

Compound Interest

What is compound interest?

I am someone that uses terms like "miracle" carefully. I would not call compound interest miraculous, but certainly "jaw dropping awesome." This is arguably the most important aspect of childhood mathematics that perhaps you, like everyone else failed to fully appreciate. However, it is the understanding of compound interest that is the building block of wise financial management and planning.



The concept is relatively simple – honestly!

You invest your money. You earn a return on top of the amount that you originally invested. Next year you earn a return on the combined amount and so on. Over time the sums are staggering and become very large indeed. The numbers appear miraculous. Here is an example of investing £100 a month with a return of 7% per annum.

Total Invested	Return	End of Year	End of Year Value
£1,200	7%	1	£1,245
£2,400	7%	2	£2,577
£3,600	7%	3	£4,003
£4,800	7%	4	£5,528
£6,000	7%	5	£7,160
£12,000	7%	10	£17,202
£18,000	7%	15	£31,286
£24,000	7%	20	£51,041
£30,000	7%	25	£78,747
£36,000	7%	30	£117,606
£42,000	7%	35	£172,109
£48,000	7%	40	£248,552
£54,000	7%	45	£355,766
£60,000	7%	50	£506,141
£66,000	7%	55	£717,048
£72,000	7%	60	£1,012,857
£78,000	7%	65	£1,427,744

Albert Einstein called compound interest "the greatest mathematical discovery of all time".

The table reveals the way that the numbers visually gather momentum much like a snowball gaining in size as it is rolled.

So now you understand *why* getting the mathematics right is so important. There is no magic or miracle being performed; this is mathematical fact, a law of life. However, investments do not work in a vacuum and we need to apply this to real life. There are two key factors that make life a little more unpredictable.

1. The return/rate of interest is never constant

In my example, I have used a rate of return of 7% each year. Investments cannot possibly perform with such predictability – or even bank deposit or savings accounts where interest rates reflect beliefs about the economy at the time. Some years you may achieve far more than 7%, in others far less, perhaps even a negative (loss) return.

2. Inflation will erode the “perceived value”

Inflation is the enemy of “spending power.” If inflation averages 3% per year, then really with a 7% return you are achieving a “real return” of 4%. This has a significant effect – equally as “miraculous.”

Total Invested	Real Return	End of Year	7% Return year end value	4% Return Year end Value = Real Worth if 3% inflation
£1,200	4%	1	£1,245	£1,226
£2,400	4%	2	£2,577	£2,501
£3,600	4%	3	£4,003	£3,827
£4,800	4%	4	£5,528	£5,206
£6,000	4%	5	£7,160	£6,640
£12,000	4%	10	£17,202	£14,718
£18,000	4%	15	£31,286	£24,546
£24,000	4%	20	£51,041	£36,503
£30,000	4%	25	£78,747	£51,051
£36,000	4%	30	£117,606	£68,751
£42,000	4%	35	£172,109	£90,286
£48,000	4%	40	£248,552	£116,486
£54,000	4%	45	£355,766	£148,363
£60,000	4%	50	£506,141	£187,146
£66,000	4%	55	£717,048	£234,331
£72,000	4%	60	£1,012,857	£291,740
£78,000	4%	65	£1,427,744	£361,585

What a staggering difference between the fund values – all due to a difference of 3% a year! Hopefully you can learn from this that inflation has an eroding effect on the value of money, in order to simply “stand still” you must ensure that your returns are better than inflation over the long-term.

I would argue that in the 10 years prior to the point that you need the money, you should gradually be reducing your investment risk which should also be reflected in the returns

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that you can expect to achieve; in turn this will reduce the compounding effect. To offset this you should be more aggressive with your investments in the early years – pushing **real returns** of 6% or more each year.

Another shortcoming is that you cannot invest without incurring charges – the annual management charges or dealing costs on investments will of course mean that you need to focus on the NET return – after charges return. The financial services industry often calls the effect of this the reduction in yield.

There are plenty of online calculators to enable you to work out your numbers. I suggest doing a quick search to find one that is helpful. You could of course simply use a calculator and finally get to use one of those buttons that has bugged you for a while. Here is the formula that you need:

P is the principal (the initial amount you invest or deposit)

r is the annual rate of interest or return (percentage where 1.00 = 100%)

n is the number of years the amount is deposited or borrowed for.

A is the amount of money accumulated after n years.

When the interest is compounded once a year:

$$A = P(1 + r)^n$$

So for example if you invest £10,000 at a rate of 7% for 15 years the formula will look like:

$$A = 10,000(1 + 0.07)^{15}$$

KEY POINT

The long-term effect of compounding returns must be understood. This will help shift your focus from the short-term towards the bigger picture. However, you need to be attentive to the achieved real returns.