2.13-3 Sequences, Patterns and Early Algebra: Practice Set 3: 30-minute Pack

GL ASSESSMENT EP.M56 · Calculators not allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

Sequences, Patterns and Early Algebra: Practice Set 3

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A third 11+ sequences, patterns and early-algebra practice set, complementing EP.M13/EP.M13B (Sequences and Patterns), EP.M14/EP.M14B (Early Algebra) and EP.M28/EP.M39 (Algebra, Sequences and Patterns Depth). 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 m = 5 and k = -2. Work out the value of each expression.

(a) 3m + k **(1)**

.....

(b) 4k - m **(1)**

.....

2 Solve x + 13 = 21.

- ☐ A) 7
- ☐ B) 8
- ☐ C) 9
- ☐ D) 34
- ☐ E) -8

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3 Solve $y + 18 = 5$.

(1)

4 Solve $4x - 9 = 23$. Show your working.

(2)

5 Solve $25 - 3x = 4$. Show your working.

(2)

6 A garden designer borders a circular flower bed with pebbles. Border 1 uses 6 pebbles, border 2 uses 15 pebbles, border 3 uses 24 pebbles, border 4 uses 33 pebbles, with each new border using 9 more pebbles than the one before.

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

(b) Nadia says that border 10 will need fewer than 90 pebbles. Is Nadia correct? Show working to justify your answer. **(2)**

(c) A large display border uses exactly 168 pebbles. Work out which border number this is. Show your working. **(2)**

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7 A jeweller threads beads onto a bracelet in a repeating pattern. Design 1 uses 9 beads, design 2 uses 13 beads, design 3 uses 17 beads.

How many beads are needed for design 4?

- ☐ A) 19
- ☐ B) 20
- ☐ C) 21
- ☐ D) 25
- ☐ E) 17

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8 A jeweller's bracelet pattern begins 9, 13, 17, 21, ..., with each design using 4 more beads than the design before it.

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

(b) How many beads are needed for design 7? **(1)**

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9 A number sequence begins 13, 15, 17, 19, ...

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

(b) Use your expression to find the 30th term of the sequence. **(2)**

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10 Here is a number sequence:
11, 16, 21, 26, ...

What is the next term in the sequence?

- ☐ A) 29
- ☐ B) 30
- ☐ C) 31
- ☐ D) 32
- ☐ E) 21

---

11 Here is a number sequence:
90, 79, 68, 57, ...

What is the next term in the sequence?

- ☐ A) 44
- ☐ B) 45
- ☐ C) 46
- ☐ D) 47
- ☐ E) 68

---

12 Find the missing term in this number sequence.

14, 22, __, 38, 46

(1)

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13 A number sequence begins 100, 93, 86, 79, ...

(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 7, to give the output.

What is the output when the input is 6?

- ☐ A) 13
- ☐ B) 36
- ☐ C) 42
- ☐ D) 48
- ☐ E) 49

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15 A function machine works like this: input, then add 17, to give the output.

The output is 31. Work out the input.

(1)

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16 A function machine has the rule: input, then multiply by 4, then subtract 11, to give the output. The output is 25.

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

(2)

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17 Aoife builds up a collection of stamps for a school project. In week 1 she has 9 stamps. Each week after that, she collects 13 more stamps than the week before, so her total is 9, 22, 35, 48, ...

(a) Find an expression, in terms of n, for the total number of stamps Aoife has after n weeks. **(1)**

.....

(b) Work out how many stamps Aoife has after 12 weeks. **(1)**

.....

(c) Aoife wants to know after how many whole weeks her collection will first contain more than 300 stamps. Work out this week number. Show your working. **(2)**

.....

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Mark scheme · 2.13-3 Sequences, Patterns and Early Algebra: Practice Set 3: 30-minute Pack

Question 1

(a) 13 cao **B1**

(a) Answer: 13

(b) -13 cao **B1**

(b) Answer: -13

Question 2

B (8) cao **B1**

Answer: B) 8

Question 3

-13 cao **B1**

Answer: -13

Question 4

4x = 32 seen (adds 9 to both sides) **M1**

8 cao **A1**

Answer: 8

Question 5

3x = 21 seen (correct rearrangement) **M1**

7 cao **A1**

Answer: 7

Question 6

(a) 9n - 3 oe **B1**

(a) Answer: 9n - 3

(b) substitutes n = 10 into 9n - 3 **M1**

(b) correct conclusion: Yes, correct, since 9 x 10 - 3 = 87 and 87 < 90 **A1**

(b) Answer: Yes, Nadia is correct; border 10 needs 87 pebbles, which is fewer than 90

(c) sets 9n - 3 = 168 and attempts to solve **M1**

(c) 19 cao **A1**

(c) Answer: 19

Question 7

C (21) cao **B1**

Answer: C) 21

Question 8

(a) add 4 to the previous term each time oe **B1**

(a) Answer: Add 4 to the previous term each time (starting at 9)

(b) 33 cao **B1**

(b) Answer: 33

Question 9

(a) 2n + 11 oe **B1**

(a) Answer: 2n + 11

(b) substitutes n = 30 into 2n + 11 **M1**

(b) 71 cao **A1**

(b) Answer: 71

Question 10

C (31) cao **B1**

Answer: C) 31

Question 11

C (46) cao **B1**

Answer: C) 46

Question 12

30 cao **B1**

Answer: 30

Question 13

(a) subtract 7 from the previous term oe **B1**

(a) Answer: Subtract 7 from the previous term

(b) 72 and 65 both correct cao **B1**

(b) Answer: 72, 65

Question 14

C (42) cao **B1**

Answer: C) 42

Question 15

14 cao **B1**

Answer: 14

Question 16

4x - 11 = 25 formed, and rearranges to 4x = 36 **M1**

9 cao **A1**

Answer: 9

Question 17

(a) 13n - 4 oe **B1**

(a) Answer: 13n - 4

(b) 152 cao **B1**

(b) Answer: 152

(c) sets up 13n - 4 > 300 and attempts to solve, or tests successive weeks **M1**

(c) week 24 cao, with week 23 shown not to satisfy the condition **A1**

(c) Answer: Week 24

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