HIGHER

2.4 Arithmetic and Geometric Sequences and Series: 30-minute Pack

Total Marks

EDEXCEL 4MA1 · Calculator allowed · about 30 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 The first four terms of an arithmetic sequence are 22, 28, 34, 40, ...
Show whether 257 is a term of the sequence.

(Total for Question 1 is 4 marks)

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2 An arithmetic series has first term 22 and common difference 7.
Find the sum of the first 28 terms.

(Total for Question 2 is 2 marks)

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3 The expressions x + 1, x - 2 and 3x - 7 are the first three terms of an arithmetic sequence.
Find the value of x.

(Total for Question 3 is 3 marks)

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4 A channel has 1 followers on day 1. Each day the number of followers is 2 times the number on the previous day.
Assuming this pattern continues, find the first day on which the value is greater than 100000.

(Total for Question 4 is 4 marks)

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5 A geometric series has first term 2 and common ratio 3/2.
Find the sum of the first 4 terms.

(Total for Question 5 is 2 marks)

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6 The first four terms of a geometric sequence are 486, 162, 54, 18, ...
(a) Write down the common ratio.
(b) Find the 8th term.

(Total for Question 6 is 4 marks)

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7 A geometric series has first term a = 6 and common ratio r = 1/2. Find the integer value of n for which the sum of the first n terms equals 11.25. Show your algebraic steps.

(Total for Question 7 is 3 marks)

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Mark scheme · 2.4 Arithmetic and Geometric Sequences and Series: 30-minute Pack

Question 1

nth term = 6n + 16	**M1**
sets 6n + 16 = 257	**M1**
n = 241/6	**A1**
n is not a positive whole number, so 257 is not a term	**B1**

Answer: No, 257 is not a term

Question 2

$S = (n/2)(2a + (n - 1)d)$ with a = 22, d = 7, n = 28	**M1**
S = 3262	**A1**

Answer: S = 3262

Question 3

uses (second term) - (first term) = (third term) - (second term)	**M1**
forms and simplifies a linear equation in x	**M1**
x = 1	**A1**

Answer: x = 1

Question 4

models the value on day n as $1 \times (2)^{n-1}$	**M1**
solves or tests: $1 \times (2)^{n-1} > 100000$	**M1**
value on day 17 is 65536 (not greater than 100000) and on day 18 is 131072	**A1**
n = 18	**A1**

Answer: n = 18

Question 5

$S = a(r^n - 1)/(r - 1)$ with a = 2, r = 3/2, n = 4	**M1**
65/4	**A1**

Answer: Sum = 65/4

Question 6

common ratio = second term / first term = 162/486	**M1**
r = 1/3	**A1**
8th term = $486 \times (1/3)^7$	**M1**
2/9	**A1**

Answer: (a) r = 1/3; (b) 2/9

Question 7

uses $S_n = 6(1 - (1/2)^n)/(1 - 1/2) = 12(1 - (1/2)^n)$ and sets equal to 11.25	**M1**
solves $12(1 - (1/2)^n) = 11.25$ to get $1 - (1/2)^n = 0.9375$ and hence $(1/2)^n = 0.0625$	**M1**
n = 4 cao	**A1**

Answer: n = 4

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