2.15 Linear Sequences and the nth Term: 2-hour Pack

Calculators not allowed · about 120 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Here are the first four terms of a sequence.
16, 25, 36, 49
Write down the next two terms and describe the rule.

(2)

2 Here are the first four terms of a sequence.
16, 13, 10, 7
Write down the next two terms and describe the rule.

(2)

3 Mo says that 57 is in the sequence with nth term 4n + 3. Is Mo correct? Explain your answer.

(3)

4 The nth term of a sequence is 6n + 6.
Work out the 33rd term.

(2)

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5 The nth term of a sequence is 4n + 2.
Work out the 54th term.

(2)

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6 The nth term of a sequence is 5n + 5.
Find the first term of the sequence that is greater than 500.

(3)

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7 Here are the first four terms of a sequence.
1, 4, 9, 16
Write down the next two terms and describe the rule.

(2)

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8 The nth term of a sequence is 8n - 1.
Find the first term of the sequence that is greater than 100.

(3)

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9 Here are the first four terms of a sequence.
64, 81, 100, 121
Write down the next two terms and describe the rule.

(2)

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10 Mo says that 97 is in the sequence with nth term 6n + 4. Is Mo correct? Explain your answer.

(3)

11 Mo says that 245 is in the sequence with nth term 9n. Is Mo correct? Explain your answer.

(3)

12 The nth term of a sequence is 9n + 2.
Work out the 32nd term.

(2)

13 Here are the first four terms of a sequence.
26, 23, 20, 17
Write down the next two terms and describe the rule.

(2)

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14 A pattern uses 6 dots in pattern number 1, 11 in pattern number 2 and 16 in pattern number 3, and continues in the same way.
Which pattern number uses 146 dots?

(3)

---

15 Mo says that 269 is in the sequence with nth term 7n. Is Mo correct? Explain your answer.

(3)

---

16 A pattern uses 4 counters in pattern number 1, 6 in pattern number 2 and 8 in pattern number 3, and continues in the same way.
Which pattern number uses 48 counters?

(3)

---

17 A pattern uses 5 dots in pattern number 1, 8 in pattern number 2 and 11 in pattern number 3, and continues in the same way.
Which pattern number uses 44 dots?

(3)

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18 The nth term of a sequence is 5n - 3.
Find the first term of the sequence that is greater than 100.

(3)

---

19 The nth term of a sequence is 7n + 7.
Find the first term of the sequence that is greater than 500.

(3)

---

20 The nth term of a sequence is 6n + 3.
Find the first term of the sequence that is greater than 150.

(3)

---

21 Here are the first five terms of an arithmetic sequence.
0, -4, -8, -12, -16
Find an expression for the nth term.

(2)

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22 Here are the first five terms of an arithmetic sequence.
-2, -4, -6, -8, -10
Find an expression for the nth term.

(2)

---

23 Mo says that 125 is in the sequence with nth term 6n + 3. Is Mo correct? Explain your answer.

(3)

---

24 The nth term of a sequence is 3n - 4.
Find the first term of the sequence that is greater than 150.

(3)

---

25 A pattern uses 8 counters in pattern number 1, 14 in pattern number 2 and 20 in pattern number 3, and continues in the same way.
Which pattern number uses 140 counters?

(3)

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26 Mo says that 186 is in the sequence with nth term 5n + 2. Is Mo correct? Explain your answer.

(3)

27 A pattern uses 6 matchsticks in pattern number 1, 11 in pattern number 2 and 16 in pattern number 3, and continues in the same way.
Which pattern number uses 101 matchsticks?

(3)

28 Here are the first five terms of an arithmetic sequence.
9, 3, -3, -9, -15
Find an expression for the nth term.

(2)

29 The nth term of a sequence is 7n - 5.
Find the first term of the sequence that is greater than 50.

(3)

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30 A row of n squares built from matchsticks needs a number of matchsticks given by the nth term 3n + 1.

(a) How many matchsticks are needed for 12 squares? **(2)**

(b) How many squares can be made with exactly 40 matchsticks? **(2)**

31 A sequence is formed using the rule 'multiply the term number by 8, then subtract 6' to give the nth term. A student says the 100th term is 800. Is the student correct? Justify your answer with a calculation.

(3)

32 Priya saves money each week. She saves £12 in week 1, and each week after she saves £3 more than the previous week.

(a) Find a formula for her savings, Sn pounds, in week n. **(1)**

(b) Find her savings in week 9. **(1)**

(c) In which week does she first save more than £50 in that single week? **(2)**

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33 Given the nth term 7n - 3, work out the 5th term and the 0th term.

(2)

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34 A sequence begins 3, 7, 11, ... and the nth term is 4n - 1.

(a) Show that the 4th term from the nth term formula is 15. **(1)**

(b) Write down the 10th term. **(1)**

.....

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35 State the common difference of the sequence 50, 43, 36, 29, ...

(1)

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Mark scheme · 2.15 Linear Sequences and the nth Term: 2-hour Pack

Question 1

next two terms 64, 81	B1
rule: square numbers	B1

Answer: **64, 81 (square numbers)**

Question 2

next two terms 4, 1	B1
rule: subtract 3	B1

Answer: **4, 1 (subtract 3)**

Question 3

4n + 3 = 57 written down	M1
n = 27/2 or a clear check that the terms are 55 and 59	M1
No, with a correct explanation	A1

Answer: **No, Mo is not correct**

Question 4

substitutes n = 33: 6 x 33 + 6	M1
204 cao	A1

Answer: **204**

Question 5

substitutes n = 54: 4 x 54 + 2	M1
218 cao	A1

Answer: **218**

Question 6

5n + 5 = 500 or 5n + 5 > 500 used, or a trial of values	M1
n = 100 identified, or the terms either side of 500 found	M1
505 cao	A1

Answer: **505**

Question 7

next two terms 25, 36	B1
rule: square numbers	B1

Answer: **25, 36 (square numbers)**

Question 8

8n - 1 = 100 or 8n - 1 > 100 used, or a trial of values	M1
n = 13 identified, or the terms either side of 100 found	M1
103 cao	A1

Answer: **103**

Question 9

next two terms 144, 169	B1
rule: square numbers	B1

Answer: **144, 169 (square numbers)**

Question 10

6n + 4 = 97 written down	M1
n = 31/2 or a clear check that the terms are 94 and 100	M1
No, with a correct explanation	A1

Answer: **No, Mo is not correct**

Question 11

9n = 245 written down	M1
n = 245/9 or a clear check that the terms are 243 and 252	M1
No, with a correct explanation	A1

Answer: **No, Mo is not correct**

Question 12

substitutes n = 32: 9 x 32 + 2	M1
290 cao	A1

Answer: **290**

Question 13

next two terms 14, 11	B1
rule: subtract 3	B1

Answer: **14, 11 (subtract 3)**

Question 14

nth term 5n + 1	M1
5n + 1 = 146	M1
pattern number 29 cao	A1

Answer: **pattern number 29**

Question 15

7n = 269 written down	M1
n = 269/7 or a clear check that the terms are 266 and 273	M1
No, with a correct explanation	A1

Answer: **No, Mo is not correct**

Question 16

nth term 2n + 2	M1
2n + 2 = 48	M1
pattern number 23 cao	A1

Answer: **pattern number 23**

Question 17

nth term 3n + 2	M1
3n + 2 = 44	M1
pattern number 14 cao	A1

Answer: **pattern number 14**

Question 18

5n - 3 = 100 or 5n - 3 > 100 used, or a trial of values	M1
n = 21 identified, or the terms either side of 100 found	M1
102 cao	A1

Answer: **102**

Question 19

7n + 7 = 500 or 7n + 7 > 500 used, or a trial of values	M1
n = 71 identified, or the terms either side of 500 found	M1
504 cao	A1

Answer: **504**

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Question 20

6n + 3 = 150 or 6n + 3 > 150 used, or a trial of values	M1
n = 25 identified, or the terms either side of 150 found	M1
153 cao	A1

Answer: **153**

Question 21

common difference -4 identified (or -4n in the expression)	M1
-4n + 4 cao	A1

Answer: **nth term = -4n + 4**

Question 22

common difference -2 identified (or -2n in the expression)	M1
-2n cao	A1

Answer: **nth term = -2n**

Question 23

6n + 3 = 125 written down	M1
n = 61/3 or a clear check that the terms are 123 and 129	M1
No, with a correct explanation	A1

Answer: **No, Mo is not correct**

Question 24

3n - 4 = 150 or 3n - 4 > 150 used, or a trial of values	M1
n = 52 identified, or the terms either side of 150 found	M1
152 cao	A1

Answer: **152**

Question 25

nth term 6n + 2	M1
6n + 2 = 140	M1
pattern number 23 cao	A1

Answer: **pattern number 23**

Question 26

5n + 2 = 186 written down	M1
n = 184/5 or a clear check that the terms are 182 and 187	M1
No, with a correct explanation	A1

Answer: **No, Mo is not correct**

Question 27

nth term 5n + 1	M1
5n + 1 = 101	M1
pattern number 20 cao	A1

Answer: **pattern number 20**

Question 28

common difference -6 identified (or -6n in the expression)	M1
-6n + 15 cao	A1

Answer: **nth term = -6n + 15**

Question 29

7n - 5 = 50 or 7n - 5 > 50 used, or a trial of values	M1
n = 8 identified, or the terms either side of 50 found	M1
51 cao	A1

Answer: **51**

Question 30

(a) substitutes n = 12	M1
(a) 37 cao	A1

(a) Answer: **37**

(b) sets up 3n + 1 = 40	M1
(b) n = 13 cao	A1

(b) Answer: **13**

Question 31

writes the nth term as 8n - 6 and substitutes n = 100	M1
correctly finds the 100th term is 794	A1
states the student is incorrect, since 794 does not equal 800	B1

Answer: **No, the 100th term is 794, not 800**

Question 32

(a) Sn = 3n + 9 cao	B1

(a) Answer: **Sn = 3n + 9**

(b) 36 cao (ft their formula)	B1

(b) Answer: **£36**

(c) sets up 3n + 9 > 50	M1
(c) week 14 cao	A1

(c) Answer: **Week 14**

Question 33

5th term = 32 cao	B1
0th term = -3 cao	B1

Answer: **5th term = 32, 0th term = -3**

Question 34

(a) 4(4) - 1 = 15 shown	B1

(a) Answer: **15**

(b) 39 cao	B1

(b) Answer: **39**

Question 35

-7 cao	B1

Answer: **-7**

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