2.13-5 Algebra and Sequences: Practice Set 5: 30-minute Pack

Total Marks

GL ASSESSMENT EP.M86 · Calculators not allowed · about 30 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

Algebra and Sequences: Practice Set 5

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A fifth 11+ sequences and early-algebra practice set, complementing EP.M13/EP.M13B (Sequences and Patterns), EP.M14/EP.M14B (Early Algebra), EP.M28 (Algebra, Sequences and Patterns Depth), EP.M56 (Sequences, Patterns and Early Algebra: Practice Set 3) and EP.M68 (Sequences and Early Algebra: Practice Set 4). It covers term-to-term and position-to-term sequences, linear nth-term rules, function machines (including reverse and equation-forming problems), forming and simplifying expressions, and one-step, two-step and both-sides 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 c = 8 and d = -5. Work out the value of each expression.

(a) 3c + d **(1)**

.....

(b) 4d - c **(1)**

.....

2 Solve x + 27 = 19.

- ☐ A) -8
- ☐ B) 8
- ☐ C) 46
- ☐ D) -46
- ☐ E) 27

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3 Solve y - 24 = 11.

(1)

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4 Solve 7x - 9 = 40. Show your working.

(2)

---

5 Solve 38 - 3x = 5. Show your working.

(2)

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6 A framer joins picture frames in a row for an exhibition wall. Arrangement 1 uses 14 pins, arrangement 2 uses 23 pins, arrangement 3 uses 32 pins, arrangement 4 uses 41 pins, with each new arrangement using 9 more pins than the one before.

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

(b) Declan says that arrangement 10 will need fewer than 90 pins. Is Declan correct? Show working to justify your answer. **(2)**

(c) A large exhibition order uses exactly 158 pins. Work out which arrangement number this is. Show your working. **(2)**

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7 A choir sets out chairs in rows for a concert. Row 1 has 9 chairs, row 2 has 15 chairs, row 3 has 21 chairs.

How many chairs are in row 4?

- ☐ A) 25
- ☐ B) 26
- ☐ C) 27
- ☐ D) 28
- ☐ E) 33

---

8 The choir's row pattern begins 9, 15, 21, 27, ..., with each row having 6 more chairs than the row before it.

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

(b) How many chairs are in row 9? **(1)**

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9 A number sequence begins 23, 30, 37, 44, ...

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

(b) Use your expression to find the 45th term of the sequence. **(2)**

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10 Here is a number sequence:
12, 19, 26, 33, ...

What is the next term in the sequence?

- ☐ A) 38
- ☐ B) 39
- ☐ C) 40
- ☐ D) 41
- ☐ E) 47

---

11 Here is a number sequence:
91, 79, 67, 55, ...

What is the next term in the sequence?

- ☐ A) 41
- ☐ B) 42
- ☐ C) 43
- ☐ D) 44
- ☐ E) 55

---

12 Find the missing term in this number sequence.

6, 17, __, 39, 50

(1)

---

13 A number sequence begins 175, 163, 151, 139, ...

(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 8, to give the output.

What is the output when the input is 7?

- ☐ A) 15
- ☐ B) 49
- ☐ C) 56
- ☐ D) 63
- ☐ E) 64

---

15 A function machine works like this: input, then add 27, to give the output.

The output is 35. Work out the input.

(1)

---

16 A function machine has the rule: input, then multiply by 5, then add 14, to give the output. The output is 69.

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

(2)

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17 Zainab trains for a running race. In week 1 she runs 14 kilometres. Each week after that, she runs 6 kilometres more than the week before, so her weekly distance is 14, 20, 26, 32, ...

(a) Find an expression, in terms of n, for the distance, in kilometres, Zainab runs in week n. **(1)**

.....

(b) Work out how far Zainab runs in week 12. **(1)**

.....

(c) After how many whole weeks will Zainab's weekly distance first exceed 100 km? Show your working. **(2)**

.....

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18 The nth term of a sequence is 5n + 11.

Find the first term in the sequence that is greater than 130. Show your working.

(2)

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Mark scheme · 2.13-5 Algebra and Sequences: Practice Set 5: 30-minute Pack

Question 1

(a) 19 cao **B1**

(a) Answer: 19

(b) -28 cao **B1**

(b) Answer: -28

Question 2

A (-8) cao **B1**

Answer: A) -8

Question 3

35 cao **B1**

Answer: 35

Question 4

7x = 49 seen **M1**

7 cao **A1**

Answer: 7

Question 5

3x = 33 seen (correct rearrangement) **M1**

11 cao **A1**

Answer: 11

Question 6

(a) 9n + 5 oe **B1**

(a) Answer: 9n + 5

(b) substitutes n = 10 into 9n + 5 **M1**

(b) correct conclusion: No, incorrect, since 9 x 10 + 5 = 95 and 95 is not fewer than 90 **A1**

(b) Answer: No, Declan is incorrect; arrangement 10 needs 95 pins, which is not fewer than 90

(c) sets 9n + 5 = 158 and attempts to solve **M1**

(c) 17 cao **A1**

(c) Answer: 17

Question 7

C (27) cao **B1**

Answer: C) 27

Question 8

(a) add 6 to the previous term each time oe **B1**

(a) Answer: Add 6 to the previous term each time (starting at 9)

(b) 57 cao **B1**

(b) Answer: 57

Question 9

(a) 7n + 16 oe **B1**

(a) Answer: 7n + 16

(b) substitutes n = 45 into 7n + 16 **M1**

(b) 331 cao **A1**

(b) Answer: 331

Question 10

C (40) cao **B1**

Answer: C) 40

Question 11

C (43) cao **B1**

Answer: C) 43

Question 12

28 cao **B1**

Answer: 28

Question 13

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

(a) Answer: Subtract 12 from the previous term

(b) 127 and 115 both correct cao **B1**

(b) Answer: 127, 115

Question 14

C (56) cao **B1**

Answer: C) 56

Question 15

8 cao **B1**

Answer: 8

Question 16

5x + 14 = 69 formed, and rearranges to 5x = 55 **M1**

11 cao **A1**

Answer: 11

Question 17

(a) 6n + 8 oe **B1**

(a) Answer: 6n + 8

(b) 80 cao (accept 80 km) **B1**

(b) Answer: 80 km

(c) sets up 6n + 8 > 100 and attempts to solve, or tests successive weeks **M1**

(c) week 16 cao, with week 15 shown not to satisfy the condition **A1**

(c) Answer: Week 16

Question 18

correct method, e.g. 5n + 11 > 130 set up, or systematic trial of terms near 130 **M1**

131 cao (with n = 24 identified) **A1**

Answer: 131 (the 24th term)

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