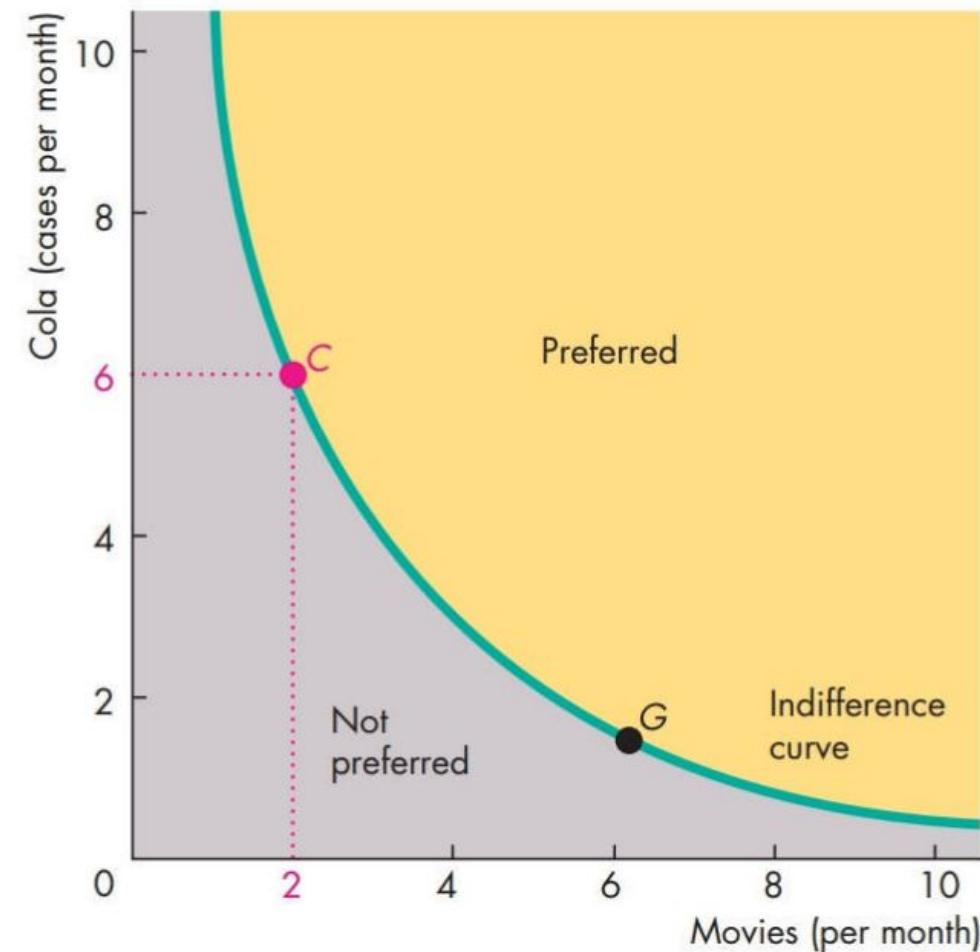
Changes in Prices	Changes in Income
<ul style="list-style-type: none"> <li>Price changes &gt; relative price changes &gt; slope changes</li> <li>Price of the good on the x-axis drops → budget line flattens</li> <li>Price of the good on the x-axis rises → budget line gets steeper</li> </ul>	<ul style="list-style-type: none"> <li>Income changes &gt; real income changes &gt; budget line shifts</li> <li>income increases → budget line shifts right</li> <li>income decreases → budget line shifts left</li> </ul>



# 9. Utility & Demand - Preferences and Indifference Curves

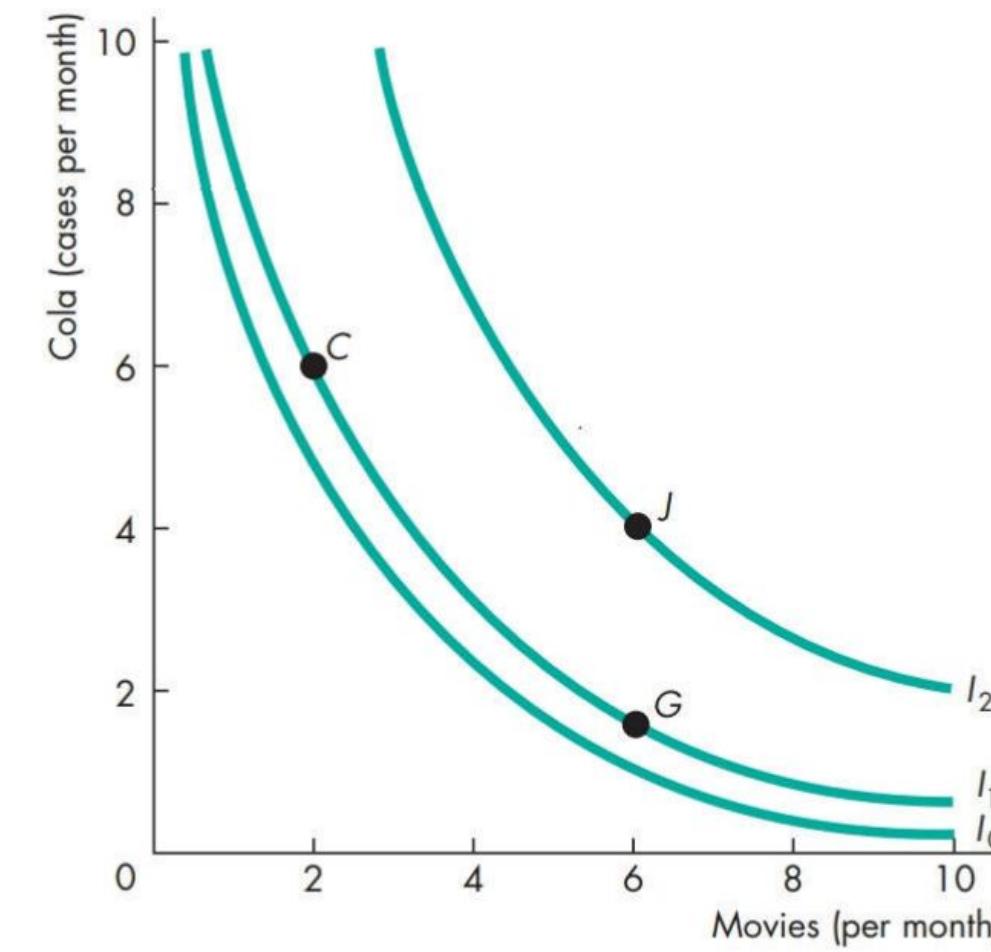
## Indifference Curve

- shows the combos of goods where the consumer is indifferent
- order of preference: below indifference curve, indifference curve, above indifference curve



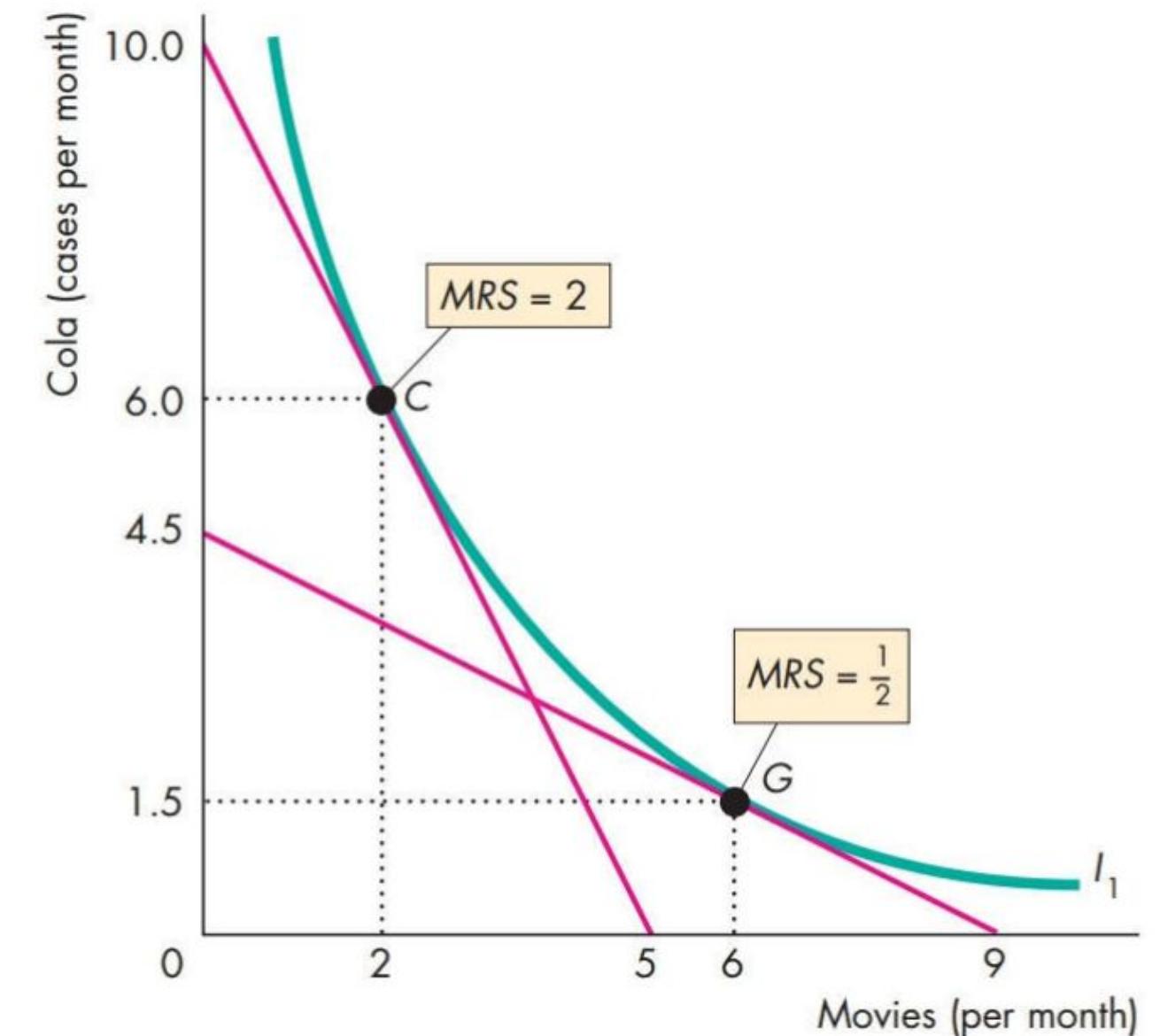
## Preference Map

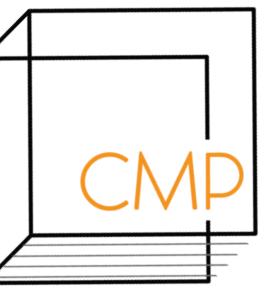
- shows multiple indifference curves
- farther the budget line is from the origin, the more the consumer prefers it



# 9. Utility & Demand - Marginal Rate of Substitution

- **marginal rate of substitution (MRS):** rate at which a person is willing to give up good y to get an additional unit of good x, while remaining indifferent
  - steep indifference curve → MRS = high
  - flat indifference curve → MRS = low
- **diminishing marginal rate of substitution:** as the consumer gets more of good x, they will be less willing to give up good y for it while staying indifferent





## 9. Utility & Demand - Changes to the Budget Line

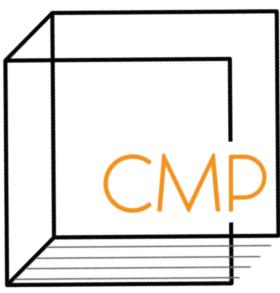
**Q29:** Consider a graph with budget line where the quantity of bubble tea is on the y-axis and the quantity of yoghurt is on the x-axis. If the consumer's income decreased, the budget line ('s) \_\_\_\_\_ would \_\_\_\_\_.

- a. N/A, shift to the right
- b. N/A, shift to the left
- c. slope, flatten
- d. slope, become steeper

**Q30:** Where on the indifference curve would you expect a high MRS?

- a. when the quantity of the good on the y-axis is 0
- b. In the middle of the indifference curve
- c. on the steeper side of indifference curve
- d. when the quantity of the good on the x-axis is very high

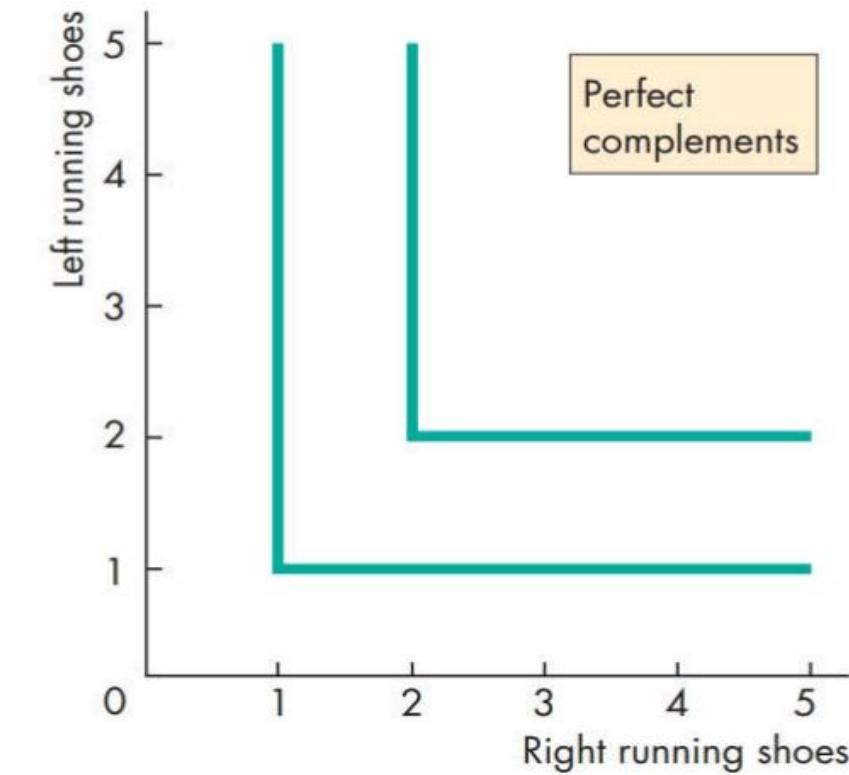
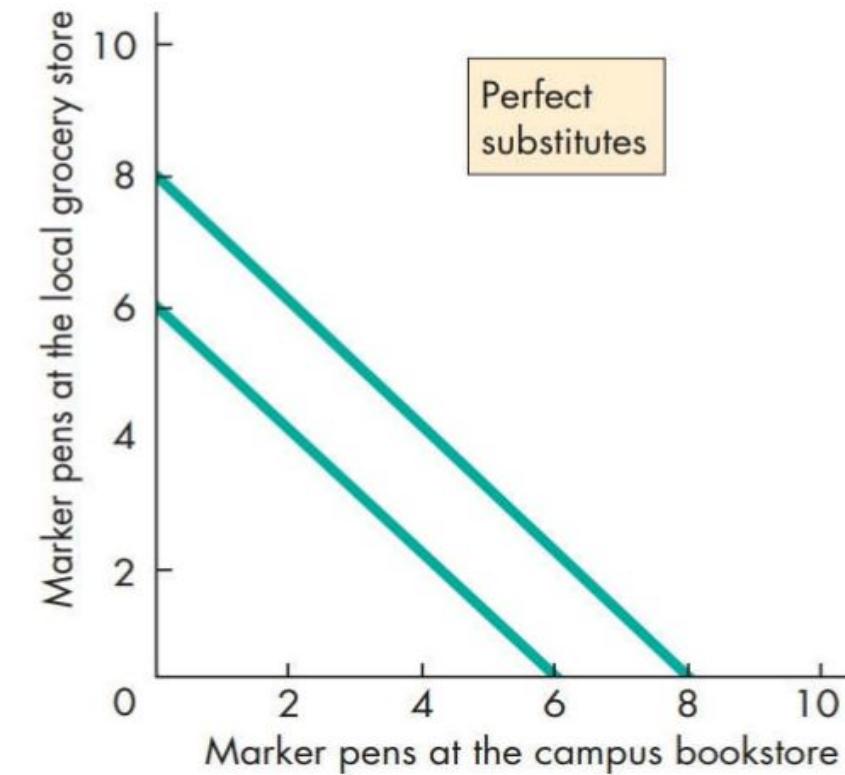
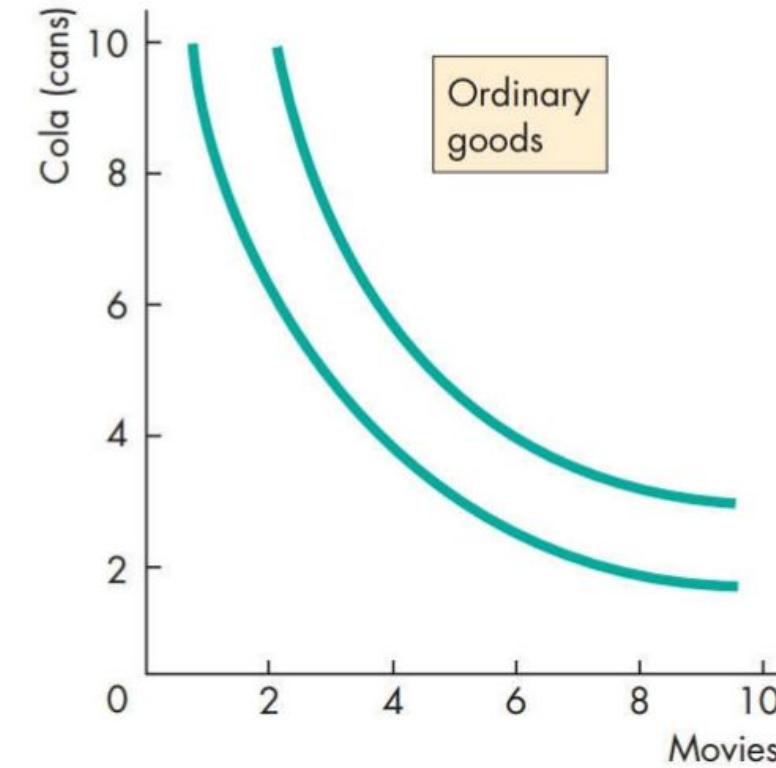


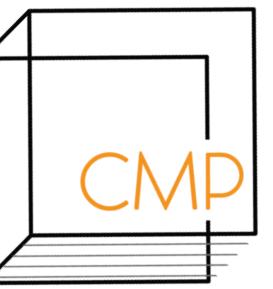


# 9. Utility & Demand - Degree of Substitutability

- **degree of substitutability:** affects the shape of the indifference curve

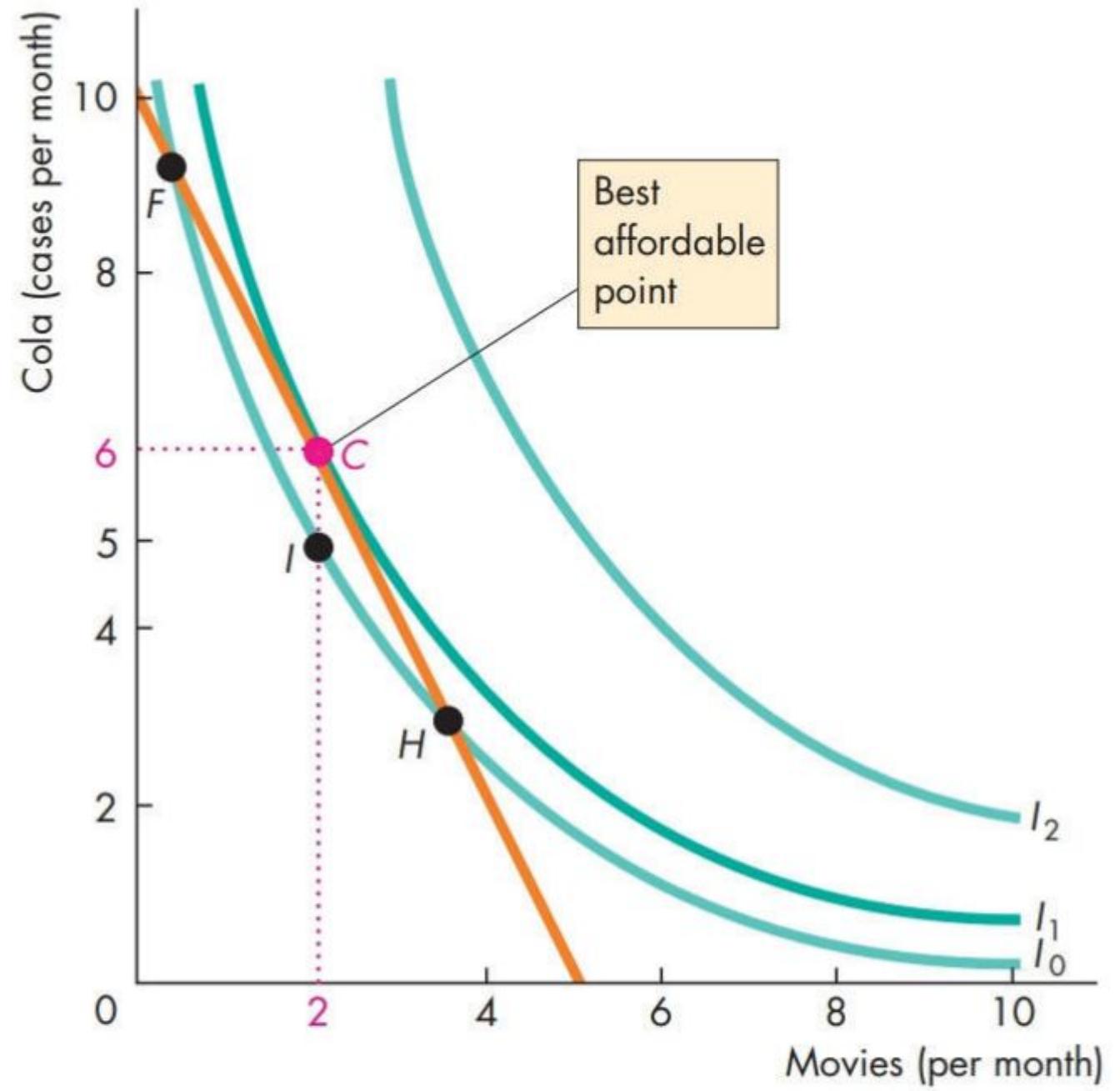
Ordinary Goods	Perfect Substitutes	Complements
<ul style="list-style-type: none"> <li>• goods that can substitute each other to a certain degree</li> <li>• eg. movie and coke</li> </ul>	<ul style="list-style-type: none"> <li>• goods that can very easily substitute for each other</li> <li>• eg. pens from Superstore and pens from Walmart</li> </ul>	<ul style="list-style-type: none"> <li>• goods that complement each other, can't replace each other at all</li> <li>• eg. left and right sneakers</li> </ul>

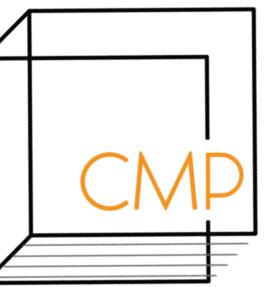




## 9. Utility & Demand - Best Affordable Choice

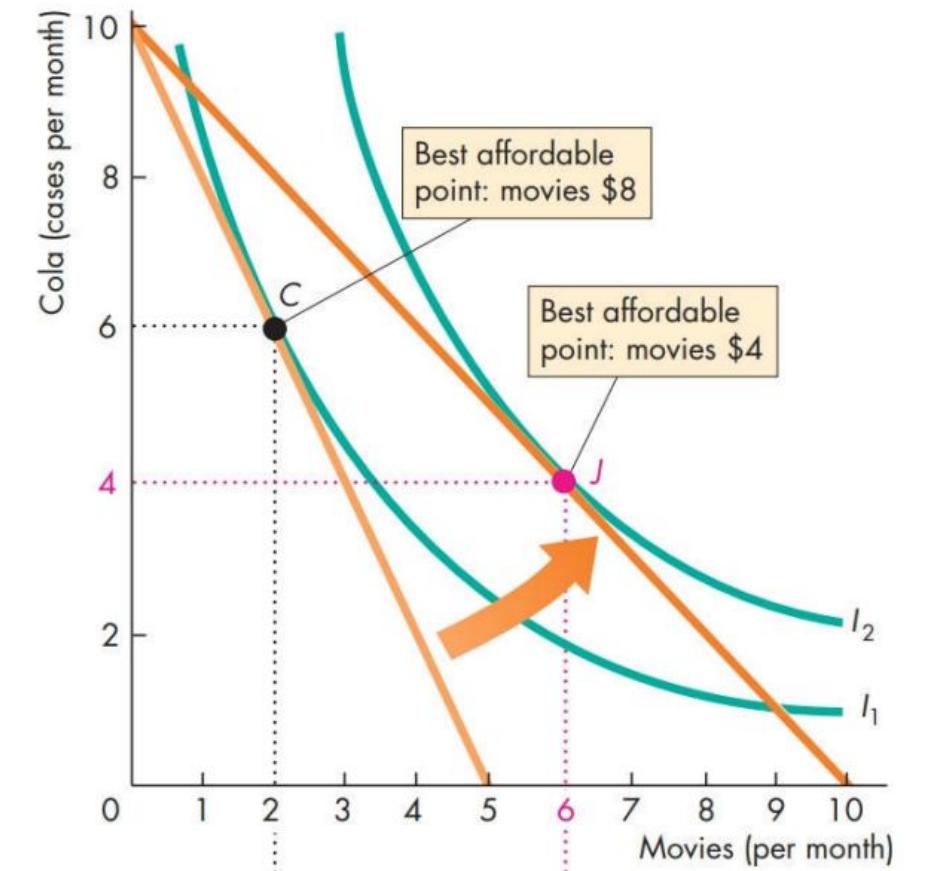
- **Characteristics of the best affordable choice:**
  - On the budget line (spent all of their income)
  - On the highest attainable indifference curve
  - MRS = the relative price of the 2 goods



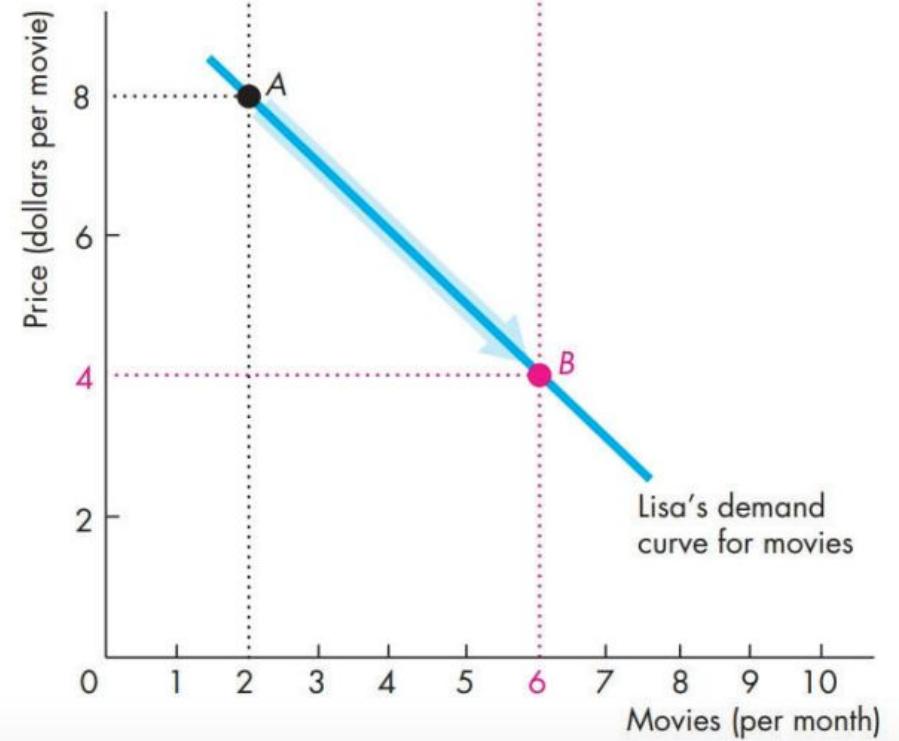


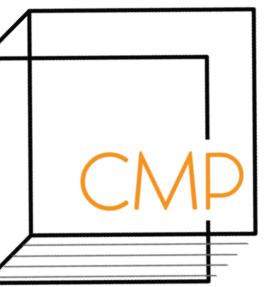
## 9. Utility & Demand - Price Effect

- **Price Effect:** when a change in the price of a good affects the quantity of the good consumed
- Price changes > relative price changes > slope changes > best affordable choice changes
- Explains why the demand curve is *downward sloping*



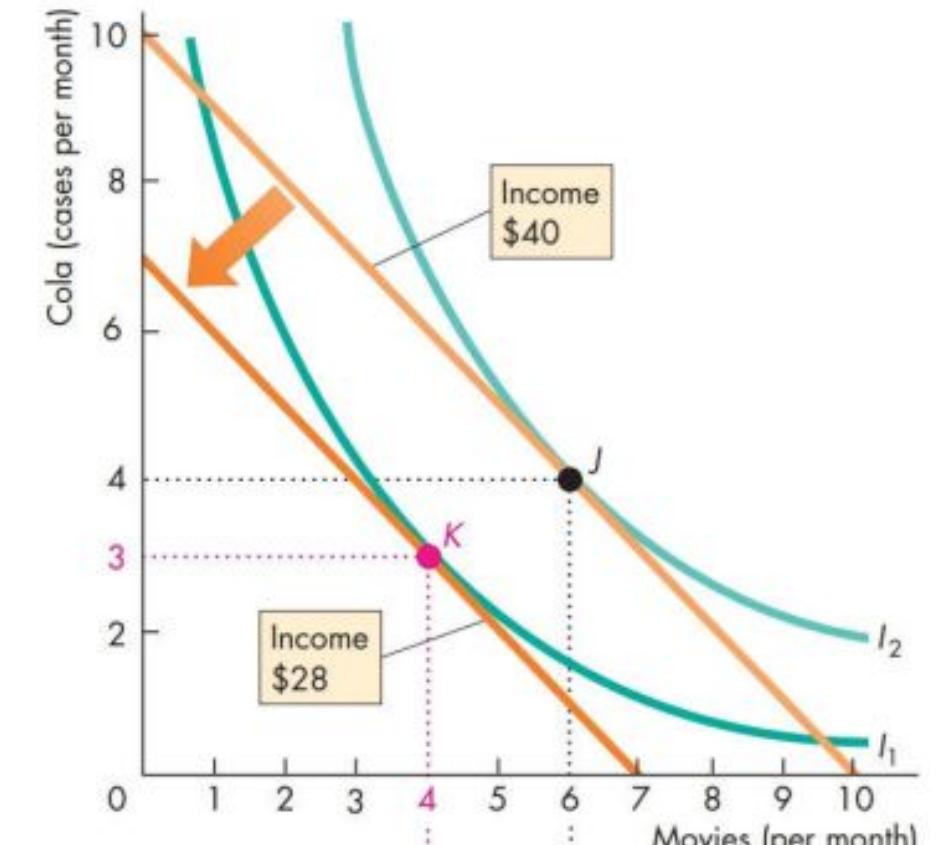
(a) Price effect



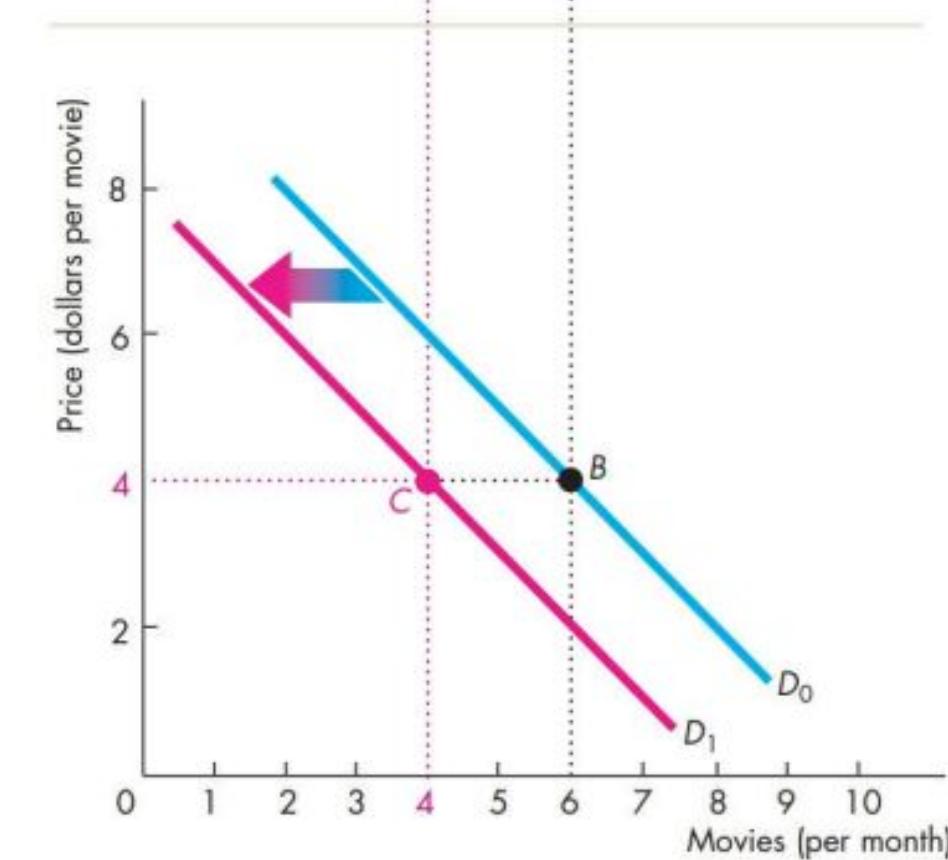


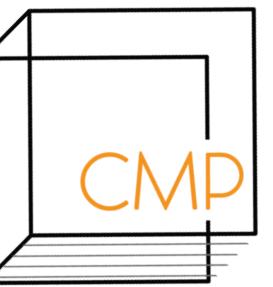
## 9. Utility & Demand - Income Effect

- **Income Effect:** when a change in income changes the quantity of the good consumed
  - Income changes > real income changes > budget line shifts > best affordable choice changes > demand changes
  - as income decreases, the consumer buys less of both goods
- Explains demand curve *shifts*



(a) Income effect





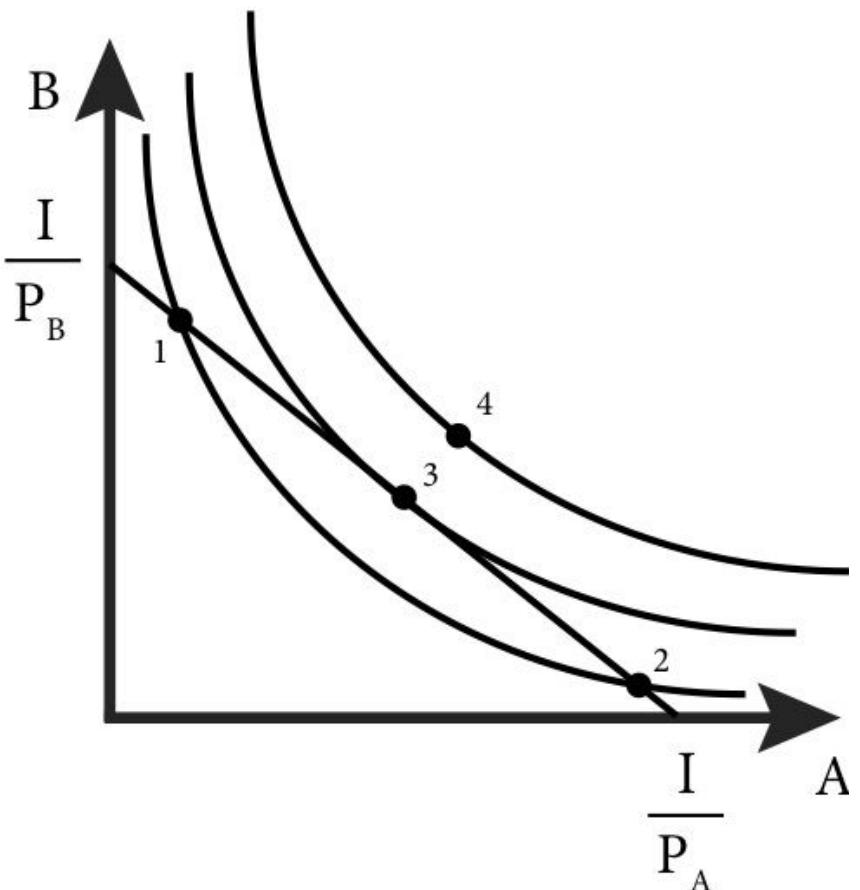
## 9. Utility & Demand - Price & Income Effect, Best Affordable Choice

**Q31:** The price effect explains the \_\_\_\_ of the demand curve, while the income effect explains the \_\_\_\_ of the demand curve.

- a. vertical intercept, horizontal intercept
- b. curviness, the vertical intercept
- c. slope, shifts

**Q32:** Looking at the diagram on the right, where is the best affordable choice?

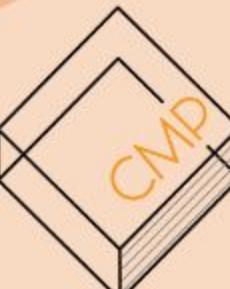
- a. Point 1
- b. Point 2
- c. Point 3
- d. Point 4



# Break Time!



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