IB Maths Studies mini Topic Exam: Number & Algebra

Recommended Time: 30mins.  Total Mark: /24

Student Name: ___________________________  Teacher: ______________

Question 1

[Maximum mark: 6]  
Only one of the following four sequences is arithmetic and only one of them is geometric.

\[ a_n = 1, 5, 10, 15, \ldots \]
\[ b_n = \frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \ldots \]
\[ c_n = 1.5, 3, 4.5, 6, \ldots \]
\[ d_n = 2, 1, \frac{1}{2}, \frac{1}{4}, \ldots \]

(a) State which sequence is arithmetic and find the common difference of the sequence.  [2]

(b) State which sequence is geometric and find the common ratio of the sequence.  [2]

(c) For the geometric sequence find the exact value of the eighth term. Give your answer as a fraction.  [2]

\[ \text{Working} \]

/6
Question 2

[Maximum mark: 6]  

Mary is travelling from London to Berlin on a vacation trip. She changes 8200 Great Britain pounds (GBP) to the euro (EUR), at an exchange rate of 1 EUR = 0.9205 GBP.

(a) Calculate the amount of EUR that Mary receives correct to two decimal places.  

(b) Mary estimates that she would receive 9000 EUR. Calculate the percentage error in Mary’s estimate. Write down the answer correct to two decimal places.

(c) While in Berlin, Mary spends 5000 EUR. On the way back to London she changes her remaining EUR back to GBP at the same exchange rate, 1 EUR = 0.9205 GBP. Calculate the amount of GBP she receives correct to two decimal places.

Working

/6
Question 3

[Maximum mark: 12] 

Lily and Eva both receive 50,000 Australian dollars (AUD) on their 18th birthday. Lily deposits her 50,000 AUD in a bank account. The bank pays a nominal annual rate of 5%, compounded yearly. Eva invests her 50,000 AUD into a high-yield mutual fund that returns a fixed amount of 3,000 AUD per year.

(a) Calculate

(i) The amount in Lily’s bank account at the end of the first year. 

(ii) The total amount of Eva’s funds at the end of the first year. 

(b) Write down an expression for

(i) The amount in Lily’s bank account at the end of the n\textsuperscript{th} year.

(ii) The total amount of Eva’s funds at the end of the n\textsuperscript{th} year.

(c) Calculate the year in which the amount in Lily’s bank account become greater than the amount in Eva’s fund.

(d) Determine

(i) The interest amount that Lily earns if invested for 12 years. Give your answer correct to two decimal places.

(ii) The amount of funds that Eva earns for her investment if invested for 12 years.