



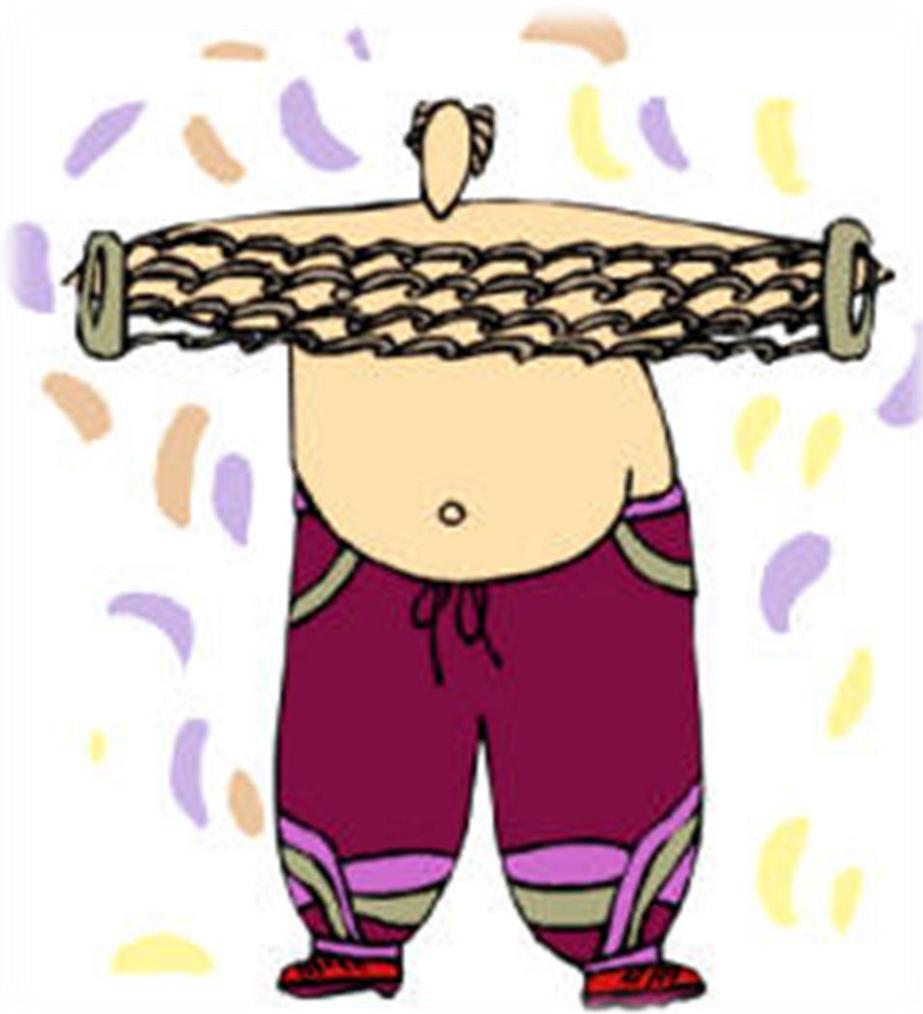
If it is important to you, you will find a way
If not, you will find an excuse.

Frank Banks

Test Yourself: Elasticity



What is elasticity?



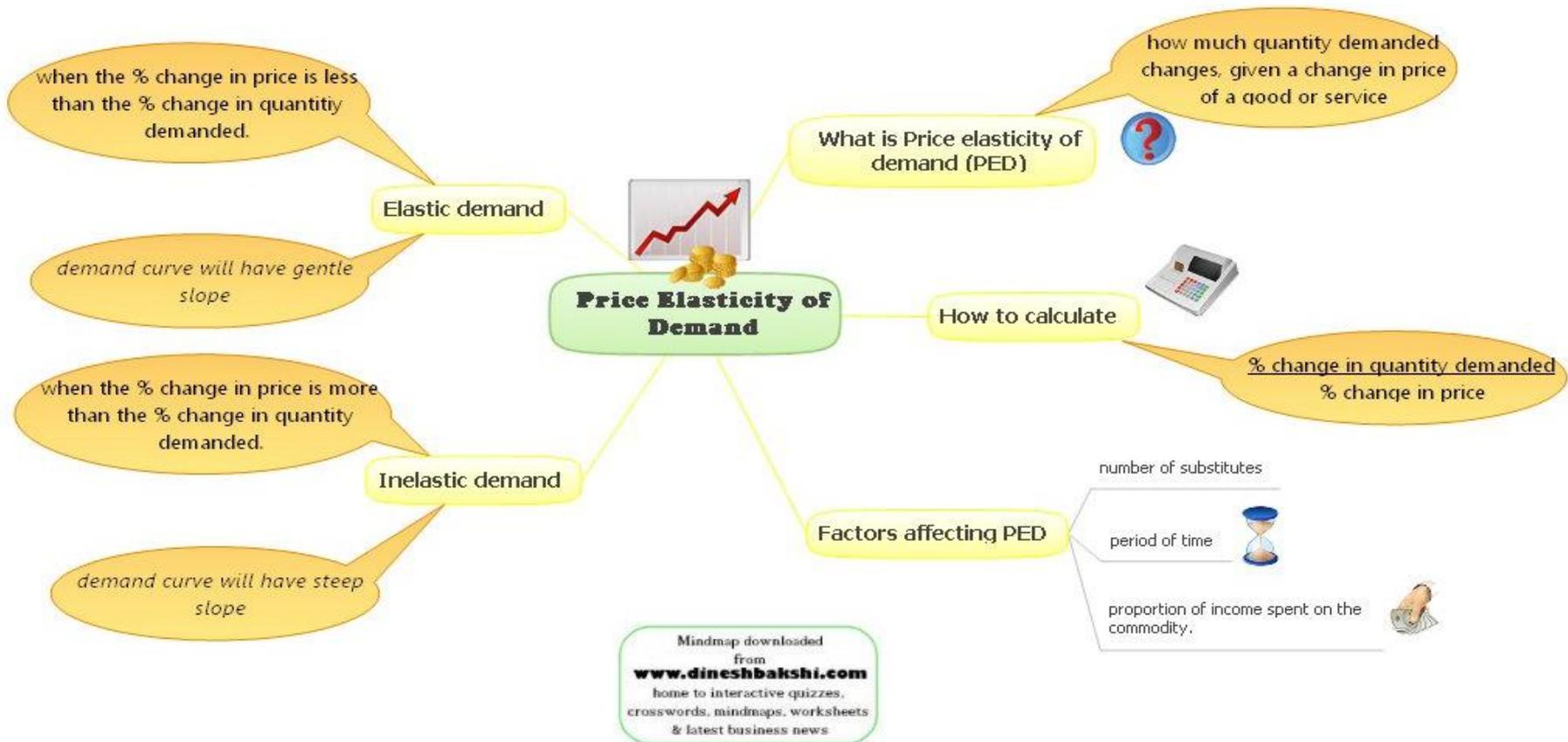


Elasticity is the responsiveness, or sensitivity, to a change in price.

What is price elasticity of demand?



Price Elasticity of Demand





Price elasticity of demand is the *ratio* of the percentage change in the quantity demanded of a product to a percentage change in its price.

$$E_d = \frac{\% \Delta Q_d}{\% \Delta P}$$

If, for example, the price of a rock concert increases by 10%, the effect the price increase will have on sales depends on the price elasticity of demand for this rock concert.

**Suppose a university's enrollment drops
by 20% because tuition rose by 10%,
what is the price elasticity of demand?**





Tuition increased 10% (P)
Enrollment dropped 20% (Q_d)

$$E_d = \frac{\% \Delta Q_d}{\% \Delta P} \qquad E_d = \frac{-20\%}{+10\%}$$
$$E_d = \frac{-0.20}{+0.10} = 2$$

The price elasticity of demand is 2.

We know it's a +2 because we know from the law of demand that quantity demanded and price are inversely related.

A raise in tuition may or may not help the bottom line. If demand is inelastic, total revenue will go up but if demand is elastic, total revenue will go down.

**How is the percent increase or decrease
of two numbers calculated?**





Percent change is the difference between the two numbers divided by the *original* number.

$$(\#1 - \#2) \div \#1$$

If there is an increase from 3 units to 5,
what is the percent change?





an increase from 3 units to 5

$$(\#1 - \#2) \div \#1$$

$$(2) \div 3 = .66 = 66\%$$

There is a 66% change (increase).

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





a decrease from 5 units to 3

$$(\#1 - \#2) \div \#1$$

$$(2) \div 5 = .40 = 40\%$$

There is a 40% change (decrease).



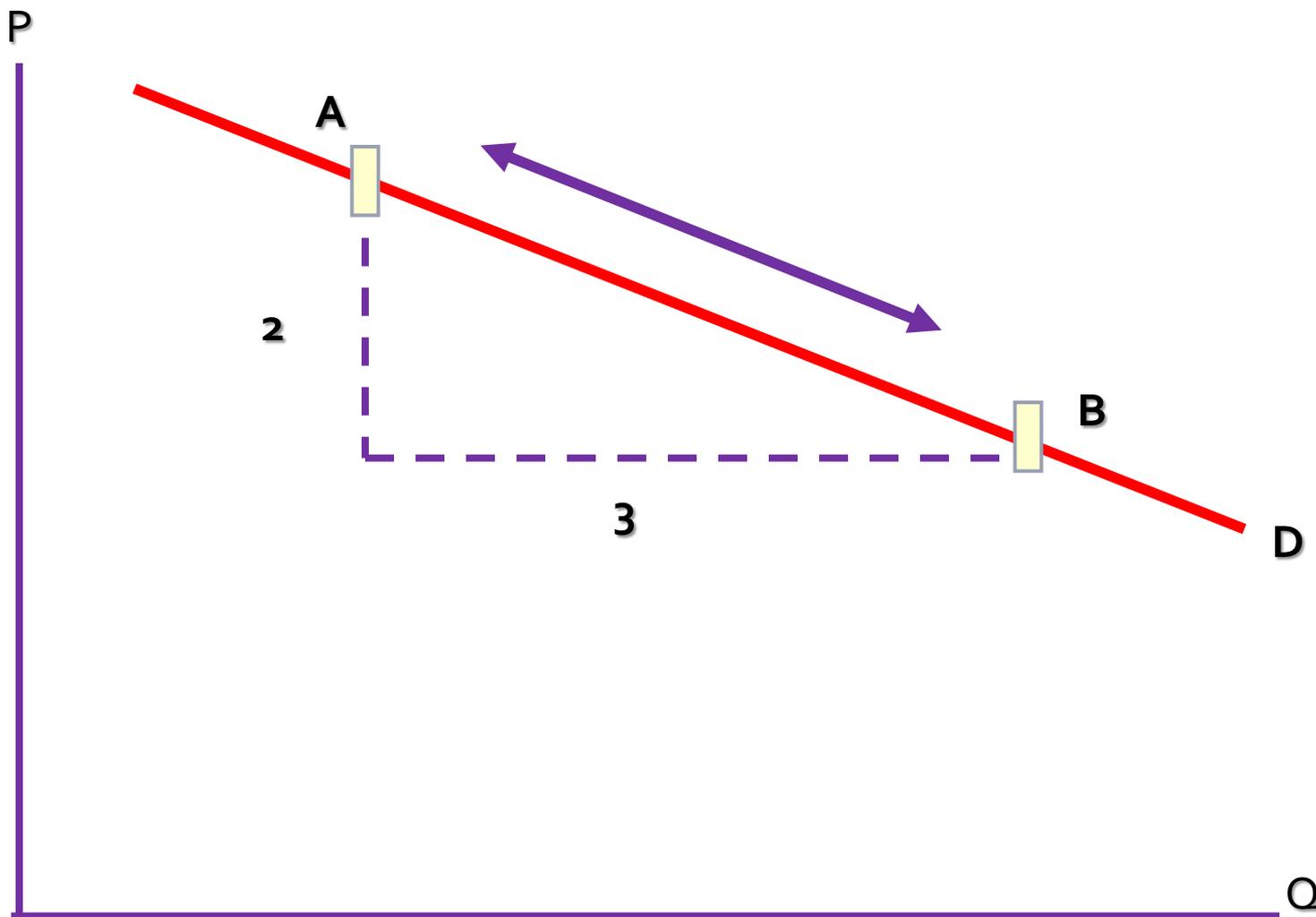
Problem: When we move along a demand curve between two points, we get different answers to elasticity depending on whether we are moving up or down the demand curve.

(Look at the two previous examples.)

Economists solve this problem of different base points by using the midpoints as the base points of changes in prices and quantity demanded.



Chart: The Direction Dilemma





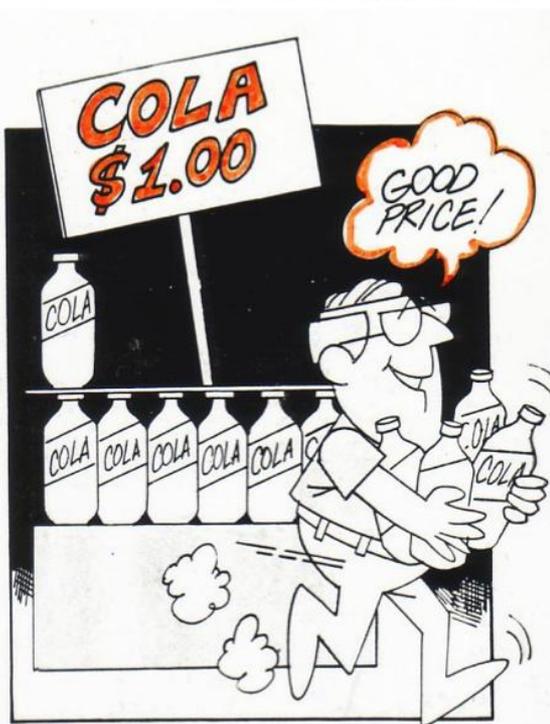
To avoid the direction dilemma while finding price elasticity of demand, we use the following formula.

$$E_d = \left[\frac{\Delta Q_d}{(\sum Q_{d1}, Q_{d2}) \div 2} \right] \div \left[\frac{\Delta P}{(\sum P_1, P_2) \div 2} \right]$$



What is elastic demand?

Elastic Demand





Elastic demand is a condition in which the percent change in quantity demanded is greater than the percentage change in price.

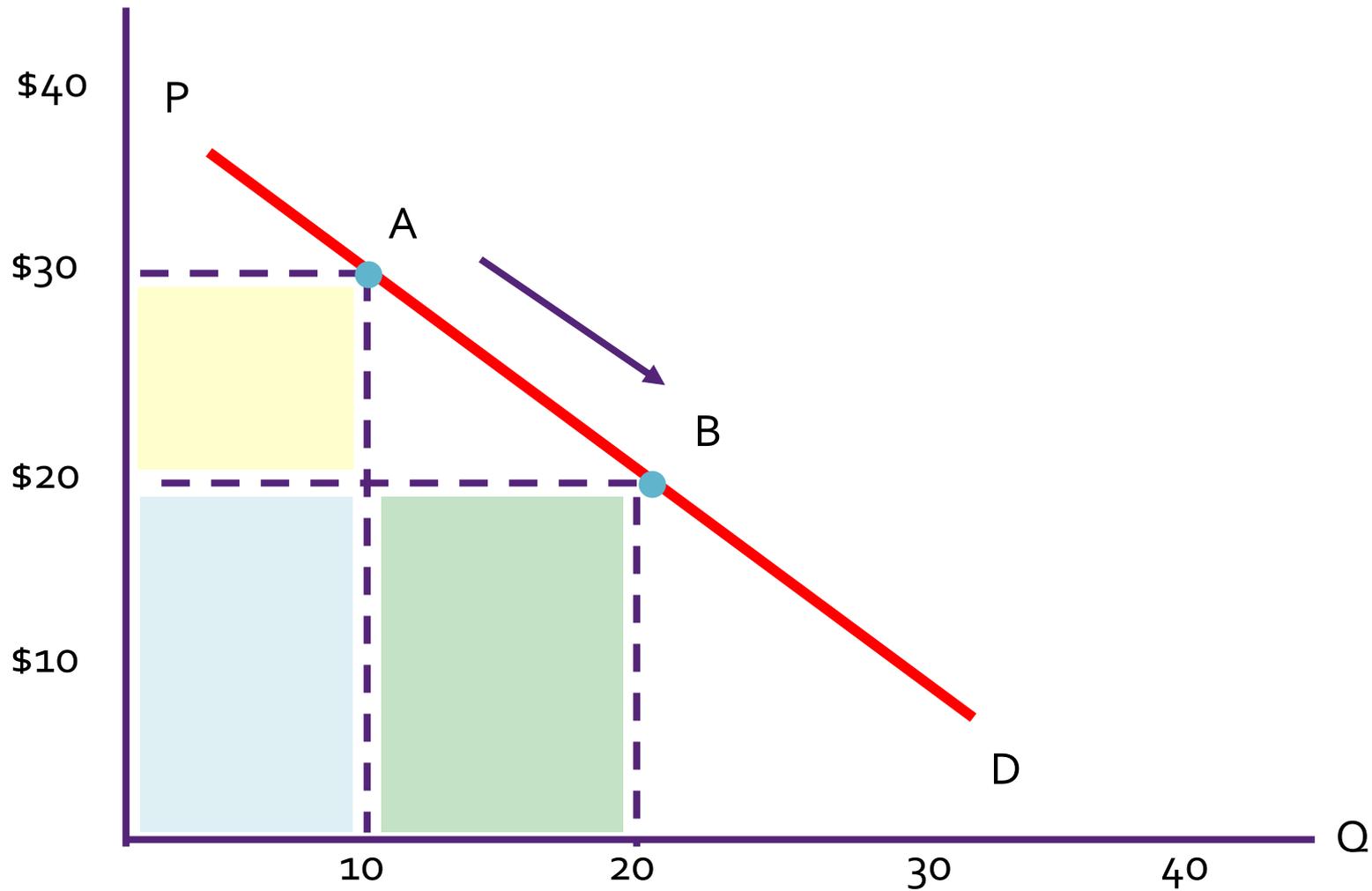
$$\% \Delta Q_d > \% \Delta P$$

**How do we know the demand curve
shown on the next slide is elastic?**



Chart: Elastic Demand

$$E_d > 1$$





We know the demand curve shown on the previous slide is elastic because the percent change in the quantity demanded is *greater* than the percent change in price.



Calculations for chart on slide 20.

$$\% \Delta Q^* = \frac{10}{15} = .66 = 66\%$$

$$\% \Delta P^* = \frac{10}{25} = .40 = 40\%$$

$$E_d = \frac{\% \Delta Q}{\% \Delta P} = \frac{.66}{.40}$$

$$E_d = 1.65$$

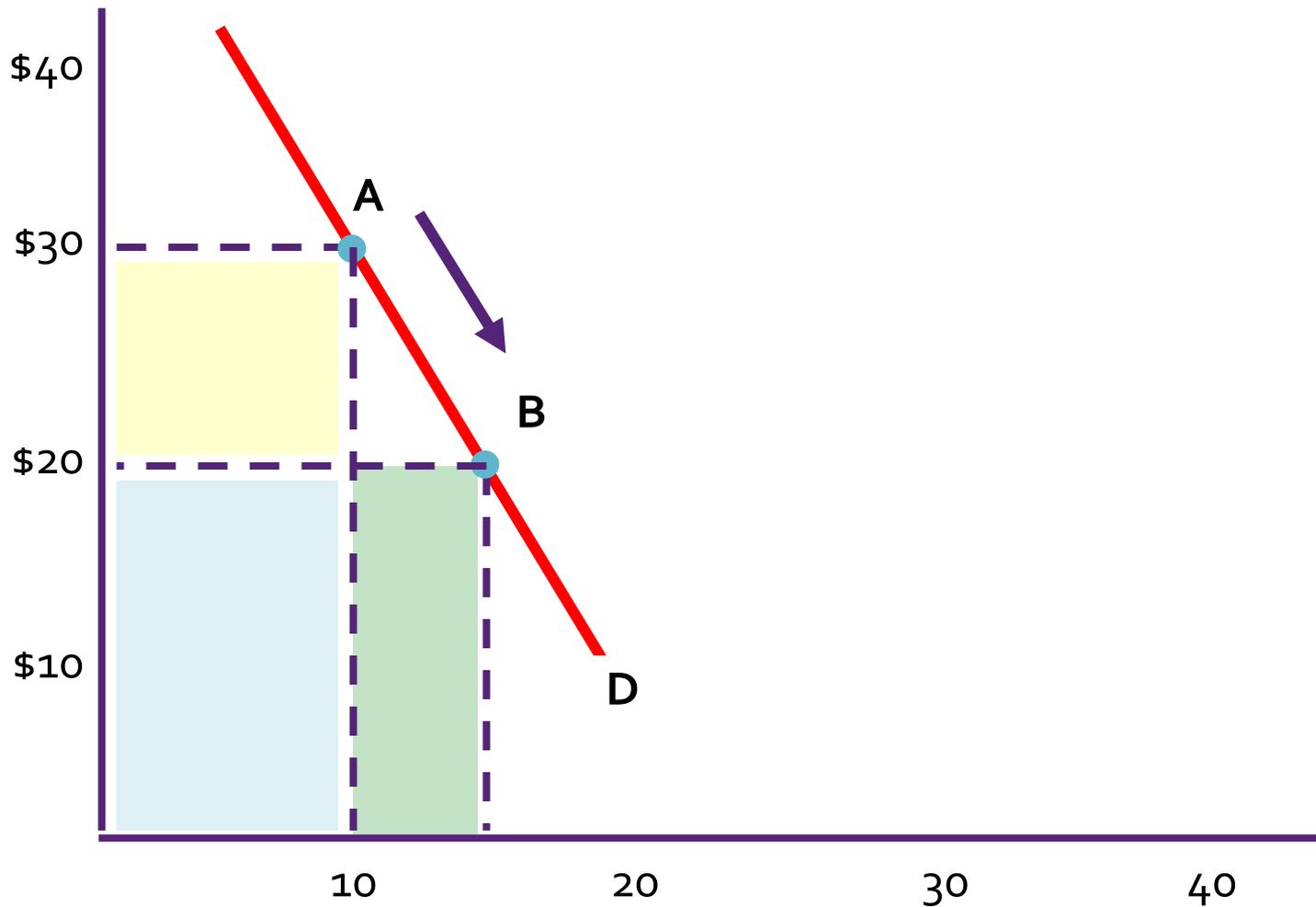
* Calculated using formulas from slide 16.

How do we know the demand curve shown on the next slide is inelastic?



Chart: Inelastic Demand

$$E_d < 1$$





We know the demand curve shown on the previous slide is inelastic because the percent change in the quantity demanded is *less* than the percent change in price.



Calculations for chart on slide 24.

$$\% \Delta Q^* = \frac{5}{13} = .38 = 38\%$$

$$\% \Delta P^* = \frac{10}{25} = .40 = 40\%$$

$$E_d = \frac{\% \Delta Q}{\% \Delta P} = \frac{.38}{.40}$$

$$E_d = 0.95$$

* Calculated using formulas from slide 16.

What is a unitary elastic demand curve?

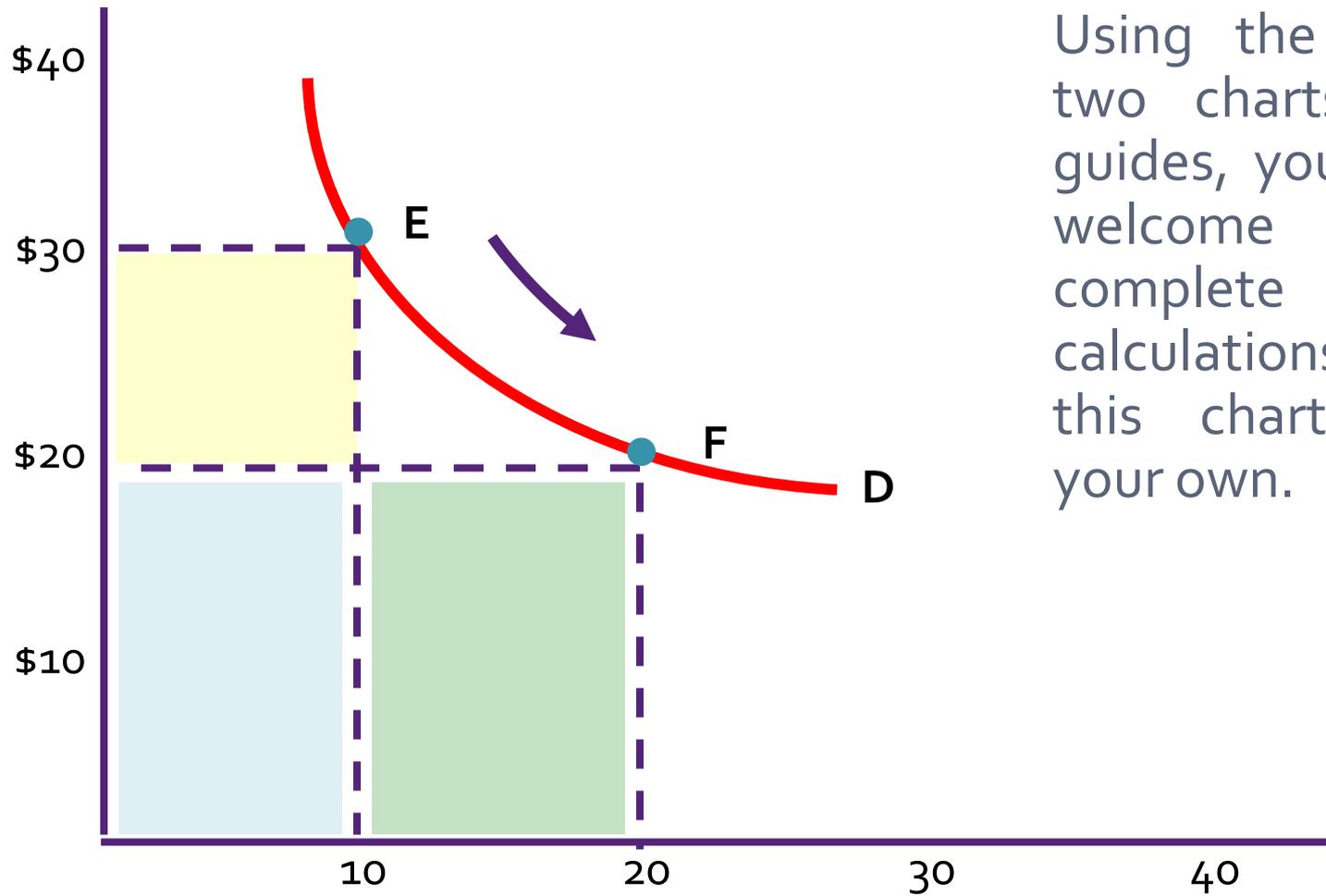




A **unitary elastic demand curve** is one with which the percent change in the quantity demanded is *equal* to the percent change in price.

Chart: Unitary Elastic Demand

$$E_d = 1$$



Using the last two charts as guides, you are welcome to complete the calculations for this chart on your own.



Summary

- If price increases and the revenue gained is *less* than the revenue lost, the demand curve is **price elastic**, > 1 .
- If price increases and the revenue gained is *greater* than the revenue lost, the demand curve is **price inelastic**, < 1 .
- If total revenue does *not change* when price increases, the demand curve is **unitary elastic**, value equals 1.



Table: A Comparison of Elasticities #1

Price Elastic

↑	An <i>increase</i> in price...	↓	<i>reduces</i> total revenue.
↓	A <i>reduction</i> in price...	↑	<i>Increases</i> total revenue.

Total revenue moves in the direction of the quantity change.

Price Inelastic

↑	An <i>increase</i> in price...	↑	<i>Increases</i> total revenue.
↓	A <i>reduction</i> in price...	↓	<i>reduces</i> total revenue.

Total revenue moves in the direction of the price change.

Unit price Elastic

↑	An <i>increase</i> in price...	●	no change in total revenue.
↓	A <i>reduction</i> in price...	●	no change in total revenue.

Total revenue does not change as price changes.

What is a perfectly elastic demand curve?



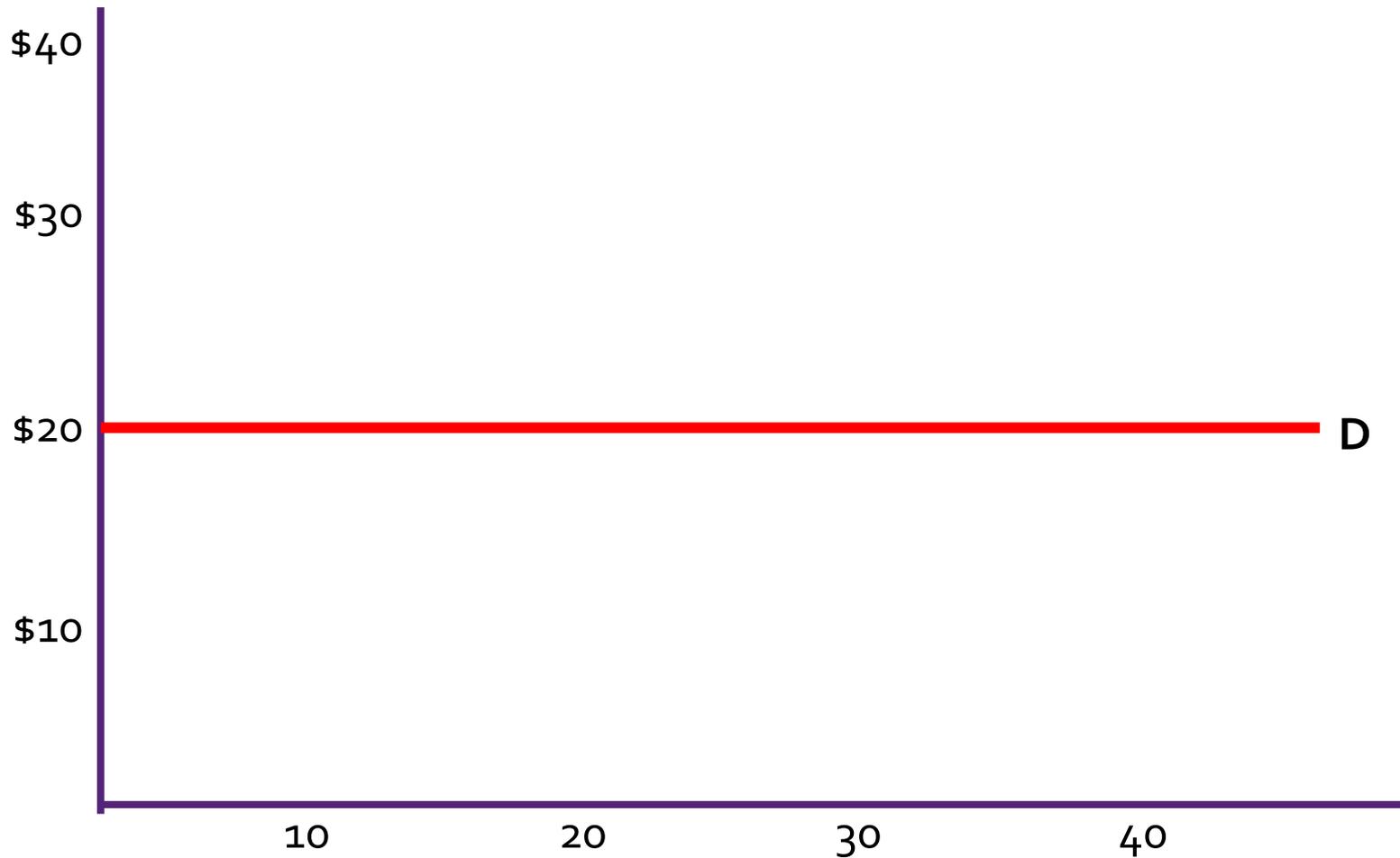


With a **perfectly elastic demand curve**, a small percent change in price brings about an infinite percent change in the quantity demanded.

Chart: Perfectly Elastic Demand



$$E_d = \infty$$



What is a perfectly inelastic demand curve?



Inelastic Demand





With a **perfectly inelastic demand curve** the quantity demanded does not change as the price changes.

Perfectly Inelastic Demand



$$E_d = 0$$

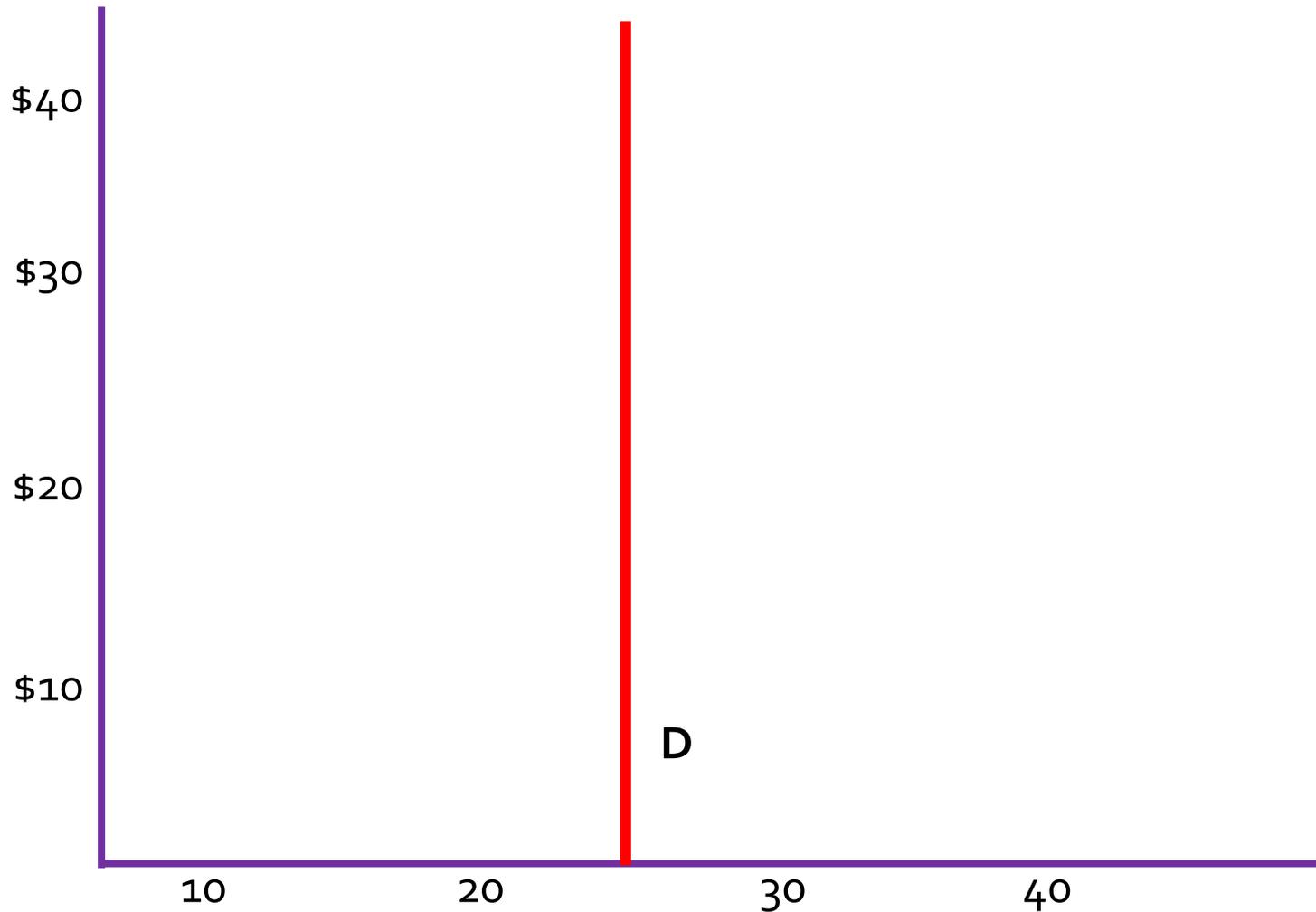




Table: A Comparison of Elasticities #2

Absolute value of elasticity coefficient	Demand is	Description	Impact on a total Revenue of a	
			Price increase	Price decrease
$E_d > 1$	Elastic or relatively elastic	Quantity demanded changes by a larger percentage than does price	Total revenue decreases	Total revenue increases
$E_d = 1$	Unit or Unitary elastic	Quantity demanded changes by the same percentage as does price	Total revenue remains unchanged	Total revenue remains unchanged
$E_d < 1$	Inelastic or relatively inelastic	Quantity demanded changes by a smaller percentage than does price	Total revenue increases	Total revenue decreases

**Does price elasticity of demand vary
along a demand curve?**





Price elasticity of demand applies only to a specific range of prices. (See next 2 slides.)



Chart: Price Elasticity of Demand Ranges

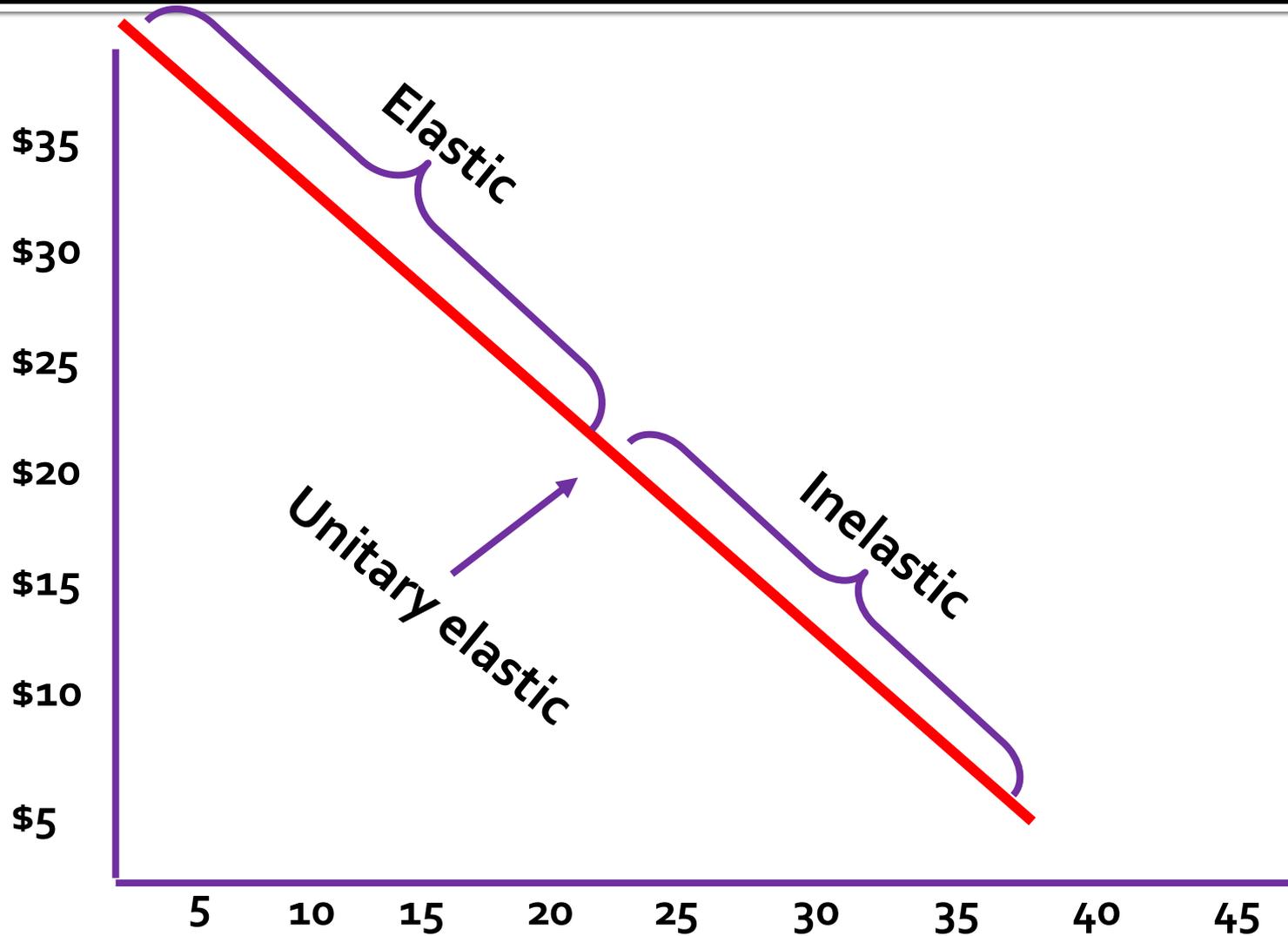
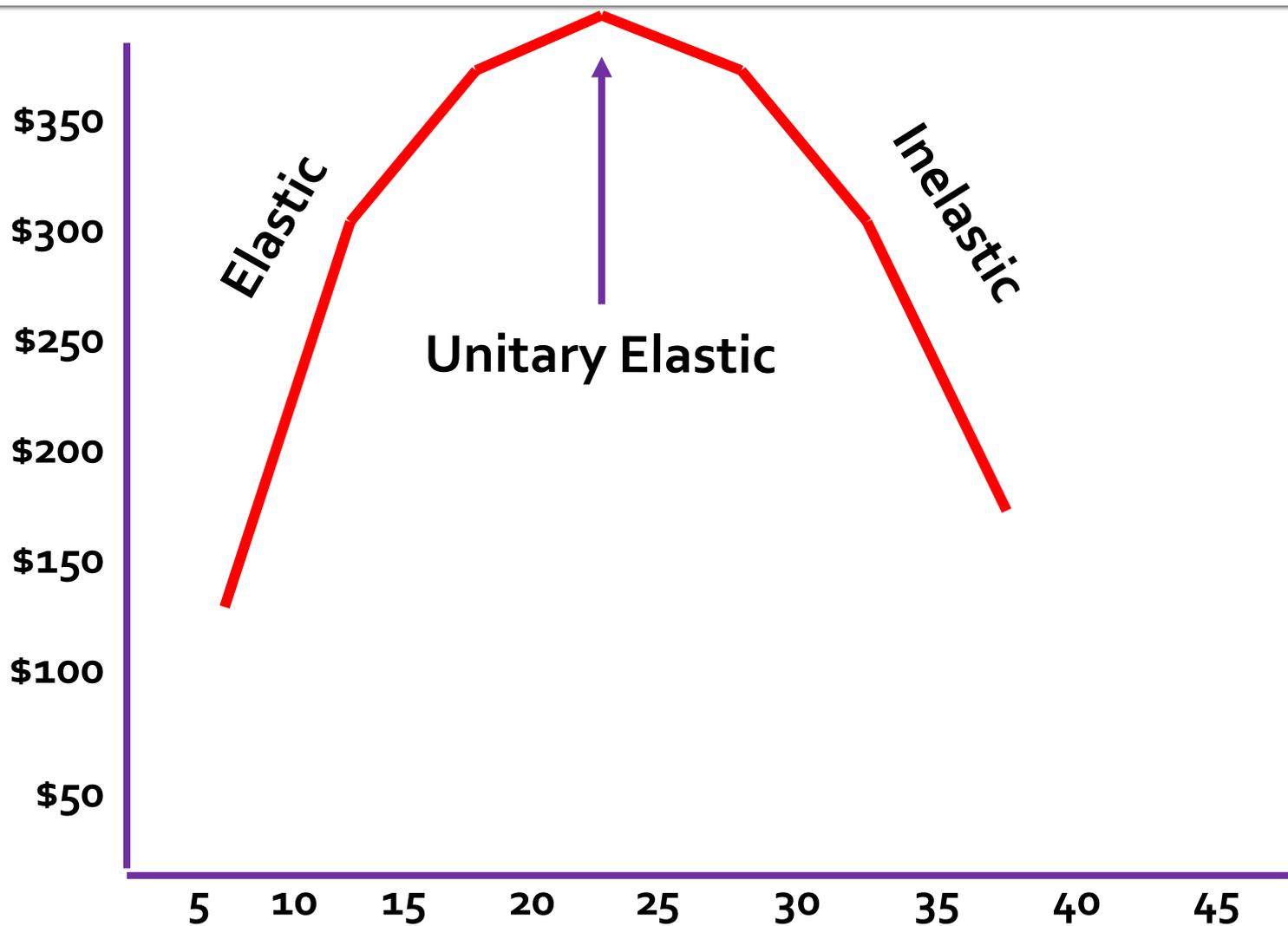




Chart: Total Revenue Curve



What factors influence demand sensitivity?



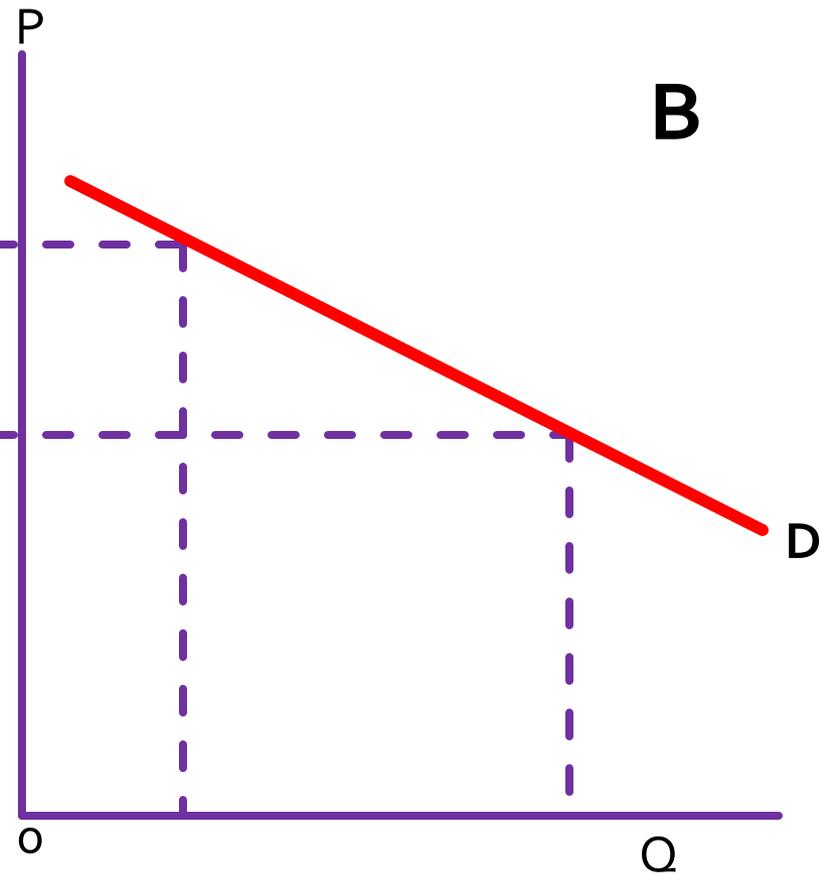
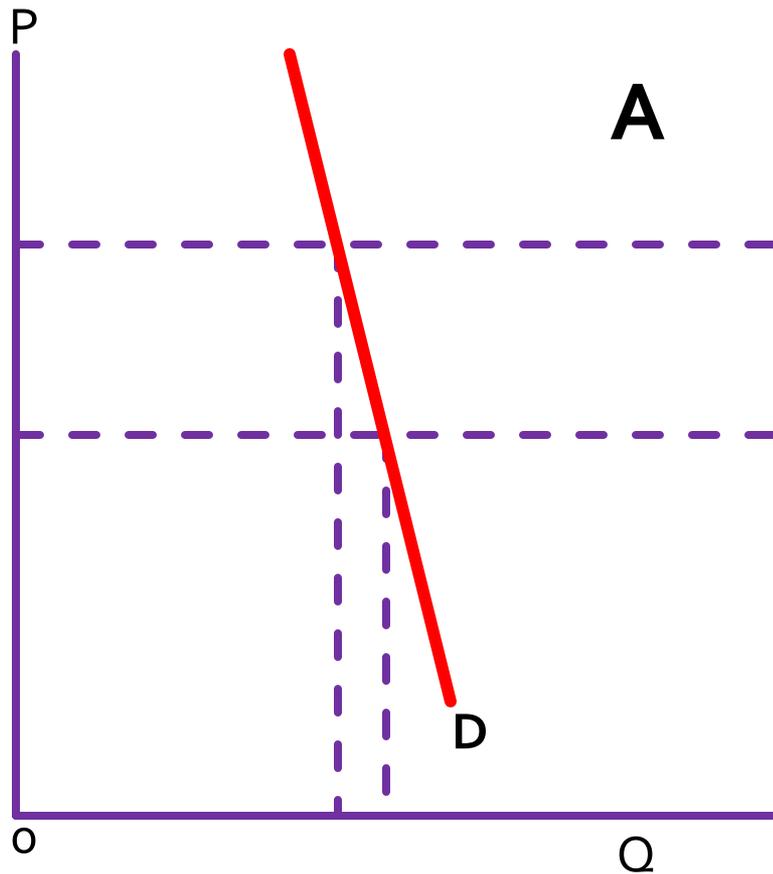
Price Elastic	
↑ An <i>increase</i> in price...	↓ <i>reduces</i> total revenue.
↓ A <i>reduction</i> in price...	↑ <i>Increases</i> total revenue.
Total revenue moves in the direction of the quantity change.	
Price Inelastic	
↑ An <i>increase</i> in price...	↑ <i>Increases</i> total revenue.
↓ A <i>reduction</i> in price...	↓ <i>reduces</i> total revenue.
Total revenue moves in the direction of the price change.	
Unit price Elastic	
↑ An <i>increase</i> in price...	● no change in total revenue.
↓ A <i>reduction</i> in price...	● no change in total revenue.
Total revenue does not change as price changes.	



The factors that influence demand sensitivity are:

- **Availability of substitutes** - The more substitutes a product has, the more sensitive consumers are to a price change, and the more elastic the demand curve. The price elasticity of demand is directly related to the availability of good substitutes for a product.
- **Share of budget on the product** - The larger the purchase is to one's budget, the more sensitive consumers are to a price change, and the more elastic the demand curve.
- **Adjustment to a price change over time** - The longer consumers have to adjust, the more sensitive they are to a price change, and the more elastic the demand curve. In general, the price elasticity coefficient of demand is higher the longer a price change persists.

Which demand curve is for a vital medicine and which is for candy?



Why is A the demand curve for medicine?



A is the demand curve for medicine because medicine is a necessity with few substitutes and the price can change with little effect on the quantity demanded.



Why is B the demand curve for candy?

B is the demand curve for candy because candy has many substitutes so a price change can bring about a big change in the quantity demanded.

What are other elasticity measures?





Other elasticity measures:

- **Income elasticity of demand** - the ratio of the percent change in the quantity demanded of a good to a given percent change in income

$$E_d = \frac{\% \Delta Q_d}{\% \Delta \text{income}}$$



Continued

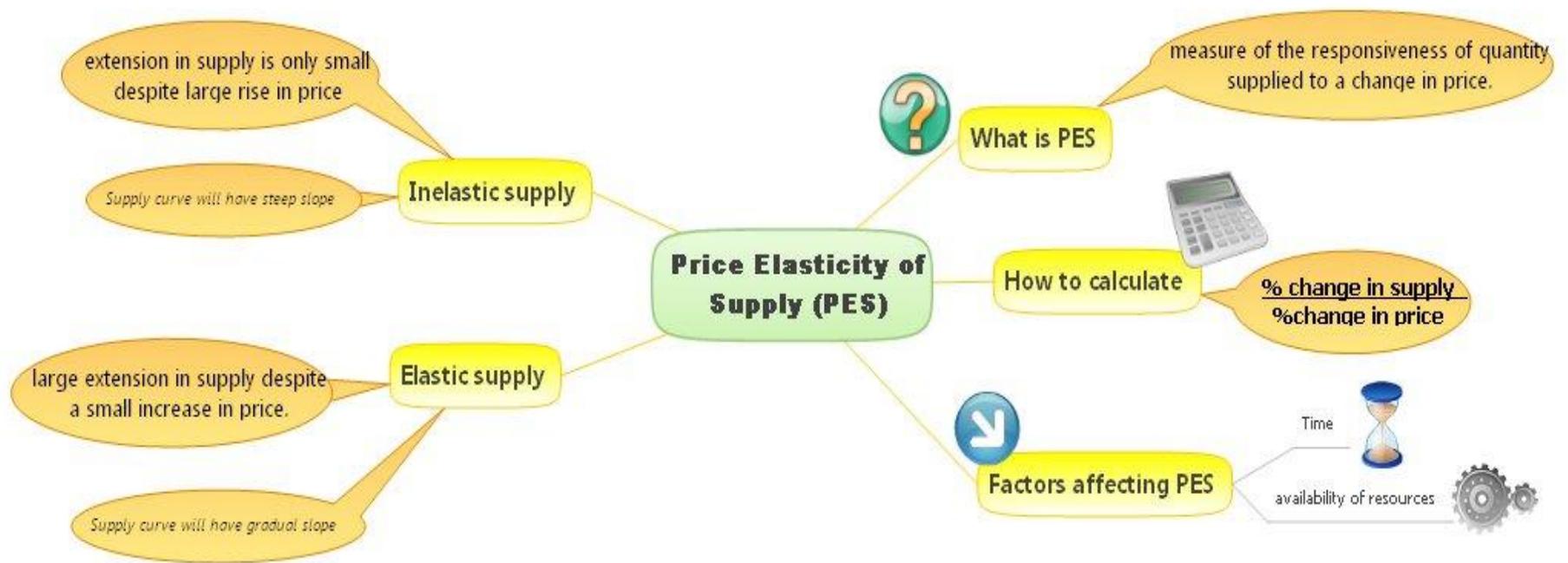
- **Cross-elasticity of demand** - the ratio of the percent change in quantity demanded of a good to a given percent change in price of another good

$$E_c = \frac{\% \Delta Q \text{ demanded of good A}}{\% \Delta \text{ price of good B}}$$



What is the price elasticity of supply?

PRICE ELASTICITY OF SUPPLY



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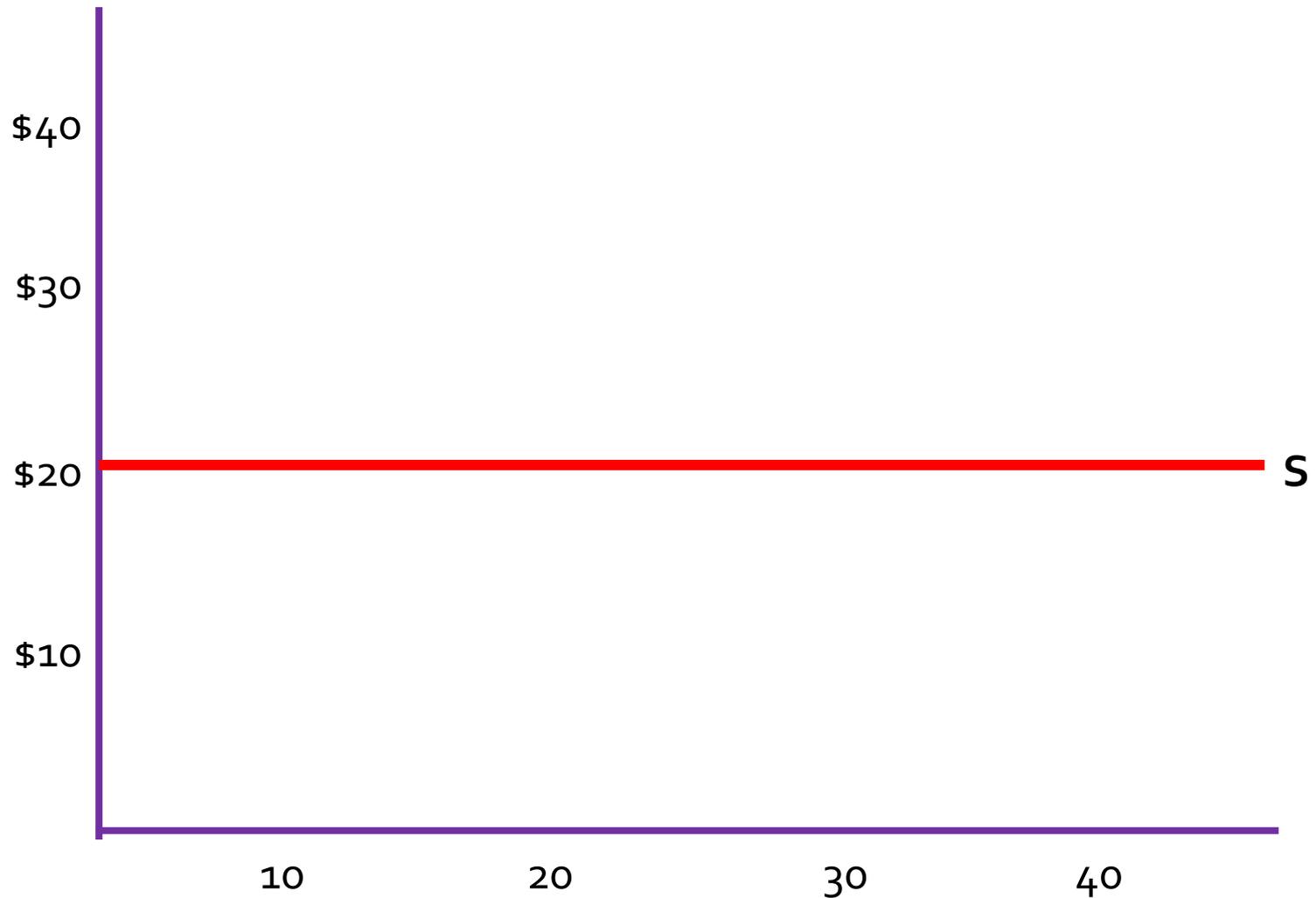


Price elasticity of supply is the ratio of the percent change in the quantity supplied of a product to the percent change in its price.

$$E_s = \frac{\% \Delta \text{ in } Q \text{ supplied}}{\% \Delta \text{ in price}}$$

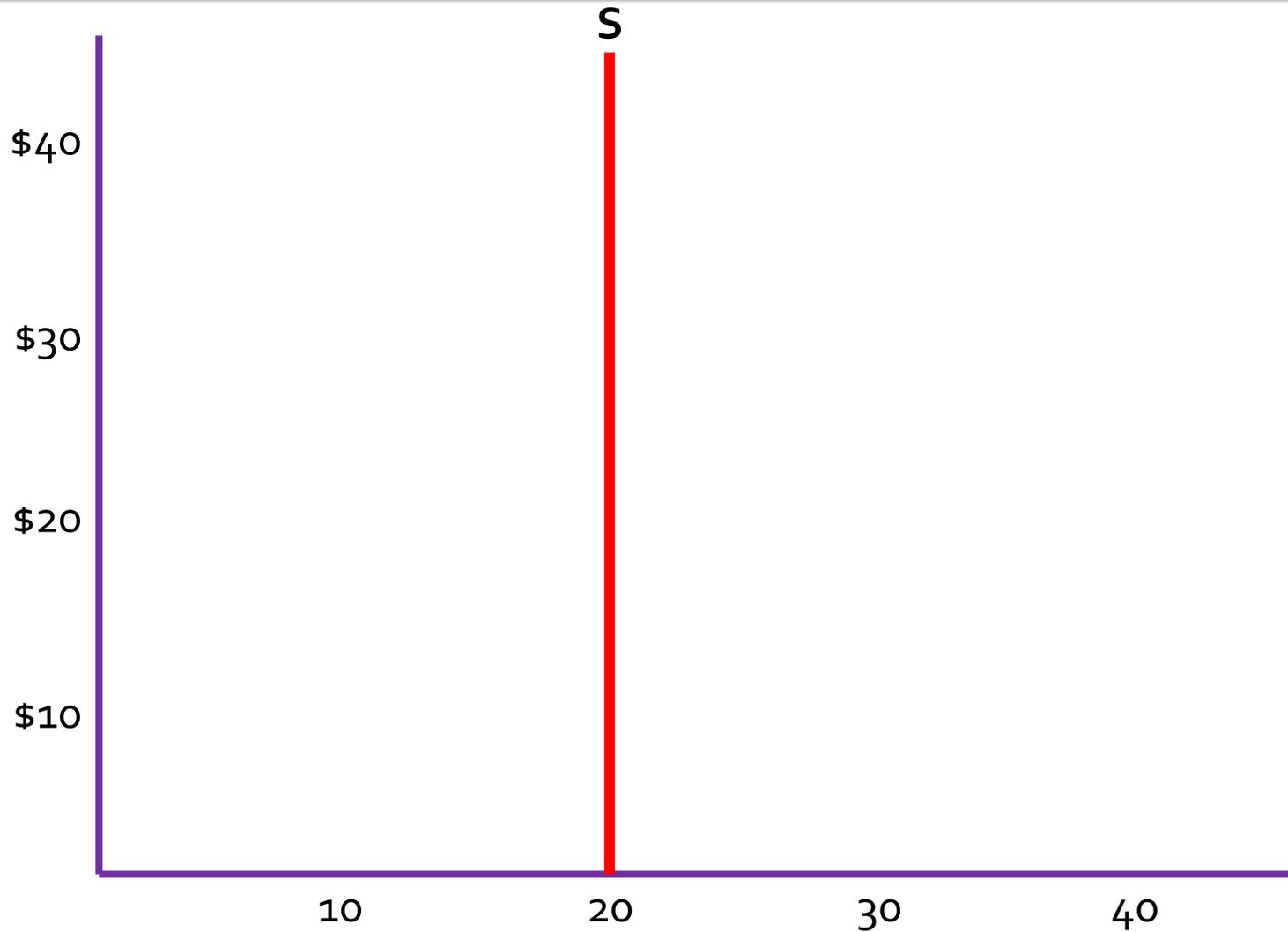
Perfectly Elastic Supply

$$E_s = \infty$$



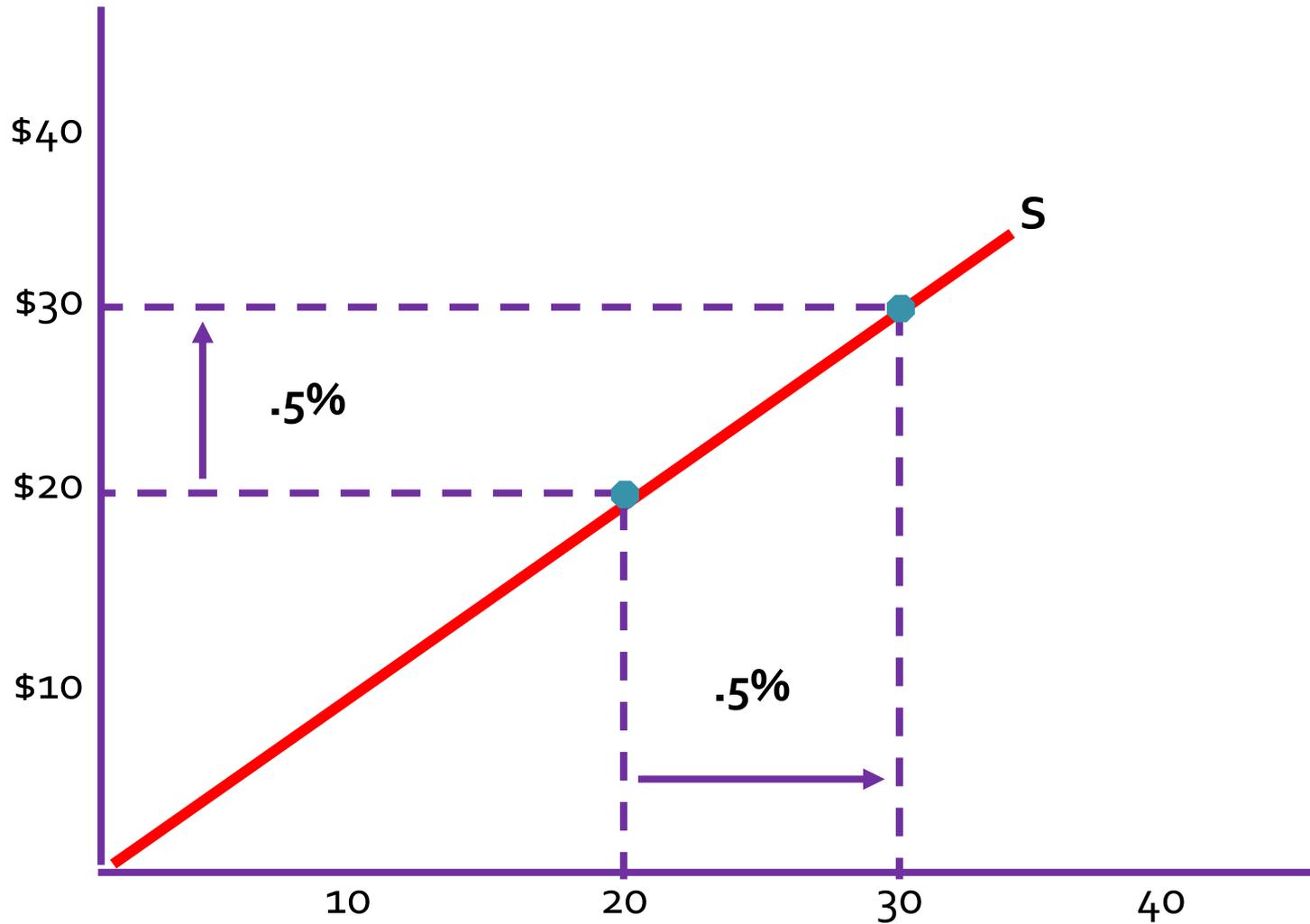
Perfectly Inelastic Supply

$$E_s = 0$$



Unit Elastic Supply

$$E_s = 1$$





Summary of Elasticity

ELASTICITY	EQUATION	BENCHMARK
Price Elasticity of Demand	$\frac{\% \Delta QD}{\% \Delta P}$	Inelastic Elastic
Midpoint Formula	$\frac{\Delta Q}{\bar{Q}} \times \frac{\bar{P}}{\Delta P}$	
Cross-Price Elasticity	$\frac{\% \Delta QD_1}{\% \Delta P_2}$	Compliments Substitutes 0
Income Elasticity	$\frac{\% \Delta QD}{\% \Delta I}$	Inferior Normal Luxury 0
Price Elasticity of Supply	$\frac{\% \Delta QS}{\% \Delta P}$	Inelastic Elastic

Who pays the tax levied on sellers of goods such as gasoline, cigarettes and alcoholic beverages?





Who pays the tax levied on sellers of goods such as gasoline, cigarettes and alcoholic beverages depends. The corporation pays all, some or very little of the tax.

The more elastic the demand, the more the corporation pays. The less elastic the demand, the more the consumer pays.

If the demand curve slopes downward and the supply curve upward, sellers cannot raise the price by the full amount of the tax.

In the case where demand is perfectly inelastic, sellers can raise the price by the full amount of a tax.



The End

