Sequences and Series Review   Name_____

1.   An arithmetic series has five terms. The first term is 2 and the last term is 32. Find the sum of the series.

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(Total 4 marks)

</div>

2.   Portable telephones are first sold in the country *Cellmania* in 1990. During 1990, the number of units sold is 160. In 1991, the number of units sold is 240 and in 1992, the number of units sold is 360.

In 1993 it was noticed that the annual sales formed a geometric sequence with first term 160, the 2nd and 3rd terms being 240 and 360 respectively.

(a)   What is the common ratio of this sequence?

<div align="right">

(1)

</div>

Assume that this trend in sales continues.

(b)   How many units will be sold during 2002?

<div align="right">

(3)

</div>

(c)   In what year does the number of units sold first exceed 5000?

<div align="right">

(4)

</div>

Between 1990 and 1992, the total number of units sold is 760.

(d)   What is the total number of units sold between 1990 and 2002?

<div align="right">

(2)

</div>

During this period, the total population of *Cellmania* remains approximately 80 000.

(e)   Use this information to suggest a reason why the geometric growth in sales would not continue.

<div align="right">

(1)
(Total 11 marks)

</div>

3.   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.

<div align="right">

(3)

</div>

(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.

<div align="right">

(4)

</div>

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

<div align="right">

(4)
(Total 11 marks)

</div>

4. In an arithmetic sequence, the first term is –2, the fourth term is 16, and the nth term is 11 998.

    (a)   Find the common difference d.

    (b)   Find the value of n.

(Total 6 marks)

5. Let S_n be the sum of the first n terms of an arithmetic sequence, whose first three terms are u_1, u_2 and u_3. It is known that $S_1 = 7$, and $S_2 = 18$.

    (a)   Write down u_1.

    (b)   Calculate the common difference of the sequence.

    (c)   Calculate u_4.

(Total 6 marks)

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 $10000 after n full years,

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

        (ii)   Calculate the minimum value of n.

(Total 6 marks)

7. In a sequence $u_4 = 12$ and $u_8 = 30$.

    (a)   If the sequence is arithmetic, find the value of the common difference. Then write an expression for the general term, u_n.

(3)

    (b)   If the sequence is geometric, find the value of the common ratio. Then write an expression for the general term, u_n.

(3)
(Total 6 marks)

8. In an arithmetic sequence $u_{21} = -37$ and $u_4 = -3$.

    (a)   Find

        (i)   the common difference;

        (ii)   the first term.

(4)

    (b)   Find S_{10}.

(3)
(Total 7 marks)

9. Gwendolyn added the multiples of 3, from 3 to 3750 and found that

$$3 + 6 + 9 + \ldots + 3750 = s.$$

Calculate s.

(Total 6 marks)

10. The first term of an infinite geometric sequence is 18, while the third term is 8. There are two possible sequences. Find the sum of each sequence.

(Total 6 marks)