Sequences

1. The nth term of a sequence is given by $2 - 5n$
   Write down the 3rd, 4th and 5th terms of the sequence.

   $3^{rd} \rightarrow 2-5(3) = 2-15 = -13$

   $4^{th} \rightarrow 2-5(4) = 2-20 = -18$

   $5^{th} \rightarrow 2-5(5) = 2-25 = -23$

2. The nth term of a sequence is given by the expression $2n^2 - 5$
   Find the first term of the sequence and the third term of the sequence.

   $1^{st} : 2(1)^2 - 5 = 2-5 = -3$

   $3^{rd} : 2(3)^2 - 5 = 18-5 = 13$

   First term =.........−3..............
   Third term =.........13..............

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3. The nth term of a sequence is given by $3n^2 + 11$
   Calculate the difference between the 6th term and the 9th term of the sequence.

$$6^{th}: \quad 3(6)^2 + 11 = 108 + 11$$
$$= 119$$
$$9^{th}: \quad 3(9)^2 + 11 = 254$$
$$diff: \quad 254 - 119 = 135$$
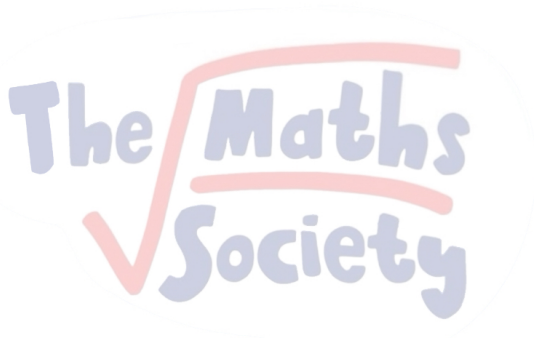
4. The nth term of a sequence is a_n where $a_n = \dfrac{2n^2+3n+1}{2n+2}$

   By simplifying the expression for a_n or otherwise, explain why no term in the

sequence is an integer.

   Show algebraic working and clearly explain your reasoning.

$$a_n = \frac{2n^2 + 3n + 1}{2n+2}$$
$$= \frac{(2n+1)(n+1)}{2(n+1)}$$
$$= \frac{2n+1}{2}$$
$$= n + \frac{1}{2}$$

As n is an integer, when added 0.5 it will always be a decimal.

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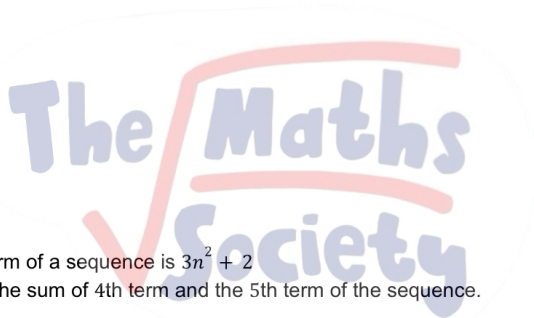5. The nth term of a sequence is given by $9 - 4n$
   Find the first 3 terms of this sequence.

$$1^{st} : 9 - 4(1) = 9 - 4 = 5$$
$$2^{nd} : 9 - 4(2) = 9 - 8 = 1$$
$$3^{rd} : 9 - 4(3) = 9 - 12 = -3$$
$$5, 1, -3$$

6. The nth term of a sequence is $3n^2 + 2$
   Calculate the sum of 4th term and the 5th term of the sequence.

$$4^{th} : 3(4)^2 + 2 = 48 + 2 = 50$$
$$5^{th} : 3(5)^2 + 2 = 75 + 2 = 77$$
$$sum. \ 50 + 77 = 127$$

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7. The nth term of a sequence is given by $3n - 5$

    (a) Write down the first two terms of this sequence.

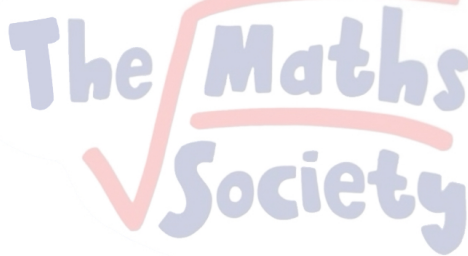$$1^{st} : 3(1) - 5 = 3 - 5 = -2$$
$$2^{nd} : 3(2) - 5 = 6 - 5 = 1$$

The nth term of this sequence is 103

    (b) Find the value of ~~m~~n

$$3n - 5 = 103$$
$$3n = 108$$
$$n = 36 \cdot$$

8. The nth term of sequence is given by $\dfrac{n^2 + 3}{2}$

Determine whether 222 is a term of this sequence.
Show your working clearly.

$$\frac{n^2 + 3}{2} = 222$$
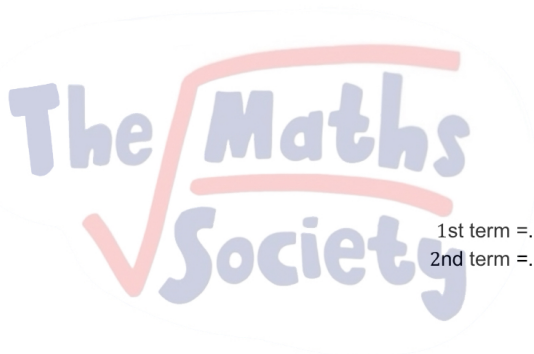$$n^2 + 3 = 444$$
$$n^2 = 441$$
$$n = \sqrt{441}$$
$$= 21$$

It is a term of the sequence.

9. The nth term of a sequence is given by $4n - 12$

Write down the first 2 terms of the sequence.

$1^{st}: \quad 4(1) - 12 = 4 - 12 = \quad -8$

$2^{nd}: \quad 4(2) - 12 \quad = 8 - 12 = \quad -4$

1st term = ...-8..........

2nd term = ...-4..........

10. The nth term of a sequence is given by $7 - 4n$
   Determine whether -123 is a term of this sequence.
   Show your working clearly.
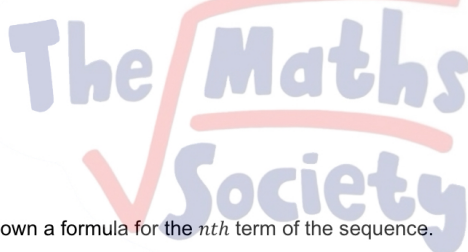
$7 - 4n = -123$

$-4n = -130$

$4n = 130$

$n = 32.5$ —

It is not a term of the sequence

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11. The nth term of a sequence is given by $6n^2 - 5$

Find the difference between the 2nd term and the 4th term of the sequence.

$$2^{nd} : \quad 6(2)^2 - 5 = 24 - 5 = 19$$

$$4^{th} : \quad 6(4)^2 - 5 = 96 - 5 = 91$$

$$\text{diff} = 91 - 19$$

$$= 72$$

12. Write down a formula for the nth term of the sequence.

7   11   15   19   23

    4   4   4   4

$$a + (n-1)d$$

$$a = 7$$
$$d = 4$$

$$7 + (n-1)\, 4$$

$$7 + 4n - 4$$

$$3 + 4n$$