

GCSE Maths: Special sequences (Higher): answers

GCSE Maths - Sequences and nth Term - Higher - Lesson 11.6

Answers. Final answers to the worksheet questions. Full step-by-step solutions for every question are free at websink.site/gcse/maths/ch11-sequences/higher/special-sequences/

Exercise 11F Special sequences Non-calculator

1 Work out each of these.

(a) The 9th square number

Answer: 81

(b) The 4th cube number

Answer: 64

(c) The 7th triangular number

Answer: 28

(d) The 8th power of 2

Answer: 256

(e) The 15th square number

Answer: 225

(f) The 6th cube number

Answer: 216

2 Write down the name of each sequence and the next two terms.

(a) 1, 4, 9, 16, ...

Answer: Square numbers; next terms 25, 36

(b) 1, 8, 27, 64, ...

Answer: Cube numbers; next terms 125, 216

(c) 3, 6, 10, 15, ...

Answer: Triangular numbers; next terms 21, 28

(d) 4, 9, 16, 25, ...

Answer: Square numbers; next terms 36, 49

(e) 2, 4, 8, 16, ...

Answer: Powers of 2; next terms 32, 64

(f) 10, 100, 1000, ...

Answer: Powers of 10; next terms 10000, 100000

3 Which term of the sequence is each number?

- (a) 169 in the square numbers

Answer: 13th term

- (b) 343 in the cube numbers

Answer: 7th term

- (c) 55 in the triangular numbers

Answer: 10th term

- (d) 64 in the powers of 2

Answer: 6th term

- (e) 1000 in the powers of 10

Answer: 3rd term

4 The first two terms of each Fibonacci-type sequence are given. Write down the first eight terms.

- (a) 1, 1, ...

Answer: 1, 1, 2, 3, 5, 8, 13, 21

- (b) 2, 3, ...

Answer: 2, 3, 5, 8, 13, 21, 34, 55

- (c) 1, 3, ...

Answer: 1, 3, 4, 7, 11, 18, 29, 47

- (d) 5, 2, ...

Answer: 5, 2, 7, 9, 16, 25, 41, 66

5 Each of these is part of a Fibonacci-type sequence. Find the missing terms.

- (a) 3, 5, ?, 13, ?

Answer: 8, 21

- (b) ?, ?, 7, 11, 18

Answer: 3, 4

- (c) 1, ?, ?, 7, 11

Answer: 3, 4

- (d) 2, 5, ?, 12, ?

Answer: 7, 19

- (e) ?, ?, ?, 11, 18

Answer: 3, 4, 7

6 Tins are stacked in a triangular pile with 1 tin in the top row, 2 in the next row, 3 in the next row, and so on.

- (a) How many tins are in a pile with 9 rows?

Answer: 45 tins

(b) A pile has 66 tins. How many rows does it have?

Answer: 11th row

7 A cube is made from small cubes. A 5 by 5 by 5 cube is made from 125 small cubes. How many **more** small cubes are needed to make a 6 by 6 by 6 cube?

Answer: 91

8 In a computer game, level 1 needs 2 points, level 2 needs 4 points, level 3 needs 8 points and the number of points doubles with each level. How many points are needed for level 10?

Answer: 1024 points

9 Work out the sum of each pair of consecutive triangular numbers. What do you notice?

(a) $3 + 6$

Answer: 9, which is 3^2

(b) $6 + 10$

Answer: 16, which is 4^2

(c) $10 + 15$

Answer: 25, which is 5^2

10 Is 50 a triangular number? Give a reason.

Answer: No: the triangular numbers go 45, 55, so 50 is not one of them.

11 Pete says that 2^n and n^2 are the same. Show that Pete is wrong.

Answer: Counter-example: when $n = 3$, $2^3 = 8$ but $3^2 = 9$.

12 The first term of a Fibonacci-type sequence is x and the second term is 3. The sixth term is 36. Find the value of x .

Answer: $x = 7$

13 Show that no square number ends in 2, 3, 7 or 8.

Answer: The last digit of a square depends only on the last digit of the number being squared: $0^2=0$, $1^2=1$, $2^2=4$, $3^2=9$, $4^2=16$, $5^2=25$, $6^2=36$, $7^2=49$, $8^2=64$, $9^2=81$, so only 0, 1, 4, 5, 6, 9 are possible.