

## 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:

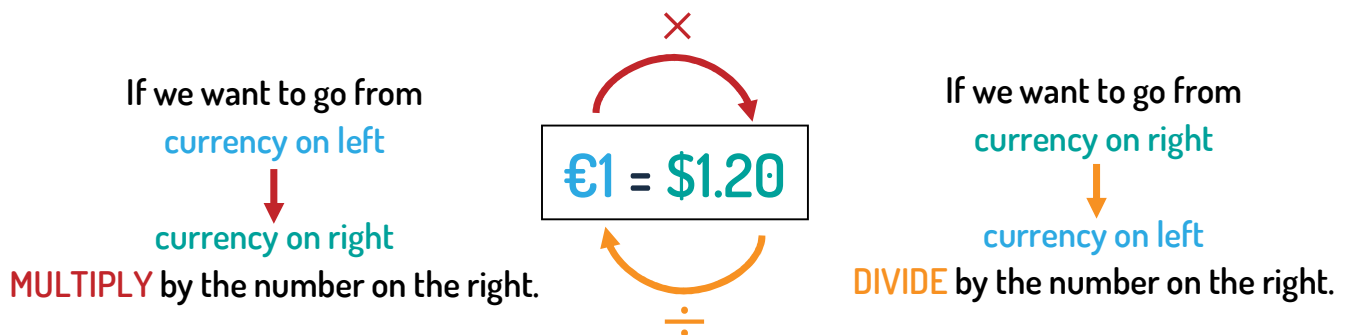
$$€1 = \$1.20$$



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!**

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## 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!”***