

NICKS & TRICKS

LUKE'S GUIDE TO JUNIOR CERT HL MATHS

Topic 8 – Financial Maths

Financial Maths is all about money. This topic will make big use of **percentages** and **decimals** so make sure you have studied the guide on **Number Systems** before you look at this one! Learn the nicks & tricks below to breeze through any money problems!

- (i) Profit
- (ii) Value Added Tax (VAT)
- (iii) Currency Exchange
- (iv) Compound Interest
- (v) Income Tax

(i) PROFIT

Profit is money that you have earned. They will expect you to know what the term means in the exam! The formula for profit is:

$$\text{Profit} = \text{Money You Have Gained} - \text{Money You Have Spent}$$

(ii) VALUE ADDED TAX (VAT)

VAT is a tax the government puts on all goods and services. Whenever you buy anything, part of the price you pay is VAT!

Example: If you bought a chocolate bar for €1.00 at the shop, €0.90 of the cost might be paying for the **actual chocolate bar** and €0.10 might just be **VAT!**



VAT Questions are all about %!

KEY TO VAT QUESTIONS

IF THEY TELL YOU VAT IS INCLUDED

- 1) The price they tell you is **100% + VAT**
- 2) Divide by this % to find 1%
- 3) Multiply by 100 to get 100% (The price before adding VAT)

IF THEY TELL YOU VAT IS NOT INCLUDED

- 1) The price they tell you is **100%**
- 2) Divide by this 100 to find 1%
- 3) Multiply by (100 + VAT) to get the price after adding VAT

(iii) CURRENCY EXCHANGE

If you've gone abroad, you might have changed your money from Euro € into something else like Dollars \$ or Pounds £ at a bank or post office. This is called **Currency Exchange**.

Example:

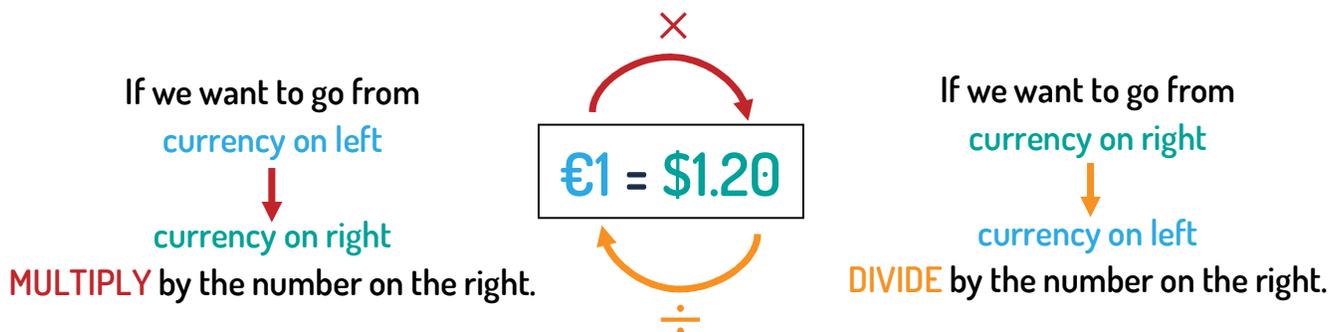
$$€1 = \$1.20$$



This box tells us that for every €1 we have, we can exchange it for \$1.20. This means that if we were going to America and we had €100, we could exchange it for \$120.

The **number on the left** will always be 1 whether it's €, \$ or £.

The **number on the right** changes.



(iv) COMPOUND INTEREST

Imagine you put €100 in the bank and the bank said that for every year you keep your money in the bank, they'll give you an extra 6%. How much money would you have at the end of 3 years? 10 years? 30 years? This is **Compound Interest**.

Matamaitic an airgeadais

Iontu seo a leanas, is é t an fad ama ina bhlianta agus is é i an ráta bliantúil úis, dímhéasa nó fáis, agus é sloinnte mar dheachúil nó mar chodán (ionas go seasann $i = 0.08$ do ráta 8%, mar shampla)*.

Ús iolraithe

$F =$ luach deiridh, $P =$ príomhshuim

Luach láithreach

$P =$ luach láithreach, $F =$ luach deiridh

Dímheas

– modh an chomhardaithe laghdaithe

$F =$ luach déanach, $P =$ luach tosaigh

Financial mathematics

In all of the following, t is the time in years and i is annual rate of interest, depreciation or growth, expressed as a decimal or fraction (so that, for example, $i = 0.08$ represents a rate of 8%)*.

$$F = P(1+i)^t \quad \textcircled{1}$$

$$P = \frac{F}{(1+i)^t} \quad \textcircled{2}$$

$$F = P(1-i)^t \quad \textcircled{3}$$

Compound interest

$F =$ final value, $P =$ principal

Present value

$P =$ present value, $F =$ final value

Depreciation

– reducing balance method
 $F =$ later value, $P =$ initial value

Log Tables Page 30 are key for this section!

Use **Formula 1** if you **have money now** and you **want** to figure out how much you'll have in the **future**.

Use **Formula 2** if your **money has gained compound interest** over time and you **want** to figure out how much you had in the past **before you gained the interest**.

Use **Formula 3** if the question talks about **depreciation**.

For all these formulas, i is the % they talk about in the question.

It is important to remember to convert the % to a decimal!

(v) INCOME TAX

Everyone pays **income tax** on the money that they get from their job. In Ireland, there are 2 different rates for income tax: a **Standard Rate** and a **Higher Rate**. (In 2021 the **Standard Rate** was **20%** and the **Higher Rate** was **40%** but you don't need to memorise these).

Here's how it works:

You pay a tax of **20%** on everything you earn, until you go over a certain amount. For everything you earn above this amount, you pay **40%**. This certain amount is called the **Standard Rate Cut-Off Point**.

Example: Let's say that the **Standard Rate Cut-Off Point** is €30,000.



Katie works at McDonalds. Her **gross income** is €20,000 one year. She only has to pay **20%** tax on this so the amount of tax she pays is:

$$€20,000 \times 20\% = €4,000$$

And so her **net income** is:

$$€20,000 - €4,000 = €16,000$$

Gross Income = Money earned before taking tax away

Net Income = Money earned after all tax has been taken away

Conor McGregor is earning a **lot more money** than Katie. His **gross income** is €100,000 one year. The **Standard Rate Cut-Off Point** is €30,000 so he pays **20% tax on the first €30,000** he's earned.

$$€30,000 \times 20\% = €6,000$$

BUT Conor has also earned **€70,000 extra over the Standard Rate Cut-Off Point** so needs to pay **40%** on that money:

$$€70,000 \times 40\% = €28,000$$

Overall the total amount of tax Conor is paying is:

$$€6,000 + €28,000 = €34,000$$

And so his **net income** is:

$$€100,000 - €34,000 = €66,000$$

And that's income tax! The question might also mention **Tax Credits**. All you do with Tax Credits is take **them away from someone's tax** so that they're paying less. **Tax Credits are like vouchers the government gives you against tax!**

LUKE'S EXAM PREDICTIONS

- VAT & Percentages have come up at least once every year for the past 5 years!
 - Profit has come up 3 times out of the past 5 years!
 - Compound Interest has come up 3 times out of the past 5 years!
 - Income Tax has come up 3 out of the past 5 years!
 - Currency Exchange has come up 2 out of the past 5 years!
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If you study this guide, you will find any money question on your exam easy! Along with this you will also become very comfortable with percentages and decimals!

“The maths exam is about progress, **not** perfection!”