Year 9 Sequences and Functions – Mixed Practice

ANSWER KEY HappyKids.fit

Answers and worked solutions · 30 questions

A. Mixed practice (mixed order)

1. 7, 4, 1, −2

Substitute n = 1, 2, 3 and 4 into 10 − 3n

n = 1: 7, n = 2: 4, n = 3: 1, n = 4: −2

2. $n^2 + 5$

Compare with the square numbers 1, 4, 9, 16, 25, the cube numbers 1, 8, 27, 64, 125 and with n/a

$n^2 + 5$

3. 30

$(3)^2 = 9$

$9 \times 4 - 6 = 30$

4. 1/4, 1/2, 3/4, 1

Substitute n = 1, 2, 3 and 4 into n/4

n = 1: 1/4, n = 2: 1/2, n = 3: 3/4, n = 4: 1

5. 0, 1, 2, 5, 26

Apply the rule to each term in turn: 0 → 1 → 2

→ 5 → 26

6. (5/2)n − 1/2

Difference 2 1/2, so the rule starts (5/2)n

n = 1 gives 2 1/2; first term 2

(5/2)n − 1/2

7. Yes, it is the 39th term.

Solve 5n + 1 = 196

n = 39: yes, it is the 39th term

8. 1 and −15

Undo the square: the number before squaring is 8 or −8

Undo + 7: 8 − 7 = 1; −8 − 7 = −15

9. No. The first terms are 7, 9, 11, 13. Counter-example: n = 5 gives 15 = 3 × 5.

First terms: 7, 9, 11, 13

Counter-example: n = 5 gives 15 = 3 × 5.

Decide

10. $n^2 + 3$

Compare with the square numbers 1, 4, 9, 16, 25, the cube numbers 1, 8, 27, 64, 125 and with n/a

$n^2 + 3$

11. second difference 1; pattern 10 has 55 dots

First differences 2, 3, 4; second difference 1 (constant, so quadratic)
Continue the first differences up to pattern 10: 55

12. 0, 3, 8, 15

Substitute n = 1, 2, 3 and 4 into $n^2 - 1$
n = 1: 0, n = 2: 3, n = 3: 8, n = 4: 15

13. 6, 15, 33, 69, 141

Apply the rule to each term in turn: 6 → 15 → 33 → 69 → 141

14. −1 and −7

Undo the square: the number before squaring is 3 or −3
Undo + 4: 3 − 4 = −1; −3 − 4 = −7

15. 121

4 + 7 = 11
$(11)^2 = 121$

16. No. $n^2 + 1 = 100$ gives $n^2 = 99$, and 99 is not a square number.

Test some terms or values
$n^2 + 1 = 100$ gives $n^2 = 99$, and 99 is not a square number.
Decide

17. No: solving $n^3 = 447$ does not give a whole number n.

Solve $n^3 = 447$
n is not a whole number: no

18. −7n + 19

Difference −7, so the rule starts −7n
n = 1 gives −7; first term 12
−7n + 19

19. second difference 4; pattern 6 has 72 chairs

First differences 6, 10, 14; second difference 4 (constant, so quadratic)
Continue the first differences up to pattern 6: 72

20. 19

$x^2 = 9$
$3 \times 9 - 8 = 19$

21. (1/3)n + 4

Difference 1/3, so the rule starts (1/3)n
n = 1 gives 1/3; first term 4 1/3
(1/3)n + 4

22. No. One input has two different outputs, but a function gives exactly one output for each input.

A function gives exactly one output for each input
Look for an input that appears with two different outputs
No

23. n/4

Compare with the square numbers 1, 4, 9, 16, 25, the cube numbers 1, 8, 27, 64, 125 and with n/a
n/4

24. Yes. The first terms are 0, 6, 24, 60. $n^3 - n = (n - 1)n(n + 1)$: three consecutive whole numbers include a multiple of 2 and a multiple of 3.

First terms: 0, 6, 24, 60
$n^3 - n = (n - 1)n(n + 1)$: three consecutive whole numbers include a multiple of 2 and a multiple of 3.
Decide

25. −2, 5, 24, 61

Substitute n = 1, 2, 3 and 4 into $n^3 - 3$
n = 1: −2, n = 2: 5, n = 3: 24, n = 4: 61

26. 1, 2, 5, 26, 677

Apply the rule to each term in turn: 1 → 2 → 5
→ 26 → 677

27. Mistake: the terms go down by 4, so the rule starts −4n. Correct: −4n + 26

Error: the terms go down by 4, so the rule starts −4n
−4n gives −4, −8, ...; add 26
−4n + 26

28. 1 and −7

Undo the square: the number before squaring is 4 or −4
Undo + 3: 4 − 3 = 1; −4 − 3 = −7

29. No. Differences 7, 19, 37 give second differences 12, 18: not constant.

Test some terms or values
Differences 7, 19, 37 give second differences 12, 18: not constant.
Decide

30. Yes, it is the 7th term.

Solve $n^3 = 343$
n = 7: yes, it is the 7th term