2.13-2 Sequences and Patterns: Practice Set 2: 30-minute Pack

Total Marks

GL ASSESSMENT GL · Calculators not allowed · about 30 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A sequence begins 9, 15, 21, __, 33, __. Find the two missing terms.

(2)

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2 A sequence begins 3, 4, 7, 11, 18, ... where, from the third term onwards, each term is the sum of the two terms before it.

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

.....

(b) Describe, in words, the rule connecting the terms of the sequence. **(1)**

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3 A sequence begins 30, 24, 18, 12, ...

(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 begins 9, 16, 23, 30, ...

(a) Find the nth term of the sequence. **(2)**

.....

(b) Use your formula to find the 22nd term of the sequence. **(2)**

.....

(c) Determine whether 191 is a term in the sequence. Show your working. **(2)**

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5 Which number continues the sequence?

2, 2, 4, 6, 10, 16, 26, __

- ☐ A) 36
- ☐ B) 40
- ☐ C) 42
- ☐ D) 44

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6 A bike hire scheme charges a fixed booking fee plus an hourly rate. The cost, in £, of hiring a bike for n hours is given by 6n + 2.

(a) Work out the cost of hiring a bike for 1 hour, 2 hours and 3 hours. **(3)**

(b) Work out the cost of hiring a bike for 25 hours. **(2)**

(c) Is it possible to hire a bike for a whole number of hours for exactly £250? Give a reason for your answer. **(2)**

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7 A video posted online gets 5 views on day 1. Each day after that, the number of views doubles.

(a) Complete the sequence for days 1 to 5. **(2)**

(b) Work out how many views the video will have on day 7. **(2)**

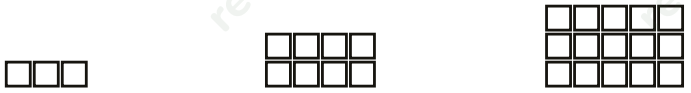
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8 Sequence C begins 3, 7, 11, 15, ... with nth term 4n - 1. Sequence D begins 6, 10, 14, 18, ... with nth term 4m + 2. Show that no term of sequence C is ever equal to a term of sequence D.

(3)

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9 A garden centre lays rectangular patios from square slabs. Patio n is n slabs wide and (n + 2) slabs long, so the total number of slabs used is $n^2 + 2n$. Patio 1 uses 3 slabs, patio 2 uses 8 slabs and patio 3 uses 15 slabs.



Patio 1
3 slabs

Patio 2
8 slabs

Patio 3
15 slabs

(a) Show that the rule $n^2 + 2n$ gives 15 slabs when n = 3. **(1)**

(b) Find the patio number that uses exactly 99 slabs. **(3)**

.....

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Mark scheme · 2.13-2 Sequences and Patterns: Practice Set 2: 30-minute Pack

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

Question 1

27	**B1**
39	**B1**

Answer: 27, 39

Question 2

(a) 29 oe	**B1**
(a) 47 (ft, sum of previous two terms)	**B1**

(a) Answer: 29, 47

(b) oe: each term (from the third) is the sum of the two terms before it	**B1**

(b) Answer: Each term after the first two is found by adding together the two terms before it

Question 3

(a) valid method continuing the pattern	**M1**
(a) all three correct: 6, 0, -6	**A1**

(a) Answer: 6, 0, -6

(b) subtract 6 (oe)	**B1**

(b) Answer: Subtract 6 from the previous term

(c) valid method, e.g. nth term = 36 - 6n and solve 36 - 6n < 0, or systematic listing	**M1**
(c) cao, the 7th term (value -6)	**A1**

(c) Answer: The 7th term (which is -6)

Question 4

(a) common difference of 7 identified and used	**M1**
(a) 7n + 2 cao	**A1**

(a) Answer: 7n + 2

(b) their formula with n = 22 substituted (ft)	**M1**
(b) 156 cao	**A1**

(b) Answer: 156

(c) sets 7n + 2 = 191 and attempts to solve	**M1**
(c) cso, yes, n = 27, so 191 is the 27th term	**A1**

(c) Answer: Yes, 191 is the 27th term

Question 5

C) 42	**B1**

Answer: C) 42

Question 6

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

(a) Answer: £8, £14, £20

(b) 6 x 25 + 2 seen	**M1**
(b) £152 cao	**A1**

(b) Answer: £152

(c) sets 6n + 2 = 250 and attempts to solve for n	**M1**
(c) correct conclusion with valid reason: No, because n = 41.33..., which is not a whole number	**A1**

(c) Answer: No, because n = 41.33... which is not a whole number

Question 7

(a) first three terms correct: 5, 10, 20	**B1**
(a) all five terms correct: 5, 10, 20, 40, 80	**B1**

(a) Answer: 5, 10, 20, 40, 80

(b) valid method, e.g. 5 x 2^6, or continued doubling to day 7	**M1**
(b) 320 cao	**A1**

(b) Answer: 320

Question 8

sets 4n - 1 = 4m + 2	**M1**
rearranges to 4n - 4m = 3, or 4(n - m) = 3 (oe)	**M1**
cso: the left-hand side is always a multiple of 4, but 3 is not a multiple of 4, so there is no integer solution and the sequences never share a term	**A1**

Answer: No common term exists, since 4(n - m) = 3 has no integer solution

Question 9

(a) cso: 3^2 + 2 x 3 = 9 + 6 = 15	**B1**

(a) Answer: 3^2 + 2 x 3 = 9 + 6 = 15

(b) sets n^2 + 2n = 99, i.e. n^2 + 2n - 99 = 0	**M1**
(b) solves by factorising or trial, e.g. (n - 9)(n + 11) = 0	**M1**
(b) cao, n = 9 (rejecting n = -11)	**A1**

(b) Answer: Patio 9

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