Interest Rates

Gross (% per annum)

This is the rate of ***simple*** interest earned in a year (before deducting tax).
Dividing by 12 gives a good estimate of the monthly rate of interest.

Annual Equivalent Rate (%)

The AER gives the total annual interest (as a percentage) assuming that the initial deposit and all interest earned is left in the account for a full 12 months.
This is the rate that you should use to make comparisons between different accounts.

Net (% per annum)

Net interest is gross interest minus tax.
If tax is deducted at a rate of 20%, net interest is 80% of gross interest.
Non-taxpayers may register for payment of gross interest.

Mathematics for all post-16
– A project funded by the Nuffield Foundation

Countrywide Building Society

Watch your money

groW

£ £ £

Saving Data Sheet

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Instant Access Accounts

The tables give the rates of interest for our three instant access savings accounts. (correct to 2 decimal places).

The Annually Extra Account

Annually Extra			
Amount £	**AER %**	**Gross % pa**	**Net % pa**
1 – 999	3.70	3.70	2.96
1000+	4.00	4.00	3.20

Interest is earned each day but only added to the account once a year at close of business on 31st December.

The Twice Annually Account

Twice Annually			
Amount £	**AER %**	**Gross % pa**	**Net % pa**
1 – 2999	3.43	3.40	2.72
3000+	4.04	4.00	3.20

Interest is earned each day but only added to the account twice a year at close of business on 30th June and 31st December.

The Monthly Extra Account

Monthly Extra			
Amount £	**AER %**	**Gross % pa**	**Net % pa**
1 – 1999	3.66	3.60	2.88
2000+	4.03	3.96	3.17

Interest is earned each day and added to accounts at close of business on the last day of each month.

General Notes

In each account interest is earned on the current balance every day until the balance is next up-dated.

If you withdraw money part of the way through the period between balance up-dates, interest will be paid on the previous balance up to and including the day prior to the withdrawal. Interest will be paid on the new balance from the day of withdrawal until the next balance up-date.

The example which follows shows how the balance of an account increases for money left for a year in a Monthly Extra Account.

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Example Monthly Extra Account

A non-taxpayer deposits £500 on 1st January in the Monthly Extra Account.

The way in which these savings grow over one year is shown in the table below.

Monthly Extra		Date	Interest	Balance
		1st Jan		**£500.00**
Gross (% pa)	3.60	1st Feb	£1.50	£501.50
Net (% pa)	2.88	1st Mar	£1.50	£503.00
AER	3.66	1st Apr	£1.51	£504.51
		1st May	£1.51	£506.03
Monthly		1st Jun	£1.52	£507.55
% Rate	0.30	1st Jul	£1.52	£509.07
		1st Aug	£1.53	£510.59
		1st Sep	£1.53	£512.13
		1st Oct	£1.54	£513.66
		1st Nov	£1.54	£515.20
		1st Dec	£1.55	£516.75
		1st Jan	£1.55	**£518.30**
		Total Interest	**£18.30**	

N.B. All calculations have been done accurately. Values given in the table are rounded to 2 decimal places.

Saving Discussion Sheet

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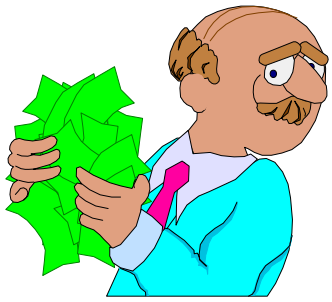
Compare the rates in different accounts.

Where will my money earn most interest?

What does pa mean?

What is AER?



What is the difference between gross and net?

Will it make a difference how often the interest is paid?

Why are gross interest and AER sometimes the same and sometimes different?

There are other things you need to consider.
Will you be able to take out your money whenever you like?

What is the difference between short term, medium term and long term savings?

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Saving Exercise

Use the Building Society leaflet to answer the following questions, giving answers correct to 2 decimal places.

In questions 1, 2 and 3 check your answers using inverse operations, estimations or alternative methods.

1. In the **Annually Extra Account**, interest is paid into the account at the end of the year. Suppose a ***taxpayer*** puts £68 into the account at the beginning of the year.
   Find to the nearest pence:
   a) the gross interest earned during the year
   b) the net interest earned during the year, assuming that tax is deducted at a rate of 20%.
   c) the total amount in the account at the end of the year after deducting tax.

2. In the **Twice Annually Account**, half of the gross profit is added after 6 months and the rest after 12 months.
   Suppose a ***non-taxpayer*** invests £4000 in this account at the beginning of the year.
   Assuming that interest is always left in the account, find
   a) the gross % interest which is paid after 6 months
   b) the amount in the account on 1st July
   c) the amount in the account at the end of the year
   d) the total interest earned during the year.
   Use your answer to part d) to check that the value given for the AER is correct.

3. The table in the example on the Data Sheet shows how a deposit of £500 in the **Monthly Extra Account** grows over the course of a year.
   Show how the following items can be calculated from earlier items in the table:
   a) Monthly % Rate 0.30 b) Interest on 1st February £1.50
   c) Interest on 1st June £1.52 d) Total Amount on 1st June £507.55
   e) Total Interest £18.30 f) AER 3.66

   For questions 4, 5 and 6 you will need the Excel Spreadsheet ***Saving.xls***.

4. The **Monthly Extra Account** table in the example on the Data Sheet is given on the ***Monthly Extra*** sheet of the spreadsheet ***Saving.xls***.
   Use this sheet to complete all parts of this question.

   a) Find and write down the spreadsheet formulae which were used to calculate each of the following values in the table.
      (i) Net (% pa) 2.88 (ii) 1st Feb Interest £1.50
      (iii) 1st Feb Balance £505.50 (iv) Total Interest £18.30
      (v) AER

b) Use the spreadsheet to produce a graph which illustrates the growth of the savings over the year.
(Note that although interest is only added to accounts once per month, interest is earned each day on the previous month's balance. The data points can be joined with straight lines to show how much the account is worth during the month.)

c) By changing the initial balance from £500 to £875 produce a table and chart to show the way in which an initial deposit of £875 would grow over a year.

d) By changing the gross (% pa) and initial balance on 1st January, produce tables and charts showing the growth of each of the following investments:
(i) £2400 at a gross % rate of 7.8% (ii) £3 580 at a gross % rate of 15.4%

5. On the ***Twice Annually*** sheet produce a new spreadsheet to show the growth of a deposit of £4 000 in the Twice Annually Account over the course of a year (using a gross % rate of 4% as given on the Data Sheet).
You should use spreadsheet formulae to calculate Six Monthly % Rate and AER as well as the interest and balance after 6 months and 12 months. Assume the investor does not pay tax.
Use your spreadsheet to check your answers for question 2.

6. a) Suppose you have £600 that you can leave in any of the three accounts for a period of 9 years. A spreadsheet to compare the growth of this deposit has been started on the ***All three accounts*** sheet of the ***Saving.xls*** spreadsheet (assuming no tax is paid). One of the Annually Extra columns has been completed to show the growth of £600 over a period of 9 years in this account. Complete other columns to show the growth of £600 in the other accounts and then draw a graph to illustrate and compare the results.

b) Complete the remaining columns on the spreadsheet to show the growth of a deposit of £3 500 over a period of 9 years. Use the results to draw a graph.

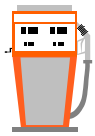
c) Write a brief summary of your findings.

7. For each of the following deposits, find which of the three accounts on the Data Sheet would give the most interest in a year. Assume deposits are made on 1st January, that any interest earned during the year is added to the account and that the investor does not pay tax. Give reasons for your answers.

a) £600 b) £1200 c) £2300 d) £3700

Saving **Assignment**

There are many good reasons to save money.
To have enough money to pay bills and buy things you want when you want them.




Some events in life are very expensive and it makes sense to save money for them over a period of time.

Buying
a car

Going on
holiday

Having
a baby

It is important to plan early to make sure you have enough income when you retire.

Collect savings leaflets from local banks, building societies, the post office and any local supermarkets or high street shops that offer savings accounts. Find out what methods are available for saving money over short and long periods. Collect information about pensions.

Write a report that compares and contrasts short, medium and long term savings..
Your report should

- show evidence of all calculations you carry out
- include comments about what your calculations tell you

To achieve high marks you will need to

- work independently and organise your work logically
- check calculations and use concise methods
- explain your findings carefully.

Saving **Assignment**

£

For courses completing in January 2000 only.

Many events in life are expensive and it makes sense to save money for them.

Getting married

Buying a car

Going on holiday

Having a baby

Imagine you have some money to save. It could be

- a lump sum you have received at Christmas or on your birthday
- a regular amount from your earnings or allowance

Collect savings leaflets from local banks, building societies, the post office and any local supermarkets or high street shops that offer savings accounts.

There are a lot of things to bear in mind when choosing a savings account:

- How much can you afford to save?
- How long will your money stay in the account?
- What interest will your money earn?
- Is the interest rate fixed or variable?
- Is the access to your money instant or restricted?
- Will tax be deducted?

Study the leaflets carefully and choose at least three different methods of saving.

Write a report comparing and contrasting the differences involved in these methods. Your report should

- compare the interest earned on your savings
- use calculations, tables and diagrams to support your findings
- show that you have checked your calculations
- include a summary which states which method you prefer and why.

Saving Sample Questions

Section A

Use the information given below for the **Annually Extra Savings Account**

Annually Extra			
Amount £	**AER %**	**Gross % pa**	**Net % pa**
1 – 999	3.70	3.70	2.96
1000+	4.00	4.00	3.20

Annually Extra
Interest paid annually at close of business on 31st December.

1. £280 is deposited in an Annually Extra account at the beginning of a year.

(a) Find the gross interest earned in one year.
Give your answer to the nearest penny.

_____

_____

(b) Use the rate given in the table to find the net interest earned in one year.
Give your answer to the nearest penny.

_____

_____

(c) **(i)** Find the amount of tax deducted.

_____

(ii) Give this as a percentage of the gross interest earned.

_____

_____

Section B

Use the information given below for the **Twice Annually Savings Account**

Twice Annually			
Amount £	**AER %**	**Gross % pa**	**Net % pa**
1 – 2999	3.43	3.40	2.72
3000+	4.04	4.00	3.20

Twice Annually
Interest paid twice per year at close of business on the following dates:
31st December and 30th June

2. For a deposit of £2500 made at the beginning of the year, find:

(a) the gross interest paid at the end of six months

_____

(b) the gross interest paid at the end of the next six months, assuming there are no withdrawals from the account

_____

(c) the total gross interest paid over the full twelve months

_____

3. The spreadsheet shown can be used to calculate the gross interest and resulting balance after each 6 month period for an initial deposit of £15 000.

	A	B	C
1	**Date**	**Interest**	**Balance**
2	1st Jan		£15,000.00
3	1st July	£300.00	
4	1st Jan		
5	**Total Interest**		

(a) Calculate the value in cell:

(i) C3 _____

(ii) B4 _____

(iii) C4 _____

(iv) B5 _____

(b) Write down a spreadsheet formula that goes in cell:

(i) B3 _____

(ii) C3 _____

(iii) B5 _____

Section C

Use the information given below for the **Monthly Extra Savings Account**

Monthly Extra			
Amount £	**AER %**	**Gross % pa**	**Net % pa**
1 – 1999	3.66	3.60	2.88
2000+	4.03	3.96	3.17

Monthly Extra
Interest paid at close of the last day of each month.

4 A deposit of £2000 is made at the beginning of January. The table shows the interest earned and balance at the beginning of each following month.

(a) Complete the empty shaded cells.

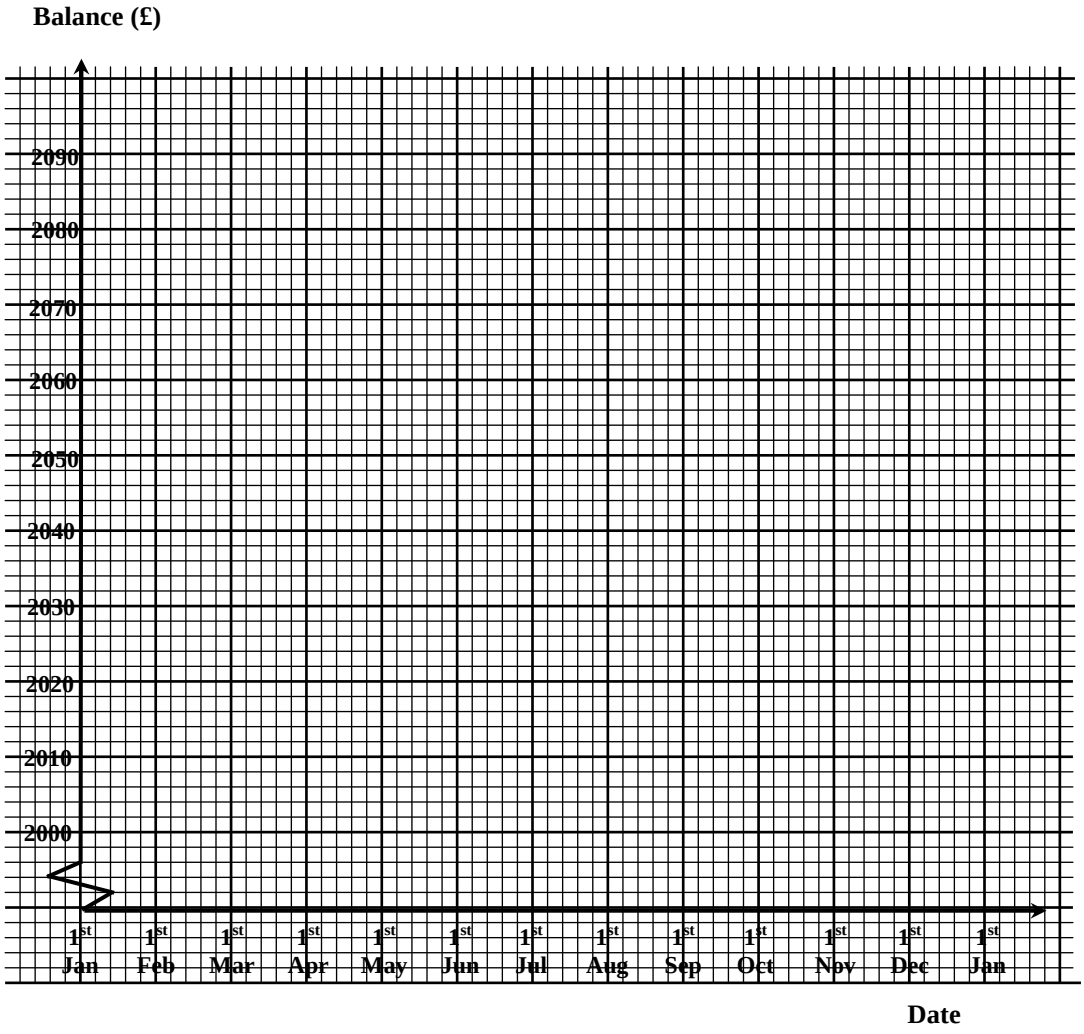
Monthly Extra Account			Date	Interest	Balance
			1st Jan		**£2,000.00**
Gross (% pa)	3.96		1st Feb		£2,006.60
Net (% pa)	3.17		1st Mar	£6.62	£2,013.22
AER	4.03		1st Apr	£6.64	£2,019.87
			1st May	£6.67	£2,026.53
Monthly			1st Jun	£6.69	£2,033.22
% Rate	0.33		1st Jul	£6.71	
			1st Aug	£6.73	£2,046.66
			1st Sep	£6.75	£2,053.42
			1st Oct	£6.78	£2,060.19
			1st Nov	£6.80	£2,066.99
			1st Dec	£6.82	£2,073.81
			1st Jan		
			Total Interest		

Space for working

4(b) The AER is the total annual interest expressed as a percentage of the deposit. Use your answers to part **4(a)** to show that the AER is 4.03 correct to 2 decimal places.

_____

4(c) On the graph paper below draw a line graph to show the growth in the investment of £2000 in the Monthly Extra Account during the year.



Section D

5. Use the AER values given for ***all accounts on the full Data Sheet*** to decide which account would give a better return on the following deposits:

(a) £250 _____

(b) £2500 _____

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Saving 2000 Teacher Notes

Which Free-Standing Unit does this material support?
Intermediate Level – Calculating Finances

Evidence for Coursework Portfolio
The assignment can be used to satisfy the requirement for a report on saving.

Note that there are two versions of this assignment. One version is for use only for courses ending in January 2000. The other can be used for courses ending in Summer 2000 or later.

What students need to know (before attempting the exercise or exam questions)
- How to calculate simple and compound interest.
- How to use spreadsheets, including formulae, absolute and relative referencing and the drawing of graphs.

General Notes
The data sheet should be printed double-sided onto a single sheet and then folded to form a leaflet. It can be used with the discussion sheet to introduce this topic. The questions on the discussion sheet bring up points which students need to understand before they tackle the exercise, assignment or sample questions. It is important that students understand that it is the annual equivalent rate (AER) which should be used when comparing accounts or when the interest is calculated over a number of years. The final questions on the discussion sheet give opportunities to extend the discussion to instant/restricted access accounts, fixed rate bonds, pensions etc.

The exercise contains structured questions based on the data sheet. These are designed to give practice in using different interest rates, but use a simplified version of the actual method used by banks or building societies. Note that the ***Saving.xls*** spreadsheet (needed for questions 4, 5 and 6) is in a separate file so that it can be copied for student use. Note that this exercise concentrates on instant access accounts that would be most suitable for short term savings. It should be stressed that in practice interest calculations can be very difficult. This is due to a number of complications, including the following:
- Banks usually work out interest on a daily basis. This means that the interest earned in February will be slightly different from that earned in March or April.
- Money can usually be deposited at any time during the year.
- Withdrawals made during the year will greatly complicate the calculations.
- Unless the account is advertised as a fixed interest account, the interest rate will probably change during the year to reflect changing economic conditions.

At this level students are not expected to include these sorts of complications.

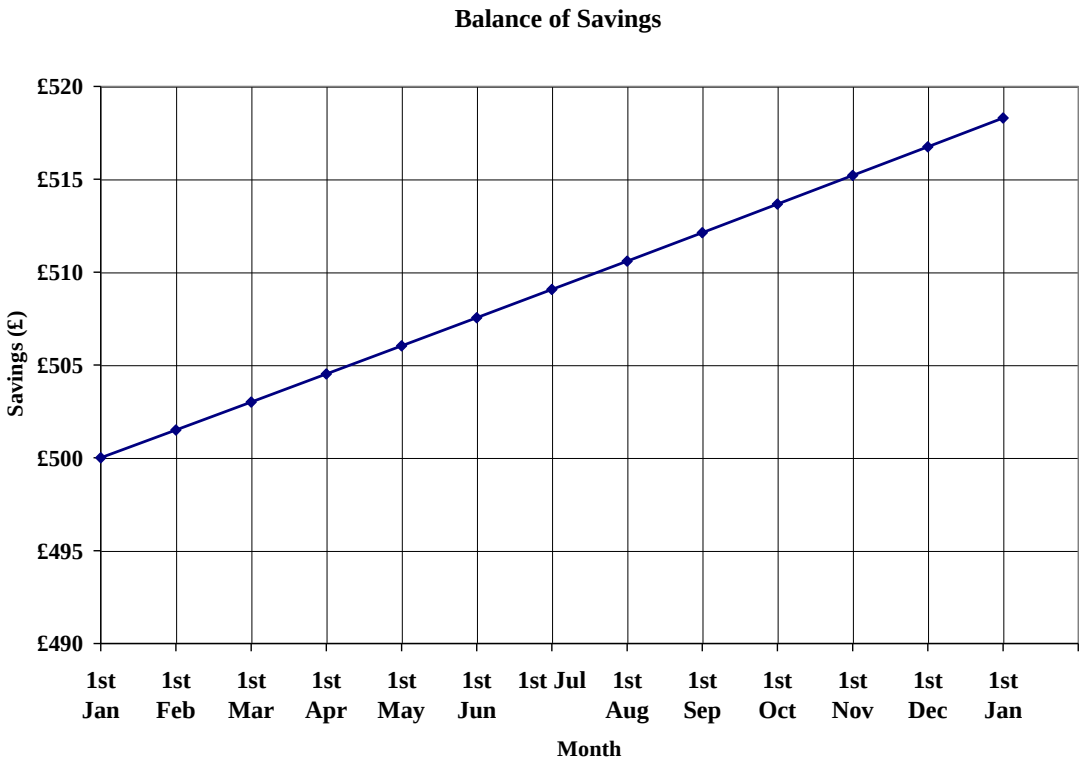
The assignment is open-ended to enable students to achieve high marks but they should be advised not to attempt anything that is too complex.

The sample examination questions use information from the data sheet and can be used for exam practice.

Answers

Saving Exercise (N.B. Graphs given as guidelines only.)

1. a) £2.52 b) £2.01 c) £70.01
2. a) 2.00% b) £4080 c) £4161.60 d) £161.60
4. a)(i) =0.8*gpr (ii) =0.01*mpr*G2 (iii) =G2+F3
   (iv) =SUM(F3:F14) (v) =100*F15/G2
   b)



c)

Monthly Extra Account	
Gross (% pa)	3.60
Net (% pa)	2.88
AER	3.66
Monthly % Rate	0.30

Date	Interest	Balance
1st Jan		**£875.00**
1st Feb	£2.63	£877.63
1st Mar	£2.63	£880.26
1st Apr	£2.64	£882.90
1st May	£2.65	£885.55
1st Jun	£2.66	£888.20
1st Jul	£2.66	£890.87
1st Aug	£2.67	£893.54
1st Sep	£2.68	£896.22
1st Oct	£2.69	£898.91
1st Nov	£2.70	£901.61
1st Dec	£2.70	£904.31
1st Jan	£2.71	**£907.02**
Total Interest	**£32.02**	

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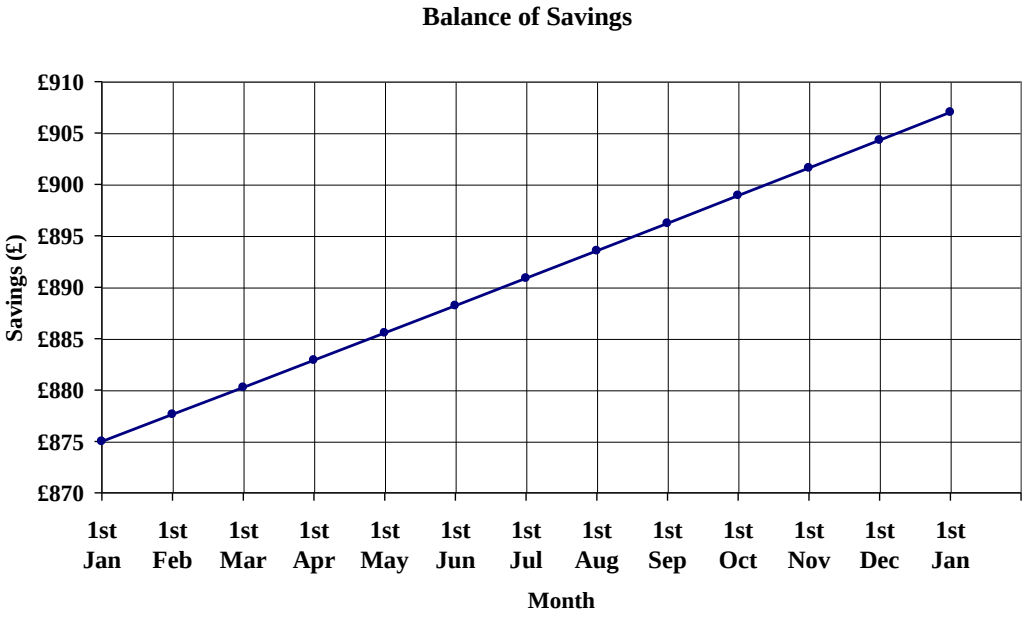
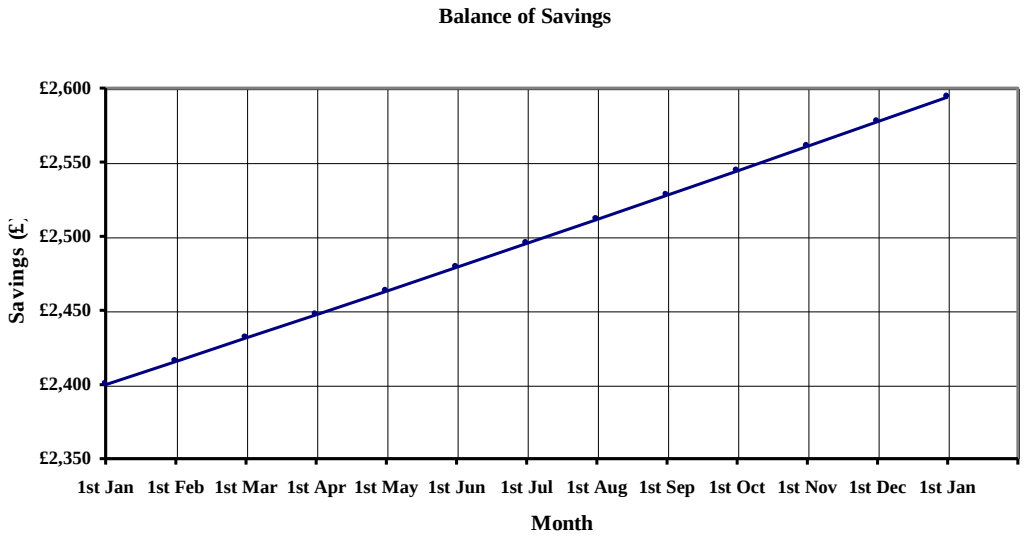


d) (i)

Monthly Extra Account	
Gross (% pa)	7.80
Net (% pa)	6.24
AER	8.08
Monthly % Rate	0.65

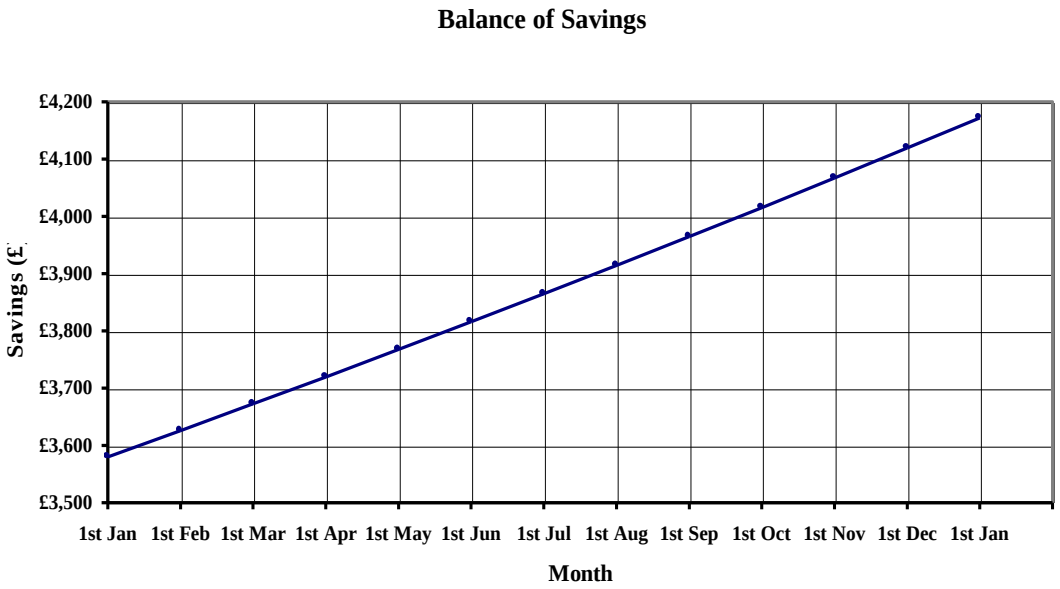
Date	Interest	Balance
1st Jan		**£2,400.00**
1st Feb	£15.60	£2,415.60
1st Mar	£15.70	£2,431.30
1st Apr	£15.80	£2,447.10
1st May	£15.91	£2,463.01
1st Jun	£16.01	£2,479.02
1st Jul	£16.11	£2,495.13
1st Aug	£16.22	£2,511.35
1st Sep	£16.32	£2,527.68
1st Oct	£16.43	£2,544.11
1st Nov	£16.54	£2,560.64
1st Dec	£16.64	£2,577.29
1st Jan	£16.75	**£2,594.04**
Total Interest	**£194.04**	



d)(ii)

Monthly Extra Account	
Gross (% pa)	15.40
Net (% pa)	12.32
AER	16.53
Monthly % Rate	1.28

Date	Interest	Balance
1st Jan		**£3,580.00**
1st Feb	£45.94	£3,625.94
1st Mar	£46.53	£3,672.48
1st Apr	£47.13	£3,719.61
1st May	£47.73	£3,767.34
1st Jun	£48.35	£3,815.69
1st Jul	£48.97	£3,864.66
1st Aug	£49.60	£3,914.25
1st Sep	£50.23	£3,964.49
1st Oct	£50.88	£4,015.36
1st Nov	£51.53	£4,066.89
1st Dec	£52.19	£4,119.09
1st Jan	£52.86	**£4,171.95**
Total Interest	**£591.95**	



5. A variety of methods may be used to give the following spreadsheet results.

			Date	Interest	Balance
Gross (% pa)	4.00		1st Jan		£4,000.00
Rate for 6 months	2.00		1st July	£80.00	£4,080.00
AER	4.04		1st Jan	£81.60	£4,161.60
			Total Interest	£161.60	

6. The values for parts a) and b) are given below

	Annually Extra						Twice Annually						Monthly Extra					
	£1 - 999			£1000+			£1 - 2999			£3000+			£1 - 1999			£2000+		
Year	Balance beginning	Interest	Balance end	Balance beginning	Interest	Balance end	Balance beginning	Interest	Balance end	Balance beginning	Interest	Balance end	Balance beginning	Interest	Balance end	Balance beginning	Interest	Balance end
1	£600.00	£22.20	£622.20	£3,500.00	£140.00	£3,640.00	£600.00	£20.58	£620.58	£3,500.00	£141.40	£3,641.40	£600.00	£21.96	£621.96	£3,500.00	£141.05	£3,641.05
2	£622.20	£23.02	£645.22	£3,640.00	£145.60	£3,785.60	£620.58	£21.29	£641.87	£3,641.40	£147.11	£3,788.51	£621.96	£22.76	£644.72	£3,641.05	£146.73	£3,787.78
3	£645.22	£23.87	£669.09	£3,785.60	£151.42	£3,937.02	£641.87	£22.02	£663.88	£3,788.51	£153.06	£3,941.57	£644.72	£23.60	£668.32	£3,787.78	£152.65	£3,940.43
4	£669.09	£24.76	£693.85	£3,937.02	£157.48	£4,094.50	£663.88	£22.77	£686.65	£3,941.57	£159.24	£4,100.81	£668.32	£24.46	£692.78	£3,940.43	£158.80	£4,099.23
5	£693.85	£25.67	£719.52	£4,094.50	£163.78	£4,258.29	£686.65	£23.55	£710.21	£4,100.81	£165.67	£4,266.48	£692.78	£25.36	£718.14	£4,099.23	£165.20	£4,264.43
6	£719.52	£26.62	£746.15	£4,258.29	£170.33	£4,428.62	£710.21	£24.36	£734.57	£4,266.48	£172.37	£4,438.85	£718.14	£26.28	£744.42	£4,264.43	£171.86	£4,436.29
7	£746.15	£27.61	£773.75	£4,428.62	£177.14	£4,605.76	£734.57	£25.20	£759.76	£4,438.85	£179.33	£4,618.18	£744.42	£27.25	£771.67	£4,436.29	£178.78	£4,615.07
8	£773.75	£28.63	£802.38	£4,605.76	£184.23	£4,789.99	£759.76	£26.06	£785.82	£4,618.18	£186.57	£4,804.75	£771.67	£28.24	£799.91	£4,615.07	£185.99	£4,801.06
9	£802.38	£29.69	£832.07	£4,789.99	£191.60	£4,981.59	£785.82	£26.95	£812.77	£4,804.75	£194.11	£4,998.86	£799.91	£29.28	£829.19	£4,801.06	£193.48	£4,994.54
10	£832.07			£4,981.59			£812.77			£4,998.86			£829.19			£4,994.54		

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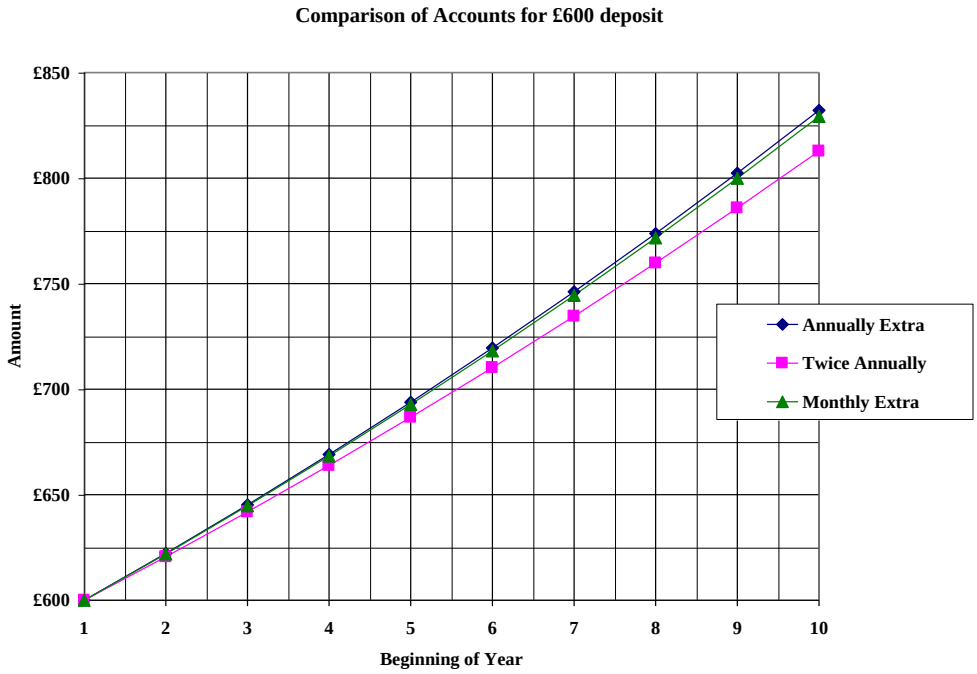
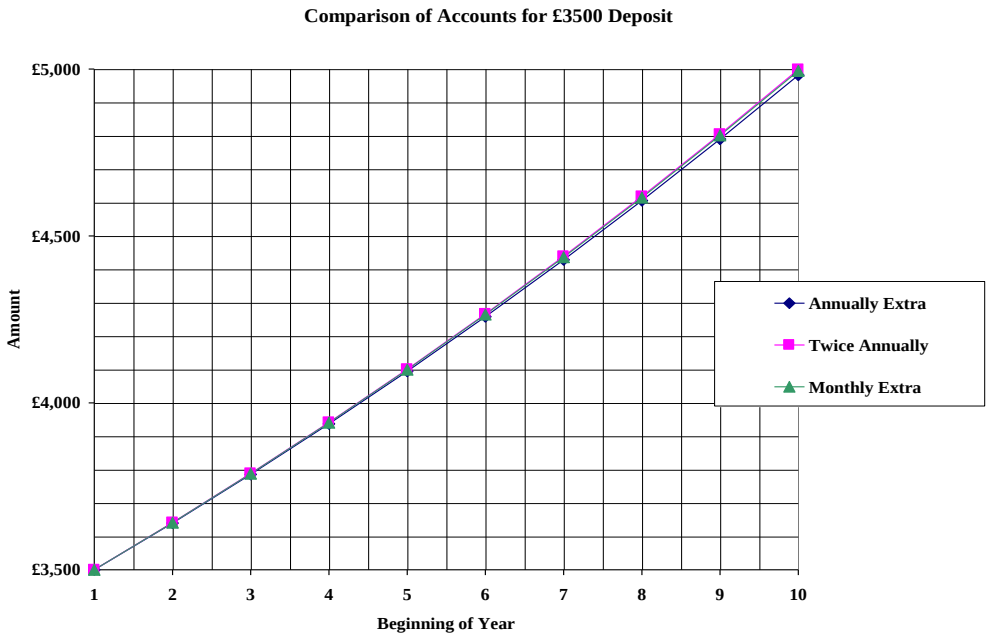
6. a)



b)



c) For a deposit of £600 the Annally Extra Account gives the most interest closely followed by the Monthly Extra Account. The Twice Annually Account gives a poor return in comparison.
For a deposit of £3 500 the interest is almost the same from each account. The Twice Annually Account gives slightly more than the Monthly Extra Account which in turn gives more than the Annually Extra Account.

7. a) £600 Annually Extra b) £1200 Annually Extra
c) £2300 Monthly Extra d) £3700 Twice Annually (by comparing AERs).

Sample Question Answers

Section A

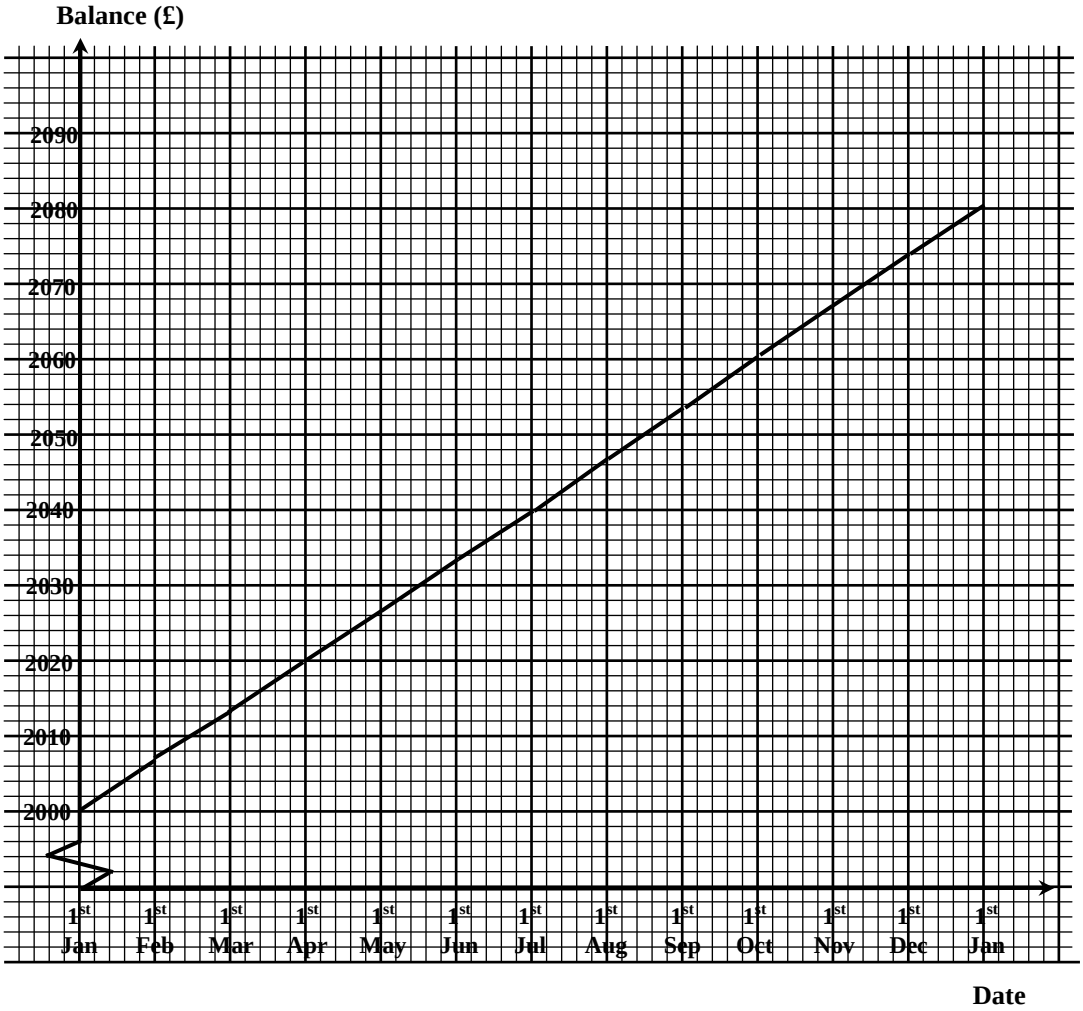
1. (a) £10.36 (b) £8.29 (c) (i) £2.07 (ii) 20%

Section B

2. (a)(i) £42.50 (b) £43.22 (c) £85.72
3. (a)(i) £15 300 (ii) £306 (iii) £15 606 (iv) £606
   (b) (i) =0.02*C2 (ii) =C2+B3 or =1.02*C2 (iii) =C4-C2 or =B3+B4
   (or alternatives)

Section C

4. (a) £6.60, £2 039.93, £6.84, £2 080.65, £80.65
   (c)



Section D

5. a) £250 Annually Extra b) £2500 Monthly Extra