2.13-4 Sequences and Early Algebra: Practice Set 4: 30-minute Pack

Total Marks

GL ASSESSMENT EP.M68 · Calculators not allowed · about 30 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

Sequences and Early Algebra: Practice Set 4

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A fourth 11+ sequences and early-algebra practice set, complementing EP.M13/EP.M13B (Sequences and Patterns), EP.M14/EP.M14B (Early Algebra), EP.M28/EP.M39 (Algebra, Sequences and Patterns Depth) and EP.M56 (Sequences, Patterns and Early Algebra: Practice Set 3). It covers term-to-term and position-to-term sequences, linear nth-term rules, function machines, forming and simplifying expressions, and one-step and two-step equations, with an entirely fresh set of numbers, contexts and names. Questions are ramped from straightforward warm-up items to demanding multi-step and reverse-reasoning problems.

1 r = 6 and s = -3. Work out the value of each expression.

(a) 2r + s **(1)**

.....

(b) 5s - r **(1)**

.....

2 Solve x + 16 = 9.

- ☐ A) -7
- ☐ B) 7
- ☐ C) 25
- ☐ D) -25
- ☐ E) 16

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3 Solve y - 21 = 8.

(1)

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4 Solve 6x - 7 = 41. Show your working.

(2)

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5 Solve 33 - 4x = 5. Show your working.

(2)

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6 A market trader stacks crates for a stall. Stack 1 uses 10 crates, stack 2 uses 17 crates, stack 3 uses 24 crates, stack 4 uses 31 crates, with each new stack using 7 more crates than the one before.

(a) Find an expression, in terms of n, for the number of crates needed for stack n. **(1)**

(b) Ronke says that stack 12 will need fewer than 90 crates. Is Ronke correct? Show working to justify your answer. **(2)**

(c) A large market-day order uses exactly 129 crates. Work out which stack number this is. Show your working. **(2)**

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7 A landscaper lays a path from hexagonal tiles. Path 1 uses 8 tiles, path 2 uses 13 tiles, path 3 uses 18 tiles.

How many tiles are needed for path 4?

- ☐ A) 20
- ☐ B) 21
- ☐ C) 22
- ☐ D) 23
- ☐ E) 28

---

8 The landscaper's path pattern begins 8, 13, 18, 23, ..., with each path using 5 more tiles than the path before it.

(a) Describe, in words, the term-to-term rule for the number of tiles. **(1)**

(b) How many tiles are needed for path 8? **(1)**

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9 A number sequence begins 21, 25, 29, 33, ...

(a) Find an expression, in terms of n, for the nth term of the sequence. **(1)**

(b) Use your expression to find the 40th term of the sequence. **(2)**

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10 Here is a number sequence:
6, 14, 22, 30, ...

What is the next term in the sequence?

- ☐ A) 36
- ☐ B) 37
- ☐ C) 38
- ☐ D) 39
- ☐ E) 46

---

11 Here is a number sequence:
84, 71, 58, 45, ...

What is the next term in the sequence?

- ☐ A) 30
- ☐ B) 31
- ☐ C) 32
- ☐ D) 33
- ☐ E) 58

---

12 Find the missing term in this number sequence.

9, 20, __, 42, 53

(1)

---

13 A number sequence begins 200, 188, 176, 164, ...

(a) Describe, in words, the term-to-term rule for this sequence. **(1)**

(b) Write down the next two terms of the sequence. **(1)**

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14 A function machine works like this: input, then multiply by 9, to give the output.

What is the output when the input is 5?

- ☐ A) 14
- ☐ B) 40
- ☐ C) 45
- ☐ D) 50
- ☐ E) 81

---

15 A function machine works like this: input, then add 19, to give the output.

The output is 32. Work out the input.

(1)

---

16 A function machine has the rule: input, then multiply by 7, then subtract 19, to give the output. The output is 30.

Form an equation and solve it to find the input. Show your working.

(2)

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17 Kwame saves money for a bicycle. In week 1 he has saved £11. Each week after that, he saves £9 more than the week before, so his total is 11, 20, 29, 38, ...

(a) Find an expression, in terms of n, for the total amount, in pounds, Kwame has saved after n weeks. **(1)**

.....

(b) Work out how much Kwame has saved after 15 weeks. **(1)**

.....

(c) After how many whole weeks will Kwame's savings first exceed £200? Show your working. **(2)**

.....

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18 The nth term of a sequence is 4n + 7.

Find the first term in the sequence that is greater than 150. Show your working.

(2)

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Mark scheme · 2.13-4 Sequences and Early Algebra: Practice Set 4: 30-minute Pack

Question 1

(a) 9 cao **B1**

(a) Answer: 9

(b) -21 cao **B1**

(b) Answer: -21

Question 2

A (-7) cao **B1**

Answer: A) -7

Question 3

29 cao **B1**

Answer: 29

Question 4

6x = 48 seen **M1**

8 cao **A1**

Answer: 8

Question 5

4x = 28 seen (correct rearrangement) **M1**

7 cao **A1**

Answer: 7

Question 6

(a) 7n + 3 oe **B1**

(a) Answer: 7n + 3

(b) substitutes n = 12 into 7n + 3 **M1**

(b) correct conclusion: Yes, correct, since 7 x 12 + 3 = 87 and 87 < 90 **A1**

(b) Answer: Yes, Ronke is correct; stack 12 needs 87 crates, which is fewer than 90

(c) sets 7n + 3 = 129 and attempts to solve **M1**

(c) 18 cao **A1**

(c) Answer: 18

Question 7

D (23) cao **B1**

Answer: D) 23

Question 8

(a) add 5 to the previous term each time oe **B1**

(a) Answer: Add 5 to the previous term each time (starting at 8)

(b) 43 cao **B1**

(b) Answer: 43

Question 9

(a) 4n + 17 oe **B1**

(a) Answer: 4n + 17

(b) substitutes n = 40 into 4n + 17 **M1**

(b) 177 cao **A1**

(b) Answer: 177

Question 10

C (38) cao **B1**

Answer: C) 38

Question 11

C (32) cao **B1**

Answer: C) 32

Question 12

31 cao **B1**

Answer: 31

Question 13

(a) subtract 12 from the previous term oe **B1**

(a) Answer: Subtract 12 from the previous term

(b) 152 and 140 both correct cao **B1**

(b) Answer: 152, 140

Question 14

C (45) cao **B1**

Answer: C) 45

Question 15

13 cao **B1**

Answer: 13

Question 16

7x - 19 = 30 formed, and rearranges to 7x = 49 **M1**

7 cao **A1**

Answer: 7

Question 17

(a) 9n + 2 oe **B1**

(a) Answer: 9n + 2

(b) 137 cao (accept £137) **B1**

(b) Answer: £137

(c) sets up 9n + 2 > 200 and attempts to solve, or tests successive weeks **M1**

(c) week 23 cao, with week 22 shown not to satisfy the condition **A1**

(c) Answer: Week 23

Question 18

correct method, e.g. 4n + 7 > 150 set up, or systematic trial of terms near 150 **M1**

151 cao (with n = 36 identified) **A1**

Answer: 151 (the 36th term)

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