

Financial applications: compound interest and depreciation

6 questions · 50 marks

Answer all questions. The marks available are shown against each part. Every question is taken unaltered from a past paper; the source is noted beneath it. Some questions are taken from higher level papers, where they examine the same standard level content.

1. 6 marks
[Maximum mark: 6]

Alex purchases a car for €30 000. The value of the car depreciates at 15 % per annum.

(a) Find the value of the car after ten years. Give your answer to two decimal places. [2]

Alex invests €50 000 in a bank account that pays a compound interest rate of 1.5 % per month.

Inflation over the same time period was 0.8 % per month.

(b) Find the number of months required for the real value of the investment to first exceed €55 000. [4]

IB 2225 – 7112 Maths AA · May 2025 Paper 2 TZ2 HL, Question 4

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2.

7 marks

[Maximum mark: 7]

Darren buys a car for \$35 000. The value of the car decreases by 15 % in the first year.

- (a) Find the value of the car at the end of the first year. [2]

After the first year, the value of the car decreases by 11 % in each subsequent year.

- (b) Find the value of Darren's car 10 years after he buys it, giving your answer to the nearest dollar. [2]

When Darren has owned the car for n complete years, the value of the car is less than 10 % of its original value.

- (c) Find the least value of n . [3]

IB 2224 – 7105 Maths AA · May 2024 Paper 2 TZ1 SL, Question 2

3.

7 marks

[Maximum mark: 7]

Darren buys a car for \$35 000. The value of the car decreases by 15 % in the first year.

- (a) Find the value of the car at the end of the first year. [2]

After the first year, the value of the car decreases by 11 % in each subsequent year.

- (b) Find the value of Darren's car 10 years after he buys it, giving your answer to the nearest dollar. [2]

When Darren has owned the car for n complete years, the value of the car is less than 10 % of its original value.

- (c) Find the least value of n . [3]

IB 2224 – 7102 Maths AA · May 2024 Paper 2 TZ1 HL, Question 1

7 marks

(c) Hence or otherwise, find the amount of money in the account after one complete year, giving your answer correct to the nearest dinar. [4]

5.
- [Maximum mark: 7]

7 marks
- Bob invests 1000 dinar in an account which pays a nominal annual interest rate of 4% compounded **quarterly**.

The amount of money in the account after one complete year can be written as $1000(1 + k)^4$ where $k \in \mathbb{Q}$.

(a)

Write down the value of k .

[1]

(b)

Expand and simplify $(1 + x)^4$.

[2]

(c)

Hence or otherwise, find the amount of money in the account after one complete year, giving your answer correct to the nearest dinar.

[4]

— IB 2225 – 7109 Maths AA · May 2025 Paper 1 TZ1 SL, Question 3

6.

[Maximum mark: 16]

16 marks

Two friends Amelia and Bill, each set themselves a target of saving \$20 000. They each have \$9000 to invest.

- (a) Amelia invests her \$9000 in an account that offers an interest rate of 7% per annum compounded **annually**.
- (i) Find the value of Amelia's investment after 5 years to the nearest hundred dollars.
- (ii) Determine the number of years required for Amelia's investment to reach the target. [5]
- (b) Bill invests his \$9000 in an account that offers an interest rate of $r\%$ per annum compounded **monthly**, where r is set to two decimal places.

Find the minimum value of r needed for Bill to reach the target after 10 years. [3]

- (c) A third friend Chris also wants to reach the \$20 000 target. He puts his money in a safe where he does not earn any interest. His system is to add more money to this safe each year. Each year he will add half the amount added in the previous year.
- (i) Show that Chris will never reach the target if his initial deposit is \$9000.
- (ii) Find the amount Chris needs to deposit initially in order to reach the target after 5 years. Give your answer to the nearest dollar. [8]

— IB 2221 – 7110 Maths AA · May 2021 Paper 2 TZ1 SL, Question 7