# Maths CBA 1

## How much money does an individual earning minimum wage in Ireland save after 1 year considering the necessities of daily life.

I want to find out how much money is saved by the end of the year if you work a job that pays minimum wage. I will need to deduct money that is used for housing, transportation, utilities, food, etc.

I chose this problem statement because I am interested in both financial maths and money itself. One of my ambitions is to work a high paying job so solving this problem will help me in my decision making in the future. It also includes a considerable amount of maths which is a bonus to my investigation

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# Assumptions

## I have made several assumptions to simplify the problem

- This individual works 9 – 5 five days a week because it is the average daily working hours in Ireland.
- The individual must provide for himself only, otherwise the problem would be too broad to solve.
- He earns minimum wage because this investigation would be pointless if he did not.
- To simplify this problem, I'm assuming that the individual has his own form of transportation (car) and pays insurance annually.
- I'm assuming the individual is renting out an apartment for a reasonable price due to the necessity of having shelter.
- He lives in the town, so he can purchase goods from his local shops, and has the option to walk instead of driving.
- He drives approximately 20 kilometers to go to work.
- I'm assuming this individual has no other additional expenses (i.e. College Fees, Debt, etc.)
- The individual tries to maintain good health, so he does not have any additional medical expenses.

# Steps

**I have broken the solving process down into steps to ensure accuracy and make it easier to solve**

- Research information based on minimum wage in Ireland in order to calculate the total gross salary of the individual.
- Calculate the individual's net pay after deducting income taxes at a standard rate of 20%. The net income has a crucial role in determining the annual savings.
- Research the necessities of daily life and the cost of living in Ireland for calculating the individual's annual expenses.
- Calculate how much money would be spent on gas in 1 year from driving to work and back (considering the high increase in prices due to the global pandemic and war in Ukraine).
- Find out the total cost of these expenses and subtract it from the net payment as the result will be the total annual savings.
- After deducting all the expenses, add charts, graphs, and tables to represent the calculations. This will display the information in a visual way.

# Gross Salary

The current minimum wage in Ireland for people aged 20 and over is **€11.30 per hour**. Since the individual works 5 days a week from 9 – 5, he works **40 hours a week.**

8 hours a day x 5 days a week = 40 hours a week

1 hour = €11.30 ∴ 40 hours = €452 a week

€452 x 52 weeks per year = €23,504

**Gross Annual Income** = €23,504

In order to make this problem simpler and easier to solve, I will not include any additional taxes the individual may have. i.e., USC, PAYE, PRSI, etc.

# Net Income

The individual pays the standard rate of tax which is 20%. According to https://www.revenue.ie, you are due a Personal Tax Credit if you are resident in Ireland. As this individual is single, he receives a **tax credit of €1,775.**

In order to calculate the net income, the following formula is used:

Gross income x Standard rate of tax – Tax Credits = Tax Payable

Gross income – Tax Payable = Net income.

€23,504 x 20% = €4,700.80 (Gross Tax)

€4,700.80 – €1,775 = €2925.80 (Tax Payable)

€23,504 – €2925.80 = €20,578.20

∴ **Net Income** = €20,578.20

# Annual Rent

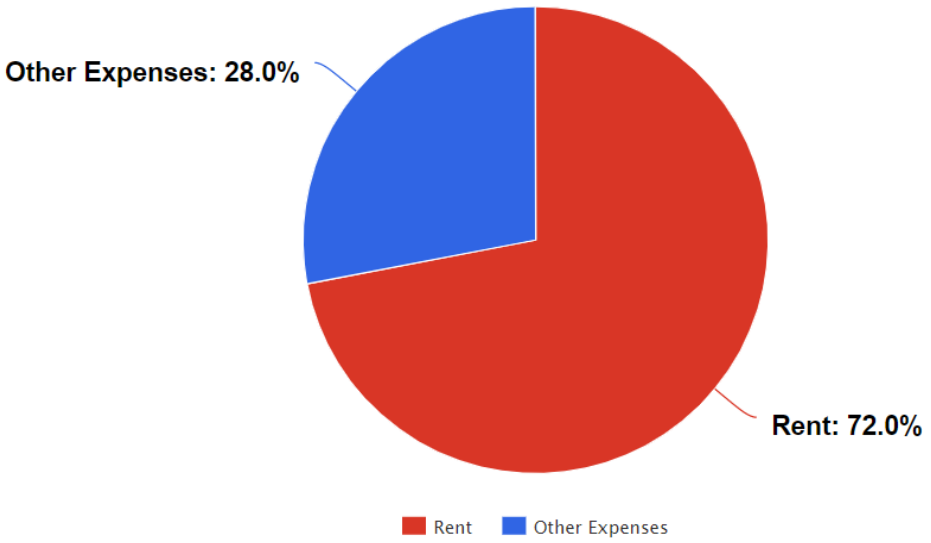
According to https://expatrist.com/rent-prices-in-ireland/, **The monthly average rent for a one-bedroom apartment in a city is €1,241**. However, the rent prices can be significantly higher in specific counties such as Dublin.

€1,241 x 12 (months in a year) = €14,892

**Annual Rent** = €14,892

€14,892 ÷ €20,578.20 = 0.7236784558

This means that 72% (rounded to nearest percentage) of your total net income is lost due to rent.



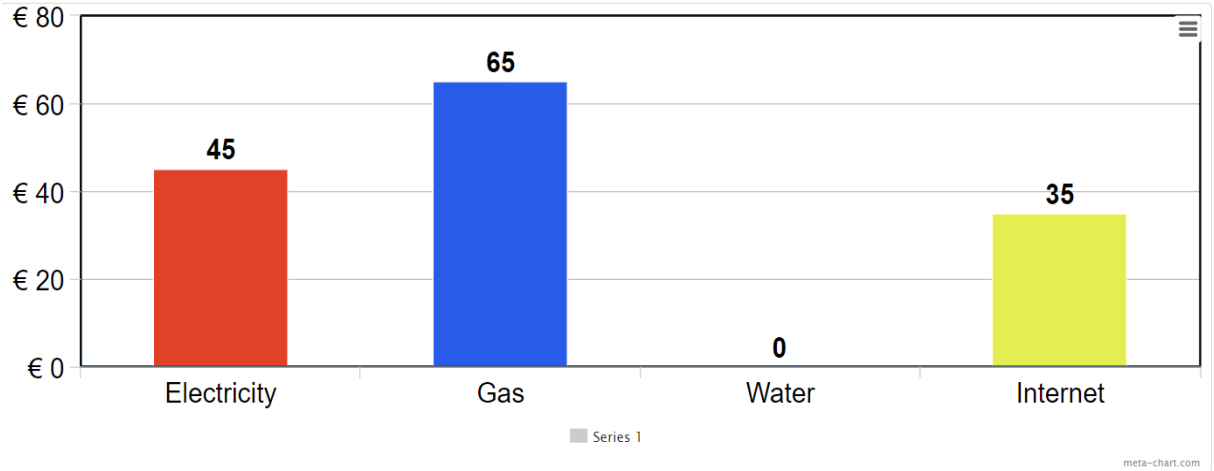
# Utilities Bill

Monthly utility costs refer to the expenses associated with providing essential services to a home or property.

These include:

- Electricity – €40-€50 per month (depending on usage)
- Gas – €60-€70 per month (If you have a gas heating)
- Water – There is currently no water charge in Ireland
- Internet – €30-€40 per month. = (basic internet plan)

You can expect to pay around €130 - €160 per month for utilities in a one-bedroom apartment in Ireland, depending on the individual's usage. ∴ **Utilities Bill per Annum** = €1,740



# Grocery Expenses

| Item | Average Price | Price Range |
|---|---|---|
| Milk (regular), (1 liter) | €1.18 | 0.79 - 1.90 |
| White Bread (500g) | €1.70 | 0.89 - 3.00 |
| Rice (white), (1kg) | €1.36 | 0.99 - 2.59 |
| Eggs (regular) (12) | €3.02 | 1.71 - 4.20 |
| Cheese (1kg) | €8.20 | 3.00 - 20.00 |
| Chicken Fillets (1kg) | €8.71 | 4.00 - 12.00 |
| Apples (1kg) | €2.32 | 1.00 - 4.00 |
| Banana (1kg) | €1.71 | 1.20 - 3.58 |
| Potato (1kg) | €1.62 | 0.80 - 3.00 |
| Lettuce (1) | €0.96 | 0.65 - 1.50 |
| Yogurt (500g) | €2.50 | 1.50 - 3.00 |

**Table representing the prices of commonly bought grocery items**

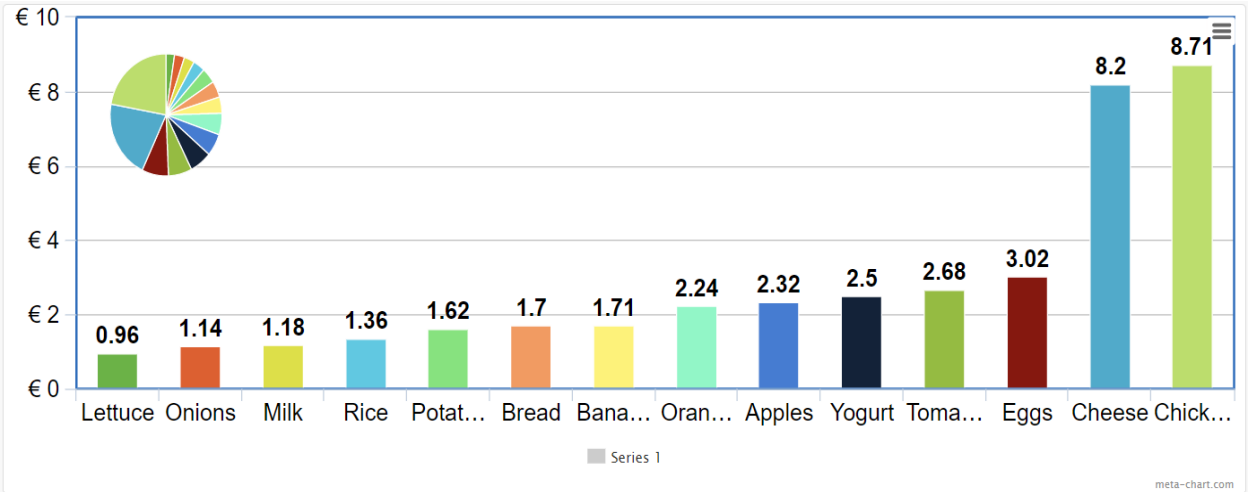
**Considering the individual purchases his groceries weekly, the total expenditure for food is calculated by adding all the prices together and multiplying by 52 (weeks in a year).**

After adding the prices of all the items together, I now have a total value of €33.28

€33.28 (weekly grocery expenses) x 52 = €1,730.56

∴ **Annual Grocery Expenses** = €1,730.56

**Note**: The items I used may not be equivalent to what the individual may purchase but they are accurate as they are some of the most common items people buy at a grocery store.




It is visual that both cheese and chicken are significantly higher in price so that could be something to consider when buying them.

# Gas Prices

According to https://www.mylpg.eu/stations/ireland/, The average cost of **petrol** in Ireland is **€1.61**, while the cost of **diesel** is **€1.71**. The average fuel consumption of a modern car is 9.3L/100km. Using these figures, I can calculate the annual cost of fuel for the journey to and from work (considering the car must travel 20km):

(9.3L/100km) ÷ 100 = 0.093L/km

0.093L/km x 20km = 1.86L

**Liters consumed to and from work** = 3.72L

3.72 x €1.61 = **€5.99** (cost of petrol)

3.72 x €1.71 = **€6.36** (cost of diesel)

Cost of gas x 5 working days x 52 weeks = Annual Gas Expense

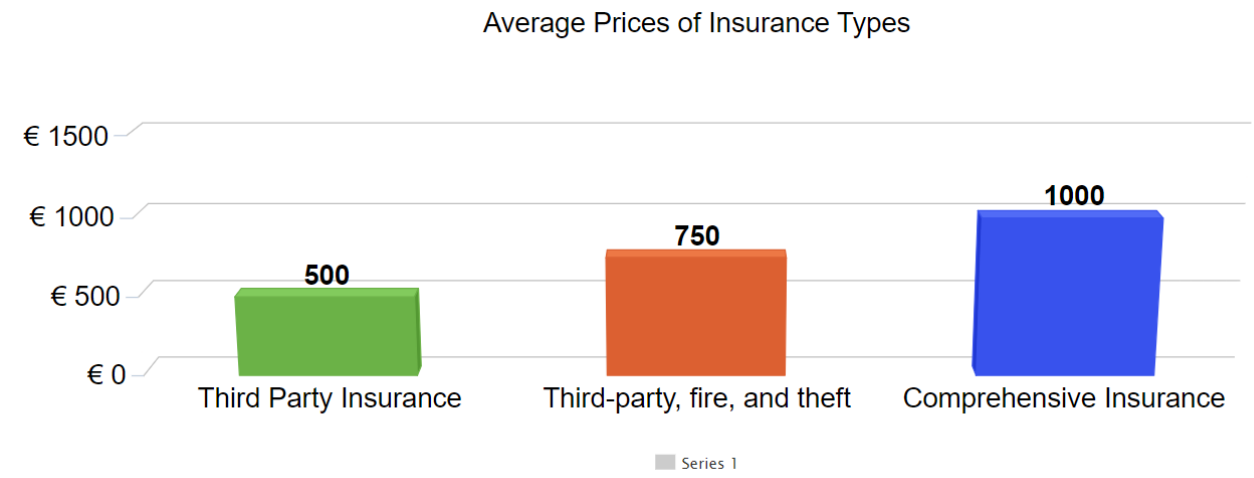
**Annual Gas Expense** (petrol) = €1,557.40

**Annual Gas Expense** (diesel) = €1,653.60

I will be calculating the final answer using the annual gas expense for **petrol** because it is the cheaper and logical option.

# Car Insurance

According to a report by https://switcher.ie/, a leading provider of price comparison services in Ireland, the **mean annual cost of car insurance in the country is estimated to be €676**. However, this amount varies depending on a range of factors, including the type of insurance policy selected and the extent of any additional coverage included in the policy.




Given the individual's objective of **saving money**, it is highly probable that he will opt for **Third Party Insurance at <u>€500</u>**.

# Variables and Constants

## Variables:

- Minimum Wage
- Utilities Bill
- Grocery Expenditure
- Gas Prices
- Type of fuel used
- Rent for a one-bedroom apartment
- Prices of grocery items
- Car Insurance

## Constants:

- Gross Salary (€23,504)
- Net income (€20,578.20)
- Working hours (9 – 5)
- Standard Rate of Tax (20%)
- Distance to work (20km)
- Form of Transportation (Car)

# Solution

**Using the figures calculated so far, we can solve the initial problem statement by forming an equation:**

500.00 – Car Insurance

1,740.00 – Annual Utilities Expenses

1,730.56 – Annual Grocery Expenditure

1,557.40 – Annual Gas Expense

+14,892.00 – Annual Rent

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**€20,419.96** – Total Annual Expenses

Net Income – Total Annual Expenses = Amount of Savings

€20,578.20 – €20,419.96 = **€158.24**

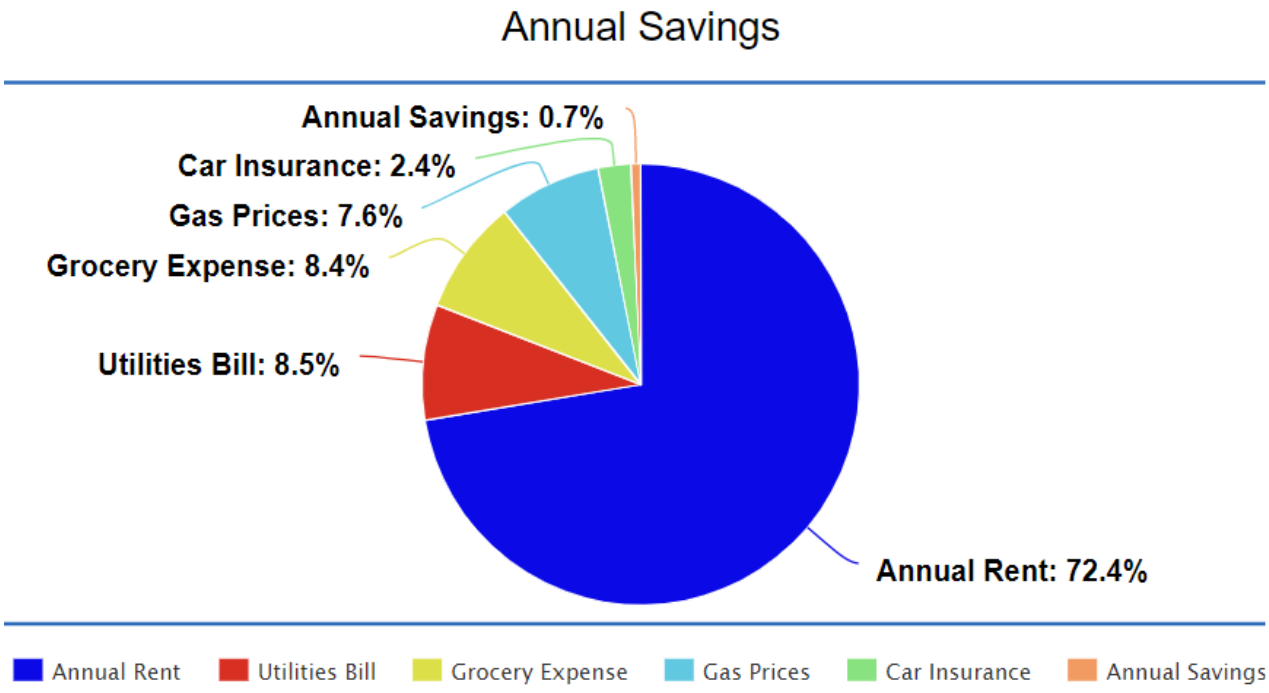
∴ **Amount of Savings = €158.24**

This indicates that the individual is only saving **0.7%** of their net income, which is significantly inadequate and insufficient for an individual.

# Conclusion

An individual earning minimum wage in Ireland saves approximately **€158.24** considering the necessities of daily life.

A crucial point to bear in mind is that despite my consideration of numerous factors to ensure accuracy in achieving this figure, there are still many more factors I have not covered that may affect the total amount of savings.



# Generalising the Approach

There are many aspects of my project that have practical applications in daily life. While calculating the net income, I used the following formula:

Gross income x Standard rate of tax – Tax Credits = Tax Payable

Gross income – Tax Payable = Net income.

If you are an employed person, this formula would be necessary to determine the net income.

While I was working out the gas prices, I attained a justified figure of 0.093L/km. This indicates the quantity of fuel consumed by a vehicle per kilometer traveled. Using this information, an individual can easily calculate their fuel expenses for a given period, provided they are aware of the distance to be covered

# Savings in a Lifetime

**To generalise this problem even more I can work out the lifetime savings of an individual earning minimum wage in Ireland.**

In order to calculate the solution for this, it is necessary to establish additional assumptions:

- The individual began working at the age of **18** and retired at the age of **66** as this is the official retirement age in Ireland.
- The individual's expenses persist at a consistent level throughout the duration of their lifetime.
- I assume the individual will abstain from expending any of their saving throughout their lifetime.
- The individual will not get a state pension as he does not contribute in PRSI payments

The **formula** for calculating the solution is: l = (y)(s)

**l** = Lifetime Savings

**y** = Years Worked

**s** = Annual Savings

As we already know the **annual savings** are **€158.24**, we must find the number of years the individual has worked.

**Years worked** = Retirement age - Starting age + 1 year (to include the first year of saving).

66 – 18 + 1 = **49**

∴ **Years worked** = **49**

Our formula, expressed as l = (y)(s), only requires the input of numerical values for the variables to find our solution.

l = (49)(158.24)

l = 7753.76

∴ **Lifetime Savings** = **€7753.76**

As I stated before, this figure is an approximate number and there are many factors which I have not considered that impact the accuracy of the solution (i.e., Inflation, Unexpected Events)

The average annual income in Ireland after tax is **€34,815** so to get the yearly savings, we subtract the annual expenses which is **€20,419.96**. This equals to **€14,395.04**. Using the same formula, we can calculate the lifetime savings of an individual earning the average salary in Ireland.

# I = (y)(s)

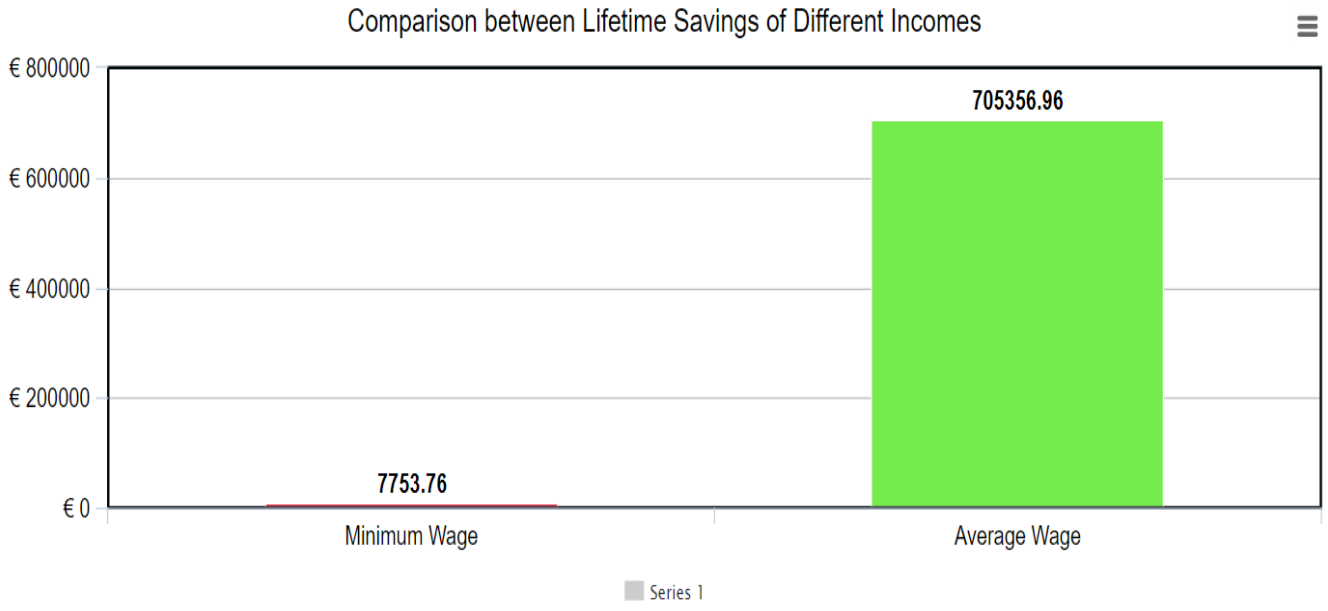
I = (49)(€14,395.04)

I = 705,356.96

**Lifetime Savings** (Average Wage) = **€705356.96**

**Lifetime Savings** (Minimum Wage) = **€7753.76**

The difference between these figures may seem overwhelming but this is the reality which shows how difficult it is to survive earning minimum wage




It appears as if there is no bar for the minimum wage section but if you look closely, there is a small red bar. This emphasizes how little you save if you earn minimum wage

# Personal Reflection

I have developed several assumptions to simplify the problem and facilitate the solving process. They were all realistic and necessary for achieving an answer.

The steps employed in the problem-solving process were highly precise, as they effectively guided me throughout the investigation. Due to the lack of time, I was unable to incorporate additional steps for a more accurate answer, but the solution attained is still a realistic figure.

The main strength in my analytical approach is that I developed an efficient justified strategy which helped me solve the initial problem. Another strength is that my answer is accurate and realistic because of the assumptions and steps I listed in the beginning of the process.

The main weakness of my solution is that there are many more expenses I have not listed which have an impact on the overall answer. If I were to do this again and had more time, I would consider more factors and address more aspects in my investigation for a more accurate result. i.e., Health insurance, Clothing costs, Entertainment, Recreation etc.