

Intermediate Check In - 6.06 Sequences

1. Write down the first five terms of the sequence generated by $19 - 4n$.
2. Find the next two numbers in this sequence.

3, 9, 27, 81,,

3. Which of the following n th term formulae describe descending sequences?

$$2^{-n} \quad -3n+1 \quad (-n)^2 \quad 2^{(n+1)} \quad \frac{1}{n}$$

4. Write the formula for the n th term of this sequence.

2, 8, 14, 20,

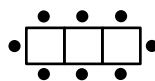
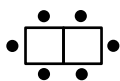
5. Write down the first five terms of the sequence generated by $n^2 - 2n$.
6. Jack says that 83 is in the sequence with n th term $7n - 1$. Show that he is correct.
7. Two sequences have n th terms $5n + 20$ and $2n + 65$ respectively. Which sequence will pass 100 for the smallest value of n ? Explain your answer.
8. Explain in words how to continue this sequence.

4, 4, 8, 12, 20, 32,

9. The sequence with n th term $2n^2 + 3n + c$ has second term 19. Work out the value of c .

10. The diagram below shows a sequence with squares and dots labelled Pattern A.

Pattern A



The number of dots in Pattern B is described by the n th term $65 - n$. Patterns A and B share a term with an equal number of dots which is in the same position in both sequences. Work out which term in Patterns A and B has the same number of dots and state the number of dots.

Extension

Martin thinks that the sum of any two consecutive triangular numbers is always a square number. Investigate whether he is correct.



Answers

- 15, 11, 7, 3, -1
- 243, 729
- 2^{-n} , $-3n+1$ and $\frac{1}{n}$
- $6n-4$
- 1, 0, 3, 8, 15
- If 83 is in the sequence, solving $7n-1=83$ would give a whole number (integer) value of n .

$$7n-1=83$$

$$7n=84$$

$n=12$ so 83 is the 12th term of the sequence.

- When $2n+65=100$, $n=17.5$. When $5n+20=100$, $n=16$. So $5n+20$ passes 100 sooner.
- To get the next number in the sequence you need to add the two previous terms. So the next term would be $20+32=52$.

- When $n=2$, $2 \times (2)^2 + 3 \times (2) + c = 19$
 $8 + 6 + c = 19$
so $c = 5$

- Equating and solving $2n+2$ and $65-n$ gives $n=21$. The 21st term has 44 dots.

Extension

Yes he is correct. The triangular numbers are: 1, 3, 6, 10, 15, 21, 28, 35,

$$1+3=4=2^2$$

$$3+6=9=3^2$$

$$6+10=16=4^2$$

$$10+15=25=5^2 \text{ and so on.}$$

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AO1	1	Generate an arithmetic sequence from a formula for the n th term			
AO1	2	Recognise simple geometric progressions			
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AO1	4	Find a formula for the n th term of an arithmetic sequence			
AO1	5	Generate a quadratic sequence from a formula for the n th term			
AO2	6	Use a formula for the n th term to locate the position of a term in a sequence			
AO2	7	Use a formula for the n th term to locate the position of a term in a sequence			
AO2	8	Recognise and describe Fibonacci sequences			
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