

Question Number	Scheme	Marks
7(a)	$\frac{(x+1)}{(x-3)} = \frac{(4x-2)}{(x+1)} \quad \text{or} \quad (x+1)^2 = (x-3)(4x-2)$ $(x+1)^2 = (4x-2)(x-3) \Rightarrow 3x^2 - 16x + 5 (=0)$ $(x-5)(3x-1) = 0 \Rightarrow x = 5, \frac{1}{3}$	M1 A1 M1A1A1 (5)
(b)	$x = \frac{1}{3} \Rightarrow r = \frac{x+1}{x-3} = \frac{\frac{4}{3}}{-\frac{8}{3}}$ $r = -\frac{1}{2} \quad \therefore \text{convergent as } -1 < r < 1 \quad *$	M1 A1cso (2)
(c)	$S = \frac{a}{1-r} = \frac{-\frac{8}{3}}{1+\frac{1}{2}} = -\frac{16}{9} \quad \text{oe}$	M1A1 (2)
(d)	$\frac{S}{S_n} = \frac{a}{1-r} \times \frac{1-r}{a(1-r^n)} = \frac{1}{(1-r^n)} = \frac{256}{255}$ $255 = 256(1-r^n)$ $256r^n = 1 \quad \left(-\frac{1}{2}\right)^n = \frac{1}{256} \quad \text{oe} \quad n = 8$	M1 dM1A1 (3) [12]
(a)M1 A1 M1 A1 A1 (b) M1 A1cso (c) M1 A1 (d) M1 dM1 A1	Form an equation using the given information about the terms Simplify their equation to a correct 3TQ, terms in any order Condone missing = 0 Attempt to solve their 3TQ by any valid method. Must reach $x = \dots$ (at least one root) Calculator solutions: <i>Both</i> roots correct from a correct equation scores M1A1A1 Incorrect equation or incorrect roots scores M0A0A0 One correct value of x Both correct values of x Use either of their values of x , provided it is < 1 , to find the corresponding value of r . No need to simplify Correct value of r and the conclusion including the reason Use their value of r (not x) provided $-1 < r < 1$ (as found in (b) or here) and the formula for the sum to infinity to obtain a value for S Correct value Obtain an equation in r and n . May use the formulae to cancel a or may sub values of a and r in the formulae for the LHS Must equate to $256/255$ Value of r not needed for this mark so allow any value used. Solve their equation of the form $r^n = \dots$ where $-1 < r < 1$ (r not x). May use trial and improvement or logs. This mark can be given if the equation and value of r are incorrect. Evidence of method needed if final answer is incorrect. If logs used condone $\log(-1/2)^n$ Correct value from correct working	