Advanced Placement Macroeconomics Table of Information

The table below contains essential equations, formulas, and graphs that you must know for the AP Macroeconomics exam. The formula sheet is divided up based on the six units of study that organize the AP Macro course. Each of the equations and graphs included below correspond with a specific task or skill that is explicitly indicated in the AP Macro Course Description as an area of knowledge you will be accountable for on the exam. Additional key terms and definitions are included in the final section of this formula sheet.

Unit 1: Basic Economic Concepts

1.2: Calculate opportunity cost

To find the opportunity cost of any good X in terms of the units of Y given up, we use the following formula:

$$\text{Opportunity cost of each unit of good X} = (Y_1 - Y_2) \div (X_1 - X_2)$$

Note that opportunity costs are always expressed in terms of the good that is given up.

1.3: Calculate mutually beneficial terms of trade

Mutually beneficial terms of trade are determined by looking at the two opportunity costs plotted on a Production Possibilities Curve (PPC) Model and choosing a number that falls between the opportunity costs.

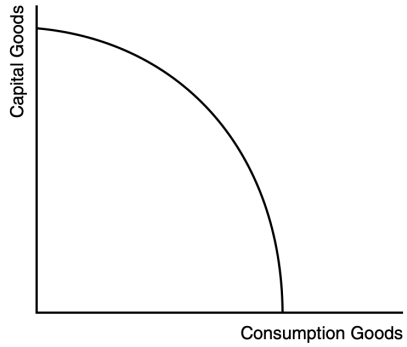
Key graph:

THE PRODUCTION POSSIBILITIES CURVE MODEL

Associated Learning Objectives

MOD-1.B MKT-1.A MKT-1.B MOD-2.F MOD-1.C POL-4.A

Example



1.6: Calculate (using graphs as appropriate) the surplus or shortage in the market experience an imbalance

We can summarize the changes in equilibrium with the following table:

Change	Change in P^*	Change in Q^*
Supply increases ↑ (shifts right)	P ↓	Q ↑
Supply decreases ↓ (shifts left)	P ↑	Q ↓
Demand increases ↑ (shifts right)	P ↑	Q ↑
Demand decreases ↓ (shifts left)	P ↓	Q ↓
Demand Increases, Supply increases	P ↕ (indeterminate)	Q ↑
Demand Increases, Supply decreases	P ↑	Q ↕ (indeterminate)
Demand decreases, Supply increases	P ↓	Q ↕ (indeterminate)
Demand decreases, Supply decreases	P ↕ (indeterminate)	Q ↓

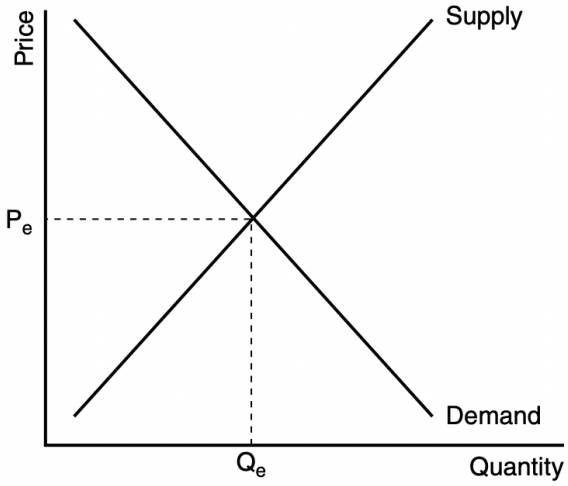
Key graph:

DEMAND AND SUPPLY

Associated Learning Objectives

MKT-2.A MKT-2.B MKT-2.C MKT-2.D MKT-2.E MKT-2.F MKT-2.G

Example



Unit 2: Economic Indicators and the Business Cycle

2.1: Calculate nominal GDP

$$\text{Nominal GDP} = \text{Real GDP} \times \text{GDP deflator (in hundredths)}$$

2.3: Calculate the unemployment rate and the labor force participation rate (LFPR)

The unemployment rate is the percentage of the labor force that is unemployed:

$$UR = \frac{\#\text{ Unemployed}}{\#\text{ in Labor Force}} \times 100\%$$

The LFPR is the percentage of the eligible population that is in the labor force:

$$LFPR = \frac{LF}{\text{Eligible Population}} \times 100\%$$

2.4: Calculate the CPI, the inflation rate, and changes in real variables

For any year, t:

$$CPI_t = \frac{\text{Cost of basket in year } t}{\text{Cost of basket base year}} \times 100$$

$$\text{Inflation rate} = \frac{CPI_{new} - CPI_{old}}{CPI_{old}} \times 100$$

2.6: Calculate the real GDP and the GDP deflator

$$\text{Real GDP} = \frac{\text{Nominal GDP}}{\text{GDP deflator (in hundredths)}}$$

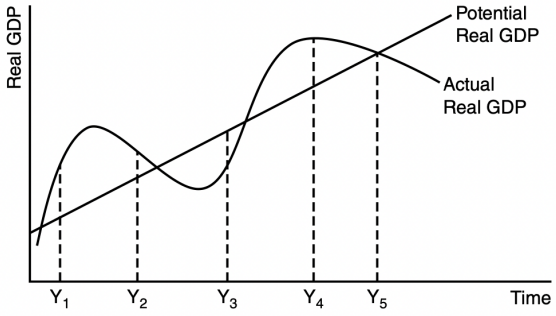
Key Graphs:

BUSINESS CYCLE GRAPH

Associated Learning Objectives

MEA-2.A

Example

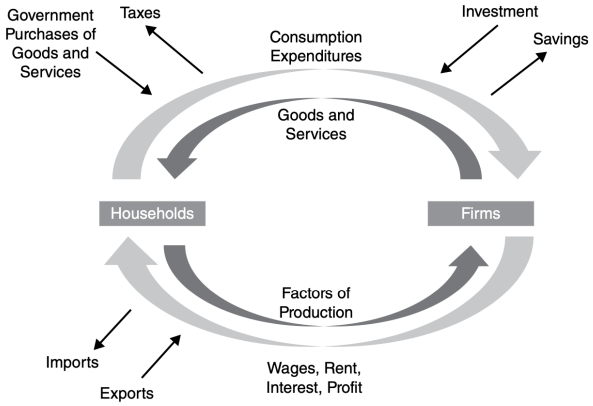


THE CIRCULAR FLOW MODEL

Associated Learning Objectives

MEA-1.A

Example



Unit 3: National Income and Price Determination

3.2: Calculate how changes in spending and taxes lead to changes in real GDP

Marginal propensity to consume (MPC)

$$MPC = \frac{\text{change in spending}}{\text{change in income}}$$

Marginal propensity to save MPS

$$MPS = 1 - MPC$$

Expenditure multiplier

$$\text{expenditure multiplier} = \frac{1}{1 - MPC}$$

Tax multiplier

$$\text{tax multiplier} = \frac{-MPC}{MPS}$$

Final impact on GDP

$$\text{final impact on GDP} = \text{multiplier} \times \text{autonomous change}$$

For example, if the the tax multiplier is -3, and taxes increase by $\$400$, then:

$$\begin{aligned}\text{final impact on GDP} &= -3 \times \$400 \\ &= -\$1{,}200\end{aligned}$$

So an increase in taxes of $\$400$ will decrease GDP by $\$1200$.

3.8: Calculate the short-run effects of a fiscal policy action

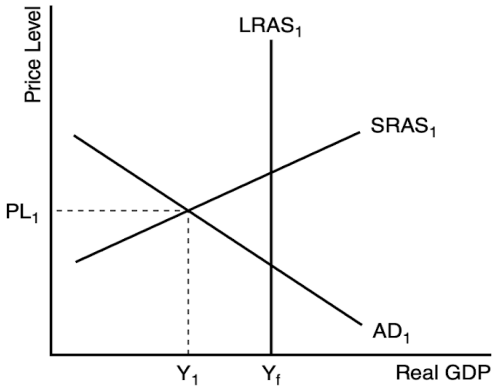
We can show the impact of fiscal policy on output and the price level using the AD-AS Model:

THE AGGREGATE DEMAND-AGGREGATE SUPPLY (AD-AS) MODEL

Associated Learning Objectives

MEA-2.A MOD-2.A MOD-2.C MOD-2.D MOD-2.E MOD-2.F MOD-2.G MOD-2.H MOD-2.I POL-1.A POL-1.D POL-1.F POL-3.A MEA-2.B MOD-1.C POL-4.A MKT-5.F

Example



	Expansionary monetary policy (open market purchases)	Contractionary monetary policy (open market sales)
Expansionary fiscal policy (increase government spending/decrease taxes)	G and/or C $\uparrow \rightarrow AD \uparrow$ $MS \uparrow i \downarrow \rightarrow AD \uparrow$ Output $\uparrow$ $UR \downarrow$ $PL \uparrow$	G and/or $C \uparrow \rightarrow AD \uparrow$ $MS \downarrow i \uparrow \rightarrow AD \downarrow$ Output ? UR ? PL ?
Contractionary fiscal policy (decrease government spending/increase taxes)	G and/or C $\downarrow \rightarrow AD \downarrow$ $MS \uparrow i \uparrow \rightarrow AD \uparrow$ Output ? UR ? PL ?	G and/or C $\downarrow \rightarrow AD \downarrow$ $MS \downarrow i \uparrow \rightarrow AD \downarrow$ Output $\downarrow UR \uparrow PL \downarrow$

Unit 4: Financial Sector

4.2: Calculate the nominal and real interest rate

Nominal interest rate:

The interest rate borrowers pay and savers earn

$$\text{Nominal interest rate} = \text{real interest rate} + \text{expected inflation}$$

Sometimes this equation is written using symbols:

$$i = r + \text{inf}_e$$

Where:

$i = \text{nominal interest rate}$

$r = \text{real interest rate}$

$\text{inf}_e = \text{expected inflation}$

Note: sometimes you will see inflation abbreviated using the Greek symbol π, and expected inflation abbreviated as π_e.

Real interest rate:

$$\text{Real interest rate} = \text{nominal interest rate} - \text{inflation rate}$$

The actual interest earned (or paid) will depend on the nominal interest rate and how much the inflation rate turned out to be.

4.3: Calculate (using data as appropriate) measures of money

$$MB = \text{cash and coins in circulation} + \text{bank reserves}$$

$$M1 = \text{cash and coins in circulation}$$

$$+ \text{checkable bank deposits} + \text{travelers checks}$$

4.4: Calculate (using data and balance sheets as appropriate) the effects of changes in the banking system

The money multiplier:

$$MM = \frac{1}{rr}, \text{where}$$

$$MM = \text{money multiplier}$$

$$rr = \text{reserve requirement}$$

$$AMM = \frac{MS}{MB}$$

Where:

$$AMM = \text{actual money multiplier}$$

$$MS = \text{money supply}$$

$$MB = \text{monetary base}$$

$$\text{Total change in } MS = \text{change in } MB \times MM$$

$$\text{Maximum total change in } MS = \text{change in } MB \times MM$$

Calculate excess reserves:

$$\text{Excess reserves} = \text{Deposits} - (\text{Deposits} \times \text{reserve requirement})$$

Maximum new loans from a deposit:

Maximum increase in loans = (Deposit - reserves) x money multiplier

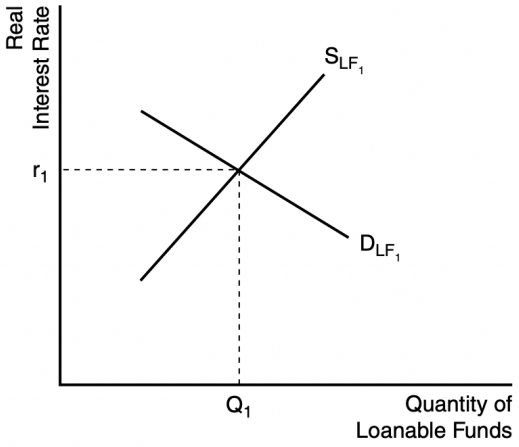
Key Graphs:

THE LOANABLE FUNDS MARKET

Associated Learning Objectives

MKT-4.A MKT-4.C MKT-4.D MKT-4.E POL-3.C MKT-5.G

Example



4.6: Calculate (using data and balance sheets as appropriate) the effects of a monetary policy action

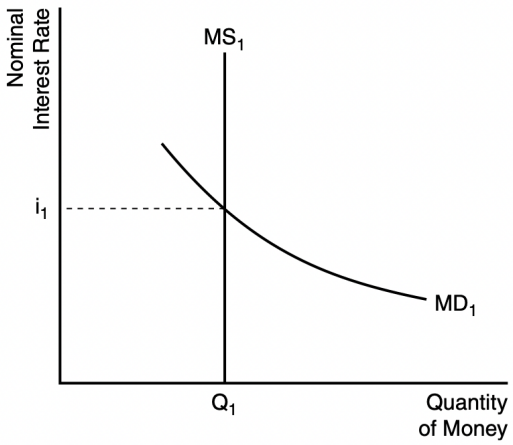
Monetary policy can be used to mitigate the impact of fiscal policy on interest rates:

THE MONEY MARKET

Associated Learning Objectives

MKT-3.A MKT-3.B MKT-3.C MKT-3.D POL-1.D POL-1.F

Example



$$\text{Nominal interest rate} = \text{real interest rate} + \text{expected inflation}$$

5.3: Calculate the money supply, velocity, the price level, and real output using the quantity theory of money

The equation of exchange:

The equation of exchange states that the effective money supply is equal to nominal GDP:

$M\ x\ V\ =\ P\ x\ Y$

Where:

$M\ x\ V\ =$ the effective money supply is the money supply(M)multiplied by the velocity of money(V)

$P\ x\ Y\ =$ is the price level(P)multiplied by real GDP(Y)

Note that $P\ x\ Y$ is the same as nominal GDP.

The quantity theory of money:

$$M \times V = P \times Y$$

Or, alternatively:

$$\%\Delta M + \%\Delta V = \%\Delta P + \%\Delta Y$$

5.6: Calculate (using graphs and data as appropriate) per capita GDP and economic growth

GDP per capita = GDP/population

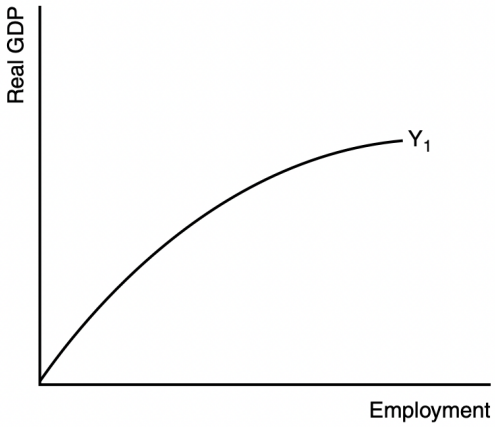
Key Graphs:

THE AGGREGATE PRODUCTION FUNCTION

Associated Learning Objectives

MEA-2.B POL-4.A

Example

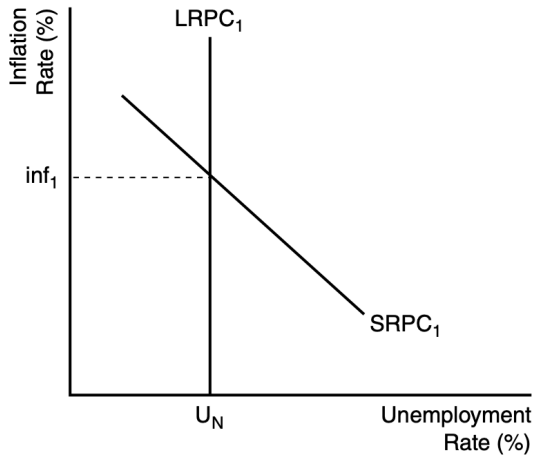


THE PHILLIPS CURVE MODEL

Associated Learning Objectives

MEA-2.A MOD-3.A MOD-3.B POL-3.A

Example



Unit 6: Open Economy--International Trade and Finance

6.1: Calculate the CA, the CFA, and the BOP

Key equation: The balance of payments

The current account (CA) and the capital and financial account (CFA) must sum to zero.

$$CA + CFA = 0$$

Note that this equation can be rearranged to read

$$CA = -CFA$$

6.2: Calculate the value of one currency relative to another

Exchange rates

The exchange rate of a currency is expressed as the units of another currency needed to buy a single unit of the currency. For example, the exchange rate for currency A is given below:

$$\text{Exchange rate}_A = \frac{\#\text{ of units of currency} B}{\text{unit of currency } A}$$

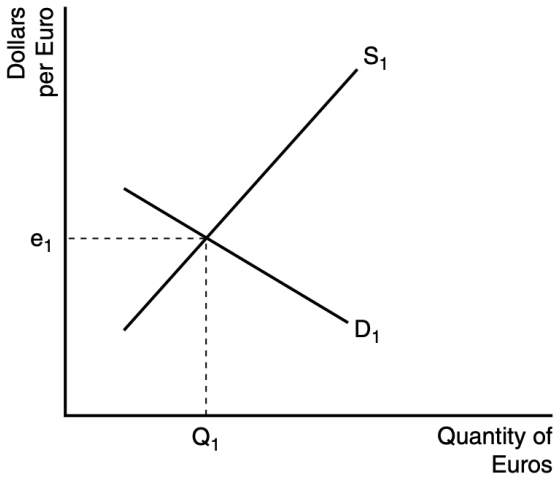
Key Graphs:

THE FOREIGN EXCHANGE MARKET

Associated Learning Objectives

MKT-5.B MKT-5.C MKT-5.D MKT-5.E MKT-5.F MKT-5.G

Example



BALANCE SHEETS (T-ACCOUNTS)

Associated Learning Objectives

POL-2.A POL-1.D

Example

Bank A

Assets		Liabilities	
Required reserves	$10,000	Demand deposits	$100,000
Excess reserves	$5,000		
Loans	$85,000	Owner's equity	$0

Key Terms and Definitions:

Opportunity cost - the value of the next best alternative to any decision you make

Production possibilities curve (PPC) - (also called a production possibilities frontier) a graphical model that represents all of the different combinations of two goods that can be produced; the PPC captures scarcity of resources and opportunity costs.

Surplus - when the quantity supplied of a good, service, or resource is greater than the quantity demanded

Shortage - when the quantity demanded of a good, service, or resource is greater than the quantity supplied

Demand - Demand is an economic principle referring to a consumer's desire to purchase goods and

services and willingness to pay a price for a specific good or service
Supply - describes the total amount of a specific good or service that is available to consumers
Equilibrium - in a market setting, an equilibrium occurs when price has adjusted until quantity supplied is equal to quantity demanded
Disequilibrium - in a market setting, disequilibrium occurs when quantity supplied is not equal to the quantity demanded; when a market is experiencing a disequilibrium, there will be either a shortage or a surplus.
GDP - measures the value of the output of all goods and services produced within the country in a year
Nominal GDP - the market value of the final production of goods and services within a country in a given period using that year's prices (also called "current prices")
Real GDP - nominal GDP adjusted for changes in the price level, using prices from a base year (constant prices) instead of "current prices" used in nominal GDP; real GDP adjusts the level of output for any price changes that may have occurred over time
GDP deflator - a price index used to adjust nominal GDP to find real GDP; the GDP deflator measures the average prices of all finished goods and services produced within a nation's borders over time.
Unemployment rate - when people are not working, but they are actively looking for work; for example, Glenn did not work at all last week, though he tried to find a job, so he is considered unemployed.
Labor force participation rate - the percentage of the eligible population that is in the labor force
CPI - an index that calculates the cost of a market basket of goods purchased by a typical family that lives in an urban area; the purpose of the CPI is to track changes in the cost of living over time.
Inflation rate - the pace at which the overall price level is increasing; this is the percentage increase in the price level from one period to the next.
Circular flow model - GDP can be represented by the circular flow diagram as a flow of income going in one direction and expenditures on goods, services, and resources going in the opposite direction. In this diagram, households buy goods and services from businesses and businesses buy resources from households.
AD-AS model - The AD-AS (aggregate demand-aggregate supply) model is a way of illustrating national income determination and changes in the price level. We can use this to illustrate phases of the business cycle and how different events can lead to changes in two of our key macroeconomic indicators: real GDP and inflation.
Fiscal policy - the use of taxes, government spending, and government transfers to stabilize an economy; the word "fiscal" refers to tax revenue and government spending.
Nominal interest rate - the interest rate that you earn (or pay) on a loan; this is the amount you see on

a sign advertising interest rates.
Real interest rate - the nominal interest rate adjusted for inflation; this is the effective interest rate that you earn (or pay).
Money multiplier - the ratio of the money supply to the monetary base (money in bank vaults and money in circulation); the money multiplier tells us how many additional dollars will be created with each addition to the monetary base, such as when there is a $1$1dollar sign, 1 increase in a bank's reserves.

Key concepts retrieved from the College Board; equations and images retrieved from Khan Academy.