

Chapter 5

Elasticity of Demand and Supply

These slides supplement the textbook, but should not replace reading the textbook

What is total revenue?

Price multiplied by the quantity sold at that price

$$P \times Q$$

**If you own a business
and you raise price,
will your total revenue
go up or down?**

That all depends on the
price elasticity of demand
for your product

When price increases what two things happen?

- more money is made per unit
- fewer units are sold

What is price elasticity of demand?

A measure of the responsiveness of quantity demanded to a price change

How do I measure responsiveness?

You measure the percent change in quantity demanded when price changes

How do I measure a percent change in quantity?

You take the difference between the two quantities and divide by the original number

For example, if there is an increase from 3 units to 5, what is the percentage increase?

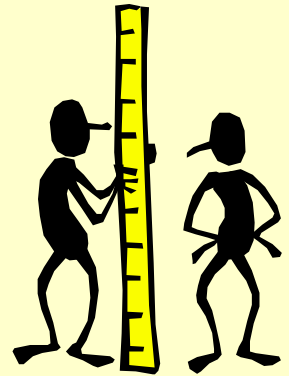
The percent increase is 67%

How do I know this?

The difference between
the two numbers is 2 and
the original number is 3

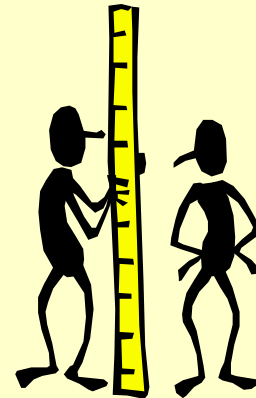
So ...

$$2/3 = 67\%$$



If there is a decrease from 5 units to 3, what is the percent decrease?

$$2/5 = 40\%$$



How do I calculate *price elasticity of demand?*

$$\text{Price elasticity of demand} = \frac{\% \text{ change in quantity}}{\% \text{ change in price}}$$

If NRCC raises tuition, what happens to total revenue?

- If demand is elastic - revenue goes down
- If demand is inelastic - revenue goes up

When price increases what two things happen?

- more money is made per unit
- fewer units are sold

**If I increase my price
from \$1.00 to \$1.10,
how will this effect
my revenue?**

The answer depends upon
the price elasticity of
demand for your product

When price increases and there is a net loss in revenue, the demand curve is price elastic, > 1

When price increases demand is elastic when ...?

More money is lost
because of the fewer units
sold than the money
gained because of the
higher price

When price increases and there is a net gain in revenue, the demand curve is price inelastic, < 1

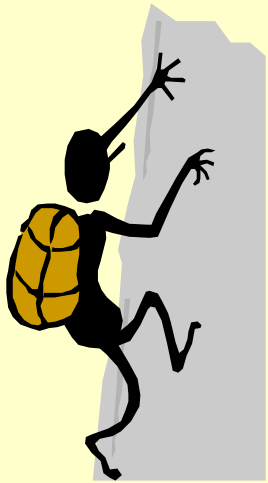
When price increases demand is inelastic when ...?

More money is gained because of the higher price than the money lost because of the fewer units sold

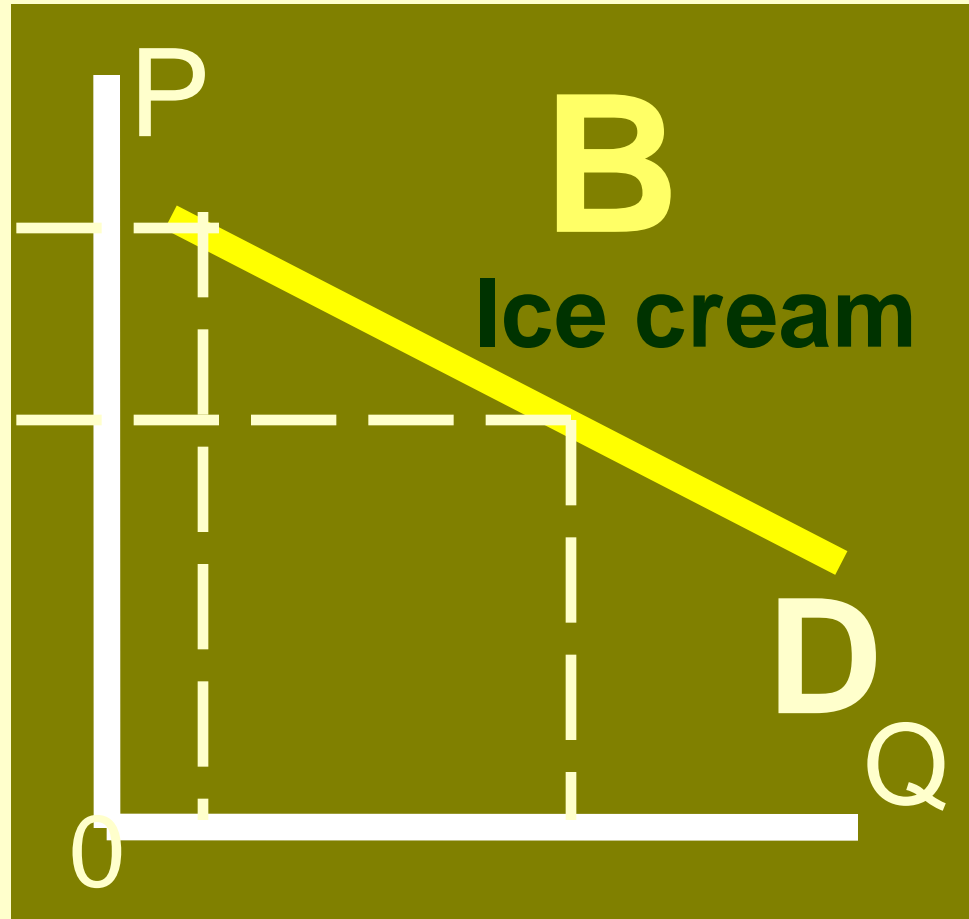
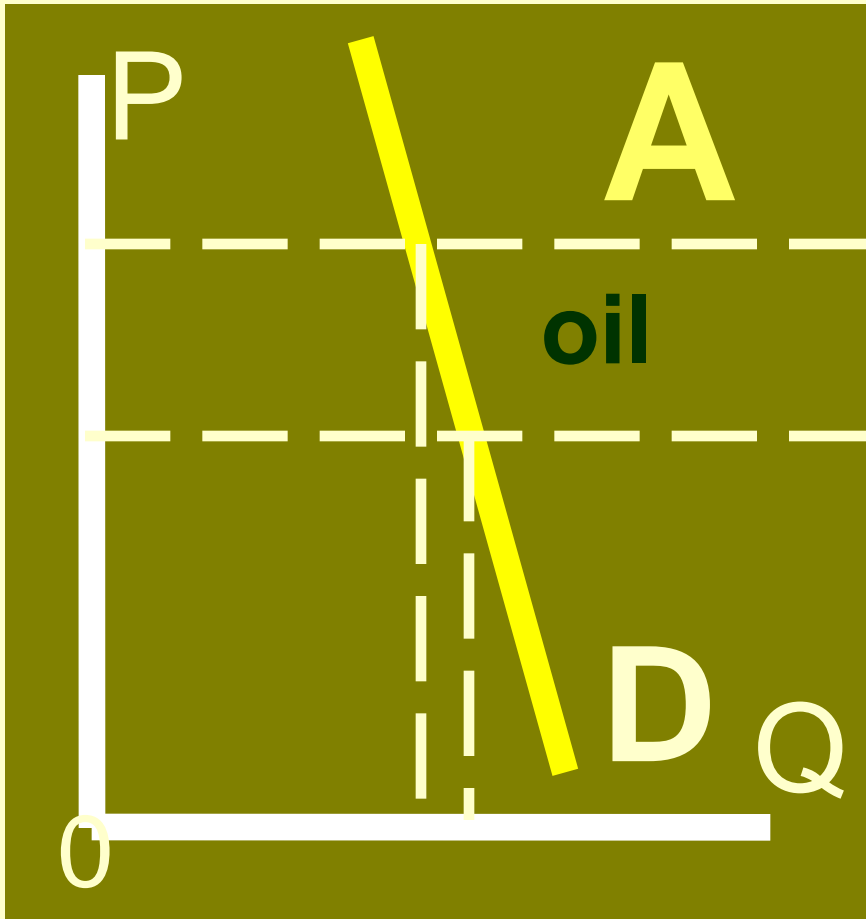
What do elastic demand curves look like?

Elastic demand curves are more horizontal than inelastic demand curves

What do inelastic demand curves look like?



Inelastic demand curves are more vertical than elastic demand curves



Which of the above demand curves is oil and which ice cream?

Why is the demand curve for oil more inelastic?

- oil is a necessity
- oil has few substitutes

Why is the demand curve for ice cream more elastic?

- Ice cream is a luxury
- ice cream has many substitutes

If tripling of the price triples the quantity of a good supplied, then price elasticity of supply is?

One

If a \$1 increase in price leads to a 3-unit decrease in quantity demanded, then demand must be elastic ?

False, the dollar increase is not given as a percent change

What is unit-elastic demand?

The type of demand that exists when a percent change in price causes an equal (but of opposite sign) percent change in quantity demanded

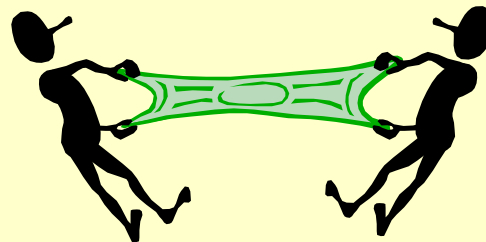
If total revenue does not change when price increases, the demand curve is unitary elastic, value equals -1

What determines the price elasticity of demand?

- substitutes
- consumers budgets
- time
- need

What do substitutes have to do with elasticity?

The more substitutes the more elastic is the demand



How does the price elasticity of demand for running shoes compare to Nike running shoes?

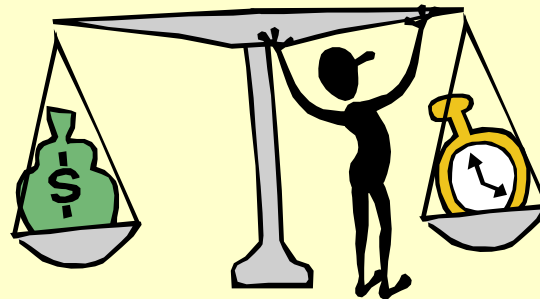
The demand for running shoes is less elastic than the demand for Nike running shoes

How does my budget effect demand?

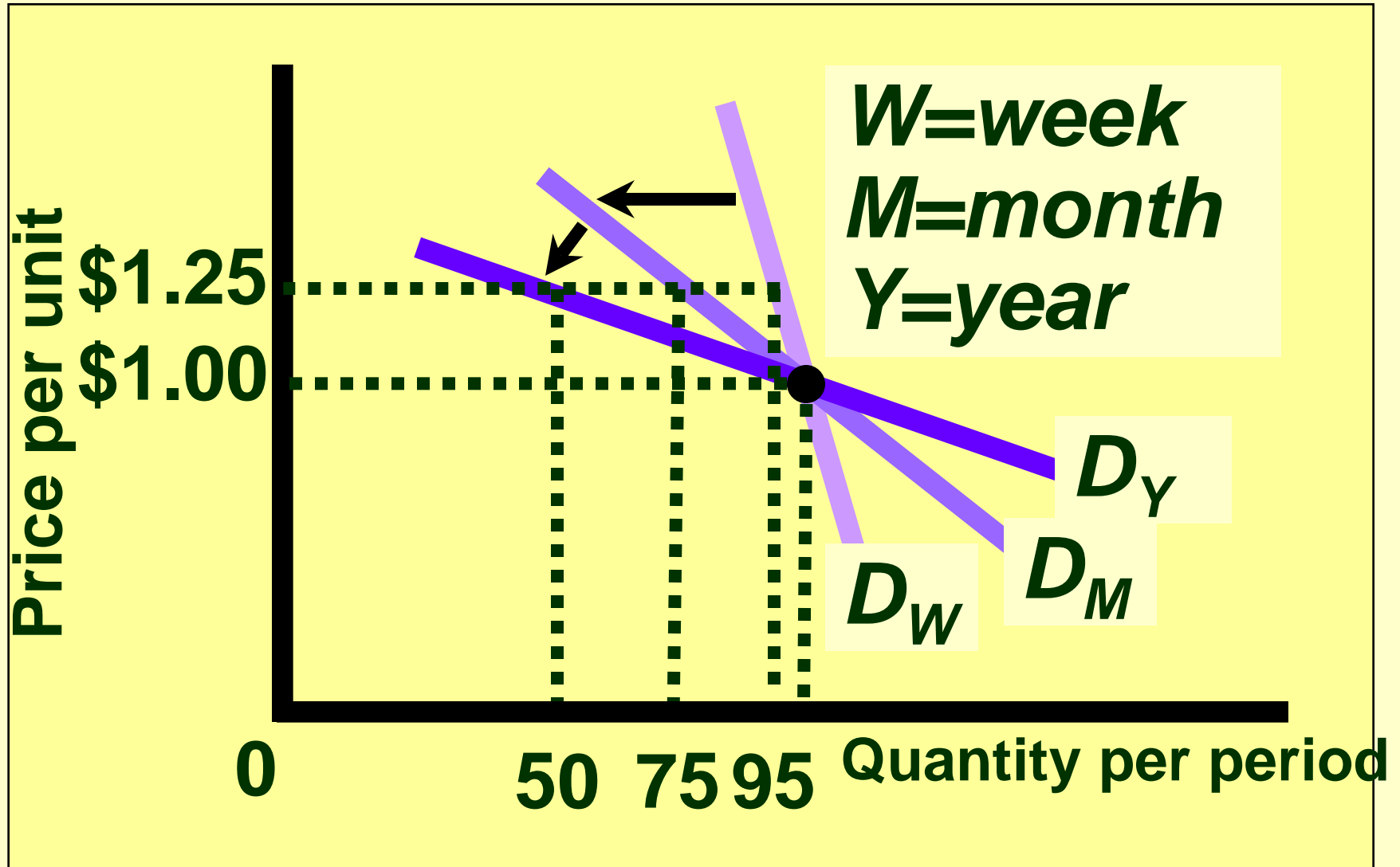
The smaller the price of something is in relation to your budget, the more inelastic the demand

What does time have to do with elasticity?

The more time to adjust to a price change the more elastic the demand



Demand Becomes More Elastic Over Time



What does need have to do with elasticity?

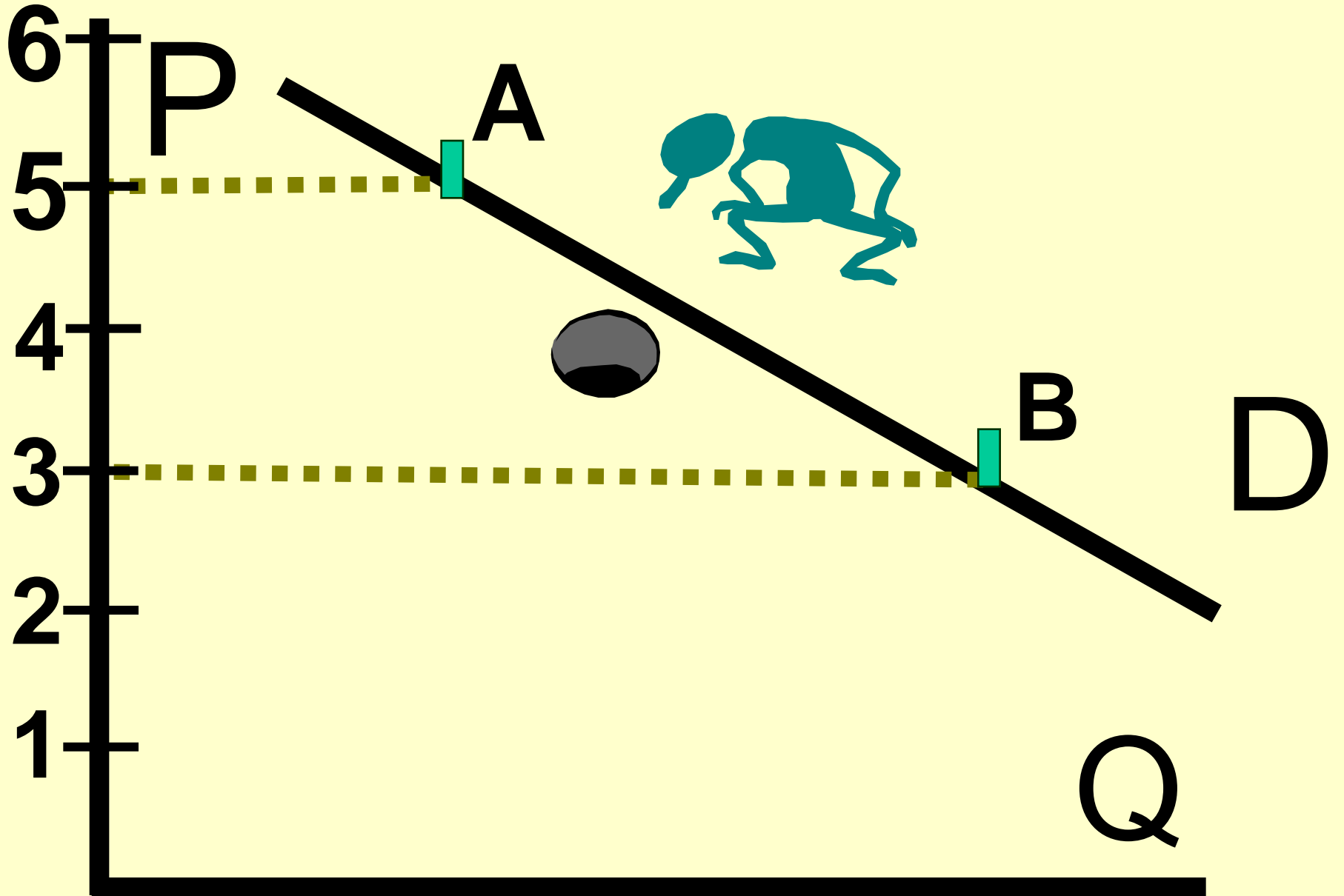
The greater the need the more inelastic the demand

How do I measure the price elasticity of demand for a good?

Price elasticity of demand is the percentage change in quantity demanded divided by the percentage change in price

Problem - when you move along a demand curve between two points, you will get different answers to elasticity depending if you are moving up or down the demand curve

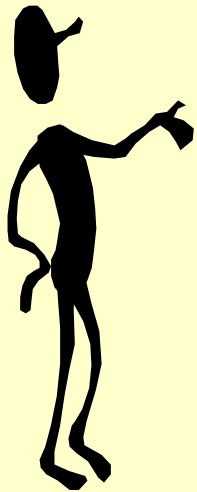
If you go from 3 to 5, the percentage change is $\frac{2}{3}$, but if you go from 5 to 3, the percentage change is $\frac{2}{5}$, so the elasticities are different !



The answer to this problem is to use the **arc elasticity of demand** formula which is ...

change in quantity demanded

sum of quantities/2



divided by
change in price

sum of prices/2

Price elasticity equals the percentage in quantity demanded divided by the percent change in price (using the arc formula)

$$E_D = \frac{q'_D - q_D}{(q'_D + q_D)/2} \div \frac{p' - p}{(p' + p)/2}$$

Mathematically, we invert the denominator and multiply, the 2's cancel one another out, so formula becomes:

$$E_D = \frac{q'_D - q_D}{(q'_D + q_D)} \times \frac{(p' + p)}{p' - p}$$

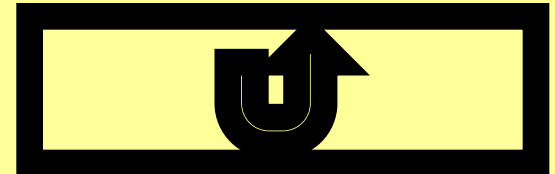
Quantity Price

Bananas **200** **\$20**

240 **\$18**

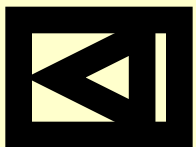
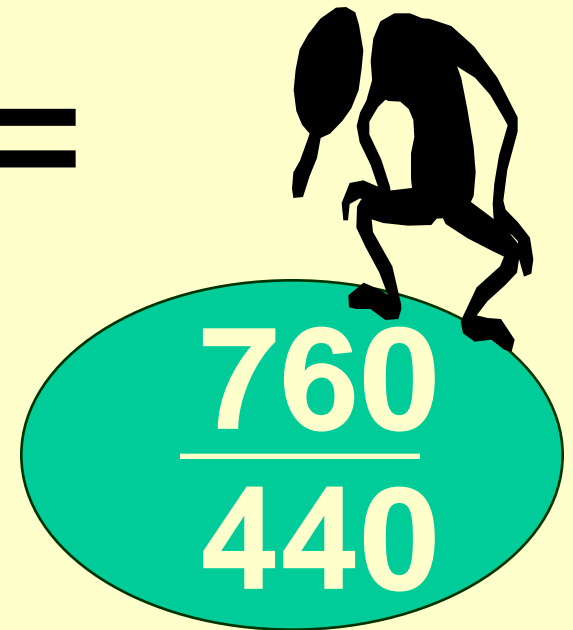
Oranges **400** **\$40**

280 **\$70**

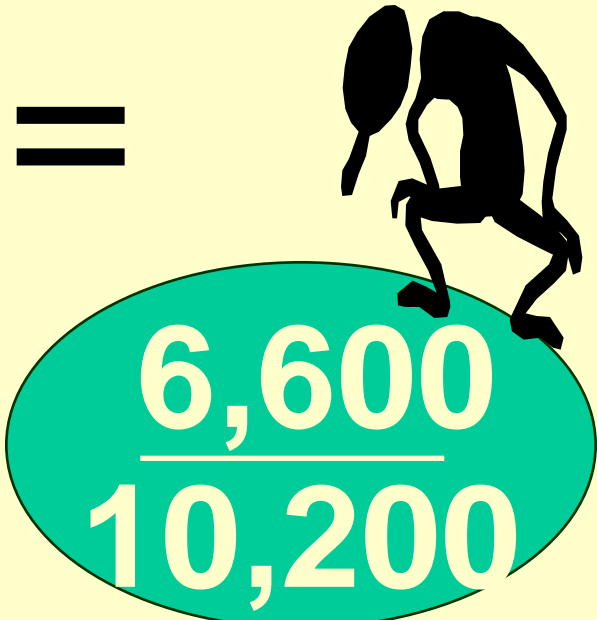


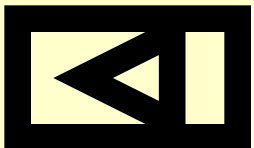
What is the Price Elasticity of Demand for bananas?

$$\frac{40}{220} \div \frac{2}{19} = \frac{40}{220} \times \frac{19}{2} =$$



What is the Price Elasticity of Demand for oranges?

$$\frac{120}{340} \div \frac{30}{55} = \frac{120}{340} \times \frac{55}{30} = \frac{6,600}{10,200}$$




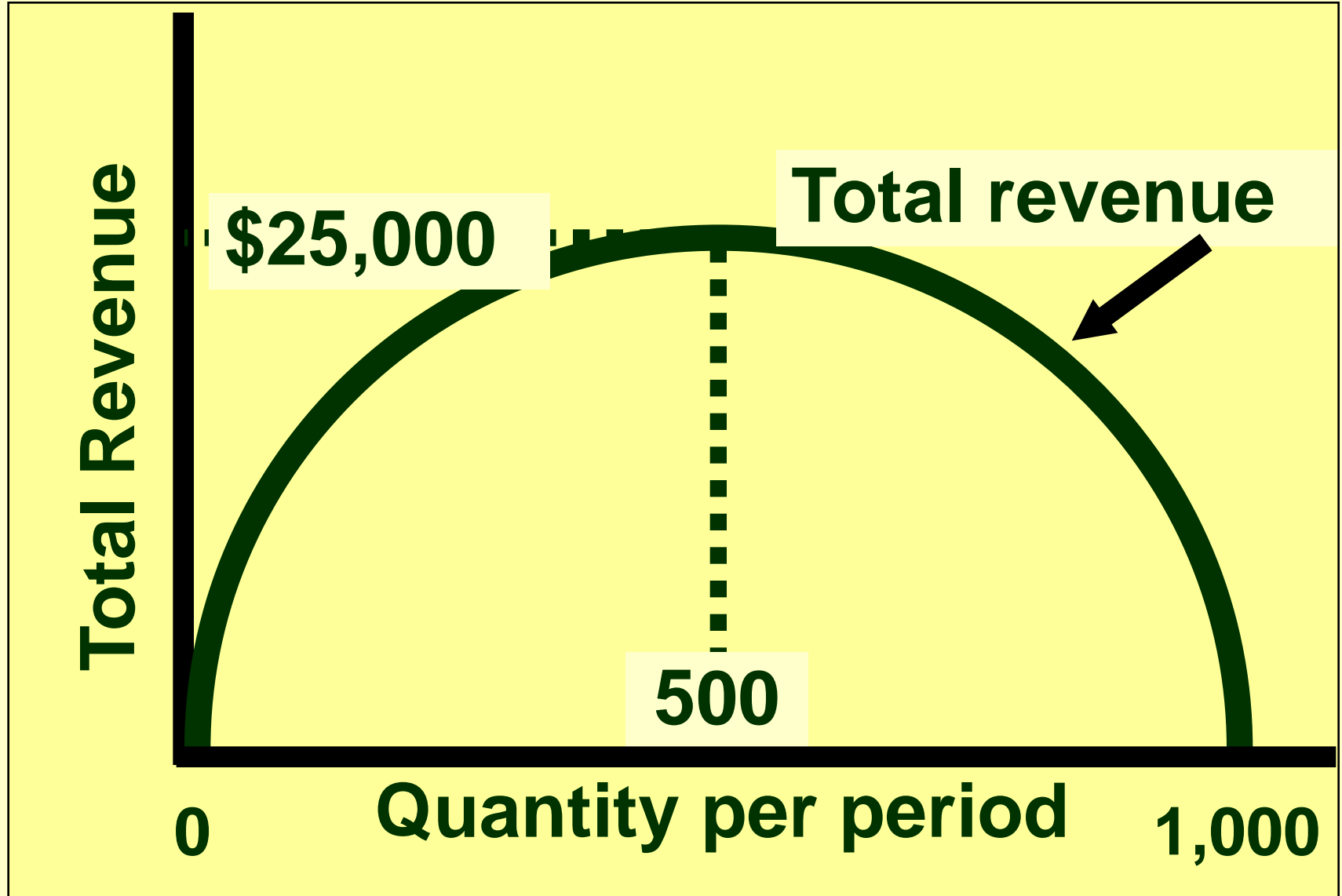
What is a linear demand curve?

A straight-line demand
curve

How do price and total revenue relate?

- In the elastic range of a demand curve, price and total revenue move in opposite directions.
- In the inelastic range, price and total revenue move in the same direction

Demand, Price Elasticity, and Total Revenue

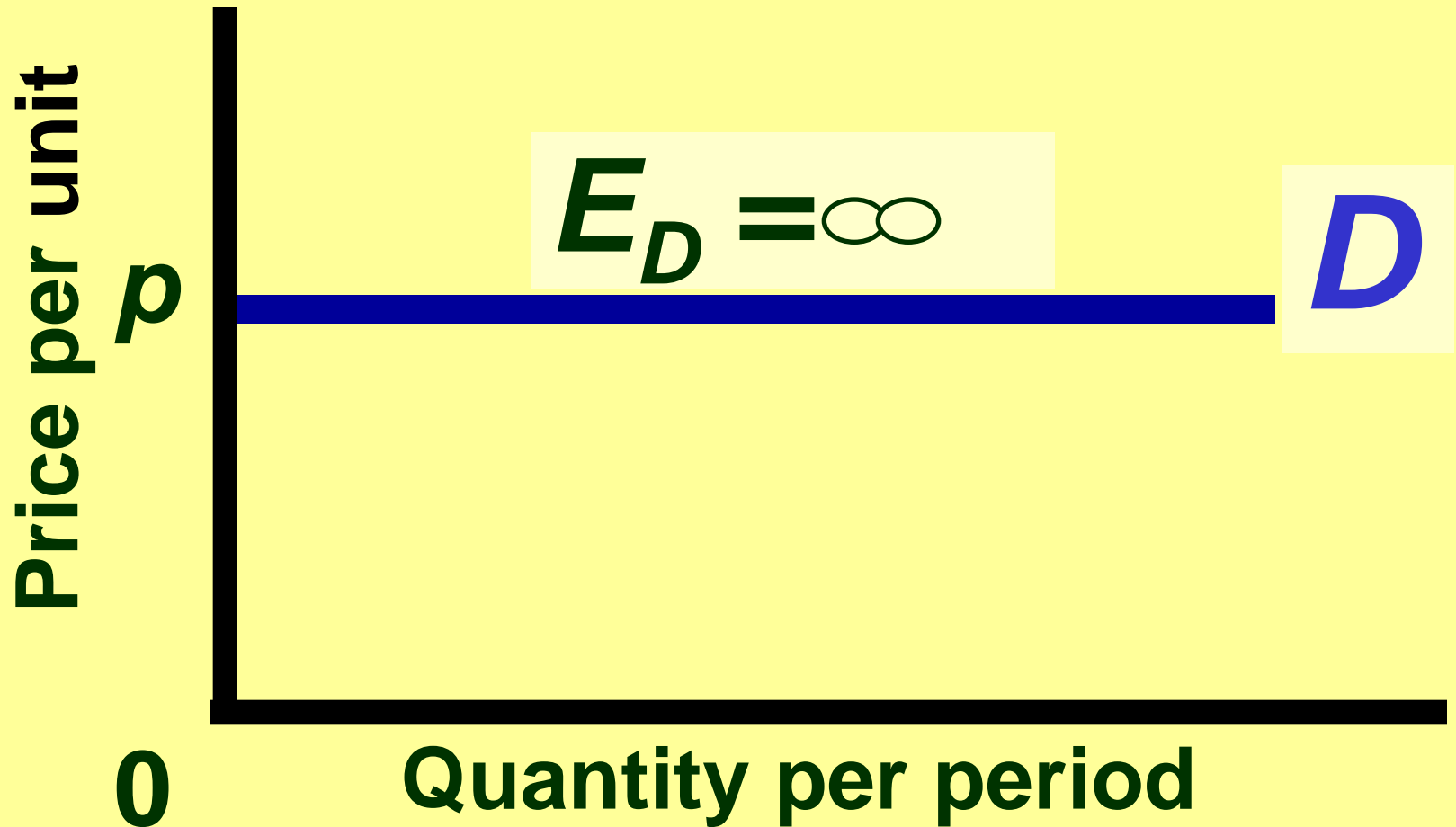


Panel B: Total Revenue

What is a perfectly elastic demand curve?

A horizontal line reflecting a situation in which any price increase reduces quantity demanded to zero

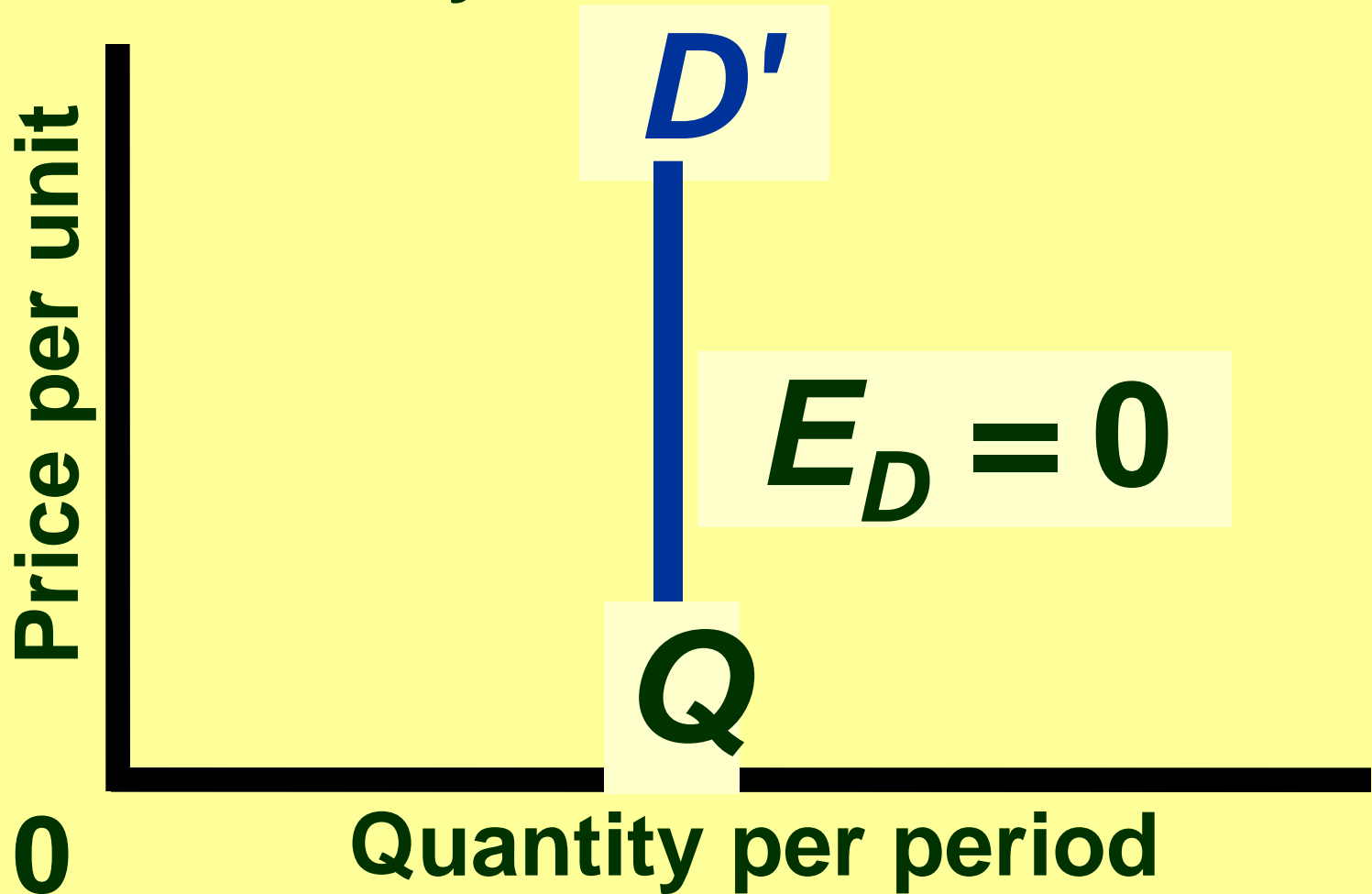
A Perfectly Elastic Demand Curve



What is a perfectly inelastic demand curve?

A vertical line reflecting a situation in which price change has no effect on the quantity demanded

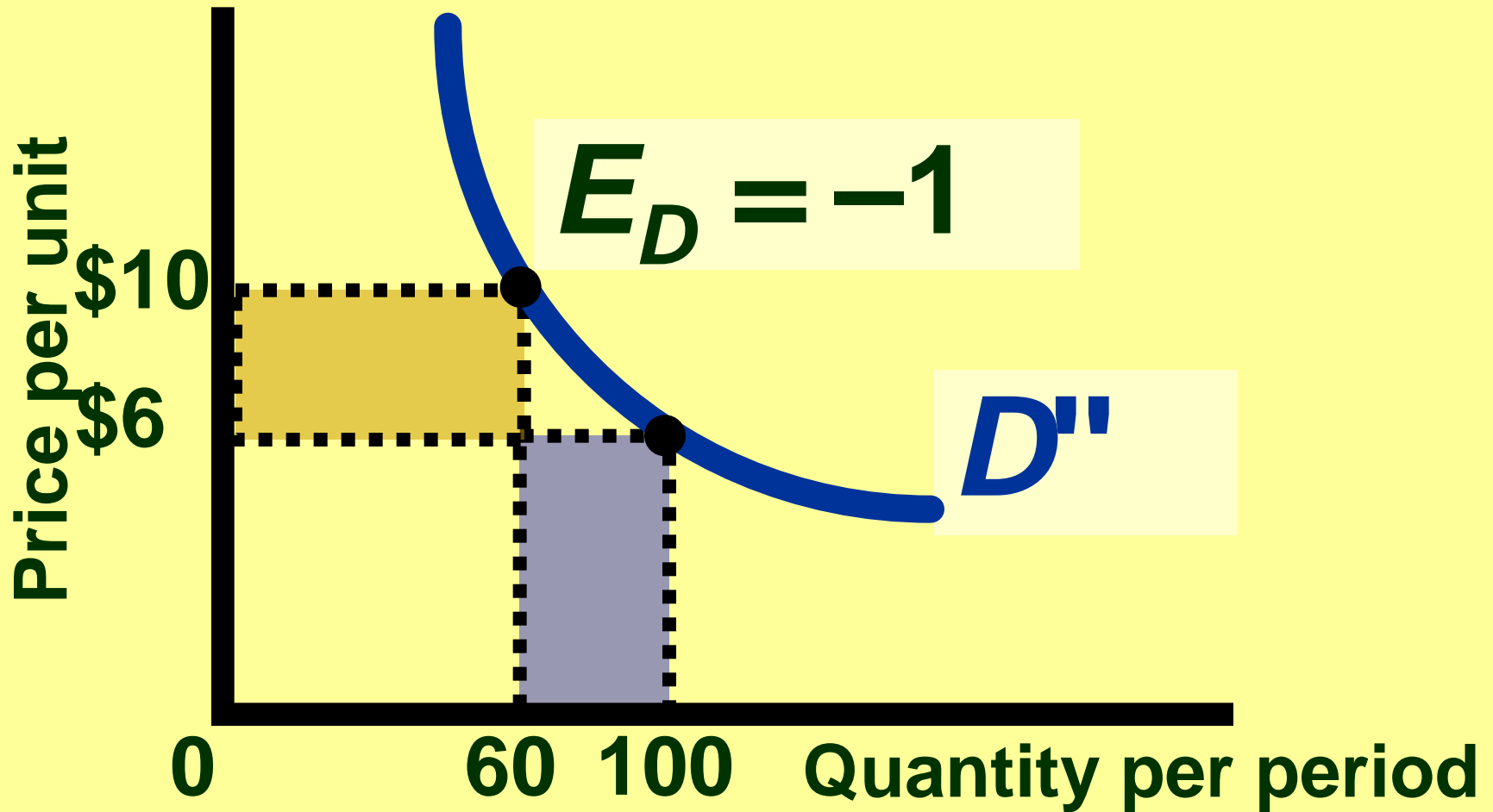
A Perfectly Inelastic Demand Curve



What is unit elasticity of demand?

The type of demand that exists when price elasticity is the same everywhere along the curve, it has an elasticity of -1.0

A Unit Elastic Demand Curve



What is income elasticity of demand?

The percentage change in the quantity demanded resulting from a 1 percent change in total income

What is a normal good?

Something that people will buy more of as their incomes increase



**If a good is normal,
then the income
elasticity of demand
for that good is ?**

Positive

What is an inferior good?

Something that people will buy less of as their incomes increase



**If a good is inferior,
then the income
elasticity of demand
for that good is ?**

Negative

What is cross-price elasticity of demand?

The percent change in the demand of one good (at a given price) as a result of the percent change in the price of another good

If negative -
complements (steak &
steak sauce)

If positive - *substitutes*
(butter & margarine)

If an increase in the price of peanut butter causes a decline in the demand for jelly, then ?

the goods are complements

If a decrease in the price of one good causes a decline in the demand for another good, then ?

The goods are substitutes

What are some examples of complementary goods?

- computers and software
- cars and gasoline
- CDs and playlists

What is price elasticity of supply?

A measure of the responsiveness of quantity supplied to a price change

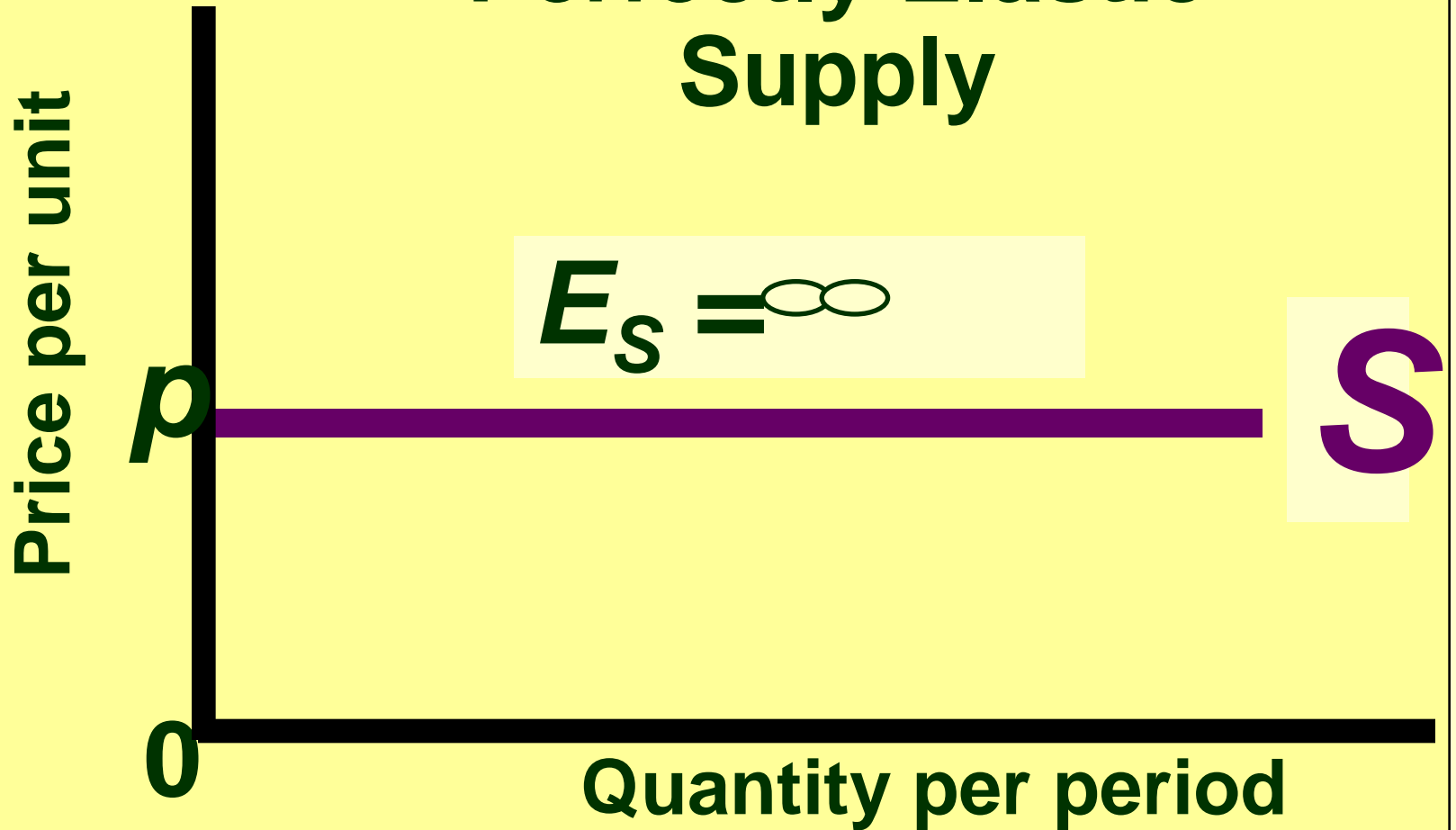
Price elasticity equals the percentage in quantity demanded divided by the percent change in price (using the arc formula)

$$E_s = \frac{q'_s - q_s}{(q'_s + q_s)/2} \div \frac{p' - p}{(p' + p)/2}$$

What is a perfectly elastic supply curve?

A horizontal line reflecting a situation in which any price decrease reduces the quantity supplied to zero; the elasticity value is infinity

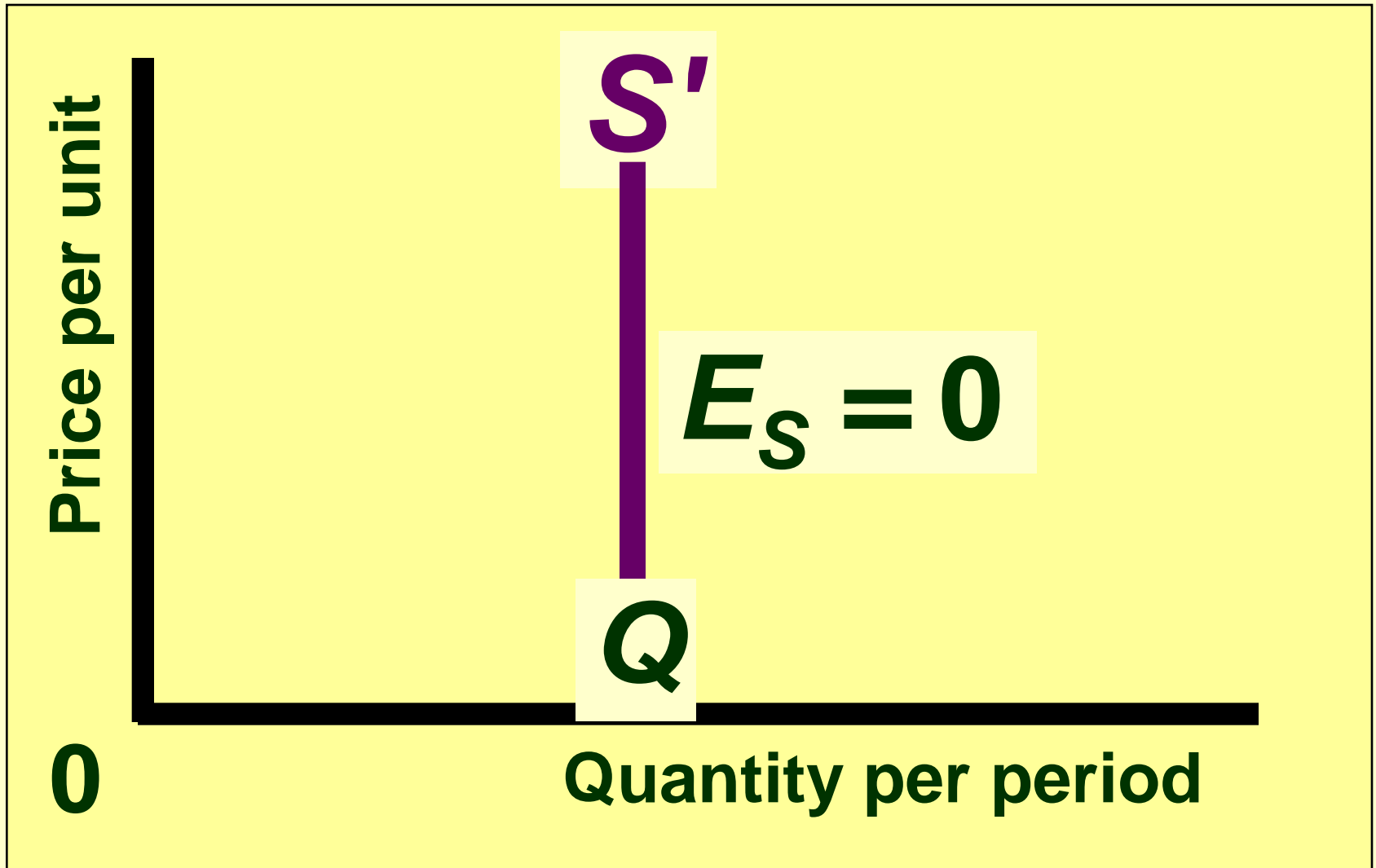
Perfectly Elastic Supply



What is a perfectly inelastic supply curve?

A vertical line reflecting a situation in which a price change has no effect on the quantity supplied; the elasticity value is zero

A Perfectly Inelastic Supply Curve



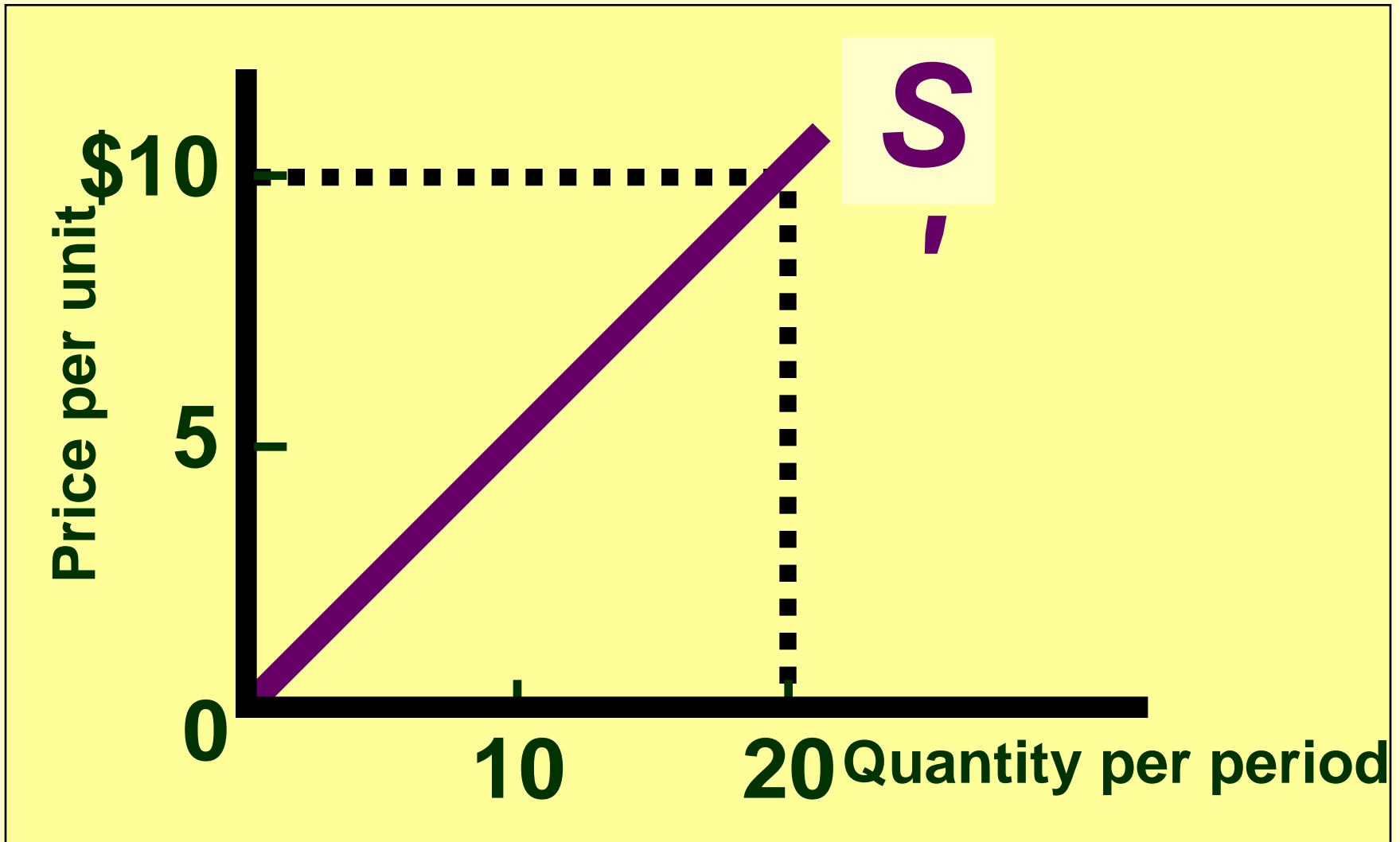
What is unit-elastic supply?

A percent change in price causes an identical percent change in quantity supplied; the elasticity value is one

How is unit-elastic supply depicted?

A supply curve that is a straight line through the origin

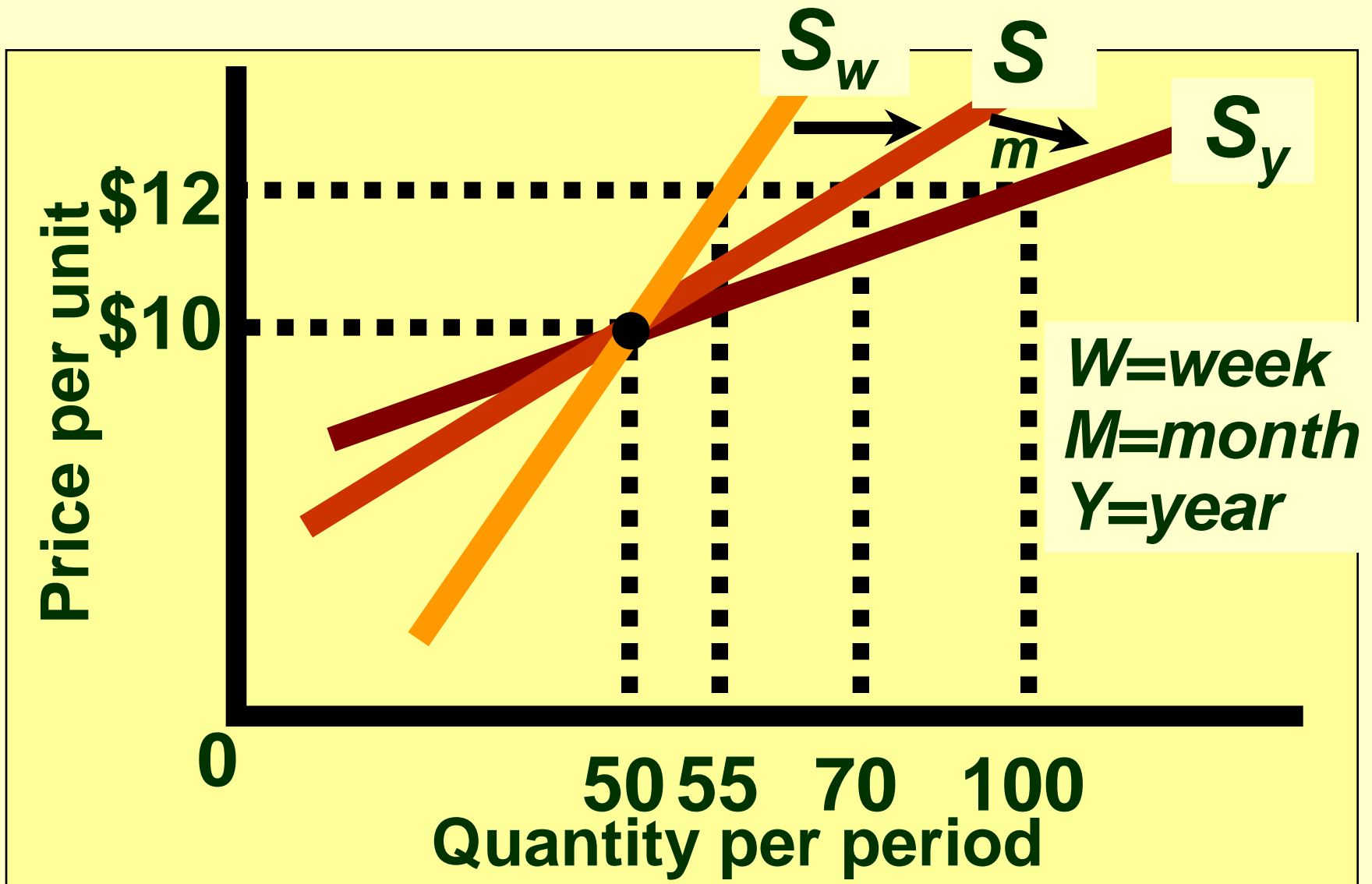
A Unit Elastic Supply Curve



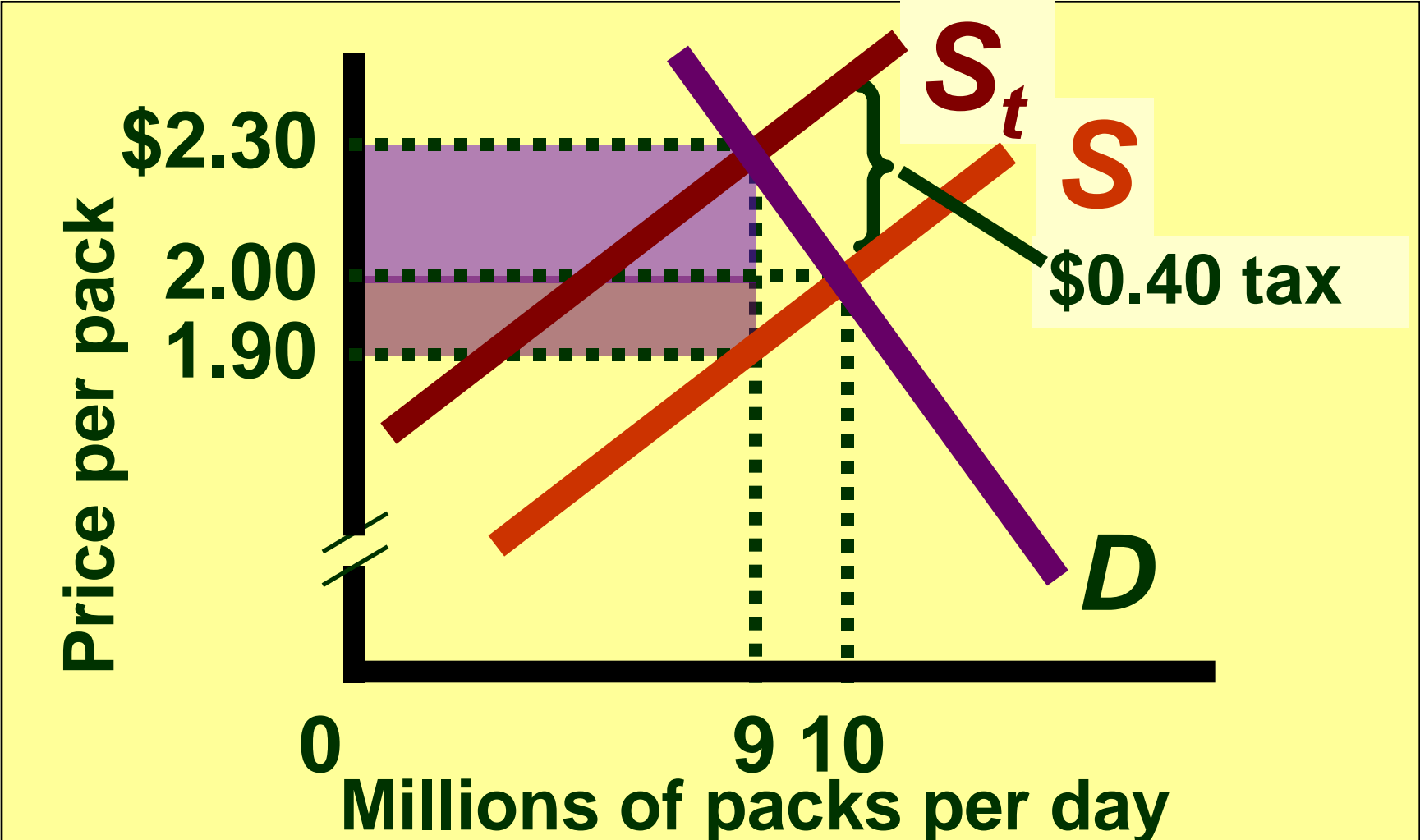
What are the determinants of supply elasticity?

- Costs
- Time

Market Supply Becomes More Elastic Over Time

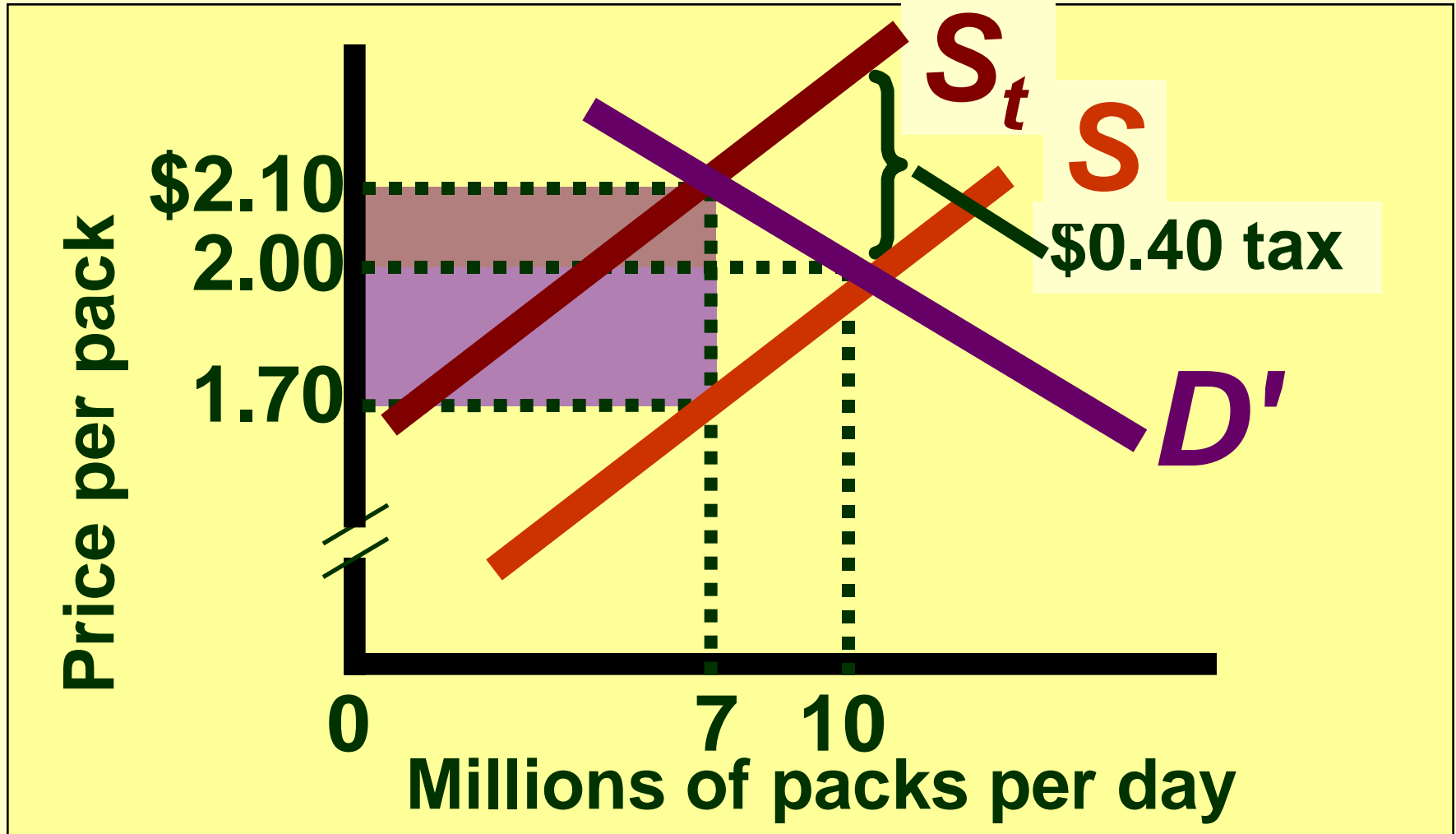


Effects of Different Demand Elasticities on Sales Tax Incidence



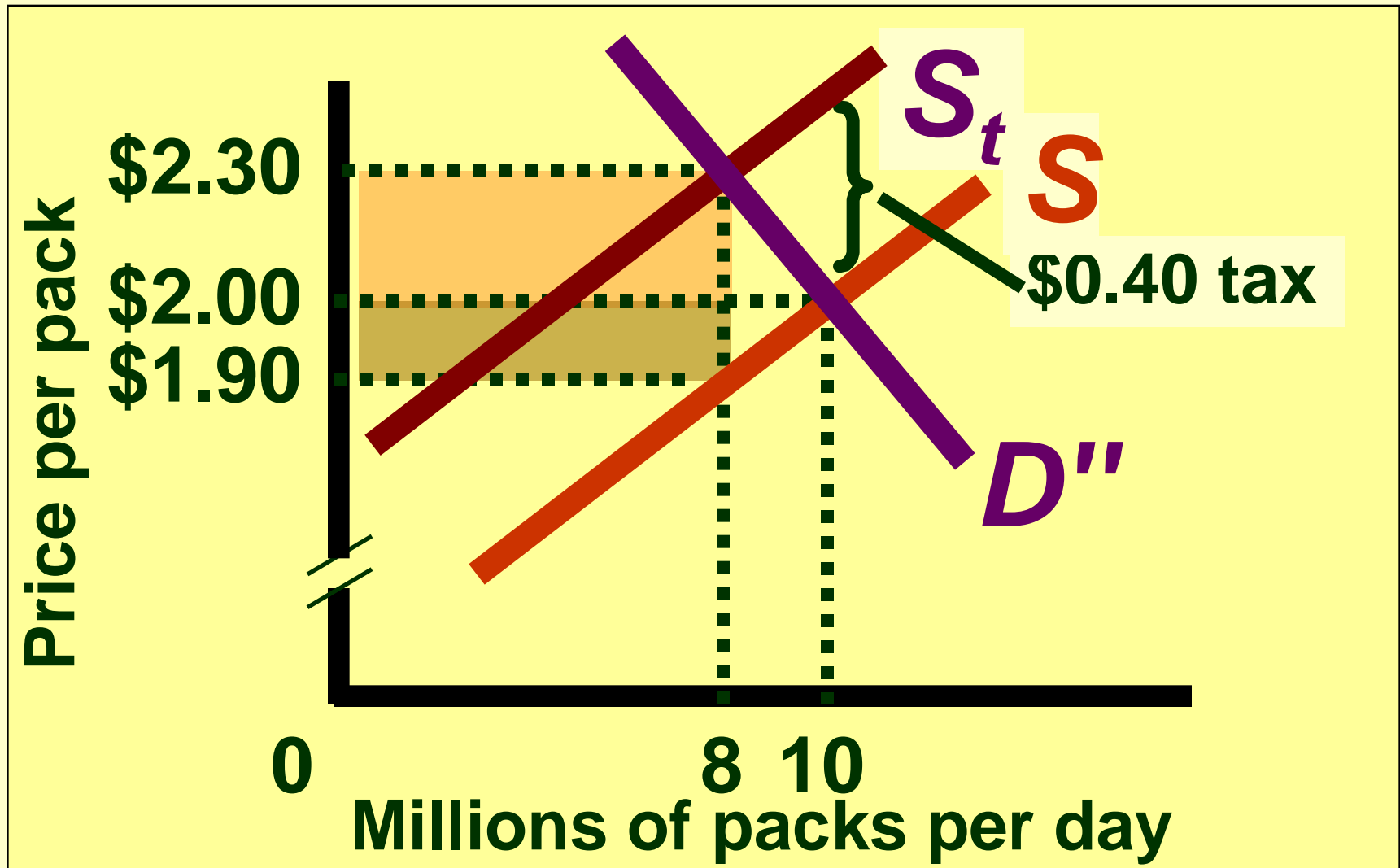
Panel A: Less elastic demand

Effects of Different Demand Elasticities on Sales Tax Incidence



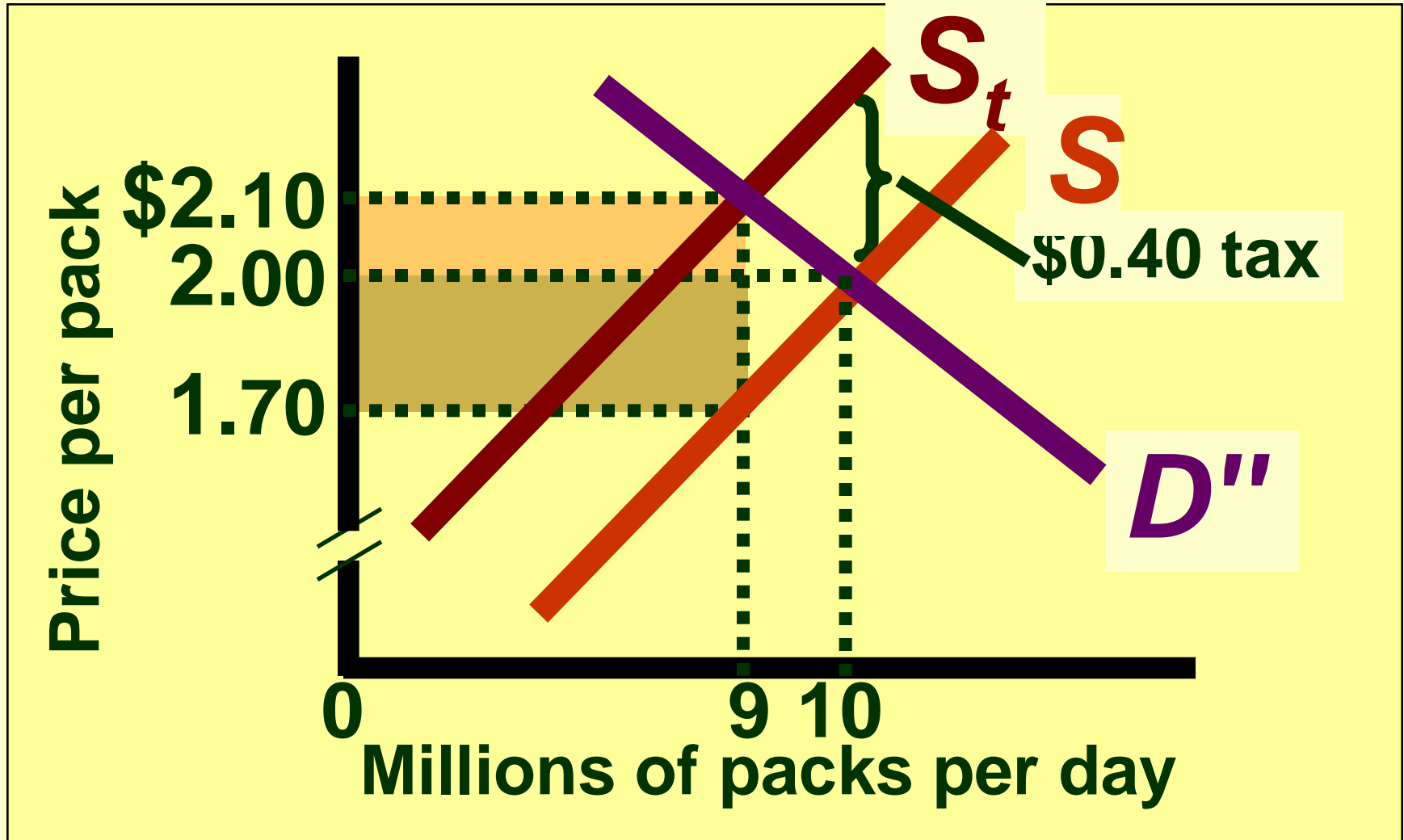
Panel B: More elastic demand

Effects of Different Supply Elasticities on Sales Tax Incidence



Panel A: More elastic supply

Effects of Different Supply Elasticities on Sales Tax Incidence



Panel B: Less elastic supply

END