The first three terms of a sequence are given by

$$5x+8, \; -2x+1, \; x-4$$

(a) When $x = 11$, show that the first three terms form the start of a geometric sequence, and state the value of the common ratio.   2

(b) Given that the entire sequence is geometric for $x = 11$

     (i) state why the associated series has a sum to infinity   1

     (ii) calculate this sum to infinity.   2

(c) There is a second value for x that also gives a geometric sequence.

     For this second sequence

     (i) show that $x^2 - 8x - 33 = 0$ 2

     (ii) find the first three terms   2

     (iii) state the value of S_{2n} and justify your answer.   1

Answers:

(a) $r = -\dfrac{1}{3}$

(b)   (i) $\left| -\dfrac{1}{3} \right| < 1$

     (ii) $\dfrac{189}{4}$ or $47 \cdot 25$

(c)   (i)   Equate ratios, cross-multiply and simplify.

     (ii) $-7, 7, -7$

     (iii)   0 since $2n$ is even, so the pairs of terms cancel each other out.