When you read the newspaper, you'll come across terms like gross domestic product, GNP, and real GDP. All of these terms refer to production in an economy. In this lesson, we're going to draw a distinction between these different measures of output.

Let's start with gross domestic product defined as the market value of all final goods and services produced in a country in a given period of time. Let's work through that definition one piece at a time starting with market value. That means valued at market prices. When a car company produces a new vehicle and that vehicle can sell in the market with a price tag of twenty thousand dollars that car company has just added twenty thousand dollars to gross domestic product.

Next, final. Final means not intermediate. Whenever I go and purchase a vehicle at a car dealership, that's a final purchase because it's winding up in the hands of the ultimate final user, a consumer who will drive the car. On the other hand, when General Motors purchases the parts that they use to build that car, it's not counted in gross domestic product because those purchases are of intermediate goods, goods that will be used to produce the final goods purchased by the final end user.

Next, the goods and services piece. Here we're not just talking about goods but also about services. Automobiles are goods, but whenever I go to take my car to the shop to have it serviced that goes into gross domestic product as well, as does my haircut, as does a visit to the doctor. The term *all* here is important, *all goods and services* because these are our best effort to measure all of the economic activity. Typically, it's going to come down to reports that businesses make to the government when they pay their taxes, but there's all kinds of economic activity that doesn't fall under that category. If you're engaged in barter transactions, if you are engaged in some kind of activity that's in an informal or underground economy, the government doesn't know about it and can't measure it. That's production that flies under the radar and doesn't show up in our measures of gross domestic product.

Produced in an economy, now here's the tricky part here. The difference between gross domestic product and gross national product is one of whether we are talking about people's citizenship or whether we are talking about geography. Gross domestic product is the production that occurs within a country like the United States. The U.S. GDP is a measure of all the production that occurs within our borders. On the other hand, gross national product is the output that is contributed to the economy: all those goods that are produced by U.S. Nationals, whether they are operating inside the United States or whether they're producing in another country. For instance, whenever Dell Corporation, a U.S. company, produces computers in China, that's part of gross national product but not part of gross domestic product. On the other hand, whenever Honda, a Japanese company, produces automobiles in Tennessee that's part of gross domestic product but not part of gross national product. The difference between gross domestic product and gross national product is the difference between production by foreign nationals in the United States and the production by U.S. Nationals living abroad.

Finally, there's the phrase *in a given period of time*. The production of goods and services in an economy is like the flow of water through a pipe. We have to measure it per period of time for the number to make any sense. We measure gross domestic product per year in our statistics. When we say that the U.S. GDP is thirteen trillion dollars, for instance, we mean that there are thirteen trillion dollars' worth of goods and services at market prices produced in our country in a year.

Now we'll draw a clear distinction between nominal GDP and real GDP. The term nominal refers to things measured in terms of money. The term real refers to things measured in terms of actual physical output. To make this even clearer, let's take a simple example of a country that produces only two goods, bananas and apples, and using the numbers in this table, we're going to calculate first the nominal GDP for year one and year two and then the real GDP for each year. We'll make this simpler, I believe, by defining it with an example. Nominal GDP is the market value of all final goods and services produced in this economy in a given year. So let's go ahead and look at nominal GDP in year one. First of all, we're producing two goods, apples and bananas, and let's start with apples. The market value of all of the apples produced will be the production of two apples times the price of one dollar per apple for a total of one dollar times two apples or two dollars from apple production for GDP. Let's look now at bananas. Three bananas are produced. The market price is two dollars per banana, so two dollars per banana times three bananas gives us six dollars that banana production is adding to nominal GDP in year one. Add them together: two dollars from apples, six dollars from bananas, and you get that gross domestic product in nominal terms is eight dollars in year one.

Let's now repeat the exercise for year two. In year two we're going to notice that two things have changed. First, the prices have changed, and second, the quantities produced have changed. Now we've got twice as many apples produced at a price of a dollar fifty a piece, four apples times a dollar fifty means that apple production is now contributing six dollars to GDP. Banana production is now up to four bananas at a price of two fifty a piece adding a total of ten dollars to GDP. Ten dollars from bananas plus six dollars from apples gives us sixteen dollars for our nominal GDP in year two.

Now let's think about real GDP. How much is output actually changing, real physical stuff changing, as we move from year one to year two? The numbers that we've just calculated for nominal GDP would suggest that in some sense GDP has doubled from eight to sixteen between year one and year two. But if we look at the actual physical quantities we'll see that they have not doubled. Although apple production has doubled, banana production has increased by only one-third. So what's going on here? Well, what's going on is that nominal GDP has two separate components, and those components are quantities and prices. We want to now neutralize the effect of prices and look at what's happening to actual physical production, the increase in stuff, and the way we're going to do that is to hold prices constant as we move from year one to year two. That's how we calculate real gross domestic product. Real GDP assumes that we have a set base year in which we are letting the prices be held constant. If we use year one prices now and we value year two production in terms of year one prices, we will get the real gross domestic product of year two.

Let's actually do that calculation now and shift our attention to real gross domestic product. If we use year one prices then we'll find that gross domestic product in year one is exactly the same as nominal gross domestic product because we're using the same prices. Exactly as before, we get eight dollars for real GDP. Now what we're going to do is we're going to take these year one prices and multiple them by the year two quantities. So we're going to imagine that although we are producing four apples now, the apples are still selling for a dollar a piece not a dollar fifty. And look what happens, calculating real gross domestic product using year one prices, we'll get four apples, or the year two quantity, multiplied by one dollar per apple, or the year one price, for four dollars worth of apples. We have four bananas times two dollars per banana again using the year one price to get eight dollars worth of bananas in year one prices. Using year two quantities and year one prices, we calculate that gross domestic product for year two is twelve dollars.

Nominal GDP increased by one hundred percent from year one to year two, but real GDP increased by only fifty percent. That's because a lot of the increase in nominal GDP was coming from rising prices. In order to measure the rate at which prices are rising from one year to the next to the next, we use a concept called the GDP deflator. You calculate the GDP deflator by taking the nominal GDP for a given year and dividing it by the real GDP for that same year and multiplying by one hundred. What you learn from the GDP deflator is the rate by which prices have increased in a given year from the base year.

Let's now actually calculate the GDP deflator for the years that we've been studying. We'll start with year one. Calculating the GDP deflator here is going to be a matter of taking the nominal GDP of eight dollars, dividing by the real GDP of eight dollars, and multiplying by one hundred to get one hundred. Well, it doesn't surprise us that we get one hundred here because were using the same prices for the nominal GDP as we are for the real GDP. One hundred is what you get when prices haven't changed at all. If you divide now sixteen dollars, which is the nominal GDP in year two, by twelve dollars which is the real GDP for year two using year one prices, and multiple by one hundred you get a hundred and thirty three point thirty three, which let's you know then that prices have increased by thirty three percent between year one and year two. The price level now measured by the GDP deflator is thirty three percent higher. To calculate the rate of inflation, all you do is you take the GDP deflator for the year that you're interested in and subtract the GDP deflator from the previous year and divide by that same GDP deflator, and you'll get the rate of inflation, in this case, thirty three and a third percent.

Now that you've got the concept of the GDP deflator, you have an alternative method for calculating the real GDP in any given year. Remember, the formula for the GDP deflator is the nominal GDP divided by the real GDP multiplied by one hundred. Doing a little algebra here, you see that if you multiply by real GDP and divide both sides by the GDP deflator that the real GDP is just the nominal GDP for a given year divided by that year's GDP deflator. There's another way then for calculating the real GDP.

Next time you're reading the newspaper and you come across these terms just keep in mind nominal refers to things measured in money, real refers to actual goods and services, gross domestic product measures the output in an economy in a given period of time. Now, what do these measures have to do with things you care about? Is gross domestic product really connected to the standard of living in an economy? Well, that turns out to be a different question altogether.