2.13 Sequences and Patterns: 30-minute Pack

GL ASSESSMENT GL · Calculators not allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A sequence begins 2, 5, 8, __, 14, __. Find the two missing terms.

(2)

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2 In a theatre, row 1 has 8 seats. Each row after that has 3 more seats than the row in front of it.

(a) Write down the number of seats in row 2, row 3 and row 4. **(2)**

.....

(b) Find a formula for the number of seats in row n. **(2)**

.....

(c) The theatre has 20 rows. Find the number of seats in row 20. **(2)**

.....

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3 A sequence begins 20, 15, 10, 5, ...

(a) Write down the next three terms of the sequence. **(2)**

.....

(b) Write down the term-to-term rule for this sequence. **(1)**

.....

(c) Find the position of the first term in the sequence that is negative. **(2)**

.....

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4 A sequence has nth term 4n + 3.

(a) Work out the first three terms of the sequence. **(3)**

.....

(b) Work out the 20th term of the sequence. **(2)**

.....

(c) Is 100 a term in this sequence? Give a reason for your answer. **(2)**

.....

.....

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5 Sequence A begins 2, 5, 8, 11, ... with nth term 3n - 1. Sequence B begins 4, 7, 10, 13, ... with nth term 3m + 1. Show that no term of sequence A is ever equal to a term of sequence B.

(3)

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6 Ffion saves £2 in week 1. Each week after that, she saves £3 more than the week before, so she saves £2, £5, £8, £11, ...

(a) Find how much Ffion saves in week 6. **(2)**

(b) Find the week in which Ffion first saves exactly £29. **(2)**

(c) Find the total amount Ffion has saved by the end of week 4. **(2)**

7 A sequence begins 8, 10, 12, 14, ... Aled says the nth term of this sequence is 2n + 5. Explain why Aled's formula is incorrect, and write down the correct nth term for the sequence.

(3)

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Mark scheme · 2.13 Sequences and Patterns: 30-minute Pack

A correct answer earns full marks unless the question asks for working, a method, proof or explanation.

Question 1

11	**B1**
17	**B1**

Answer: 11, 17

Question 2

(a) two of the three values correct	**B1**
(a) all three correct: 11, 14, 17	**B1**

(a) Answer: 11, 14, 17

(b) valid method using common difference 3 and row 1 value 8	**M1**
(b) 3n + 5 cao	**A1**

(b) Answer: Number of seats = 3n + 5

(c) their formula with n = 20 substituted (ft)	**M1**
(c) 65 cao	**A1**

(c) Answer: 65 seats

Question 3

(a) valid method continuing the pattern	**M1**
(a) all three correct: 0, -5, -10	**A1**

(a) Answer: 0, -5, -10

(b) subtract 5 (oe)	**B1**

(b) Answer: Subtract 5 from the previous term

(c) valid method, e.g. nth term = 25 - 5n and solve 25 - 5n < 0, or systematic listing	**M1**
(c) cao, the 6th term (value -5)	**A1**

(c) Answer: The 6th term (which is -5)

Question 4

(a) correct substitution shown for at least one value of n	**M1**
(a) two of the three terms correct	**A1**
(a) all three terms correct cao	**A1**

(a) Answer: 7, 11, 15

(b) 4 x 20 + 3 seen	**M1**
(b) 83 cao	**A1**

(b) Answer: 83

(c) sets 4n + 3 = 100 and attempts to solve for n	**M1**
(c) correct conclusion with valid reason: No, because n = 24.25, which is not a whole number	**A1**

(c) Answer: No, because n = 24.25 which is not a whole number

Question 5

sets 3n - 1 = 3m + 1	**M1**
rearranges to 3n - 3m = 2, or 3(n - m) = 2 (oe)	**M1**
cso: the left-hand side is always a multiple of 3, but 2 is not a multiple of 3, so there is no integer solution and the sequences never share a term	**A1**

Answer: No common term exists, since 3(n - m) = 2 has no integer solution

Question 6

(a) nth term 3n - 1 identified, or valid continuation to week 6	**M1**
(a) £17 cao	**A1**

(a) Answer: £17

(b) sets 3n - 1 = 29 and attempts to solve	**M1**
(b) week 10 cao	**A1**

(b) Answer: Week 10

(c) adds the first four terms: 2 + 5 + 8 + 11	**M1**
(c) £26 cao	**A1**

(c) Answer: £26

Question 7

tests Aled's formula, e.g. substitutes n = 1 into 2n + 5 to get 7, and compares with the actual first term 8, showing a mismatch	**M1**
finds the correct constant using the common difference of 2 and first term 8	**M1**
correct formula 2n + 6 cao	**A1**

Answer: Aled's formula is incorrect because 2(1) + 5 = 7, not 8; the correct nth term is 2n + 6

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