Edexcel A level Maths Sequences and series

Topic assessment

1. An arithmetic series has first term 3 and common difference 5. Find
   (i) the 4^{th} term [2]
   (ii) the sum of the first 12 terms. [3]

2. The 5^{th} term of an arithmetic series is 16 and the 10^{th} term is 30.
   (i) Find the first term and the common difference. [4]
   (ii) How many terms of the series are needed for the sum of the series to exceed 1000? [4]

3. A geometric series has first term 2 and common ratio 0.2. Find
   (i) the 3^{rd} term [2]
   (ii) the sum of the first 4 terms of the series [3]
   (iii) the sum to infinity of the series. [2]

4. A geometric series has 1^{st} term 3 and sum to infinity 8.
   Find the common ratio. [4]

5. A geometric series has first term 54 and 4^{th} term 2.
   (i) What is the common ratio? [3]
   (ii) Find the sum to infinity of the series. [2]
   (iii) After how many terms is the sum of the series greater than 99% of the sum to infinity? [5]

6. When Mirka is 5 years old, her parents start to give her pocket money of 50p per week. On her birthday each year, her parents increase her pocket money by 50p.
   (i) How much pocket money does Mirka get in the first year? [2]
   (ii) How much more money in total does Mirka get in the second year than the first year? [3]
   (iii) How much money has Mirka been given in total by her 11^{th} birthday? [3]
   (iv) After how many complete years is the total amount Mirka has been given more than £1000? [4]

7. At the beginning of each month, Mark puts £N from his salary into a savings account. At the end of every month, interest is added to his savings at the rate of r% per month.
   (i) Write down an expression for the amount of money in Mark's account at the end of (a) 1 month (b) 2 months (c) 3 months,
   and hence show that the amount of money in Mark's account at the end of n months is given by
   $$N\left(1+\tfrac{r}{100}\right)+N\left(1+\tfrac{r}{100}\right)^2+N\left(1+\tfrac{r}{100}\right)^3+....+N\left(1+\tfrac{r}{100}\right)^n$$ [8]
   (ii) Use the formula for a geometric progression to simplify this expression. [3]
   (iii) How much does Mark have after 5 years if he saves £100 a month at an interest rate of 0.5% per month? [3]

Total 60 marks