

Problems with Arithmetic Sequences

(a) The n th term of a sequence is $6n - 1$. Find an expression for the $(n + 1)$ th term of the sequence.

(b) The n th term of a sequence is $12 - 5n$. Find an expression for the $(n + 2)$ th term of the sequence.

(c) The n th term of a sequence is $4n - 9$. Find an expression for the $(2n)$ th term of the sequence.

$$(a) 6(n+1) - 1 = 6n + 5$$

$$(b) 12 - 5(n+2) = 2 - 5n$$

$$(c) 4(2n) - 9 = 8n - 9$$

(a) An arithmetic sequence starts

$$2a, 2a - b, 2a - 2b, 2a - 3b, \dots$$

Find expressions for (i) the 6th term and (ii) the n th term of the sequence in terms of a and b .

(b) An arithmetic sequence has a 2nd term $7c$ and a 5th term $10c - 3d$. Find

expressions in terms of ~~for~~ c and d for

(i) the 1st term and (ii) the n th term of the sequence.

$$(a) (i) 2a - 5b$$

$$(ii) 2a - (n-1)b = 2a + b - bn$$

$$(b)(i) 6c + d$$

$$(ii) (c-d)n + 5c + 2d$$

Karen is training for a marathon. In week 1 she runs 5 miles. She increases the distance she runs by 2 miles each week.

(i) In which week does Karen run 17 miles?

(ii) How many miles does she run in the n th week?

$$5, 7, 9, 11, 13, 15, 17, \dots$$

$$(i) \text{ week } 7$$

$$(ii) 2n + 3$$

Alisha is donating money to charity. On the first day, she gives 25p to charity. On the second day she gives 40p, and so on in an arithmetic sequence.

(i) How much money does Alisha donate on the 5th day?

(ii) How much money does she donate on the n th day?

(iii) How much more does she donate on day 28 compared to day 14?

$$25p, 40p, 55p, 70p, 85p$$

$$(i) 85p$$

$$(ii) (15n + 10) \text{ pence}$$

$$(iii) n = 28 \quad \text{£}4.30$$

$$n = 14 \quad \text{£}2.20$$

$$\underline{\text{£}2.10}$$

Sequence A starts 23, 27, 31, 35, ...

Sequence B starts 8, 13, 18, 23, ...

For what value of n does the n th term of sequence B first exceed the n th term of sequence A.

$$5n + 3 > 4n + 19$$

$$n > 16$$

$$\text{When } n = 17$$