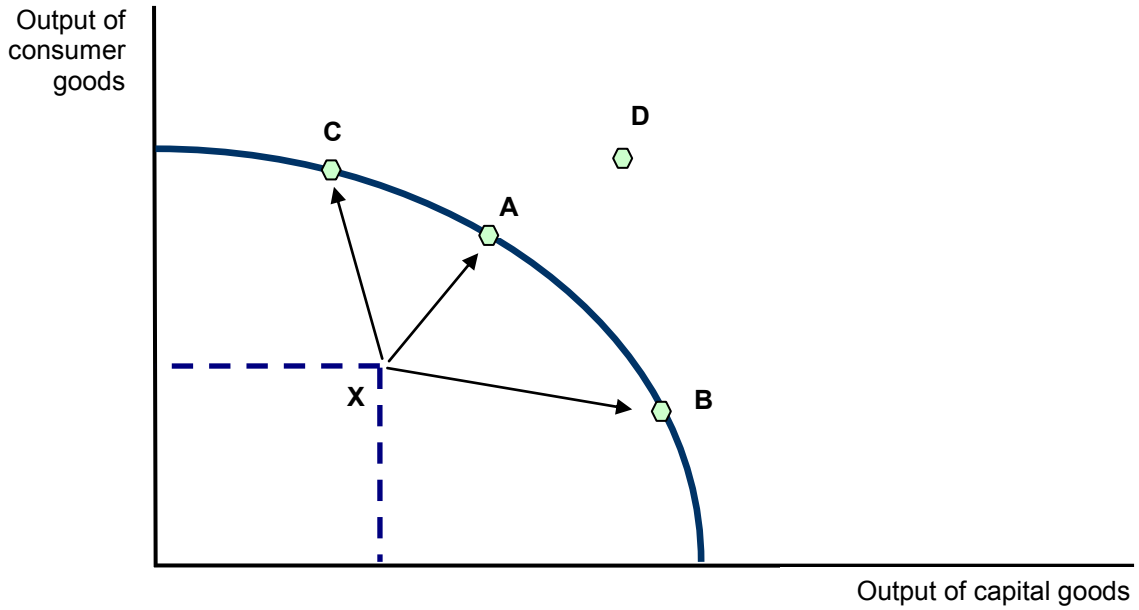
The Production Possibility Frontier

A **production possibility frontier** (PPF) is a boundary which shows the combinations of two or more goods and services that can be produced whilst using all available factor resources efficiently.

We normally draw a PPF on a diagram as **concave to the origin** i.e. as we move down the PPF, as more resources are allocated towards Good Y the extra output gets smaller – so more of Good X has to be given up in order to produce Good Y. This is **the law of diminishing returns** and it occurs because not all factor inputs are equally suited to producing items.

A PPF shows the different combinations of goods and services that can be produced with a given amount of resources in their most efficient way
Any point inside the curve – suggests resources are not being utilised efficiently
Any point outside the curve – not attainable with the current level of resources



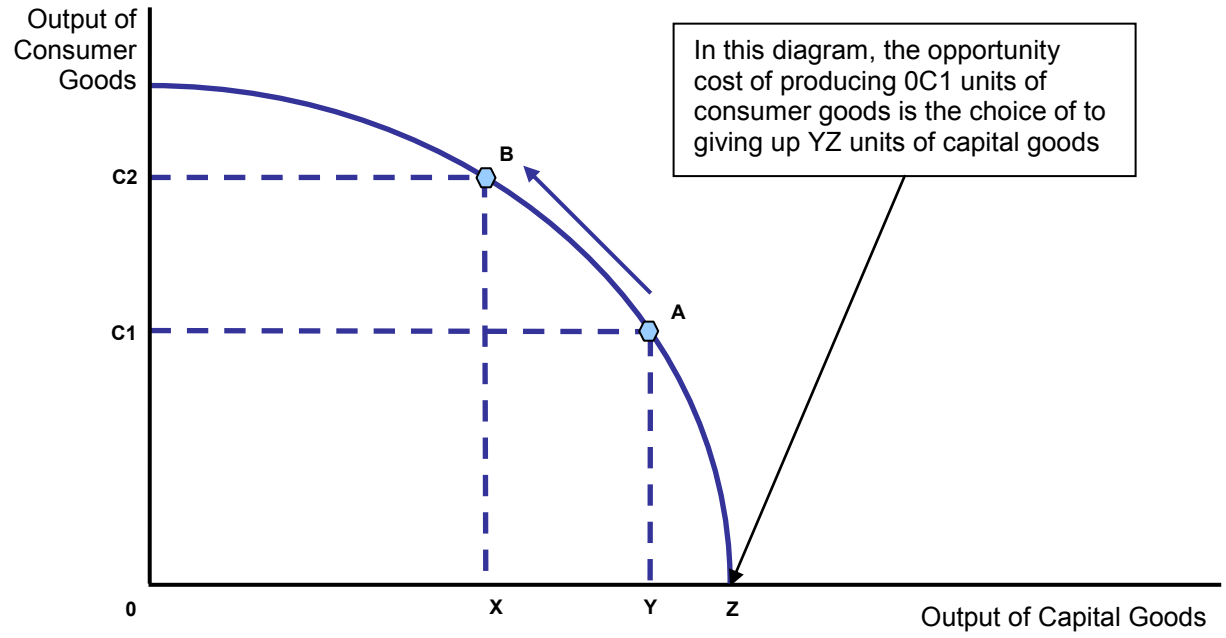
PPF and economic efficiency

- Combinations of the output of consumer and capital goods lying inside the PPF happen when there are **unemployed resources** or when resources are used **inefficiently** – e.g. point X. We could increase total output by moving towards the PPF and reaching any of points C, A or B.
- Point D is unattainable at the moment because it lies beyond the PPF. A country would require an **increase in factor resources**, an **increase in the productivity** or an **improvement in technology** to reach this combination of Good X and Good Y. As we shall see a little later, trade between countries allows nations to consume beyond their own PPF.
- Producing more of both goods would represent an improvement in **welfare** and an gain in what is called **allocative efficiency**

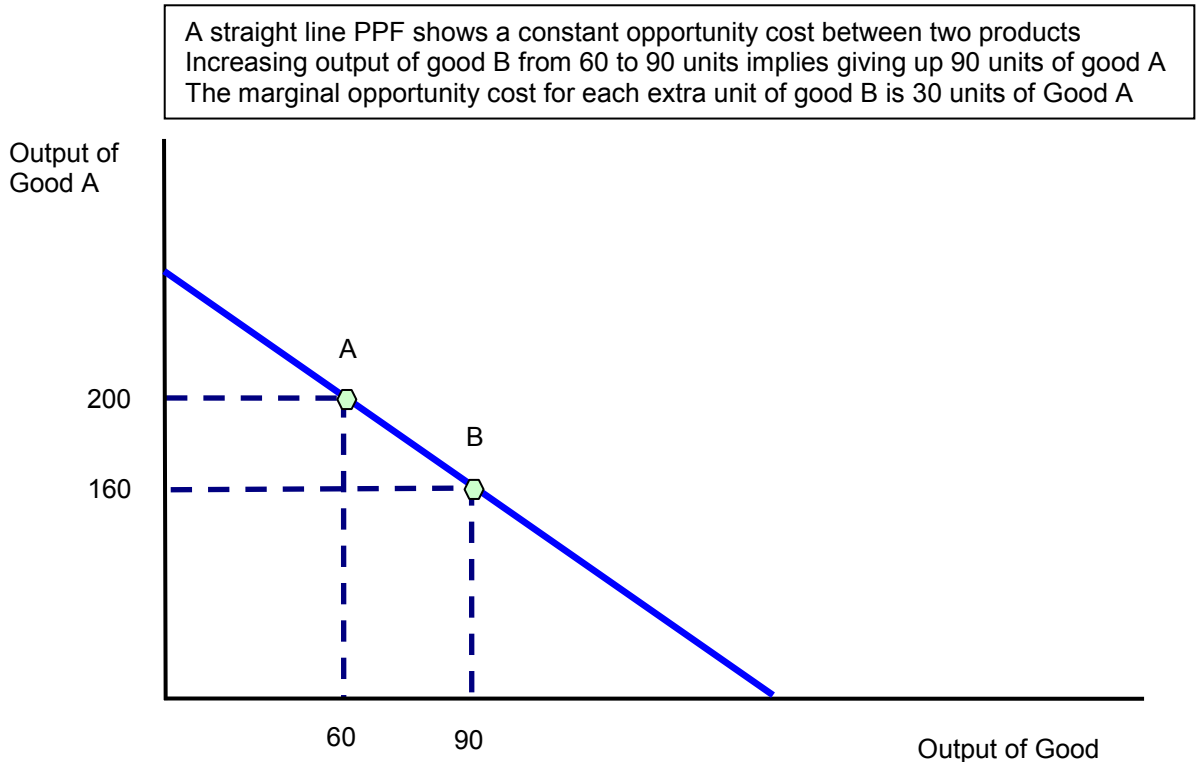
Opportunity cost and the PPF

Reallocating scarce resources from one product to another involves an **opportunity cost**. If we increase our output of consumer goods (moving along the PPF from point A to point B) then fewer

resources are available to produce capital. if the **law of diminishing returns** holds true then the opportunity cost of expanding output of X measured in terms of lost units of Y is increasing.



If the opportunity cost for producing two products is constant, then we draw the PPF as a straight line. The **gradient** of that line is a way of measuring the opportunity cost between two goods.



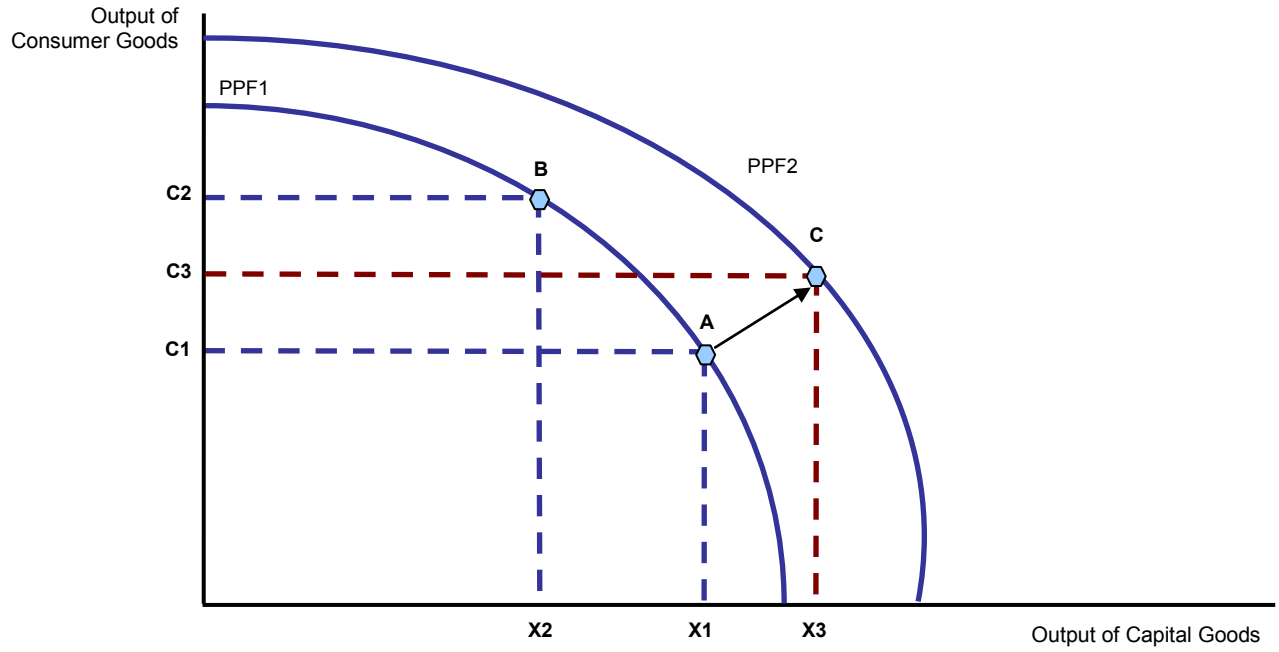
Shifts in the Production Possibility Frontier

The PPF will shift when:

- There are **improvements in productivity and efficiency** perhaps because of the introduction of **new technology** or **advances in the techniques of production**
- **More factors of production are exploited** perhaps due to an increase in the size of the workforce or a rise in the amount of capital available for businesses

In the diagram below, there is an improvement in technology which shifts the PPF outwards.

An outward shift in the PPF shows that there has been either an improvement in productivity or an increase in the total stock of resources available to produce different goods and services. The outward shift represents an improvement in efficiency and leads to economic growth.



Free Goods

Free goods are not scarce and no cost is involved when consuming them.

Is fresh air an example of a free good?

Usually the answer is yes – yet we know that air can become contaminated by pollutants. And, in thousands of offices, shops and schools, air-conditioning systems cool the air before it is "consumed".

With air conditioning, scarce resources are used up in providing the "product" – for example the capital machinery and technology that goes into manufacturing the air conditioning equipment; the labour involved in its design, production, distribution and maintenance and the energy used up in powering the system. Cool air might appear to be free – but in fact it is often an expensive product to supply! Air conditioning guzzles 15 per cent of total American energy consumption, higher than any other country, and uses the same amount of fossil fuel as the whole of Africa employs for all its energy needs.