

Review Packet—Sequence and Series

3. Ann and John go to a swimming pool.
They both swim the first length of the pool in 2 minutes.
The time John takes to swim a length is 6 seconds more than he took to swim the previous length.
The time Ann takes to swim a length is 1.05 times that she took to swim the previous length.

- (a) (i) Find the time John takes to swim the third length.
- (ii) Show that Ann takes 2.205 minutes to swim the third length. (3)

- (b) Find the time taken for Ann to swim a total of 10 lengths of the pool. (3)
- (Total 6 marks)**

4. Two students Ann and Ben play a game. Each time Ann passes GO she receives \$15. Each time Ben passes GO he receives 8 % of the amount he already has. Both students start with \$ 100.

- (a) How much money will Ann have after she has passed GO 10 times?
- (b) How much money will Ben have after he passes GO 10 times?
- (c) How many times will the students have to pass GO for Ben to have more money than Ann? (Total 6 marks)

5. A geometric sequence has all its terms positive. The first term is 7 and the third term is 28.

- (a) Find the common ratio.
- (b) Find the sum of the first 14 terms.

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| <i>Working:</i> |
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| <i>Answers:</i> |
| (a) |
| (b) |

(Total 6 marks)

6. The sixth term of an arithmetic sequence is 24. The common difference is 8.
- (a) Calculate the first term of the sequence.
The sum of the first n terms is 600.
- (b) Calculate the value of n .

Working:

Answers:

(a)

(b)

(Total 8 marks)

7. The fourth term of an arithmetic sequence is 12 and the tenth term is 42.
- (a) Given that the first term is u_1 and the common difference is d , write down two equations in u_1 and d that satisfy this information.
- (b) Solve the equations to find the values of u_1 and d .

Working:

Answers:

(a)

.....

(b) $u_1 =$

$d =$

(Total 8 marks)

10. The first four terms of an arithmetic sequence are shown below.

1, 5, 9, 13,.....

- (a) Write down the n^{th} term of the sequence.
- (b) Calculate the 100th term of the sequence.
- (c) Find the sum of the first 100 terms of the sequence.

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| <i>Working:</i> | <i>Answers:</i> |
| | (a) |
| | (b) |
| | (c) |

(Total 4 marks)

12. The tuition fees for the first three years of high school are given in the table below.

| Year | Tuition fees (in dollars) |
|------|------------------------------|
| 1 | 2000 |
| 2 | 2500 |
| 3 | 3125 |

These tuition fees form a geometric sequence.

- (a) Find the common ratio, r , for this sequence.
- (b) If fees continue to rise at the same rate, calculate (to the nearest dollar) the total cost of tuition fees for the first six years of high school.

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| <i>Working:</i> |
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| | <p><i>Answers:</i></p> <p>(a)</p> <p>(b)</p> |
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(Total 4 marks)

14. Mr Jones decides to increase the amount of money he spends on food by d GBP every year. In the first year he spends a GBP. In the 8th year he spends twice as much as in the 4th year. In the 20th year he spends 4000 GBP.

Find the value of d .

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| <p><i>Working:</i></p> | <p><i>Answer:</i></p> <p>.....</p> |
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(Total 4 marks)

18. Angela needs \$4000 to pay for a car. She was given two options by the car seller.

Option A: Outright Loan

A loan of \$4000 at a rate of 12% per annum compounded monthly.

- (a) Find
 - (i) the cost of this loan for one year; (2)
 - (ii) the equivalent annual simple interest rate. (2)

Option B: Friendly Credit Terms

A 25% deposit, followed by 12 equal monthly payments of \$ 287.50.

- (b) (i) How much is to be paid as a deposit under this option? (1)
- (ii) Find the cost of the loan under *Friendly Credit Terms*. (2)

(c) Give a reason why Angela might choose

(i) **Option A**

(ii) **Option B**

(2)

To help Angela, her employer agrees to give her an interest free loan of \$4000 to buy the car. The employer is to recover the money by making the following deductions from Angela's salary:

\$ x in the first month,

\$ y every subsequent month.

The total deductions after 20 months is \$1540 and after 30 months it is \$2140.

(d) Find x and y .

(4)

(e) How many months will it take for Angela to completely pay off the \$4000 loan?

(2)

(Total 15 marks)

19. On Vera's 18th birthday she was given an allowance from her parents. She was given the following choices.

Choice A \$100 every month of the year.

Choice B A fixed amount of \$1100 at the beginning of the year, to be invested at an interest rate of 12% per annum, compounded monthly.

Choice C \$75 the first month and an increase of \$5 every month thereafter.

Choice D \$80 the first month and an increase of 5% every month.

(a) Assuming that Vera does not spend any of her allowance during the year, calculate, for each of the choices, how much money she would have at the end of the year.

(8)

(b) Which of the choices do you think that Vera should choose? Give a reason for your answer.

(2)

(c) On her 19th birthday Vera invests \$1200 in a bank that pays interest at $r\%$ per annum compounded annually. Vera would like to buy a scooter costing \$1452 on her 21st birthday. What rate will the bank have to offer her to enable her to buy the scooter?

(4)

(Total 14 marks)