Higher APplciations of MatheMatics

Unit 3: Finance

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# Introduction

Welcome to the World of Finance in Higher Applications of Mathematics. In this unit you will be looking at lots of real world problems and skills you might find useful after you leave school. Although you might not use them yourself it might be good to understand where all the figures they give you come from.

When buying a house mortgage advisors will happily share interest rates and how much your monthly payments are going to be. But here we will see where those payments come from.

**Capital –** The amount of money being deposited or invested.

When buying a mortgage you need ‘capital’, it is in the form of the deposit required.

**Interest –** Money rewarded for investing. Can also be money added on to a loan.

# Simple and Compound Interest

Simple Interest is…

Simple Interest Calculations can use the following formula.

Interest = Principal amount x Interest Rate x Time

I = P R T

Example 1. Harriot is borrowing £500. The loan company charges a simple interest rate of 3% p.a. How much interest will Harriot pay if she pays it back after 3 year?

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Example 2. Monica deposits £1200 into a savings account. Her bank uses a simple interest rate of 2% p.a. How much will Monica have in her bank account in 4 years?

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Example 3. Jane invests £1000. She receives £15 interest. Calculate the interest rate she received.

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**Exercise 1: Simple Interest**

1. John puts £900 into a savings account. He receive a simple interest rate of 4.5% p.a. How much will John have in his bank account in 6 years?

2. Paula puts £1500 into a savings account. She receives a simple interest rate of 7.2% p.a. How much will Paula have in her bank account in 5 years?

3. Joan puts £2000 into her bank account. She receives a simple interest rate of 8% p.a. How long will it take for her bank account to exceed £2500? **Justify your answer with working**.

4. Owen puts £1200 into his bank account. After 1 year he received £150 interest. What was his interest rate?

5. Ian puts £2000 into his bank account. After 5 years he has received a total of £400 in simple interest. What simple interest rate is Ian receiving?

6. Lily borrows £500 from the bank. A month later she pays back £600. What is her monthly interest rate?

7. Erica borrows £3 from her friend. A week later she gives back £4. What is her weekly interest rate?

8. William puts £400 into a bank account. He receives a simple interest rate of 5% p.a. After 2 years of the money sitting in the bank, he takes it out. He spends $\frac{2}{5}$ of the money on himself and gives the rest two his brother. How much money does his brother receive?

9. Tina puts money into a bank account. She receive a simple interest rate of 5%. After a year she now has £5250, how much did she originally put into the bank?

10. Yousef puts money into his bank account. He receives a simple interest rate of 4%. After 2 years he now has £1296. How much did he originally put into his bank account?

Compound Interest is...

Example 1. No multiplier

Tanya puts £400 into her bank account. Her bank calculates interest annually at 5%.

Show Tanya's interest every year and here balance after 3 years.

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Example 2.

Kevin puts £1600 in his bank account. His bank calculates annually. The interest rate applied to his bank account is 6 % p.a. Calculate how much Kevin will have in his bank account after 6 years?

Give your answer to the nearest penny.

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Example 3.

The value of a painting drops by 3.92% every year. If the initial value of £8,900. How long will it take the value of the painting to drop below £8000?

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**Exercise 2: Compound Interest**

1. Dana puts £2400 in the bank account. She receives a compound interest rate of 4.5%. How much will Dana have in 7 years?

2. Erin puts £4000 in her bank account. She receive a compound interest rate of 2.25%. How much will Erin have in 5 years?

3. Aaron puts £3400 in his bank account. His bank offers him a monthly interest rate of 0.55%. How much money will Aaron have in his account in 5 months?

4. Chris puts £1800 into his bank account. He receives an interest rate of 6.2%. How long will it take for the amount Chris has in his bank account to be greater than £2400?

5. The value of a car in 2010 is £8,900. Every year the price drops by 7.5%. What will the value of the car be in 4 years?

6. The population of a country increases by 1.25% every 5 years. If the country has a population of 1,300,000 in 1980 what will the population be in 2020?

7. A firefighter’s salary is £56,000. Every year salaries should increase by 1.5% to match the rate of inflations. 3 years later firefighters’ salary has increased to £58,200. Is this more or less than the normal increase?

8. The annual sale of 4 branches of a fashion shop are given below.

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| --- | --- |
| Branch | Sales |
| Glasgow | £240,000 |
| Edinburgh | £299 000 |
| Motherwell | £275 000 |
| Livingston | £262 000 |

Each branch is expected to increase its sales by 7% per year. How many years will it take for each of the branches to reach sales of more than £300,000?

Example 4.

Ryan puts £800 into his bank account. In 4 years Ryan has £1050. What interest rate did Ryan get?

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Example 5.

With a compound interest rate of 8%, how long would it take for the initial amount to double?

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9. Adrian puts £500 into his bank account. After 4 years he now has £780. What annual interest rate did Adrian receive?

10. Tracy puts £3400 into his bank account, in 10 years she now has £4600. What interest rate did she receive?

11. With a compound interest rate of 6%, how long would it take for the initial amount to double?

12. With a compound interest rate of 9.2% how long would it take for the initial amount to treble?

13. If the population of a country is 18,000,000. The country’s population increases by 1.5% every year. How long would it take for the population to reach 23,000,000?

14. Alex has £4000 in the bank. If his interest rate is 3.5%. How long would it take for his money to reach £8000?

# Compound Interest with Multiple Rates

In reality interest rate rarely stay the same for long. This is because of the following reasons.

Banks use enticing deals to lure customers but lower once the customer is settled.

Interest rates generally fluctuate depending on how the economy is doing. Terms like a 'savers market' means it is a good time to save money. Other would be 'buyer’s market' means you are better investing your money in other ventures (houses, stocks and shares).

Example 1. Emily puts £8000 into her savings account.

Emily's bank calculates her interest annually on the 31st of December each year.

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| --- | --- |
| Date | Interest Rate(Annual) |
| 31st December 2008 | 2.3% |
| 31st December 2009 | 2.1% |
| 31st December 2010 | 1.9% |
| 31st December 2011 | 1.7% |
| 31st December 2012 | 1.6% |

a) Calculate how much Emily will have in the bank on the 31st of December 2012.

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b) When Emily opened the account she actually thought it was a fixed rate of 2.3%. How much more money did Emily think she was going to receive?

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Example 2. Time takes out a student loan of £18,000

Every year interest is added on the 28th of February.

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| Date | Interest Rate(Annual) |
| Feb 2013 | 0.75% |
| Feb 2014 | 1.1% |
| Feb 2015 | 1.05% |
| Feb 2016 | 0.95% |
| Feb 2017 | 1.45% |
| Feb 2018 | 0.58% |

a) Calculate the total amount Tim will owe for his student loan after 6 years. Give your answer to the nearest penny.

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Once Tim is out of university he gets a graduate job earning £42.250 a year.

You only begin paying a student loan back when earn more than £600 a week.

After this threshold 3.5% of your wage is paid for student loans.

b) Calculate how much Tim owes after his first student loan payment.

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Example 3. In August 2013 Helen starts university.

Every year in August she receives £4000.

Interest is calculated on her loan in July.

Her interest rates are as follows

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| Date | Interest Rates(Annual) |
| July 2014 | 2.5% |
| July 2015 | 2.3% |
| July 2016 | 1.95% |
| July 2017 | 1.8% |

Helen receives her student loan for 4 years. How much does she owe the student loans company in July 2017?

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**Exercise 3. Compound Interest with variable rates.**

1. Alex puts £2500 into her bank account on January 1st 2016. Her bank calculates interest on January 1st every year but the interest rate varies. The interest rates are as follows.

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| Date | Interest Rates(Annual) |
| Jan 2017 | 3.4% |
| Jan 2018 | 2.6% |
| Jan 2019 | 2.4% |
| Jan 2020 | 2.75% |

Calculate how much money Alex will have in her account on January 1st 2020?

2. Simone takes out a loan of £9000.

The loan gathers interest at the following rates being applied at March each year.

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| --- | --- |
| Date | Interest Rate(Annual) |
| Mar 2010 | 2.1% |
| Mar 2011 | 1.9% |
| Mar 2012 | 3.4% |
| Mar 2013 | 2.9% |
| Mar 2014 | 2.8% |
| Mar 2015 | 2.4% |

a) Calculate how much Simone will owe for her loan in March 2015?

Simone begins paying back her loan in March 2015.

She has a job earning £28,900 a year.

Her friend is a financial advisor and says she should spend 7.5% of her monthly wage to pay off the loan.

b) How much will Simone owe for her student loan after the first payment?

3. Maisy has a savings account with a variable interest rate.

She deposits the money on the 12th of April 2012.

Interest is calculated every year after on the 12th of April.

Her interest rates are as follows.

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| --- | --- |
| Date | Interest Rate(Annual) |
| April 2013 | 6.2% |
| April 2014 | 4.7% |
| April 2015 | 5.1% |
| April 2016 | 6.4% |

a) If Maisy put in £4000 on the 12th April 2012 how much will she have on the **12th April 2015**?

On the 5th of April 2016 Maisy has an issue from her car and takes £1500 out of her savings account to fix it.

b) How much less with Maisy have in her savings account on the 12th April 2016 compared to if she didn’t have to pay the repair on the car?

4. Sean goes to university in 2015.

He is paid his student loan on the 1st August every year.

Interest is calculated on the 31st of July.

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| --- | --- |
| Date | Interest Rate(Annual) |
| July 2016 | 5.2% |
| July 2017 | 4.1% |
| July 2018 | 3.6% |
| July 2019 | 4.5% |

a) How much will Sean owe for his student loan by the 31st July 2019?

Once Sean finishes university he gets a graduate job earning £38,750 a year.

Sean begins paying university fees once he is over a threshold of £550 a week.

Sean then pays 5% of his wage over his threshold back to the student loans company.

b) How much will Sean pay each month for his student loan?

c) If Sean is paid on the 30th from September 2019 to July 2020. How much will Sean owe the student loans company before interest is next calculated?

5. Carly has a savings account with a variable interest rate.

Her bank account across 5 years reads as follows.

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| Year 1 | £1500 |
| Year 2 | £1575 |
| Year 3 | £1631.70 |
| Year 4 | £1726.34 |
| Year 5 | £1848.91 |

Calculate the annual interest rate the Carly received each year?

6. Amina is looking at different banks. She finds the following two options.

**Option 1:** A Fixed rate of 3.1% per year.

**Option 2:** A variable interest rate with the following rates

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| --- | --- |
| Year 1 | 2.4% |
| Year 2 | 3.6% |
| Year 3 | 2.5% |
| Year 4 | 3.3% |

a) If Amina puts £1600 into her account. Which option should Amina chose? How much more would she get?

b) If Amina decides she might leave her money in longer than 4 years, why should she not chose the 2nd option?

7. Jamie is looking at different savings account options. He finds the following three options.

**Option 1:** A fixed rate of 2.8% per year.

**Option 2:** A variable rate of

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| Year 1 | 4.1% |
| Year 2 | 2.4% |
| Year 3 | 2.5% |
| Year 4 | 3.6% |

**Option 3:** A variable rate of

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| Year 1 | 1.25% |
| Year 2 | 2.9% |
| Year 3 | 3.3% |
| Year 4 | 4.5% |

If Jamie puts £4000 into his account, which gives him the best deal?

# Calculating VAT

VAT is the third major tax revenue for the UK government.

**Can you name the other two?**



VAT was cut in 2009, what effect would this have?

Hint: VAT was also cut June 2020.

Children’s clothes and most food you pay little to no VAT on.

There are other examples of this.

Unless otherwise stated VAT should be taken as 20%.

Example 1. The retail price of a TV without VAT is £905.

If James has £1050 does he have enough money to buy the TV?

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Example 2: The cash price of a laptop is £760. There is a deal on laptops being

14% off today. What is the total price of the laptop including VAT?

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**Exercise 4. VAT**

1. The price of a bill in a restaurant is £85.40 + VAT. What is the total cost of the bill?

2. A local shop sells a bookcase for £210 plus VAT. Online the same bookcase can be purchased for £249.99 which includes VAT. Which is better value?

3. A television is priced at £800 plus VAT.

There is a deal on it of 23% off.

What is the total cost of the TV?

4. A web designer charges £15,000 for 3 months work plus VAT.

During the same time she buys 2 computers for £1000 + VAT each.

The web designer must pay the government the VAT that she charged minus the amount she paid for the computers.

Calculate how much VAT she pays the government.

5. A driving instructor gives 140 lessons in a month.

In total he charged £980 VAT to all the lessons in total.

Calculate the price charged for a singles lesson.

6. In 2008 a TV costs £900 + VAT which was 17.5% at the time.

The following year VAT increased to 20%.

The shopkeeper wanted to make sure that the customer didn't pay any more for the TV than they would have in 2008. How much less did the shopkeeper make in 2008 compared to 2009?

# Effective Rates of Interest over Multiple Time Units

An effective rate of interest is an estimate or an approximation. We can use these to work out interest over multiple time units.

*Remember: 1 year = 12 months, 1 year = 52 weeks, 1 year = 365 days.*

Example 1: How much will you get if you invest £1200 for 3.75 years at an effective rate of interest of 3% per year.

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Example 2: How much will you get if you invest £4500 for 4 months, at an effective interest rate of 2.5% per year.

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Example 3: How much will you get if you invest £1800 for 11 weeks, at an effective interest rate of 3.4% per year.

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**Exercise 5. Multiple Time Units**

1. Sam invests £5000 for 4 and a half years with an effective interest rate of 4.5% per year, how much will he receive?

2. Anna invest £2800 for 2 years and 3 months, with an effective interest rate of 2.7% per year, how much will he receive?

3. Kevin invests £3000 for 7 months, with an effective interest of 2.9% per year, how much will he receive?

4. Oscar invests £6000 for 3 months, with an effective interest rate of 5.7% per year, how much will he receive?

5. Iona invests £750 for 18 weeks, with an effective interest of 4.6% per year, how much will she receive?

6. Leanne invests £2400 for 37 weeks, with an effective interest of 2.9% per year, how much will she receive?

7. Devesh invests £1400 for 9 months, with an effective rate of interest of 3.7% per 6 months, how much will he receive?

8. Beth invests £1850 for 3 months, with an effective interest of 1.8% per 6 months, how much will she receive?

9. Jack invests £6400 for 7 months, with an effective interest of 0.75% every 3 months, how much will she receive?

10. Rory is offered two deals with his bank.

Offer 1 – A weekly interest rate of 0.1% per week

Offer 2 – A year interest rate of 5% per year.

Calculate is Rory invested £2000, which is the better offer and how much more would he receive?

# Calculating effective interest rates between time units.

If you want to convert an effective interest rate from 1 amount of time to another, you must use the following formula. When converting into annual this is referred to as the Annual Equivalent Rate.

$$j=\left(1+i\right)^{\frac{y}{x}}-1$$

i stands for the original effective interest rate for x years

j is the effective interest rate you are converting into for y years.

Example 1: What is the effective interest rate every 6 months equivalent to an interest rate of 10% per year?

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Example 2: What is the effective interest rate every month is equivalent to an interest rate of 4.5% per year?

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Example 3: (AER) What is the effective rate of interest per year equivalent to 0.5% per month.

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Example 4: What is the effective rate of interest per 4 months, equivalent to 3.5% every 3 months?

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**Exercise 6: Calculating effective interest rates**

1. Calculate the annual effective interest rate, when you receive 4% interest after 6 months.

2. Calculate the effective interest rate of 6 months that is equivalent to 9% per year.

3. Calculate the annual effective interest rate equivalent to when you receive 1.2% per month.

4. Calculate the annual effective interest rate equivalent to when you receive 0.5% every 3 months.

5. Calculate the annual effective interest rate equivalent to when you receive 15% across 3 years.

6. Calculate the effective 4 month interest rate when you receive 8.2% for 2 years.

Example 5: Alan puts £4000 into the bank. In 6 months Alan has £4150, what is the AER of what is receiving with this bank account?

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Example 6: Interest on loans. John borrows £2700 from a loan provider. 6 months later he much pay back £3000. What is the AER of his loan?

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7. Jessie puts £8000 in the bank. In 4 months she now has £8400. What is Jessica’s bank account’s AER?

8. Mark puts £2800 into his bank account in end of June. By the end of September he not has £2980. What is the bank accounts AER?

9. Stephen puts £1900 into his bank account on the 24th of March 2018. By the 24th of April 2019, Stephen has £2415. What is the AER of this bank account?

10. Heather borrows £1200 from a loan provider. 4 months later she pays back £1300. What is the AER of this loan?

11. Jane takes out a loan of £2450 on the 1st of February. On the 1st of September she pays back £2600. What is the AER of the loan?

12. Abdullah takes out a loan of £5100 on the 3rd of July 2010. He pays back £5850 on the 3rd of January 2012. What is the AER of the loan Abdullah took out.

13. Natalie takes out a loan of £800. A month later she pays back £900. What is the AER of her loan?

14. Cameron takes out a loan of £1500. 18 weeks later be pays back £1620. What is the AER of his loan?

15. Fraser takes out a loan of £9000 on the 1st of March 2017. On the 1st of June 2019 he pays back £11200. What is the AER of this loan?

Consumers and small businesses may find themselves in a financial bind and need a short-term or "bridge loan" to tide them over until additional resources become available. If used responsibly, short-term loans can be invaluable tools for times when money is tight, credit is unavailable and a problem like an emergency bill or automotive repair needs to be handled immediately. There are numerous pros to short-term loans but the cons can be significant and it is important to understand the benefits and limitations before signing on the dotted line.

Do you know any companies that offer short terms loans? Do you know of any negatives or positives to them?

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Short term loans are famous for having ridiculously high AERs (Like hundreds and thousands of AER). This is due to the short term nature of the deals.

Example 7. Gary borrows £500 from a short term loan provider to cover the overheads of an event he is hosting. 3 days later he pays £540 back to the loan provider

a) Does this seem like a sensible loan? YES/NO

b) Calculate the AER of the loan.

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16. Amy borrows £200. A week later she pays back £210. What is the AER of this loan?

17. Riley borrows £50. A 5 days later he pays back £65. What is the AER of this loan?

18. Sophie borrows £400. Two weeks later she pays back £455. What is the AER of this loan?

19. Natalie borrows £180. 2 days later she pays back £200. What is the AER of this loan?

20. Amal borrows £300. 6 hours later she pays back £303. What is the AER of this loan?

# AER with Multiple Payments

Example 1. Alan borrows £2000. He pays the loan across 8 monthly instalments of £330 each. Calculate the AER of this loan.

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Example 2. Olivia borrows £9000. She pays her loan back across 48 months with £244.40 per month. Calculate the AER of this loan.

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**Exercise 7: AER with Multiple Payments**

1. Hannah borrows £2800. She pays back the loan across 8 months, with 8 payments of £475. Calculate the AER of the loan.

2. Lewis borrows £6000. He pays back the loan across 36 months, with payments of £182 a month. Calculate the AER of the loan.

3. Dana borrows £7500. She pays the loan back across 48 months, with payments of £162 a month. Calculate the AER if the loan.

4. Gary borrows £2400. He pays back the loan across 6 payments of £240 and 6 payments of £218. Calculate the AER of the loan.

5. Samantha borrows £9000. She pays an initial deposit of £3500, then pays the rest back over 48 months, paying £178 a month. Calculate the AER of the loan.

# Finding the initial amount (Present Value)

Example 1. Say we need £1000 in one years. The effective rate of interest in our bank account is 5% per year. How much money do we need to Deposit into our account originally to meet this target?

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Example 2: If you want to save up £18,000 in 4 years and you have an interest rate of 3.4%. How much will you need to deposit originally?

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Example 3: If you want to save up £12,000 in 10 years and you have an interest rate of 0.5% per month. How much would you need to originally deposit?

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**Exercise 8: Finding the initial amount (Present Value)**

In order to find the initial amount you can use the following formula

$$Initial Amount=\frac{Future Amount}{\left(1+i\right)^{n}}$$

1. If you want to save £3000 in 2 years and you have an interest rate of 3.5%.

How much would you need to deposit?

2. If you want to save £9800 in 6 years and you have an interest rate of 9%.

How much would you need to deposit?

3. The Smiths are saving up £40,000 for a deposit on a house. They want to make it in 8 years time and have an annual effective interest rate of 7.5%. How much would they need to deposit?

 4. Miss Anderson is saving up £100,000 to start a business. She gets an effective monthly interest rate of 0.3%. She is going to save for the next 15 years. How much should she deposit if she is going to reach her goal?

5. Kiera is saving up £10,000 for a deposit. She receives a monthly interest rate of 0.25%. She is saving for 6 years, how much should her initial deposit be?

6. Joseph is saving up £1200. He receives an annual interest rate of 4.5% p.a. He is saving for 4 years, how much should his initial deposit be?

7. Gordon is saving up £4000 in 7 months, receiving interest monthly. Gordon’s AER is 5.2%

a) Calculate Gordon’s monthly interest rate

b) What is the initial deposit that Gordon should make?

8. Pam is saving up £2500 in 5 months, receiving interest monthly. Pam’s AER is 4.2%.

What initial deposit should Pam make?

9. Angela is saving £1800 in 11 months, receiving interest monthly. Angela’s AER is 3.6%.

What initial deposit should Angela make?

10. Michael is saving £3500 in 19 months, receiving interest monthly. Michael’s AER is 5.2%. What initial deposit should Michael make?

**Present Value**

Another name for this is the present value. But it is calculated in the exact same way.

11. Calculate the present value of £19,000 in 8 years if you interest rate is 4% per year.

12. Calculate the present value of £25,000 in 10 years if your interest rate is 2.6%.

13. Calculate the present value of £10,000 in 10 years time if you will have the following interest tate

2.5% for the first 3 years.

2% for the remaining 7.

14.

15.

# Income Tax

When we have jobs and are getting paid, we must contribute parts of out wage to ensure that the country has enough money to run properly.

Parts of our country such as the NHS are funded primarily through money gained from the residents income tax.

Online tax caluclators and more information can be found on

<https://www/gov.uk/income_tax>

Personal Allowance is…

Tax in the UK is calculated from April to April.

Personal allowance for the majority of people is around £10,000.

There are circumstances were this changes such as having a second income and being able to use a spouse's personal allowance.

Unless otherwise stated use the table below for Income Tax questions.



Example 1. William is paid £14.50 an hour.

He works 28 hours a week.

a) How much income tax will William pay per year?

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b) How much will William take home each month?

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Example 2.

Hannah earns £58,000 a year.

Calculate how much income tax Hannah will pay.

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Example 3:

Zach earns £215,000 a year.

a) how much income tax will Zach earn?

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b) What percentage of his wage goes to income tax?

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**Exercise 9: Income Tax**

1. Iain is paid £1950 a month. How much income tax will Iain pay annually?

2. Gareth is paid £18.20 an hour. He works 35 hours a week. How much income tax will Gareth paid annually?

3. Cara is paid £32,800 a year. If Cara is paid in 12 equal instalments, how much will Cara take home every month after income tax has been deducted?

4. Ryan is paid £19,950 a year. If Ryan is paid in 12 equal instalments, how much will Ryan take home every month after income tax has been deducted?

5. Jaya is paid £83,100 a year. How much will Jaya take home every month after income tax has been deducted?

6. Peter is paid £162,000 a year. How much income tax will Peter pay a year?

7. Dana is paid £37,500 a year. Calculate what percentage of her total wage is paid as income tax.

8. Jarik is paid £65,000 a year. Calculate what percentage of his total wage is paid as income tax.

# National Insurance

Similar to income tax, national insurance is paid for different aspects of running a country.

You will also need to contribute money for national insurance if you want to qualify for a state pension.

Much like income tax, there will be a threshold on how much you need to earn before you need to contribute any money.

You can also be **contracted out** of national insurance, which means you will pay a lower rate of national insurance but the pension you receive might be significantly lower.

Unless otherwise stated use the following to calculate national insurance.



Example 1.

Simon earns £13.50 an hour and works 35 hours a week.

Calculate how much national insurance he will pay a year.

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Example 2:

Rihannon earns £58,600 a year.

Calculate how much national insurance she will pay in 1 year.

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**Exercise 10.**

1. Mairead is a Pharmacist and earns £59,000 a year, calculate how much national insurance she is going to pay a week.

2. Peter earns £13.80 an hour. He works 30 hours a week. Calculate how much national insurance he is going to pay a year.

3. Emma earns £29,800 a year. Calculate how much national insurance she will pay across one year.

4. Mark earns £12.50 an hour. He works 32 hours a week. Calculate how much money he will earn a week, after national insurance has been paid.

5. Karine earns £1700 a month. Calculate how much national insurance she will pay a year.

6. Julia earns £41,000 a year. Calculate what percentage of her total wage deducted for national insurance.

7. Alex earns £65,600 a year. Calculate what percentage of his total wage is deducted for national insurance.

# National Insurance and Income Tax

Example 1.

Harry earns £9.60 an hour and works 28 hours a week.

Calculate Harry's annual take home pay.

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Example 2

Jane earns £95,000 a year.

Calculate her annual take home pay.

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**Exercise 11: Income Tax and National Insurance**

1. Harry earns £42,000 a year. Calculate his take home pay after Income Tax and National Insurance is deducted.

2. Maike earns £51,000 a year. Calculate her take home pay after Income Tax and National Insurance is deducted.

3. Jordan earns £15.40 a year. Calculate his annual take home pay

4. Ailsa earns £2,600 a month. Calculate her annual take home pay.

5. Scott earns £86,900 a year. Calculate his annual take home pay.

6. Molly earns £65,900 a year. Calculate her annual take home pay.

# Loan Repayments

Example 1: Borrowing £1200 for a loan.

With a bank charging £5% interest per month.

Repaying £120 each month.

Create a table to show the repayments.

Show how long it will take to pay and how much you will pay in total.

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Example 2: Rona borrows £4500

The bank charges 10% interest every year.

At the end of each year she pays back £700.

a) How many years will it take to pay back the money.

b) How much will she pay the bank.

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**Exercise 12: Loan Repayments**

1. £500 borrowed at 9% interest and repaid at £200 per year.

2. £1200 borrowed at 14% interest and repaid at £350 per year

3. £2000 borrowed at 7.5% interest and repaid at £400 per year

4. £1500 borrowed at 11% interest and repaid at £375 per year.

# Loan Terminologies

Interest Content - How much of the repayment is made up of interest.

Capital Content - How much of the repayment is made up of repayment of capital.

Loan Outstanding - The amount of the loan remaining after the repayment has been made.

Example 1: Fraser borrows £2000. The bank charges him 12% APR. If Fraser paid it back in 2 years how much would be his

a) Interest Content

b) Capital Content

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Example 2: Amelia borrows £4000. Her bank charges 5% interest annually. Every year Amelia pays back £500.

a) After a period of 4 years calculate Amelia's Loan Outstanding

Once the full loan has been paid what is Amelia's

b) Interest Content

c) Capital Content

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Example 3: Ian borrows £2800. The interest on this is 3% p.a.

In his first year Ian paid back £250. Every year Ian is going to pay back an extra £50 from the year before.

a) How long will it take Ian to pay this back?

b) What is the interest content of this loan?

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**Exercise 13: Loan and Capital Content**

# Calculating APR from loan repayments.

$$i=\left(\frac{A}{C}\right)^{\frac{1}{n}}-1 $$

A – final amount

C – initial amount

n – number of years

Example 1: Aaron takes out a loan of £1200, he pays back £1500 back the following year. What is the APR of this loan?

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Example 2: A loan of £2500 is paid is repaid by a payment of £3200 made 5 years later.

What is the APR of the loan?

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Example 3: A loan of £12000 is paid is repaid by a payment of £14500 made 10 years later.

What is the APR of the loan?

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**Exercise 14: APR from Loan Repayments**

1. £1000 repaid by single repayment of £1100 made after 1 year

2. £1000 repaid by single repayment of £1400 made after 4 years

3. £4500 repaid by single repayment of £5000 made after 2 and a half years.

4. £25000 repaid by single repayment of £30000 after 10 years.

# Mortgages

Mortgage are large loans typically used to purchase property.

Mortgage's are typically given out to cover 95% of the value of the property

The applicant must to be able to cover the following

* Deposit of 5% of the value of the property (If it is a 95% mortgage)
* If applicant has bid over the value of the house they must pay the excess
* Any legal fees from buying the house (typically in total will be about £1000)

Example 1

Paul is buying a house valued at £145,000.

His bid of £149,222 is accepted.

His mortgage will cover 95% of the value of the property

His legal fees will total £995

How much will Paul pay up front when buying this house.

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**Exercise 15: Mortgages**

1. Gillian is buying a flat valued at £98,750. She bids £99,888.

It is a 95% Mortgage. Legal fees total to £1080.

2. Joe is buying a house valued at £238,000. He bids £277,111.

It is a 90% Mortgage. Legal fees total to £2400.

3. Liam is buying a plot of land valued at £320,000. He bids £328,500.

It is a 97% Mortgage. Legal fees total to £840.

# Inflation

Inflation is when prices are generally increasing.

The effects of relatively gently inflation with the cost of goods and services are as follows.

* The economy is stimulated since consumers and businesses have an incentive to use money either by spending or investing.
* Debt is reduced in real terms for both individuals and most importantly, for the state.

To show this in real terms.

If you invest £2000 in a bank account with a 1% interest rate.

You will have £2020 after 1 year.

But if inflation is at 2%, this means that your £2020 would be worth less than the £2000 was the year before, because the rate of inflation is higher than your interest rate.

The government uses a ‘Consumer price index’ known as a CPI. In order to calculate the inflation rate between two different periods of time. Below is a list of selected CPI indexes (a larger list is shown at the back of this booklet to be used in questions).



To calculate the inflation rate use the following formula .

$$Inflation Rate=\frac{Current CPI}{Previous CPI}-1$$

Example 1: What is the rate of inflation between July 2012 and July 2013?

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Example 2: a) Calculation the inflation rate between January 2010 and January 2015?

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b) If you invested £2000 in January 2010, how much would it need to be worth in January 2015 to match the rate of inflation?

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Example 3: Find the average rate of inflation per year between July 2011 and July 2014.

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**Exercise 16: Inflation (Use the CPI booklet at the back)**

1. Calculate the inflation between the following.

a) February 1988 and September 1993

b) December 2002 and September 2010

c) January 2007 and December 2014

d) March 1991 and April 2019

2. Calculate the average rate of inflation between the following.

a) March 2004 and March 2018

b) September 1995 and September 2003

c) January 1989 and January 2020

3. A painting is bought in January 2008 for £30,000. How much would this equate to in January 2019?

4. A company is bought for £400,000 in September 1999 and sold for £565,000 in September 2015. When taking inflation into account how much profit was made on selling the company?

5. A house is bought for £145,000 in July 2010.

a) Calculate the value of the house in July 2021. Give your answer to the nearest thousand.

b) Find the average rate of inflation between July 2010 and July 2021.

If inflations continues in this average rate from July 2021 to July 2025

c) Estimate the value of the house be in July 2025.

6. A company is bought in February 1994 for £500,000.

a) How much would this equate to in February 2016?

b) How much would the company need to be sold for in February 2018 to make a 15% profit on the company.

7. A rare comic book is bought in March 1996 for £4000. In March 2009 it was sold for £5650. How much profit was made on comic book taking inflation into account.

8. A painting is bought for £50,000 in December 1996. It was sold for £89,500 in December 2013. What was the percentage of profit made on the painting.

9. A car is bought for £12,000 in January 1994. It was sold in January 2000 for £6850.

10. A house was bought in March 1996 for £140,000.

a) Calculate the inflation from March 1996 to March 2004.

b) Calculate the price of the house in March 2004 (adjusted for inflation) to 2 significant figures.

c) Calculate the average rate of inflation from March 1996 to March 2004.

d) If this average rate continues calculate the price of the house in March 2014.

e) Starting from March 1996 at £140,000 adjust the price of this due to inflation to Match 2014 and compare to your answer for part d.

**RPI**

There is also a 'Retail Price Index'

This is the old version of the 'Consumer Price Index' , if has since been found not to meet the standard for a National Statistic.

However CPI only goes back to 1989 while RPI goes back to the early 1900s.

Both are different because they relate to a different 'basket of goods'.

It is still sometimes used when negotiating wages.

Example 1: Using the RPI, how much should someone getting paid £32,500 in 2015 make in 2020?

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Example 2. Tim works as a Truck driver. In 2008 he made £27,600 a year.

His contract was up for renewal in 2011. He was offered £31,400. Should Tim accept this deal or does he have reason to deserve better pay?

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**(For the following us the RPI index at the back of the booklet)**

11. Rona is paid £32,500 in 2004. How much should she expect to earn in 2008?

12. In 2010 a union of Electricians are deciding on a pay rise they have been offered.

a) On average they earn £40,000 in 2010. How much should they expect to earn in 2013?

b) They are offered a pay increase of 1.2% per year. Is this a good deal when taking into account the current rate of inflation using the RPI index.

13. Social workers in 1995 are paid on average £25,600 a year. They are offered the following deal

1.5% increase in 1995

2% increase in 1996

0.5% in 1997 and 1998.

a) How much will Social Workers earn in 1998?

b) Using the RPI index, find out how much Social Workers should earn in 1998 to match the rate of inflation.

14. In 1940 Teachers were paid £500 a year. How much is that in today’s money? (Use 2020)

15. A union of waiter’s earn on average £11,900 a year in 1992. They are offered the following pay increase

1992 – 0.5%

1993 - 1%

1994 – 1.4%

1995. 2%

a) How much would this mean they are paid in 1995?

b) Is this more than they should expect?

# Insurance

Insurance provides the buyer with financial protection against the risk of loss.

These products all work in a similar way, where a contract (or policy) is set up between the insured individual and an insurance company. The insured individual pays the insurance company a (relatively smaller) amount of money, called a premium, and the insurance company agrees to pay out a (relatively larger) amount of money, called the benefit (sometimes called sum assured), if the insured event (e.g. a car accident) occurs.



There are a few different types of insurance.

**Life Insurance**

**Life insurance** pays out a sum assured on the death of an individual. Since the individual is no longer alive in this case, the **benefit** is paid to a spouse or child (sometimes called a dependant). Life insurance contracts can be single life (paying out on the death of one individual) or sometimes joint life (paying out on the death of either of two individuals, often two spouses).

*Question*

*Would you expect the life insurance premium to be higher or lower for an older person?*

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**Health Insurance**

Health insurance pays out benefits to cover the cost of private medical treatment of an individual, for example, on diagnosis of a serious illness.

These products come in many different product forms, for example Private Medical Insurance (PMI) or Critical Illness (CI) contracts. They can differ greatly in terms of what illnesses and treatments are covered and exclusions may apply. For example, some critical illness contracts may pay out in the event of the individual suffering from a serious illness only, and this often needs to be diagnosed by a qualified medical professional (e.g. doctor).

**Buildings Insurance**

**Buildings insurance** pays out benefits to cover the cost of repairing damage to the structure of a property e.g. a person's home. It often covers the building itself, and any 'fixtures and fittings' which are considered to be permanent parts of the building, for example, a fitted kitchen or a toilet.

**Contents Insurance**

Contents insurance pays out benefits to cover the cost of replacing items inside a property if they are destroyed, damaged or stolen.

For an individual, they often want 'home contents insurance' for the contents of their home.

*Question*

*Make a list of different things you would find in a house and if they would require Buildings or Contents Insurance*

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**Car Insurance**

Car insurance pays out benefits to cover the cost of financial losses as a result of the person's car being stolen or damaged. It is nearly always a legal requirement for a car owner to buy car insurance, with significant penalties in place (including large fines or having the vehicle seized) if you drive without insurance.

In the event of a car accident, the insurer will pay out if the insured individual caused the accident. If another driver is to blame, then their insurer should pay out instead.

There are three main types of car insurance: ‘Comprehensive’, ‘Third Party’ and ‘Third Party Fire and Theft’.

*Question*

*The price of insurance varies for a number of reasons, list as many as you can below.*

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**Exercise 17: Insurance**

1. When buying Buildings and Contents cover and your house is worth £200,000, why is it important to make sure that your total cover is for more than £200,000?

2. You can pay your car insurance in a one of premium of £1700 or for £146.20 a month. Give a good reason to take either offer.

3. Can you give an example of compulsory insurance and insurance that is not compulsory?

4. Calculate the annual cost of insuring a set of golf clubs worth £375 at a rate of £6.40 per £50.

5. Nadia has purchased a new home cinema system costing £2 200.

She has contacted two insurance companies for quotes on the cost of insuring the

system and for paying the premium monthly. The quotes are given below.

 Domestic Insurance Ltd. Axia Insurance

 Annual charge £7.20 per £100 Annual charge £4.20 per £500

 **Extra charge for monthly** **Extra charge for monthly**

 **payment**: 10 % of premium **payment**: £25

Nadia chooses the cheaper company.

Which company will she choose and how much will she save?

6. Stephen owns a yacht valued at £52 500. The annual cost of insuring the yacht is £1197.Calculate the rate per £1000 which the insurance company charges for insuring the yacht.

7. Sasha owns a Porsche car. It is valued at £32 500 and costs £2 340 to insure annually.

Calculate the rate per £100 the insurance company charge to insure the Porsche.

8. Asif owns an antique clock valued at £4600. He contacts an Insurance company to get a quote for insuring his clock. He is quoted an annual premium of £147.20.

Calculate the rate per £50 the insurance company has quoted Asif.

9. The table shows the holiday insurance premiums for safaris and cruises to Africa.

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|  Duration |  Safari |  Cruise |
| Up to 9 days |  £30 |  £24 |
| 10 to 17 days |  £38 |  £30 |
| 18 to 23 days |  £45 |  £34 |
| 24 to 31 days |  £50 |  £40 |

**Under 16 is a 25% discount. Over 60 is a 30% increase.**

a) Find the cost of insuring Sheila, aged 32, and George, aged 36, on a 21 day safari to Kenya.

b) Mr. and Mrs. Smith, both aged 44, are going on a cruise with their children Sarah, aged 14 and Simon aged 11, and Mr. Smith’s mother aged 70. Their cruise will last 16 days. Calculate their total insurance premium.

c) Mr. Chan, aged 66, is taking his grandson Raymond, aged 15, on a 4 week safari. Calculate their total insurance premium.

# Irregular (Ad Hoc) Payments

Example 1.

We have an effective interest rate of 4% per year.

The following payments are made in an out of a bank account.

In the beginning £300 is paid in.

After 3 years £400 is paid in and after 6 years £250 is paid in.

Calculate how much will be in the bank account in 8 years.

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Example 2. John has an interest rate of 3.2%.

The following payments are made in and out of a bank account.

In the beginning John deposits £1000

After 2 years £500 is paid in

After 4 years £200 is paid out.

How much will John have in his bank account in 5 years?

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Example 3. Zoe opens a bank account and puts £2000 into it.

Her interest rate is 2.9%

In the beginning Zoe deposits £700

After 1 year she deposits £400

After 3 years she withdraws £150

After 5 years she withdraws £200

After 7 years she deposits £300

How much will Zoe have in 10 years?

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**Exercise 18: Irregular (Ad hoc) Payments**

1. Jason opens a bank account with an interest rate of 2.5% p.a..

In the beginning he puts in £400

After 1 year he puts in £250

After 3 years he puts in £100.

How much will Jason have in his bank account after 6 years.

2. Stella opens a bank account with an interest of 3.5% p.a.

In the beginning she puts in £800

After 3 years she takes out £200

After 5 years she puts in £400

How much will Stella have in her bank account in 8 years?

3. Christopher opens a bank account with an interest rate of 4.8% p.a.

In the beginning he puts in £1000.

After 2 years he takes out £200

After 3 year he puts in £400

After 5 years he puts in £250.

Calculate how much he will have in 8 years.

4. Iona opens a bank account with an interest rate of 5.5% p.a.

In the beginning she puts in £750

After 1 year she puts in £400

After 5 years she takes out £200

After 7 years she takes out £100

How much will she have after 10 years?

5. Francesca opens a bank account with an interest rate of 6% p.a..

She puts £1500 into the account.

After 3 years she puts in £400

After 5 years she puts in £250

After 7 years she deposits one final amount to take the total in the account to £2600.

How much is the final deposit.

6. Karine opens a bank account with an interest rate of 2.8% p.a.

She puts £1000 into the account.

After 2 years she puts in £500

After 4 years she takes out £600

After 6 years she takes out all of the money apart from £200.

How much did Karine take out after 6 years?

7. Barrett opens a bank account on the 1st November 2012 and puts £2000 in the account.

It has an annual 3.6% interest rate.

He makes the following transactions.

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| 1st November 2014 | Deposit £800 |
| 1st November 2017 | Withdraw £165 |
| 1st November 2018 | Withdraw £500 |
| 1st November 2020 | Deposit £200 |

How much will Barrett have in his account on the 1st November 2021?

# Level Payments

Example 1: Beginning in January 2004. Danial has an interest rate of 2.5% p.a.

Every year he puts in £200. How much will he have in 5 years?

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Example 2. Beginning in January 2010.

Anna makes regular payments of £120.

From 1 January 2010 until 31 December 2012 Anna’s interest rate is 2%

From 1 January 2013 until 31 December 2015 Anna’s interest rate is 1.5%

How much will Anna have in her bank account on 1 December 2016

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Example 3: Today is 1 January. You decide to make regular payments into your bank account on the 1st of every month, including today and up until (and including) November this year,

The effective interest rate is 1.5% per month from January to March, but changes to 3.5% per quarter year from April onwards.

How much will you have in your bank account on 1 November (after the payment has been made).

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**Exercise 19: Level Payments**

1. Matthew puts £400 into his bank account every year on 1 January, beginning in 2009. How much will he have on 1 January 2015 if his interest rate is 4% p.a?

2. Una puts £120 in her bank account and then again at the beginning of every month for 10 months. If her bank account is an effective interest rate of 3.5% p.a how much will she have in the account in 10 months?

3. Robert puts £200 into his bank account and the once every month for 7 months. If his bank account has an effective interest rate of 3.5% p.a how much will he have in his bank account after 7 months and he has made his seventh payment?

4. Barry puts £150 into his bank account. He then does the same at the beginning of every year.

For the first 3 years his bank account gives him an interest rate of 5.2% p.a.

For the following 3 years his bank account gives him an interest rate of 4%.

How much will Barry have in his bank account after 6 years after he has made his final deposit of £150?

5. Aisha puts £300 into her bank account. She then does the same thing at the beginning of every year.

For the first 2 years her interest rate is 3.5% p.a.

For the following 3 years she receives an interest rate of 5.4% p.a.

How much will Aisha have in her bank account in 5 years after she has made her sixth deposit?

6. Gary puts £100 into his bank account every month. He then does the same at the beginning of every month.

For the first 4 months he receives an interest rate equivalent to 5% p.a.

For the following 3 months he receives an interest rate of 0.5% per month.

How much will Gary have in 7 months?

7. Tiya puts £200 into her bank account every month. She does the same every month after that.

For the first 5 months she receives an interest rate of 0.5% per month.

For the following 3 months she receives an interest rate equivalent to 1.4% every 3 months.

How much will Tiya have in her bank account in 8 months?

8. Ryan puts £200 into his bank account every year,

For the first 3 years he receives an interest rate of 5% per year,

For the following 2 years he receives an interest rate of 3% every 6 months.

How much will Ryan have in his bank account in 5 years?

9. David puts £400 into his bank account every year.

For the first 2 years he receives an interest rate of 3.8% per year,

For the following 2 years he receives an interest rate of 0.15% per month.

How much will David have in his bank account in 4 years?

10. Mariam puts £500 into her bank account every year.

For the first 3 years she receives an interest rate of 4.2% per year.

For the next 2 years she receives an interest rate of 2.6% every 6 months.

For the following 2 years she receives an interest rate of 0.35% per month.

How much will Mariam have in her account in 7 years?

# Regular Payments w/ varying proportions

Example 1. John pays money into his bank account at the beginning of every month. The first payment is £350 and the payment reduce by £50 each month. The bank account gives him an effective interest rate of 3.6% per year.

Calculate how much John will have in his bank account after 5 months.

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Example 2. Alice pays money into her bank account for 6 months. She initially puts in £300 but every month she increases the amount by £25.

Her bank offers an effective interest rate of 2.5% p.a. How much will Alice have in her account in 6 months?

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Example 3. Beginning on the 1st of August Sophie pays £200 into her bank account.

She makes a deposit on the 1st of every month but her payments increases by 5% every month.

She does this until the 1st of December.

Her bank account also gives her an interest rate equivalent to 2.8% per year.

How much will Sophie have in her bank account on the 1st of December?

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Example 4. Ross initially pays £300 into his bank account. Every month he pays in 4% less than the following month. He receives an interest rate of 6.2%.

How much will Ross have in his bank account in 7 months?

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**Exercise 20: Regular payments with varying proportions**

1. Zach initially puts £100 into his bank account on 1 January. Every month on the 1st he makes a deposit and increases his payment by £10. The interest rate he receives is equivalent to 3.2% p.a. How much will Zach have in his bank account on the 1 August?

2. Viola puts £500 into her bank account on the 1 August. Every month on the 1st she makes another deposit but every month her payment decreases by £20. The interest rate she receives is equivalent to 5%. How much will Viola have in her bank account on the 1 December?

3. Andy puts £400 into his bank account on the 1 March. Every month on the 1st he makes another deposit, but he increases his payment by £75. The interest rate he receives is equivalent to 4.5% per year. How much will Andy have in his account on the 1August?

4. Indi puts £400 into her bank account on the 1 February. Every month on the 1st she makes another deposit but she increases her payment by 5%. The interest rate he receives is equivalent to 2.8% per year. How much will Indi have in her bank account on the 1 July?

5. Cora puts £500 into her bank account on the 1 June. Every month on the 1 she makes another deposit but she increases her payment by 4% every month. The interest rate he receives is equivalent to 3% per year. How much will Cora have in her account on the 1 October?

# Saving for a Specific Goal

Example 1: David wants to save up £400 to pay for a holiday in 9 months. The effective rate of interest is 9% per year. How much should David deposit if he wants to save up enough?

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Example 2: Kirsty wants to save up £1100 to pay for a new computer in 14 months. The effect rate of interest on her savings account is 4% per year.

She decides to pay it in 2 equal instalments, one now and one in 5 months. Calculate how much each payment should be.

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Example 3: Katherine wants to save up £7000 to pay for a deposit in 24 months. The effect rate of interest on her savings account is 7% per year.

She decides to pay it in 4 equal instalments, 1 now and then every 6 months.

How much will each instalment be?

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**Exercise 21: Saving for a Specific Goal**

1. Seher wants to save up £600 in 5 months. Her bank account gives her 6% per year. How much should Seher put into her bank account in the beginning?

2. Zara wants to save up £800 in 6 months. She wants to make an initial deposit followed by an equal payment after 3 months. If Zara’s interest rate is 2.5% p.a. how much should each of the payment be?

3. William wants to save up £2000 in 10 months. He wants to make 4 equal payments. One in the beginning and one after 2, 4 and 6 months respectfully. If his interest rate is 4.2% p.a, how much should each payment be?

4. Liam wants to save up £1500 in 20 months. He wants to make 5 equal payments, one in the beginning and then one after 4,8,12 and 16 months. If his interest rate is 6.1% p.a, how much should each payment be?

5. Jack wants to save up £1800 in 12 months. He wants to make 3 equal payments, one in the beginning and one after 4 and 8 months. If his interest rate is 3.5% p.a, how much should each payment be?

6. Erin wants to save up £9000 in 15 months. She wants to make 5 equal payments, one in the beginning and one after 3,6,9 and 12 months. If her interest rate is 4.6% p.a, how much should each payment be?

# Foreign Exchange

There are more than 180 recognised national currencies in the world in circulation. This does not include cryptocurrencies which we will get to later on.

The strength of the economy of the country (or countries associated with that currency). For example when our economy is doing well in comparison to others the value of the pound will go up. Phrases in the news will be "The pound is up against the euro" would mean you can get more euros for a £1 than you did yesterday.

This is because the more countries trading with us means they need to convert their money into pounds before buying goods. The more people converting their money to pounds, it increases the demand of the pound, hence the value increases.

**Adapting Exchange Rates.**

The following exchange rates are from pounds.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Euro | 1.19 | Yen | 156 | Lira | 128.4 |
| US Dollar | 1.36 | Rand | 20.8 | Rupee | 101.45 |
| AUS Dollar | 1.90 | Swiss Franc | 1.24 | Dirham | 4.98 |

Example 1: Use the following to estimate the exchange rate from Yen to Euros.

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| --- |
|  |

Example 2: Use the above exchange rates to find to rate for changing from US dollars to Dirham.

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|  |

**Exercise 22: Foreign Exchange**

1. Find the exchange rate for the following

a. Rupee to Lira

b. US dollar to Yen

c. Swiss Franc to Lia

d. AUS Dollar to Rand

**Foreign Exchange with Commission.**

For the following use this table converting £1.

|  |  |  |
| --- | --- | --- |
|  | Sell | Buy |
| Euro | 1.23 | 1.46 |
| US dollar | 1.19 | 1.28 |
| AUS dollar | 1.90 | 2.05 |
| Lira | 128.4 | 143.7 |
| Yen | 155.5 | 170 |

Example 1: Graham converts £800 into euros. He spends 600 euros and converts the rest back. How much pounds will he have?

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Example 2: Katie converts £2000 into Yen. She goes to Japan for 5 days and spends 65000 Yen every day.

She then converts her money back into pounds. The company transferring the money also charges commission of 0.5% on **each** transaction. How much pounds will she have left?

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| --- |
|  |

Example 3: A bank has its own exchange rate for US dollars of £1 =$1.35 with a rate of commission of r%. If you received $654.75 when changing £500. What is the rate r% of mission you were charged?

|  |
| --- |
|  |

**For the following questions use the following table *unless otherwise stated*.**

|  |  |  |
| --- | --- | --- |
|  | **We Sell** | **We Buy** |
| **Euro** | **1.24** | **1.48** |
| **US dollars** | **1.45** | **162** |
| **Hungarian Forint** | **425** | **442** |
| **Rupee** | **102** | **113** |

2. Convert £200 into Euros and then convert it back. How much pounds would you have? Explain why you can’t buy and sell at the same price?

3. Dana coverts £1600 into Forint. She then spends 68% of her money and converts it back to pounds. How much will Dana have now?

4. Ian is going to Europe and the US over his holidays. He converts £3000 into Euros. He spends 350 euros every day for a week.

After this he plans to head to the US, he can either use the prices above to sell his euros and buy American Dollars, or he has found another company that offer 1 euro = $1.08. Which is the better deal and how much more US dollars would Ian end up with?

5. Molly converts £500 into US dollars. She is charged a commission of 2.1% for each transaction. She spends $485 dollars then converts the money back. How much in pounds is she left with?

6. Amber converts £4000 into Rupees. She spends 20,000 rupees each day she is in India. She stays for 8 days and then converts her money back into pounds. Each transaction has a 1.2% commission charge. How much will Amber be left with in pounds.

7. Chris uses the exchange rate £1 = 400 Hungarian Forint. He is charged an exchange rate of r%. After converting £200 he receives 78400 Forint. What percentage was he charged for commission?

# Answers

**Exercise 1: Simple Interest.**

**Exercise 2: Compound Interest**

**Exercise 3: Compound Interest with Multiple Rates**

**Exercise 4: VAT**

**Exercise 5: Multiple Time units**

**Exercise 6: Calculating the effective interest rates**

**Exercise 7: AER with Multiple Payments**

**Exercise 8: Finding the initial amount**

**Exercise 9: Income Tax**

**Exercise 10: National Insurance**

**Exercise 11: Income Tax and National Insurance**

**Exercise 12: Loan Repayments**

**Exercise 13: Interest and Capital Content**

**Exercise 14: APR from Loan Repayments**

**Exercise 15: Mortgage**

**Exercise 16: Inflation Rates**

**Exercise 17: Insurance**

**Exercise 18: Irregular (Ad Hoc) Payment**

**Exercise 19: Level Payments**

**Exercise 20: Level Payments with varying proportions**

**Exercise 21: Saving for a Specific Goal**

**Exercise 22: Foreign Exchange**