



4.1H Compound Interest and Depreciation: Higher Tier Practice

EDEXCEL Edexcel 1MA1 · Calculator allowed · about 75 minutes

Total Marks

Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

- 1** Work out the value of £1200 after 2 years when it is invested at 3% compound interest, compounded annually.

(Total for Question 1 is 2 marks)

- 2** Zoe invests £800 at 4% compound interest, compounded annually, for 3 years. She then withdraws £200 from the account and the remaining amount earns 5% compound interest for one more year. Work out the amount in the account after these transactions. Give your answer to 2 decimal places.

(Total for Question 2 is 4 marks)

- 3** A delivery van depreciates in value by 12% each year. After 2 years its value is £788. Find its original value before depreciation. Give your answer to the nearest penny.

(Total for Question 3 is 3 marks)

- 4 Show that if an amount P is invested at an annual compound rate r (as a decimal) for n years, the value after n years is $P(1 + r)^n$. You must give a clear algebraic argument.

(Total for Question 4 is 4 marks)

- 5 A laptop costs £500. It increases in value by 6% in year 1, by 3% in year 2, and then it depreciates by 5% in year 3. Work out its value after 3 years. Give your answer to 2 decimal places.

(Total for Question 5 is 5 marks)

- 6 An investment of £1500 grows to £1749.15 in 3 years with interest compounded annually. Work out the annual interest rate to 1 decimal place.

(Total for Question 6 is 4 marks)

- 7 Calculate the value of £2000 invested for 2 years at 3% per annum, compounded monthly. Give your answer to 2 decimal places.

(Total for Question 7 is 4 marks)

8 Priya invests £1500 at compound interest. After 4 years the amount is £1893.72.

a) Work out the annual compound interest rate. Give your answer as a percentage to 1 decimal place.

b) Priya withdraws £200 at the end of year 2. Work out how much she has in the account at the end of year 4. Give your answer to 2 decimal places.

c) At the end of year 4 she transfers the balance found in part (b) into a new account and immediately deposits an additional £500 into that new account. That new account earns 4% compound interest annually. Work out the total amount in the new account after 3 years. Give your answer to 2 decimal places.

(a) Work out the annual compound interest rate. Give your answer as a percentage to 1 decimal place. **(3)**

(b) Priya withdraws £200 at the end of year 2. Work out how much she has at the end of year 4. Give your answer to 2 decimal places. **(6)**

(c) At the end of year 4 she transfers the balance from part (b) into a new account and immediately deposits an extra £500. That new account pays 4% compound interest annually. Work out the total amount in the new account after 3 years. Give your answer to 2 decimal places. **(5)**

(Total for Question 8 is 14 marks)

Mark scheme · 4.1H Compound Interest and Depreciation: Higher Tier Practice

Question 1

- **M1** Use of compound growth: $1200 * (1 + 0.03)^2$ or $1200 * 1.03^2$
- **A1** £1273.08 cao
- **Answer: 1273.08 (to 2 decimal places).**

Question 2

- **M1** Amount after 3 years at 4%: $800 * 1.04^3$ or equivalent method
- **M1** Subtract 200 then apply 5%: $(800 * 1.04^3 - 200) * 1.05$
- **A1** £734.89 awrt (intermediate correct values seen)
- **A1** £734.89 cao to 2 dp
- **Answer: 734.89**

Question 3

- **M1** Set up: original $* 0.88^2 = 788$ or equivalent
- **M1** Divide: original = $788 / 0.88^2$
- **A1** £1017.56 cao
- **Answer: 1017.56**

Question 4

- **dM1** Start: after 1 year amount = $P(1 + r)$; after 2 years amount = $P(1 + r)(1 + r)$ stated
- **dM1** Recognise repeated multiplication n times gives $P(1 + r)^n$
- **A1** Conclude $P(1 + r)^n$ cao
- **C1** Clear communicative algebraic justification linking the repeated multiplication to exponent notation
- **Answer: $P(1 + r)^n$, with algebraic justification as above.**

Question 5

- **M1** Apply 6%: $500 * 1.06$ or equivalent
- **M1** Then apply 3%: previous $* 1.03$
- **M1** Then apply depreciation 5%: previous $* 0.95$
- **A1** £518.61 awrt (intermediate correct)
- **A1** £518.61 cao to 2 dp
- **Answer: 518.61**

Question 6

- **M1** Form ratio: $(1749.15 / 1500) = (1 + r)^3$
- **M1** Take cube root: $1 + r = (1749.15 / 1500)^{1/3}$
- **A1** Calculate $r = (\text{ratio})^{1/3} - 1$
- **A1** $r = 5.3\%$ to 1 dp cao
- **Answer: 5.3% (to 1 decimal place)**

Question 7

- **M1** Use monthly rate $0.03/12$ and $n = 24$: $2000 * (1 + 0.03/12)^{24}$
- **M1** Calculate $(1 + 0.0025)^{24}$ or equivalent
- **A1** £2123.51 awrt (intermediate correct shown)
- **A1** £2123.51 cao to 2 dp
- **Answer: 2123.51**

Question 8

- (a) **M1** Form $(1 + r)^4 = 1893.72 / 1500$
- (a) **M1** Take fourth root: $1 + r = (1893.72 / 1500)^{1/4}$
- (a) **A1** $r = 6.0\%$ to 1 dp cao
- **(a) Answer: 6.0 %**
- (b) **M1** Calculate amount after 2 years: $1500 * 1.06^2$
- (b) **M1** Subtract 200 at end of year 2
- (b) **M1** Grow remaining amount for 2 more years: $(\text{amount after withdrawal}) * 1.06^2$
- (b) **A1** £1669.00 awrt (intermediate seen)
- (b) **A1** £1669.00 cao to 2 dp
- (b) **C1** Clear multi-step working showing the sequence: grow, withdraw, grow
- **(b) Answer: 1669.00**
- (c) **M1** Add extra deposit to balance from (b): $1669.00 + 500$
- (c) **M1** Use 4% compound for 3 years: $(\text{sum}) * 1.04^3$
- (c) **A1** Intermediate calculation shown correctly
- (c) **A1** £2439.83 awrt to 2 dp
- (c) **C1** Final answer stated with correct rounding and units
- **(c) Answer: 2439.83**