SATPREP

Assignment: Applications of Sequence and Series

1. A theatre has 20 rows of seats. There are 15 seats in the first row, 17 seats in the second row, and each successive row of seats has two more seats in it than the previous row.

   (a) Calculate the number of seats in the 20th row.

   (b) Calculate the **total** number of seats.

2. Ashley and Billie are swimmers training for a competition.

   (a) Ashley trains for 12 hours in the first week. She decides to increase the amount of time she spends training by 2 hours each week. Find the total number of hours she spends training during the first 15 weeks.

   (b) Billie also trains for 12 hours in the first week. She decides to train for 10% longer each week than the previous week.

       (i) Show that in the third week she trains for 14.52 hours.

       (ii) Find the total number of hours she spends training during the first 15 weeks.

   (c) In which week will the time Billie spends training first exceed 50 hours?

3. (a) Consider the geometric sequence $-3, 6, -12, 24, \ldots.$

       (i) Write down the common ratio.

       (ii) Find the 15th term.

   Consider the sequence $x - 3, x + 1, 2x + 8, \ldots.$

   (b) When $x = 5$, the sequence is geometric.

       (i) Write down the first three terms.

       (ii) Find the common ratio.

   (c) Find the other value of x for which the sequence is geometric.

   (d) For this value of x, find

       (i) the common ratio;

       (ii) the sum of the infinite sequence.

4. A company offers its employees a choice of two salary schemes A and B over a period of 10 years.

Scheme A offers a starting salary of $11000 in the first year and then an annual increase of $400 per year.

(a) (i) Write down the salary paid in the second year and in the third year.

(ii) Calculate the **total** (amount of) salary paid over ten years.

Scheme B offers a starting salary of $10000 dollars in the first year and then an annual increase of 7% of the previous year's salary.

(b) (i) Write down the salary paid in the second year and in the third year.

(ii) Calculate the salary paid in the tenth year.

(c) Arturo works for n complete years under scheme A. Bill works for n complete years under scheme B. Find the minimum number of years so that the total earned by Bill exceeds the total earned by Arturo.

5. Arturo goes swimming every week. He swims 200 metres in the first week. Each week he swims 30 metres more than the previous week. He continues for one year (52 weeks).

(a) How far does Arturo swim in the final week?

(b) How far does he swim altogether?

6. A sum of $ 5000 is invested at a compound interest rate of 6.3 % per annum.

(a) Write down an expression for the value of the investment after n full years.

(b) What will be the value of the investment at the end of five years?

(c) The value of the investment will exceed $ 10 000 after n full years.

(i) Write down an inequality to represent this information.

(ii) Calculate the minimum value of n.