Edexcel GCSE
Mathematics (Linear) – 1MA0

COMPOUND INTEREST AND DEPRECIATION

Materials required for examination
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser.
Tracing paper may be used.

Items included with question papers
Nil

Instructions

Use black ink or ball-point pen.
Fill in the boxes at the top of this page with your name, centre number and candidate number.
Answer all questions.
Answer the questions in the spaces provided – there may be more space than you need.
Calculators may be used.

Information

The marks for each question are shown in brackets – use this as a guide as to how much time to spend on **each** question.
Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed – you should take particular care on these questions with your spelling, punctuation and grammar, as well as the clarity of expression.

Advice

Read each question carefully before you start to answer it.
Keep an eye on the time.
Try to answer every question.
Check your answers if you have time at the end.

1. Toby invested £4500 for 2 years in a savings account.
He was paid 4% per annum compound interest.

How much did Toby have in his savings account after 2 years?

$4500 \times 1.04^2 = £4867.20$

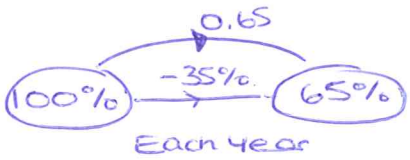
£ 4867.20

(Total 3 marks)

2. The value of a car depreciates by 35% each year.

At the end of 2007 the value of the car was £5460

Work out the value of the car at the end of 2006



Value 2006 $\times$ 0.65 = Value 2007

Value $\times$ 0.65 = £5460

Value = 5460 $\div$ 0.65

= 8400

£ 8400

(Total 3 marks)

3. Mario invests £2000 for 3 years at 5% per annum **compound** interest.

Calculate the value of the investment at the end of 3 years.

$2000 \times 1.05^3 = £2315.25$

£ 2315.25

(Total 3 marks)

4. Derek invests £154 500 for 2 years at 4% per year compound interest.

Work out the value of the investment at the end of 2 years.

$154500 \times 1.04^2 = £167\,107.20$

£ 167107.20

(3)

(Total 3 marks)

5. Henry invests £4500 at a compound interest rate of 5% per annum.

At the end of n complete years the investment has grown to £5469.78.

Find the value of n.

$4500 \times 1.05^n = 5469.78$

$1.05^n = 5469.78 \div 4500$

$= 1.2155066...$

$1.05^2 = 1.1025$

$1.05^3 = 1.157625$

$1.05^4 = 1.215506...$

$1.05^5 = 1.276281...$

$n = 4$

.....

(Total 2 marks)

6. A company bought a van that had a value of £12 000
Each year the value of the van depreciates by 25%.

Work out the value of the van at the end of three years.

Each year: 100% $\xrightarrow{-25\%}$ 75% $\times 0.75$

$12000 \times 0.75^3 = £5062.50$

£ 5062.50

(3)

(Total 3 marks)

7. Bill invests £500 on 1st January 2004 at a compound interest rate of R% per annum.
The value, £V, of this investment after n years is given by the formula

$$V = 500 \times (1.045)^n$$

(a) Write down the value of R.

1.045 = 104.5%.

R = 4.5%

(1)

(b) Use your calculator to find the value of Bill's investment after 20 years.

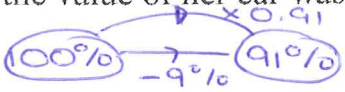
$V = 500 \times 1.045^{20}$
$= £1205.8570...$
$= £1205.86$

£ 1205.86

(2)
(Total 3 marks)

8. Gwen bought a new car.
Each year, the value of her car depreciated by 9%.

Calculate the number of years after which the value of her car was 47% of its value when new.

Each year 

$0.47V =$

$0.47V = V \times 0.91^n$

$(\div V)$ $\quad 0.47 = 0.91^n$

$0.91^4 = 0.6857...$
$0.91^6 = 0.5678...$
$0.91^7 = 0.5167...$
$0.91^8 = 0.4702...$
$0.91^9 = 0.4279...$

8 years

(Total 3 marks)

9. Liam invests £6200 for 3 years in a savings account.
He gets 2.5% per annum compound interest.

How much money will Liam have in his savings account at the end of 3 years?

$6200 \times 1.025^3 = £6676.7218...$
$= £6676.72$

£ 6676.72

(Total 3 marks)

10. Toby invested £4500 for 2 years in a savings account.
He was paid 4% per annum compound interest.

(a) How much did Toby have in his savings account after 2 years?

$4500 \times 1.04^2 = £4867.20$

£ 4867.20

(3)

Jaspir invested £2400 for n years in a savings account.
He was paid 7.5% per annum compound interest.

At the end of the n years he had £3445.51 in the savings account.

(b) Work out the value of n.

$2400 \times 1.075^n = 3445.51$

$1.075^n = 3445.51 \div 2400$

$1.075^n = 1.435629...$

$1.075^3 = 1.24229...$

$1.075^4 = 1.33546...$

$1.075^5 = 1.43562...$

$1.075^6 = 1.54330...$

$n = 5$

(2)

(Total 5 marks)

*11 Viv wants to invest £2000 for 2 years in the same bank.

The International Bank	The Friendly Bank
Compound Interest	Compound Interest
4% for the first year 1% for each extra year	5% for the first year 0.5% for each extra year

At the end of 2 years, Viv wants to have as much money as possible.

Which bank should she invest her £2000 in?

The International Bank

End 1st Year: 2000×1.04

End 2nd Year: $(2000 \times 1.04) \times 1.01$

$= £2100.80$

The Friendly Bank

End 1st Year: 2000×1.05

End 2nd Year: $(2000 \times 1.05) \times 1.005$

$= £2110.50$

Viv should invest her money in The Friendly Bank, this will give her £9.70 more at the end of two years.

(Total 4 marks)