

## Section 3: Geometric sequences and series

### Exercise level 2

- The numbers  $5x + 1$ ,  $4x - 4$  and  $3x - 5$  form three consecutive terms of a geometric sequence.
  - Find the two possible values of  $x$ .
  - Find the common ratio corresponding to each possible value of  $x$ .
- The infinite recurring decimal  $0.\dot{4}\dot{5} = 0.454545\dots$  can be written as the infinite geometric series  $0.45 + 0.0045 + 0.000045 + \dots$ 
  - Write down the first term and the common ratio of this geometric series.
  - Find the sum to infinity of the series and hence express  $0.\dot{4}\dot{5}$  as an exact fraction in its lowest terms.
- Using the same method as in Question 2, express the recurring decimal  $0.\dot{4}0\dot{7}$  as an exact fraction in its lowest terms.
- Aisha works for the same company for 10 years. Her starting salary is £18000, and each year she receives a pay rise of 4%.
  - How much does Aisha earn in the 10<sup>th</sup> year?
  - How much has she earned in total over the 10 year period?
- A ball is dropped from a height of 2 metres. After each bounce it rebounds to a height 0.8 times the height that it reached after the last bounce.
  - After how many bounces does the ball first rebound to less than 10 cm from the ground?
  - Find the total distance travelled by the ball before it comes to rest.
  - After how many bounces has the ball travelled more than 99% of the total distance it travels before coming to rest?
- A series is  $S = 1 - \frac{1}{2} + \frac{1}{4} - \frac{1}{8} + \dots$ 
  - Find the sum to infinity of the series.
  - Express the odd terms of the series  $S$  as a geometric sequence, and find its sum to infinity.
  - Express the even terms of the series  $S$  as a geometric sequence, and find its sum to infinity.
  - Show that your solutions in parts (ii) and (iii) confirm your answer in (i).