Qurious Education

Revenue (Curves, Calculations & Elasticity)

GCE A-LEVEL & IB ECONOMICS

Lesson Structure

- Revenue
  - Total Revenue, Marginal Revenue and Average Revenue
  - Revenue Curves under Perfect and Imperfect Competition
  - PED and its relationship to revenue curves

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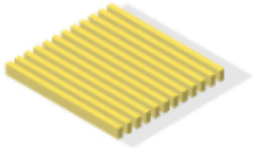
What is Perfect Competition?

What Are Common Commodities?

Energy
(crude oil, gasoline, heating oil, natural gas)



Grains and oilseeds
(corn, soybeans, soybean meal, soybean oil, wheat)

Livestock/meats
(feeder cattle, live cattle, lean hogs)

Metals
(copper, gold, palladium, platinum, silver)

"Softs"
(cocoa, coffee, cotton, orange juice, sugar)

Other
(lumber, dairy products)

Revenues Under Perfect Competition

Perfect Competition Assumptions:

- Price Taker

- Perfect Information

- Unlimited number of buyers (consumers) and sellers (firms)

- Homogeneous (Same) Goods

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Definitions and Formulas

Total revenue (TR) is money received by a firm from the sale of goods or services:

- **TR = P x Q**

Average revenue (AR) is total revenue divided by output:

- **AR = TR/Q**

Marginal revenue is the addition to revenue of selling an additional unit of output:

- **ΔTR/ΔQ**
  - where Δ stands for “change in”

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Calculate

Quantity (Output)	Price	Average Revenue	Total Revenue	Marginal Revenue
0	5	0	0	-
1	5			
2	5			
3	5			
4	5			
5	5			
6	5			

A firm selling Plain Ravioli is in a perfectly competitive market, and the price of selling each ravioli is GBP 5.

Fill in the blanks for the rest of the table.

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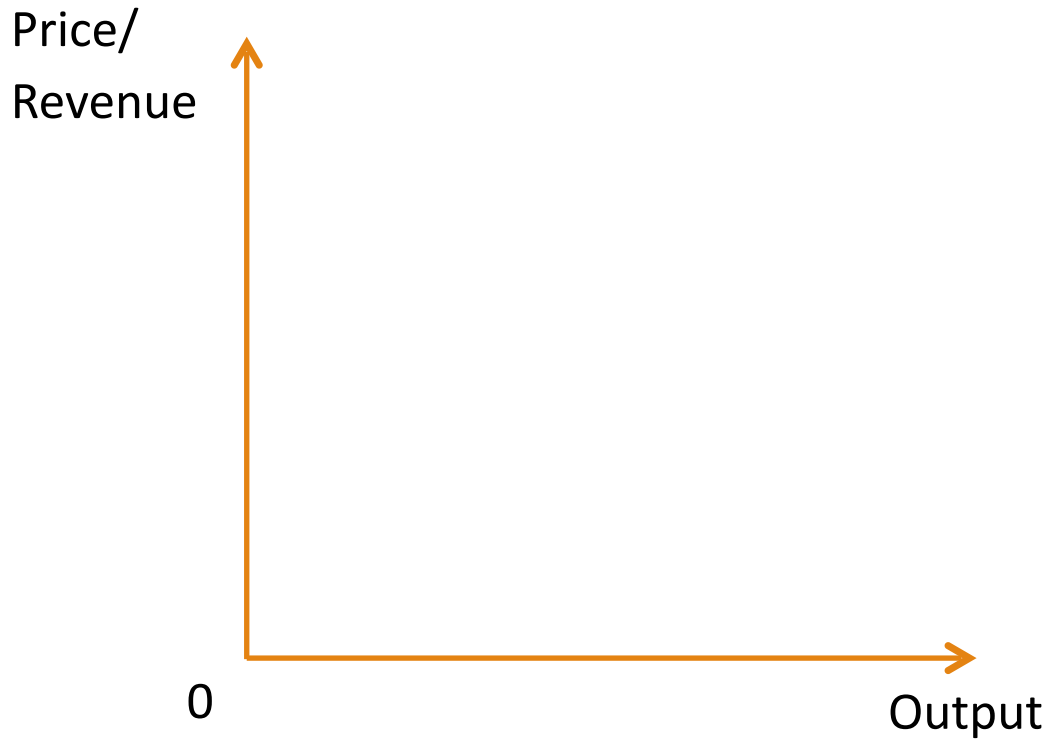
Calculate

Quantity (Output)	Price	Average Revenue	Total Revenue	Marginal Revenue
0	5	0	0	-
1	5	5	5	5
2	5	5	10	5
3	5	5	15	5
4	5	5	20	5
5	5	5	25	5
6	5	5	30	5

A firm selling Plain Ravioli is in a perfectly competitive market, and the price of selling each ravioli is GBP 5.

Fill in the blanks for the rest of the table.

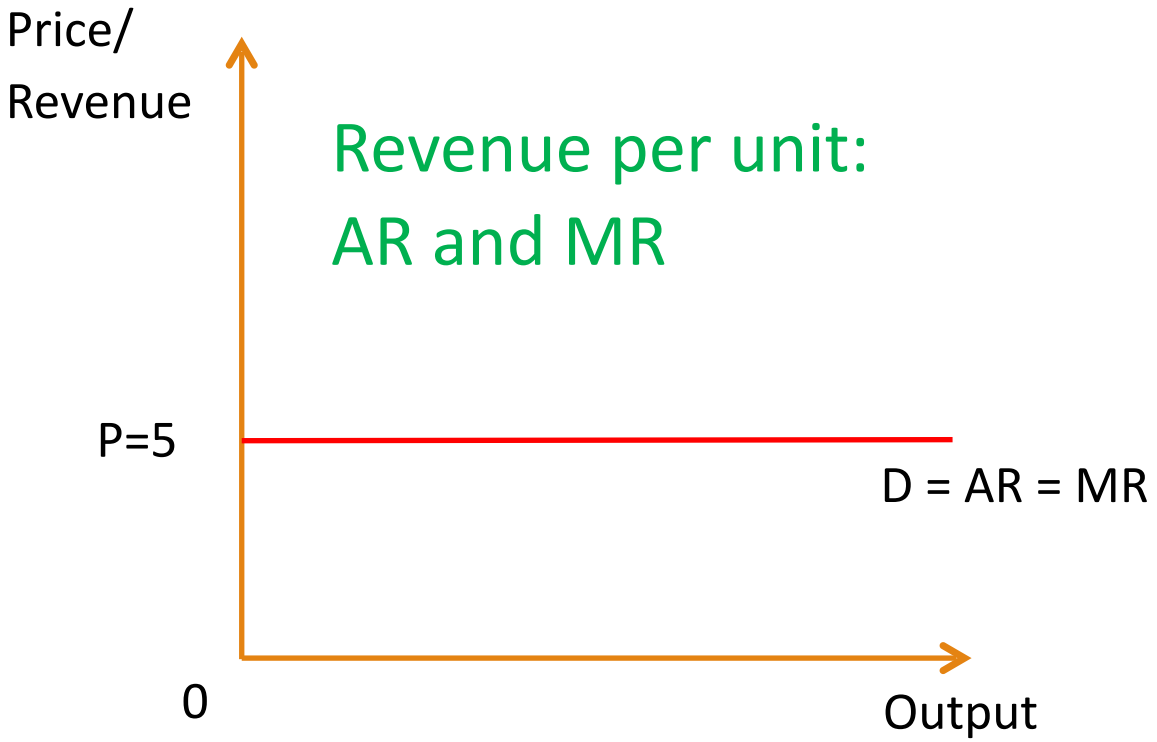
AR and MR Under Perfect Competition



The demand curve is perfectly elastic. Why?

- The firm must sell at P as if they increase their price, all consumers will buy the same product from other firms. If they decrease their price, the firm will not remain profitable and will close down.

AR and MR Under Perfect Competition

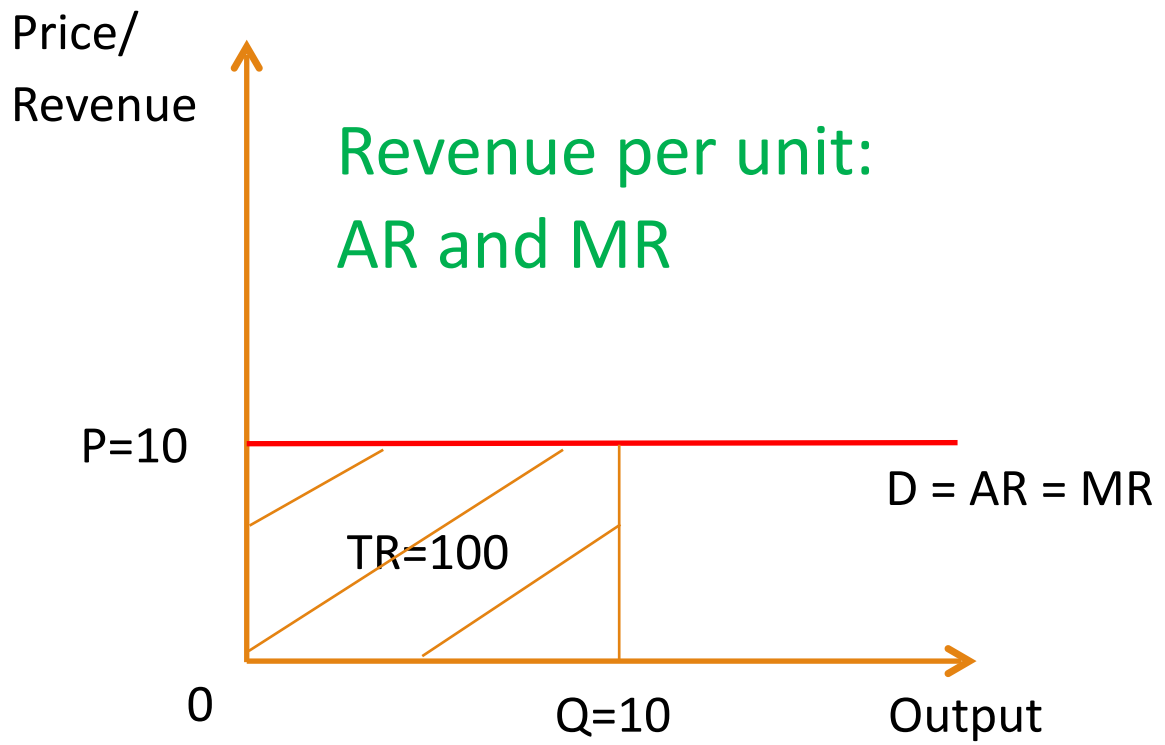


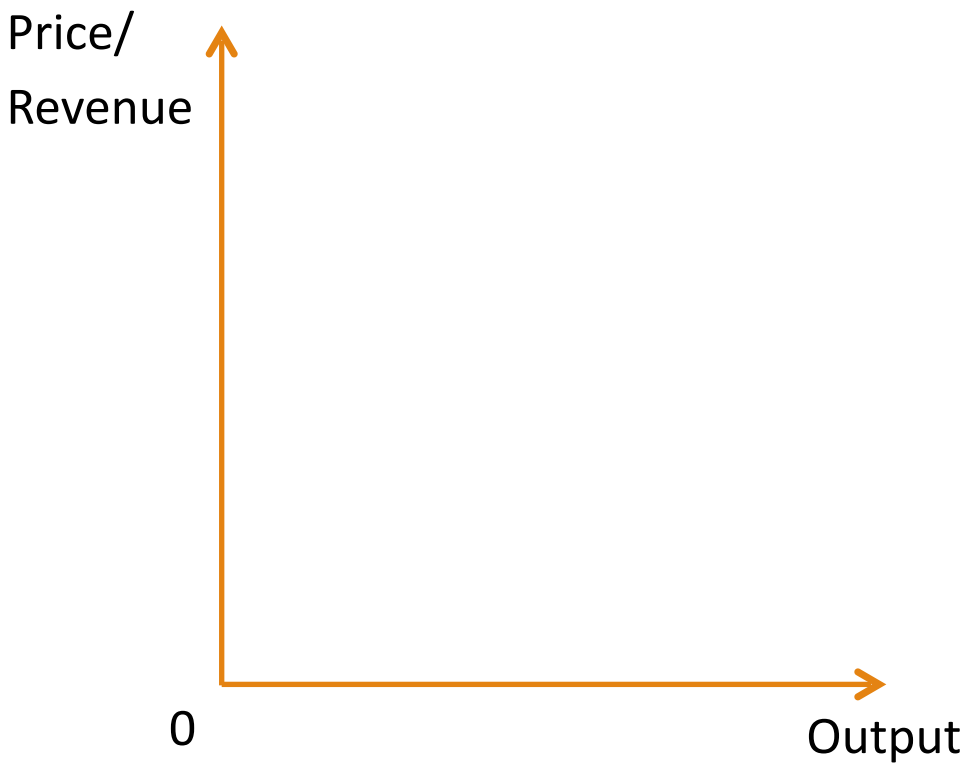
Why is AR and MR also horizontal and equals to demand?

- As the firm cannot alter prices, each additional unit produced is sold at the same price. Hence, marginal revenue is constant with increasing output. Because of this, the average price will also remain the same when output increases.

Hence AR=MR=D, and the area under the demand curve equates to total revenues

How AR and MR Relates to TR





Can you plot the Total Revenue curve?

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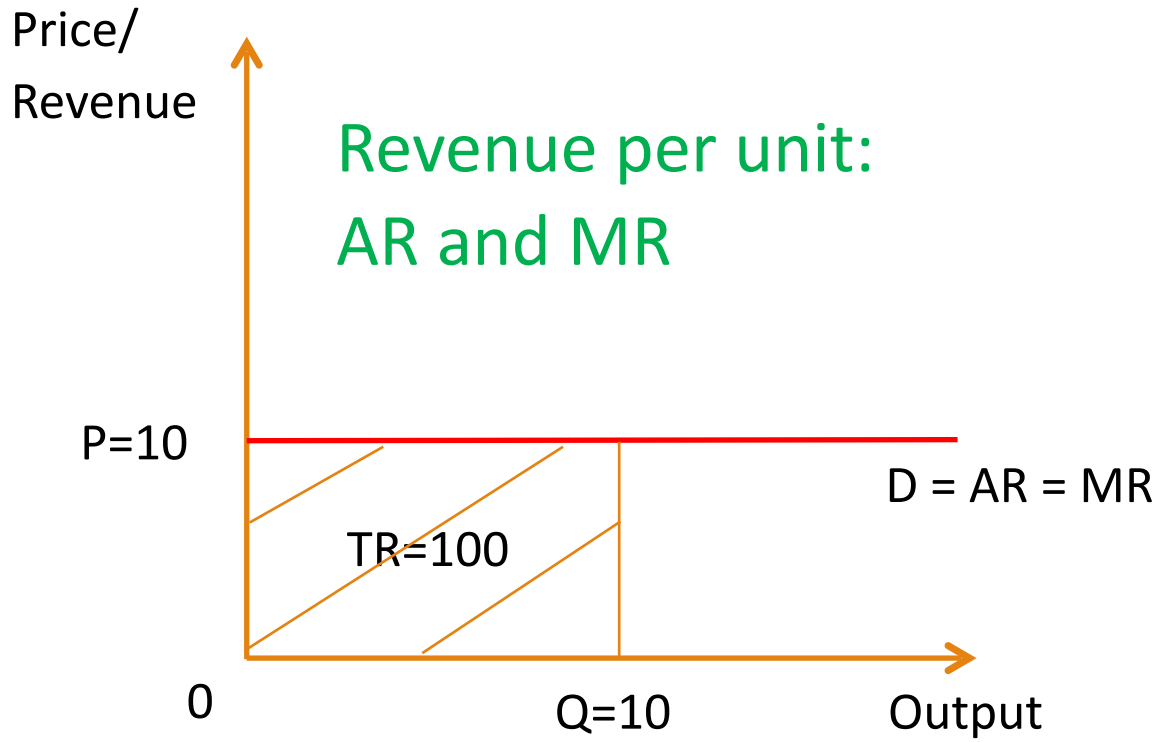
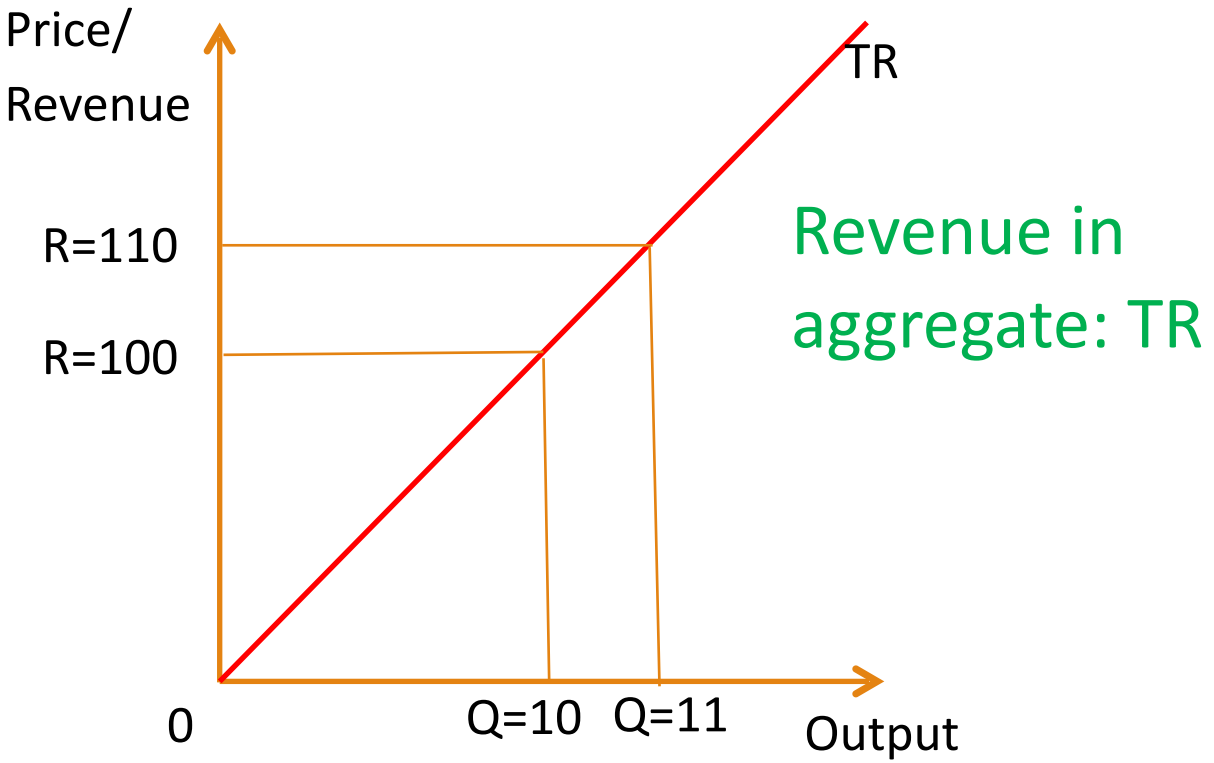
How AR and MR Relates to TR





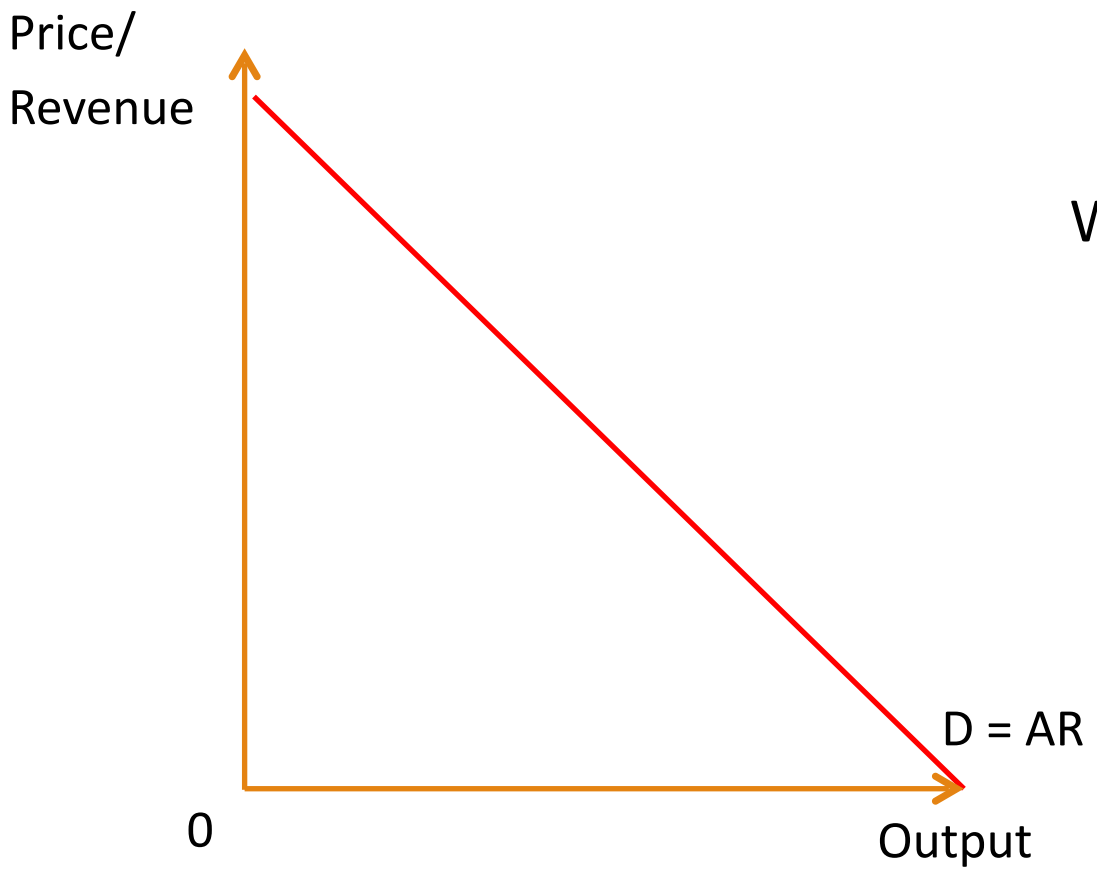
Revenues Under Imperfect Competition

Under usual circumstances with imperfect competition, firms can change their prices.

Imperfect competition includes market structures like monopoly, oligopoly, monopolistic competition etc.

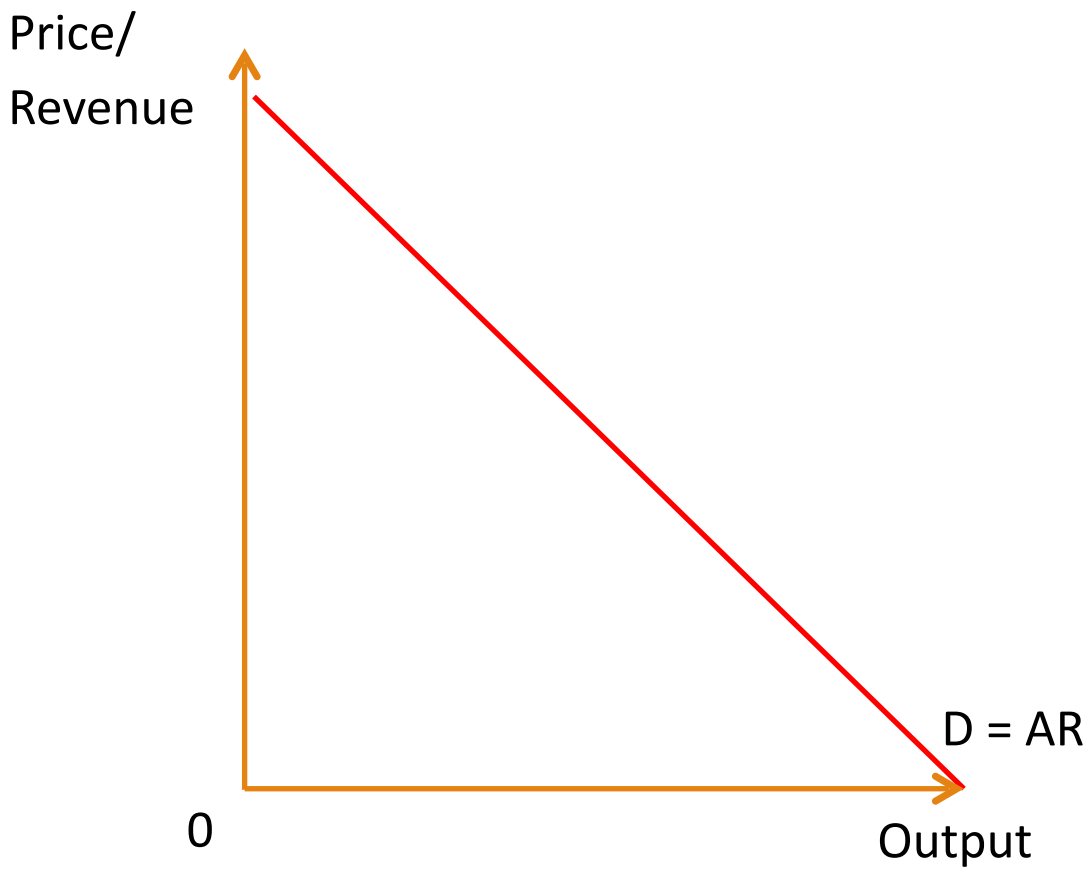
What does a usual demand curve look like?

Revenues Under Imperfect Competition



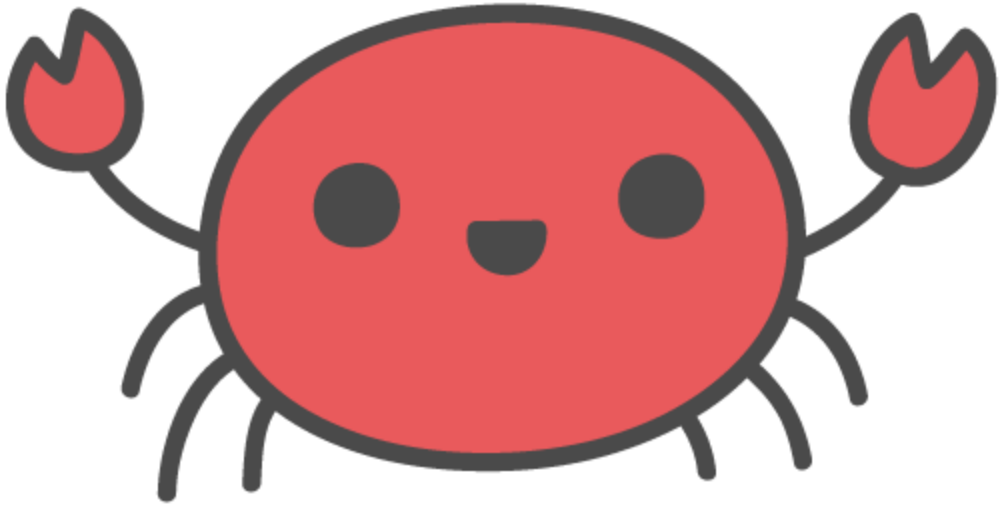
Why is the demand curve downward sloping?

Revenues Under Imperfect Competition



Why is the demand curve downward sloping?

- This is because of the law of demand. When prices are high, people buy less; when prices are low, people buy more.



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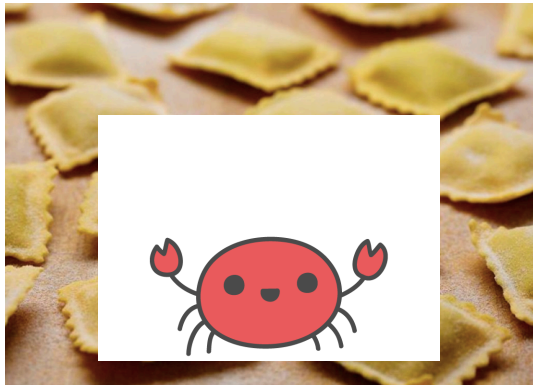
Calculate More!

Quantity (Output)	Price	Total Revenue	Average Revenue	Marginal Revenue
0	22	0	0	-
1	20			
2	18			
3	16			
4	14			
5	12			
6	10			
7	8			

A firm selling Homemade Crab Ravioli is in a market with imperfect competition, and the highest price of being able to sell one ravioli is GBP 20.

Fill in the blanks for the rest of the table.



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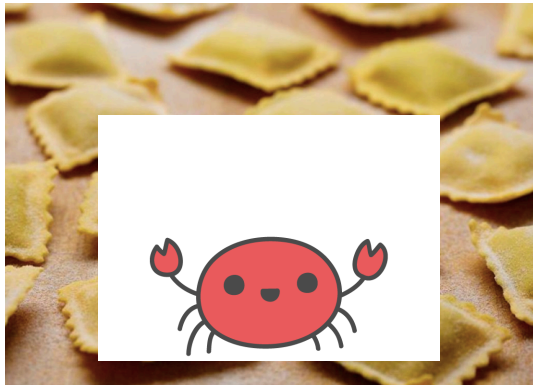
Calculate More!

Quantity (Output)	Price	Total Revenue	Average Revenue	Marginal Revenue
0	22	0	0	-
1	20	20	20	20
2	18	36	18	16
3	16	48	16	12
4	14	56	14	8
5	12	60	12	4
6	10	60	10	0
7	8	56	8	-4

A firm selling Homemade Crab Ravioli is in a market with imperfect competition, and the price of selling each ravioli is GBP 20.

Fill in the blanks for the rest of the table.



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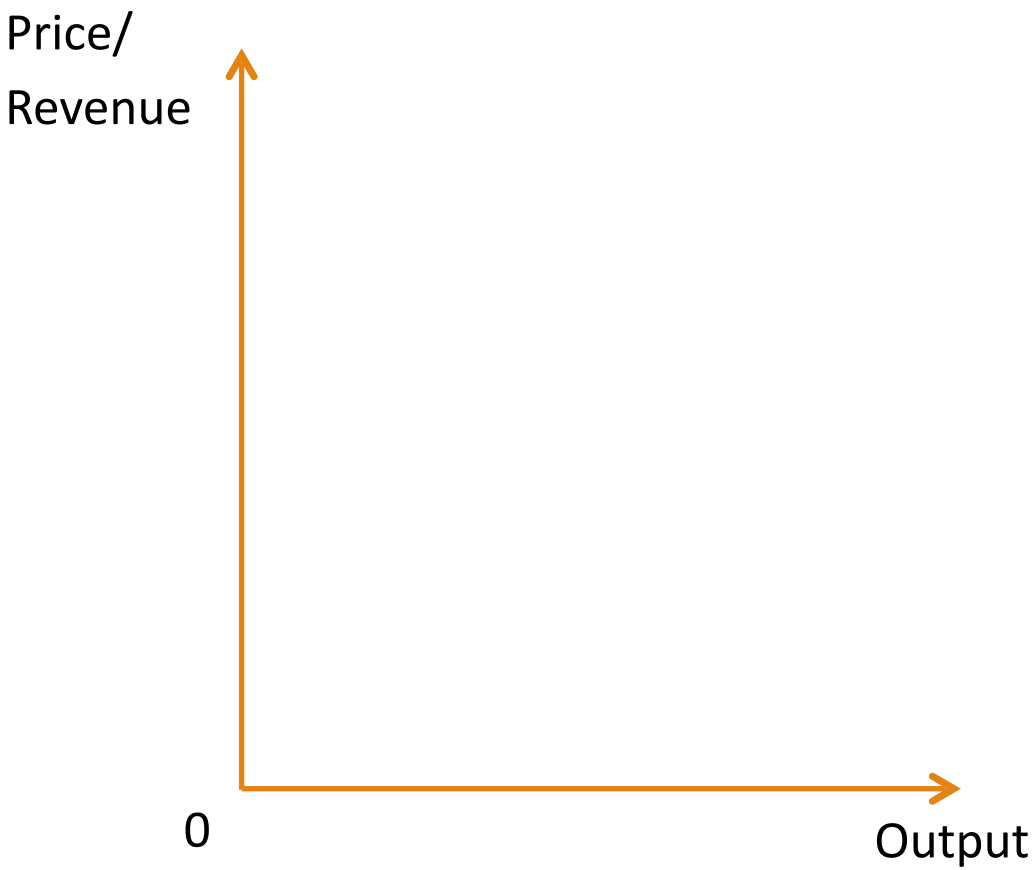
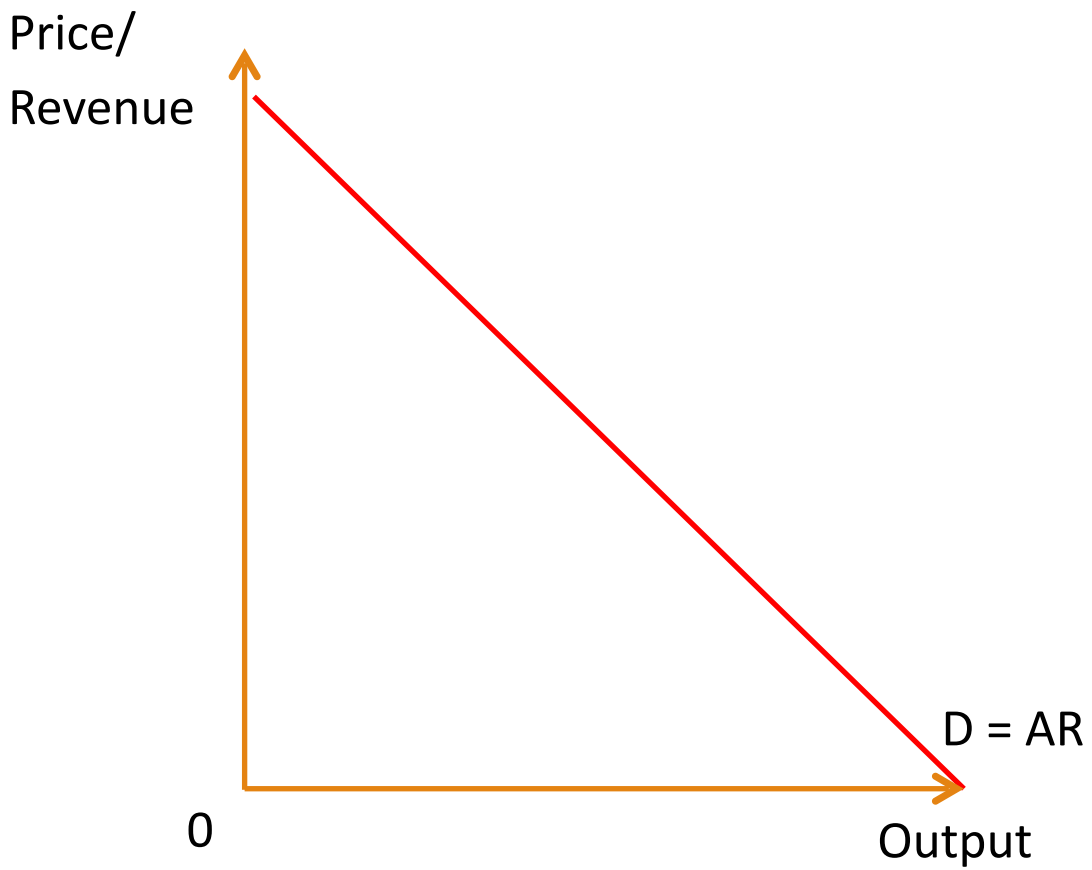
Revenues Under Imperfect Competition



Let us plot the AR and MR curves on the same diagram.

Revenues Under Imperfect Competition

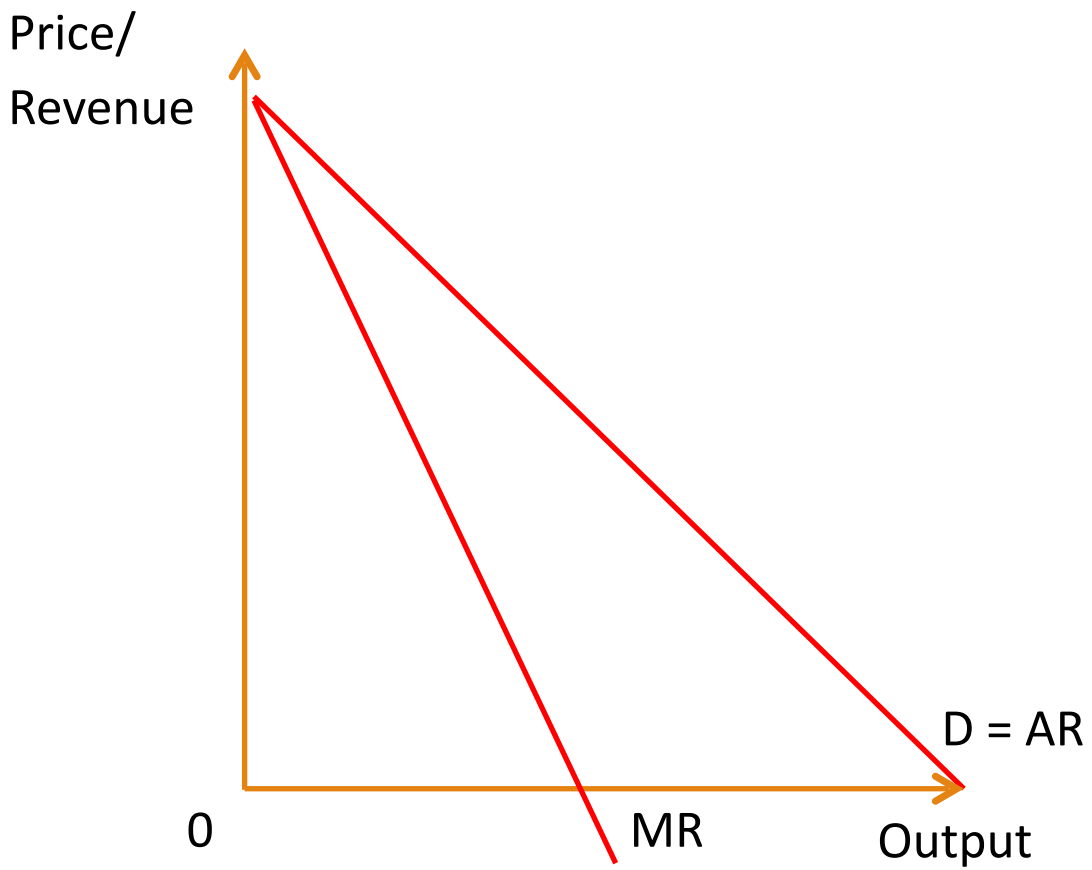


Why is the AR also downward sloping and equal to Demand?

- The Demand Curve is simply the price given different levels of output. If AR = P for different levels of output, then it must equal to demand.

Mathematically:
AR = TR / Q
AR = P x Q / Q (because TR = P x Q)
AR = P

Revenues Under Imperfect Competition

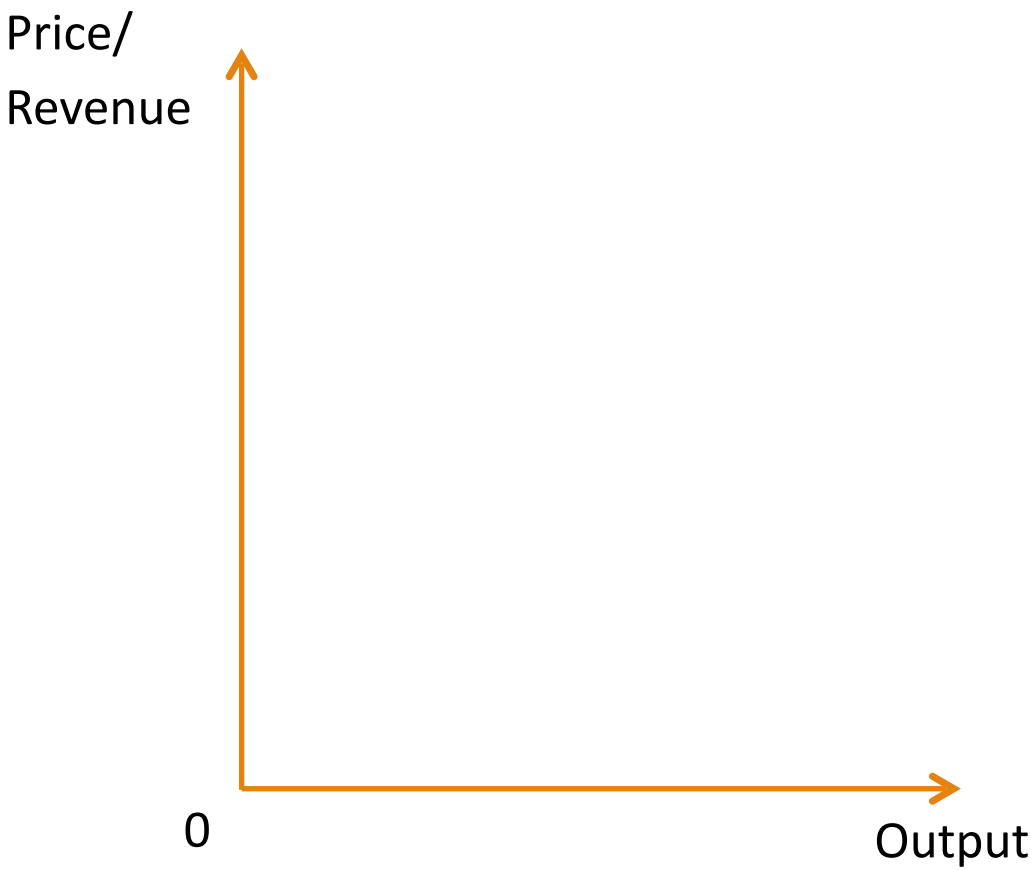


Why is the MR twice as steep as the AR?

- This is because when the firm reduces price, it needs to decrease it for all units of output. This means the loss in marginal revenue when decreasing output is much higher than the reduction in average revenue. You can also see this in the data.

Mathematical Proof:
https://warwickeconomics.wordpress.com/2015/02/26/why-is-the-slope-of-mr-twice-than-that-of-ar-assuming-that-the-ar-curve-is-linear/

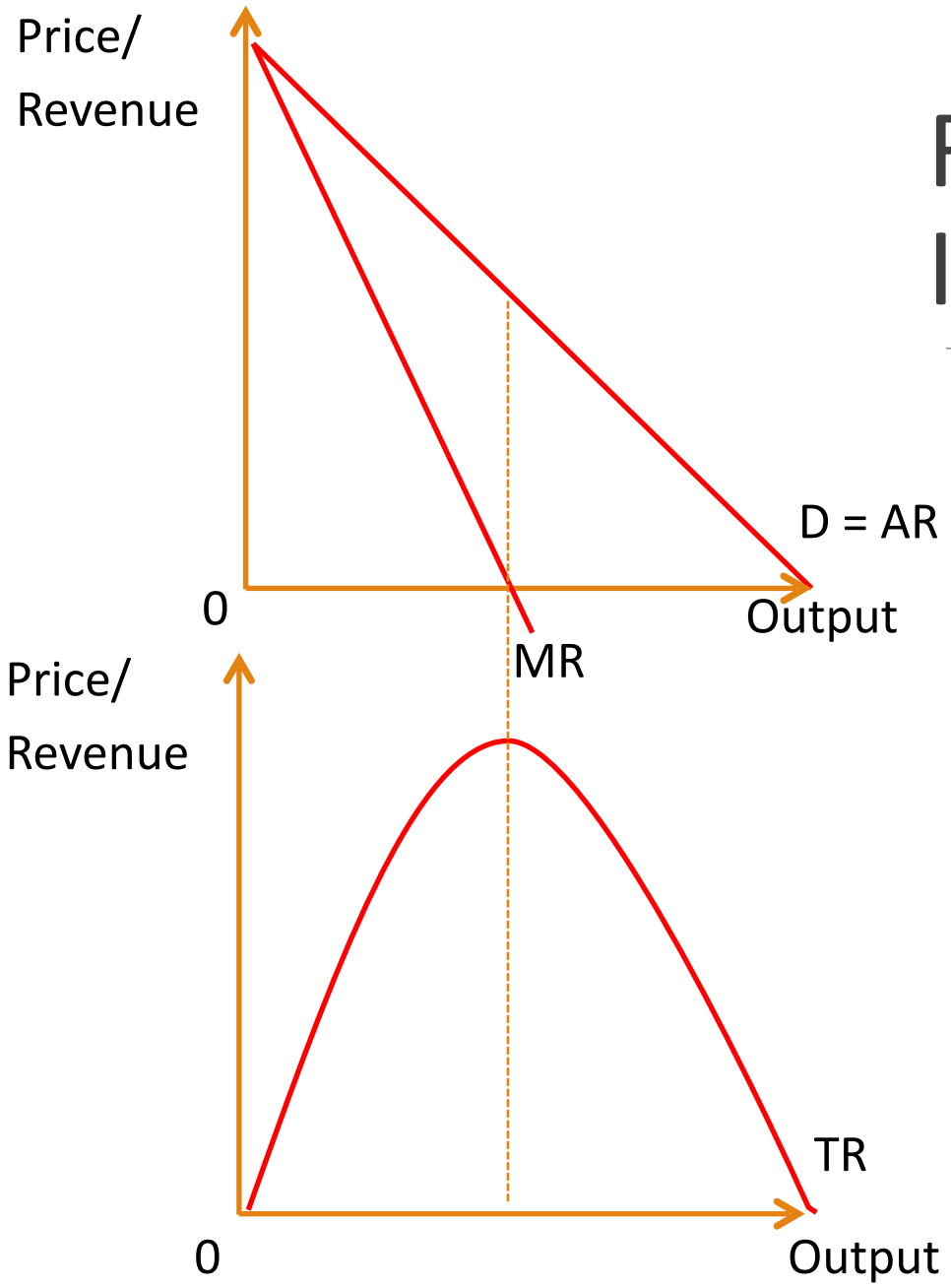
Revenues Under Imperfect Competition



Plot the AR and MR curves on this diagram.

Afterwards, let's also plot the total revenue curve here.

Revenues Under Imperfect Competition



Why is the TR shaped like this?

- MR means the amount of revenue earned for the next unit of output. Hence, as long as MR remains to be a positive number, TR will increase.
- TR is maximized when MR=0
- Similarly, when MR becomes negative (i.e. loss of revenue when producing one more output) then TR will decrease

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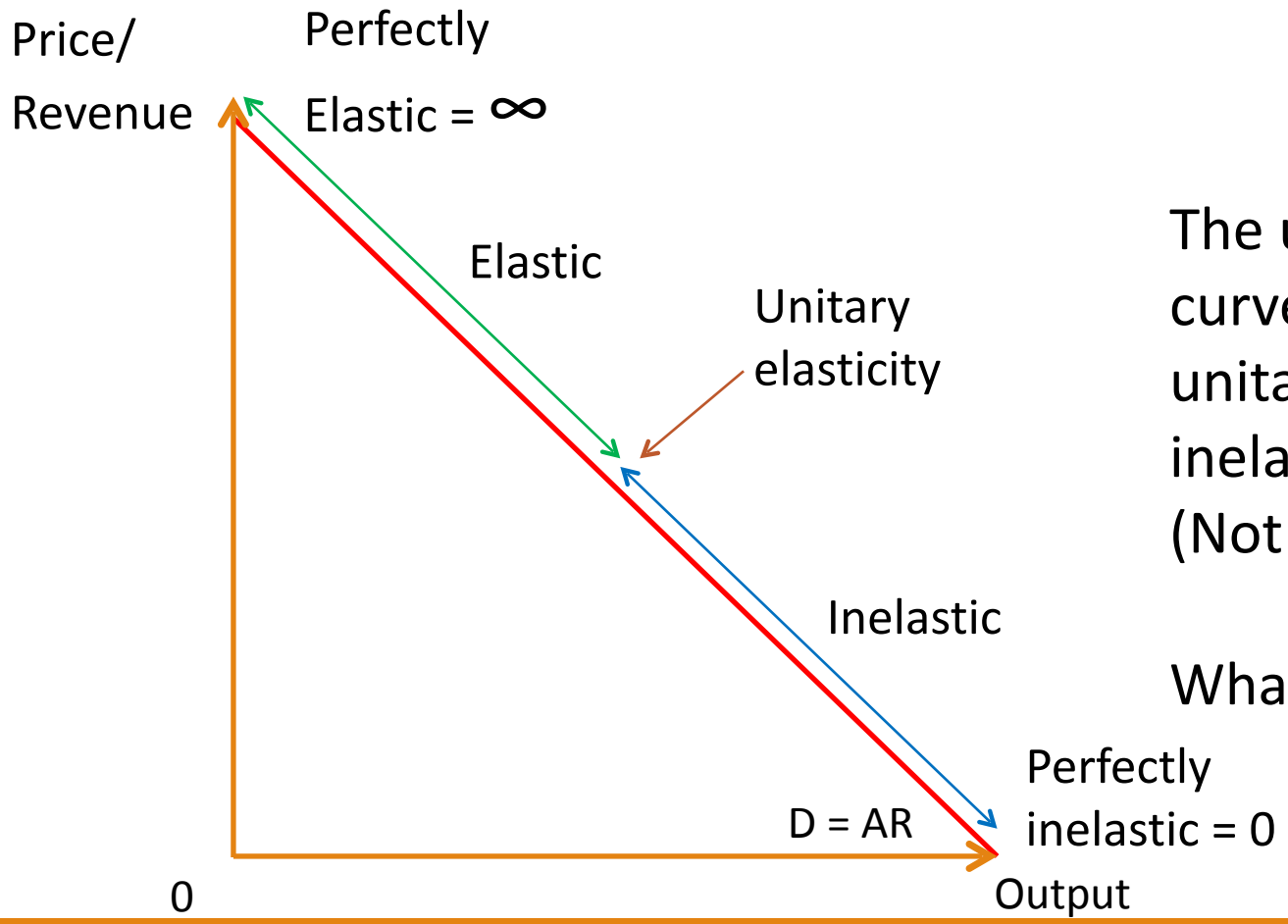
Elasticity Under Imperfect Competition



The upper parts of the demand/revenue curve is PED elastic; the middle part is unitarily elastic; and the lower parts PED inelastic.
(Not to be confused with the steepness)

What do I mean?

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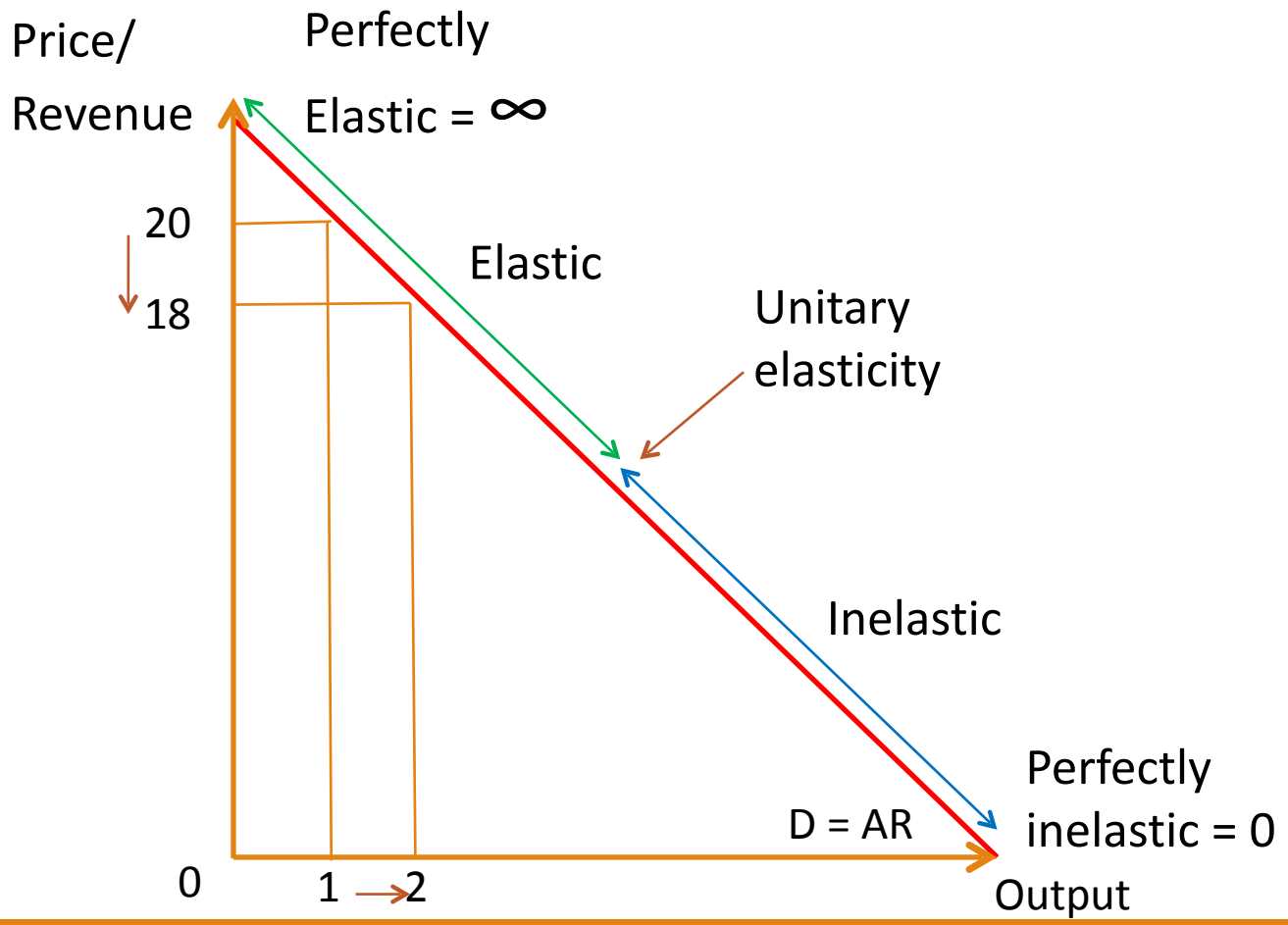
Elasticity Under Imperfect Competition



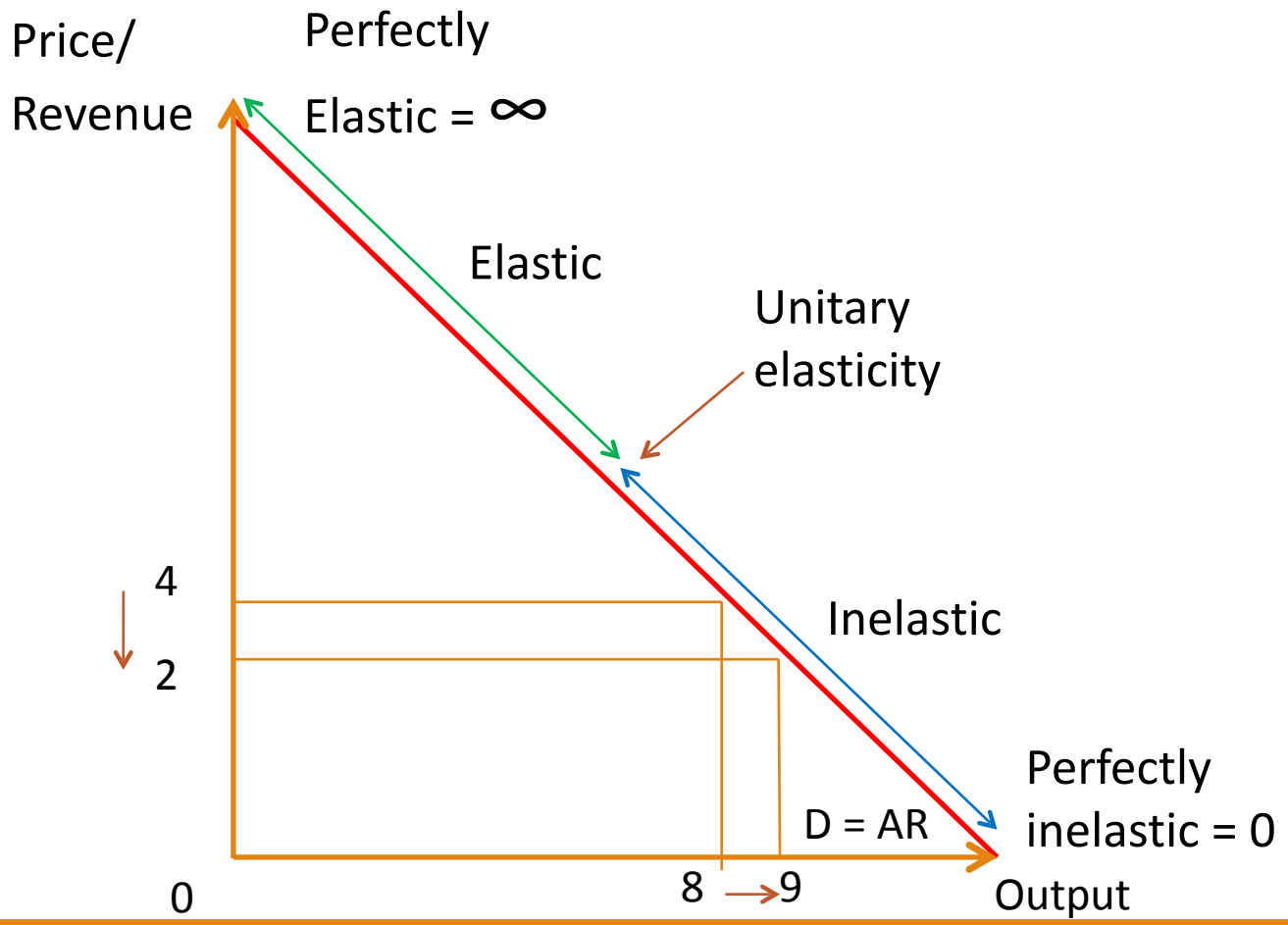
PED = %ΔQd/%ΔP

At higher levels of the curve,
% change in quantity going from
1 to 2 is +100%

% change in price going from
20 to 18 is -10%

PED = 100%/10% = 10... Very elastic!

Elasticity Under Imperfect Competition



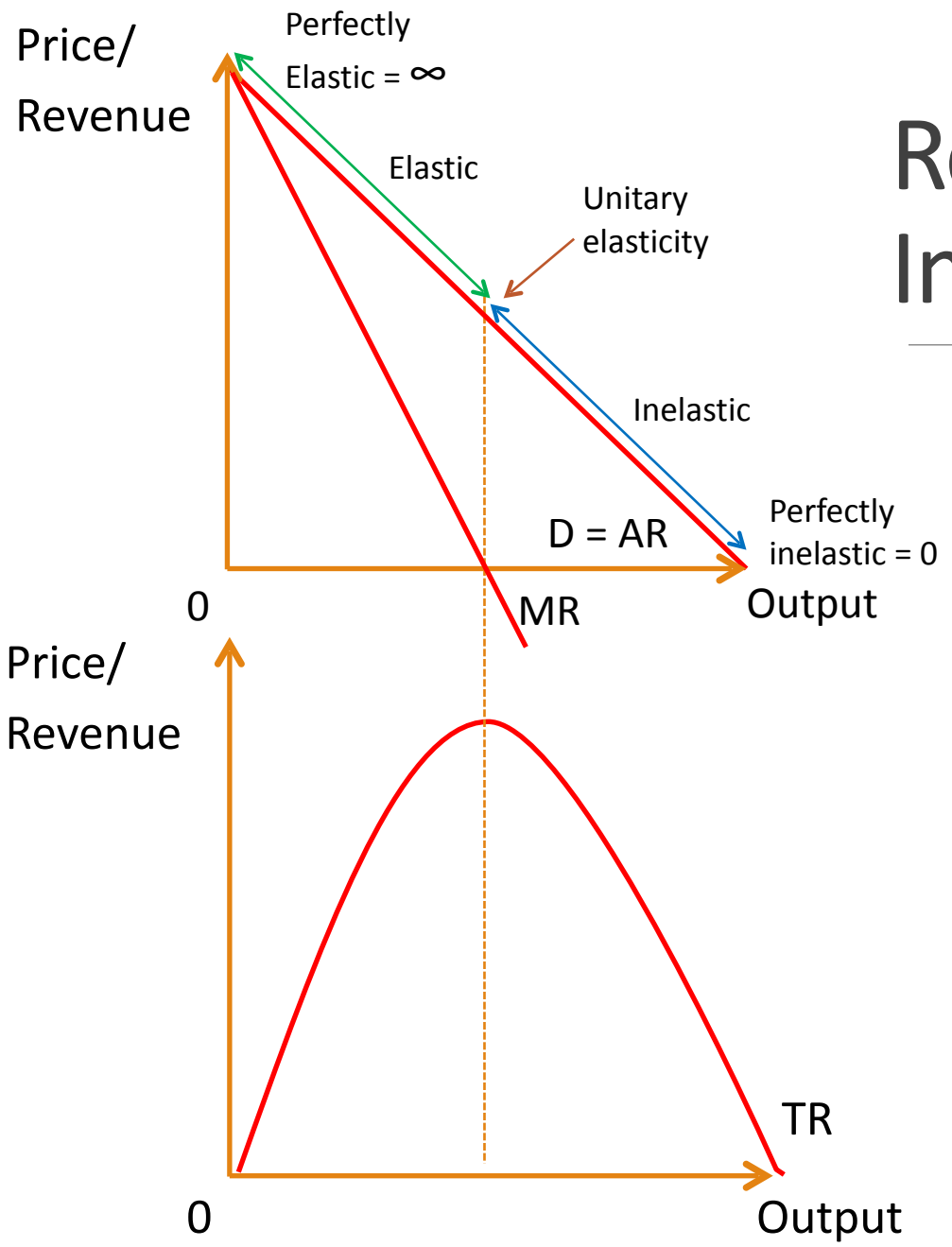
PED = %ΔQd/%ΔP

At higher levels of the curve,
% change in quantity going from
8 to 9 is +12.5%

% change in price going from
4 to 2 is -50%

PED = 12.5%/50% = 0.25... Very inelastic!

Revenues Under Imperfect Competition



As MR is twice as steep as AR, the output where MR=0 is also the middle of the demand/revenue curve.

Remember the theory of PED? It also applies here.

- If PED is elastic at higher portions of the revenue/ demand curve, a decrease in price will result in higher total revenues.

- If PED is inelastic at lower portions of the revenue/demand curve, an increase in price will result in higher total revenues.

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Quick Questions

- What does the marginal revenue curve of a perfectly competitive market look like? Why?
- What does the average revenue curve of an imperfectly competitive market look like? Why?
- What is the relationship between AR and MR in an imperfectly competitive market?
- When is total revenue maximized in an imperfectly competitive market?
- Which parts of the demand curve is elastic, inelastic and unitary elastic?

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