Year 12 Extension 1 **Sequences & Series Assignment** **Date Due:**

1. Write down the arithmetic sequence whose fifth and ninth terms are –17 and –29 respectively.

2. Insert 5 arithmetic means between 25 and 7.

3. How many terms of the series 4 + 7 + 10 ..... must be taken to give a sum of 531?

4. Find the sum of the first twenty terms of the arithmetic sequence given that the tenth term is 39 and the sum of the first ten terms if 165.

5. Find an expression for U_n = given that $S_n = 2n^2 + n$.

6. (a) Evaluate: $\sum_{k=1}^{8}(1 + 4k)$ (b) Write $1^2 + 2^2 + 3^2 + ... + 9^2$ using sigma notation.

7. Insert three terms between 2 and 162 so that the five numbers form a geometric sequence.

8. Find the sum of the first eight terms of the geometric sequence 3, 6, 12, ...

9. Find the sum of the first ten terms of the series 4 + 2 + 1 + ...

10. The first term of a geometric sequence is 8 and the sum to infinity is 32. Find the common ratio.

11. Find the fractional equivalent to $0.5\dot{7}$ by first writing it as an infinite series.

12. At the beginning of each year a man invests $500 with interest compounding at 8% p.a. Calculate:
    (a) the magnitude of his first investment at the end of 10 years.
    (b) the accumulated value of his investments at the end of 10 years.

13. A person borrows $5000 and undertakes to repay $100 at the end of each month reckoned from the date f the loan. Interest is charged on the unpaid debt at 1½% per month. How much does he owe after the 8^{th} repayment?

14. A person invests $5000 on condition that he is repaid the money in 10 equal quarterly instalments. If interest is receives at the rate of 4% per quarter, what is the amount of each instalment?

15. If $1 + 2x + 4x^2 + ... = \frac{3}{4}$, find the value of x.

16. $2m – 8$, 2m + 4 and 5m – 2 are successive terms of a geometric sequence. Find the value of m.

17. A pump removes one-quarter of the water from a tank every 15 minutes. If the tank initially holds 256 000 litres, how much water will remain in the tank after one hour?

18. The sum of the first n terms of the series 30 + 26 + 22 + ... is 120.
    Find two possible values of n.

19. Logs of wood are stacked in a pile so that there are 15 logs on the top row, 16 on the next, 17 on the next, and so on. If there are 246 logs altogether,
    (a) how many rows are there?
    (b) how many logs are on the bottom row?