

GCSE MATHS • GRADE 4

MATHS



MODEL ANSWERS

SEQUENCES

SCORE

/92

PERCENTAGE

%

STEM UP

- 1 The n th term of a sequence is $6n + 4$
Find the first two terms of this sequence.

Put $n = 1$ and $n = 2$ into the rule

10, 16

1 / 1

- 2 Here are the first five terms of a sequence.

39 37 35 33 31

Write down the next term in the sequence.

The terms go down by 2 each time

29

1 / 1

- 3 Here are the first five terms of a Fibonacci-type sequence.

1 4 5 9 14

Write down the next two terms in the sequence.

Each term is the sum of the two terms before it

23, 37

1 / 1

- 4 The n th term of a sequence is $7n + 2$
Find the first three terms of this sequence.

Put $n = 1, 2$ and 3 into the rule

9, 16, 23

1 / 1

- 5 Here are the first four terms of a sequence.
30 26 22 18
Write down the next two terms in the sequence.

The terms go down by 4 each time

14, 10

1 / 1

- 6 Here are the first five terms of a Fibonacci-type sequence.
2 7 9 16 25
Write down the next two terms in the sequence.

Each term is the sum of the two terms before it

41, 66

1 / 1

- 7 The n th term of a sequence is $8n - 6$
Work out the 30th term of this sequence.

Put $n = 30$ into the rule

234

/ 1

- 8 Here are the first four terms of a sequence.

2 8 32 128

Write down the next term.

Multiply by 4 each time

512

/ 1

- 9 The first term in a sequence is 2.

The term-to-term rule is add 2.

Is 17 a term in the sequence?

Give a reason for your answer.

Terms are 2, 4, 6, ... each 2 more

17 is not on the list

*No, because $(17 - 2) \div 2$ is not
a whole number*

/ 1

- 10** The n th term of a sequence is $2n + 12$
Work out the 50th term of this sequence.

Put $n = 50$ into the rule

112

1 / 1

- 11** Here are the first four terms of a sequence.

3 6 12 24

Write down the next two terms.

Multiply by 2 each time

48, 96

1 / 1

- 12** The first term in a sequence is 6.

The term-to-term rule is add 7.

Is 121 a term in the sequence?

Give a reason for your answer.

Terms are 6, 13, 20, ... each 7 more

121 is not on the list

*No, because $(121 - 6) \div 7$ is not
a whole number*

1 / 1

- 13 Here are the first five terms of a sequence.

10 15 22 31 42

Write down the next two terms in the sequence.

The differences are 5, 7, 9, 11, so they go up by 2 each time

55, 70

1 / 1

- 14 Here are the first four terms of a sequence.

5 10 18 29

(a) Write down the next term in the sequence.

(b) Explain how you got your answer.

Find the difference or multiplier between terms

(a) 43 (b) The differences are 5, 8, 11, so the difference goes up by 3 each time

1 / 1

- 15 Here are the first four terms of a number sequence.

6 14 22 30

The rule to continue the sequence is

add 8 to the previous term

Work out the 5th term of this sequence.

Apply the rule: 6, 14, 22, 30, 38

38

1 / 1

- 16 Here are the first five terms of a sequence.

3 6 11 18 27

Write down the next two terms in the sequence.

The differences are 3, 5, 7, 9, so they go up by 2 each time

38, 51

1 / 1

- 17 Here are the first four terms of a sequence.

13 17 21 25

(a) Write down the next term in the sequence.

(b) Explain how you got your answer.

Find the difference or multiplier between terms

(a) 29 (b) The sequence goes up by 4 each time, so add 4 to the last term

1 / 1

- 18 Here are the first five terms of a Fibonacci-type sequence.

5 2 7 9 16

Find the 7th term of this sequence.

Add the previous two terms each time: 5, 2, 7, 9, 16, 25, 41

41

1 / 1

- 19 Here are the first five terms of a sequence.

1 4 9 16 25

Write down the next two terms in the sequence.

The differences are 3, 5, 7, 9, so they go up by 2 each time

36, 49

1 / 1

- 20 Here are the first four terms of a sequence.

54 50 46 42

(a) Write down the next term in the sequence.

(b) Explain how you got your answer.

Find the difference or multiplier between terms

(a) 38 (b) The sequence goes down by 4 each time, so subtract 4 from the last term

1 / 1

- 21 The n th term of a sequence is $n^2 + 6$

Work out the 10th term of this sequence.

Put $n = 10$ into the rule

106

2 / 2

- 22 Here are the first five terms of a Fibonacci-type sequence.

4 2 6 8 14

Find the 8th term of this sequence.

Add the previous two terms each time: 4, 2, 6, 8, 14, 22, 36, 58

58

/ 2

- 23 Here are the first four terms of a sequence.

5 8 13 20

(a) Write down the next term in the sequence.

(b) Explain how you got your answer.

Find the difference or multiplier between terms

(a) 29 (b) The differences are 3, 5, 7, so the difference goes up by 2 each time

/ 2

- 24 Here are the first five terms of a Fibonacci-type sequence.

4 1 5 6 11

Find the 8th term of this sequence.

Each term is the sum of the two terms before it: 4, 1, 5, 6, 11, 17, 28, 45

45

/ 2

- 25 Here are the first four terms of a number sequence.

6 19 58 175

The rule to continue the sequence is
multiply the previous term by 3 and then add 1
Work out the 6th term of this sequence.

Apply the rule: 6, 19, 58, 175, 526, 1579

1579

2 / 2

- 26 The n th term of a sequence is $3n^2 + 6$
Work out the 5th term of this sequence.

*Put $n = 5$ into the rule: square first, then
multiply by 3*

81

2 / 2

- 27 Here are the first five terms of a Fibonacci-type sequence.
2 3 5 8 13
Find the 8th term of this sequence.

*Each term is the sum of the two terms before
it: 2, 3, 5, 8, 13, 21, 34, 55*

55

2 / 2

28 Here are the first four terms of an arithmetic sequence.

13 18 23 28

Write down an expression, in terms of n , for the n th term of the sequence.

The common difference is 5 so the rule starts

$5n$

Compare with 5 to find the constant

$5n + 8$

/ 2

29 The n th term of a sequence is $2n + 3$

Which term of the sequence has the value 95?

Solve $2n + 3 = 95$, so $n = 46$

46th term

/ 2

30 Here are the first five terms of a Fibonacci-type sequence.

2 4 6 10 16

Find the 8th term of this sequence.

Each term is the sum of the two terms before

it: 2, 4, 6, 10, 16, 26, 42, 68

68

/ 2

- 31 Here are the first five terms of a sequence.

13 18 23 28 33

Find an expression, in terms of n , for the n th term of this sequence.

The common difference is 5 so the rule starts

$5n$

Compare with 5 to find the constant

$$5n + 8$$

2 / 2

- 32 The n th term of a sequence is $n^2 + 5$

(a) Find the first three terms of this sequence.

(b) Find the 8th term in this sequence.

(a) $n = 1, 2, 3$: $1 + 5, 4 + 5, 9 + 5$. (b) $8^2 + 5 = 69$

$$(a) 6, 9, 14 \quad (b) 69$$

2 / 2

- 33 A sequence of patterns is made using tiles.

Pattern 1 uses 8 tiles, pattern 2 uses 14 tiles and pattern 3 uses 20 tiles.

Write an expression, in terms of n , for the number of tiles in pattern n .

Each pattern adds 6, so the rule starts $6n$

pattern 1 has 8, so add 2

$$6n + 2$$

2 / 2

34 Here are the first five terms of a sequence.

2 4 6 8 10

Find an expression, in terms of n , for the n th term of this sequence.

The common difference is 2 so the rule starts

$2n$

Compare with 2 to find the constant

$2n$

$\boxed{2} / 2$

35 Here are the first five terms of a sequence.

59 52 45 38 31

(a) Find the first negative term in the sequence.

(b) Is -28 a term in this sequence? Give a reason for your answer.

Keep subtracting 7: 59, 52, 45, 38, 31, 24, 17, 10, 3, -4

(b) check whether $(59 - -28) \div 7$ is a whole number

(a) -4 (b) No, because every term is 7 less than the one before so the terms are 3 more than a multiple of 7, and -28 is not

$\boxed{2} / 2$

36 A sequence of patterns is made using tiles.

Pattern 1 uses 11 tiles, pattern 2 uses 15 tiles and pattern 3 uses 19 tiles.

Write an expression, in terms of n , for the number of tiles in pattern n .

*Each pattern adds 4, so the rule starts $4n$
pattern 1 has 11, so add 7*

$4n + 7$

$\boxed{2} / 2$

37 Here are the first five terms of a sequence.

$-3 \quad -7 \quad -11 \quad -15 \quad -19$

Write down an expression, in terms of n , for the n th term of the sequence.

The common difference is -4 so the rule starts

$-4n$

Compare with -4 to find the constant

$$-4n + 1$$

2 / 2

38 Here are the first five terms of a sequence.

$32 \quad 25 \quad 18 \quad 11 \quad 4$

(a) Find the first negative term in the sequence.

(b) Is -20 a term in this sequence? Give a reason for your answer.

Keep subtracting 7: $32, 25, 18, 11, 4, -3$

(b) check whether $(32 - -20) \div 7$ is a whole number

(a) -3 (b) No, because every term is 7 less than the one before so the terms are 4 more than a multiple of 7, and -20 is not

2 / 2

39 A sequence of patterns is made using tiles.

Pattern 1 uses 8 tiles, pattern 2 uses 12 tiles and pattern 3 uses 16 tiles.

Write an expression, in terms of n , for the number of tiles in pattern n .

Each pattern adds 4, so the rule starts $4n$

pattern 1 has 8, so add 4

$$4n + 4$$

3 / 3

40 The n th term of a sequence is $n^2 + 2$

(a) Find the first two terms of this sequence.

(b) Is 28 a term in this sequence?

You must show how you get your answer.

(a) $n = 1: 1 + 2 = 3$

$n = 2: 4 + 2 = 6$. (b) No: $n^2 = 28 - 2 = 26$,
and 26 is not a square number

(a) 3, 6 (b) No: $n^2 = 28 - 2 = 26$, and 26 is not a square number

3 / 3

41 Here is a sequence of patterns made from grey counters.

(a) In the space below, draw pattern number 4.

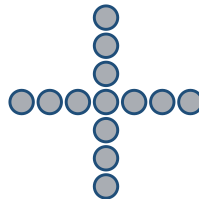
(b) Work out the total number of counters to make pattern number 8.



pattern number 1



pattern number 2



pattern number 3

The number of counters in pattern n is $4n + 1$:
pattern 1 has 5, pattern 2 has 9, pattern 3 has 13, so it goes up by 4 each time
pattern 8: $4 \times 8 + 1 = 33$

(a) Pattern 4 is a cross with 4 counters in each arm around a centre counter (17 counters) (b) 33

3 / 3

42 Here are the first five terms of a sequence.

7 10 15 22 31

Find an expression, in terms of n , for the n th term of this sequence.

The terms are the square numbers 1, 4, 9, 16, 25 plus 6

$n^2 + 6$

3 / 3

- 43 The n th term of a sequence is $n^2 + 5$
- (a) Find the first two terms of this sequence.
- (b) Is 54 a term in this sequence?
- You must show how you get your answer.

(a) $n = 1: 1 + 5 = 6$
 $n = 2: 4 + 5 = 9$. (b) Yes: $n^2 = 54 - 5 = 49$,
 so $n = 7$

(a) 6, 9 (b) Yes: $n^2 = 54 - 5$
 $= 49$, so $n = 7$

3 / 3

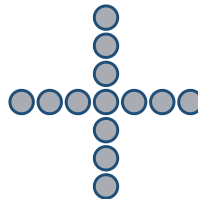
- 44 Here is a sequence of patterns made from grey counters.
- (a) In the space below, draw pattern number 4.
- (b) Work out the total number of counters to make pattern number 10.



pattern number 1



pattern number 2



pattern number 3

The number of counters in pattern n is $4n + 1$:
 pattern 1 has 5, pattern 2 has 9, pattern 3 has 13, so it goes up by 4 each time
 pattern 10: $4 \times 10 + 1 = 41$

(a) Pattern 4 is a cross with 4 counters in each arm around a centre counter (17 counters) (b) 41

3 / 3

- 45 Here are the first five terms of a sequence.
- 6 9 14 21 30
- Find an expression, in terms of n , for the n th term of this sequence.

The terms are the square numbers 1, 4, 9, 16, 25 plus 5

$$n^2 + 5$$

3 / 3

- 46 Here is a sequence of patterns made from grey and white tiles.
- (a) In the space below, draw pattern number 4.
- (b) Work out the total number of tiles needed to make pattern number 8.
- Kyle says, "There are 5 white tiles in pattern number 4 so there will be 10 white tiles in pattern number 8."
- (c) Is Kyle right? You must give a reason for your answer.



Pattern 1



Pattern 2



Pattern 3

Pattern n has $2n + 1$ tiles
for pattern 8 the number is
17

(a) Pattern 4 has 4 grey tiles above 5 white tiles (b)
17 (c) No, pattern 8 has 9 white tiles ($n + 1$), not 10

3 / 3

- 47 The 2nd term of an arithmetic sequence is 14.
- The 7th term of the same sequence is 39.
- Find an expression, in terms of n , for the n th term of this sequence.

Difference: $(39 - 14) \div (7 - 2) = 5$
So $5n + b$ with $b = 14 - 10$

$5n + 4$

3 / 3

- 48 Here is a sequence of patterns made from grey and white tiles.
- (a) In the space below, draw pattern number 4.
- (b) Work out the total number of tiles needed to make pattern number 10.
- Maya says, "There are 4 white tiles in pattern number 3 so there will be 8 white tiles in pattern number 6."
- (c) Is Maya right? You must give a reason for your answer.



Pattern 1



Pattern 2



Pattern 3

Pattern n has $2n + 1$ tiles
for pattern 10 the number is
21

(a) Pattern 4 has 4 grey tiles above 5 white tiles (b)
21 (c) No, pattern 6 has 7 white tiles ($n + 1$), not 8

3 / 3

- 49 The 2nd term of an arithmetic sequence is 15.
The 6th term of the same sequence is 27.
Find an expression, in terms of n , for the n th term of this sequence.

Difference: $(27 - 15) \div (6 - 2) = 3$

So $3n + b$ with $b = 15 - 6$

$$3n + 9$$

$$\boxed{3} / 3$$

- 50 The 2nd term of an arithmetic sequence is 2.
The 9th term of the same sequence is 23.
Find an expression, in terms of n , for the n th term of this sequence.

Difference: $(23 - 2) \div (9 - 2) = 3$

So $3n + b$ with $b = 2 - 6$

$$3n - 4$$

$$\boxed{3} / 3$$