1   **(a)** Solve this equation.

$$5x - 4 = 3x + 7$$

(a) .... **[3]**

(b) Here are the first four terms of a sequence.

| 4 | 7 | 10 | 13 |

Find an expression for the nth term of this sequence.

(b) .... **[2]**

2   Here are the first four patterns in a sequence.

Pattern 1   Pattern 2   Pattern 3   Pattern 4

(a) How many dots are there in Pattern 10?

(a) .... **[1]**

(b) Write an expression for the number of dots in Pattern n.

(b) .... **[2]**

3 **(a** The nth term of a sequence is $n(n + 1)$.

Work out the first three terms of this sequence.

(a) _____ _____ _____ **[2]**

(b) Here are the first four terms of another sequence.

　　　7　　　4　　　1　　　⁻2

Find an expression for the nth term of this sequence.

(b) _____ **[2]**

4   **(a**   Find the value of $6x^2$ when $x = {}^-4$.

(a) _____ **[2]**

(b) Find the first 3 terms of the sequence whose nth term is $4n + 3$.

(b) _____ _____ _____**[2]**

(c) Factorise completely.

$6y^2 + 9y$

(c) _____ **[2]**

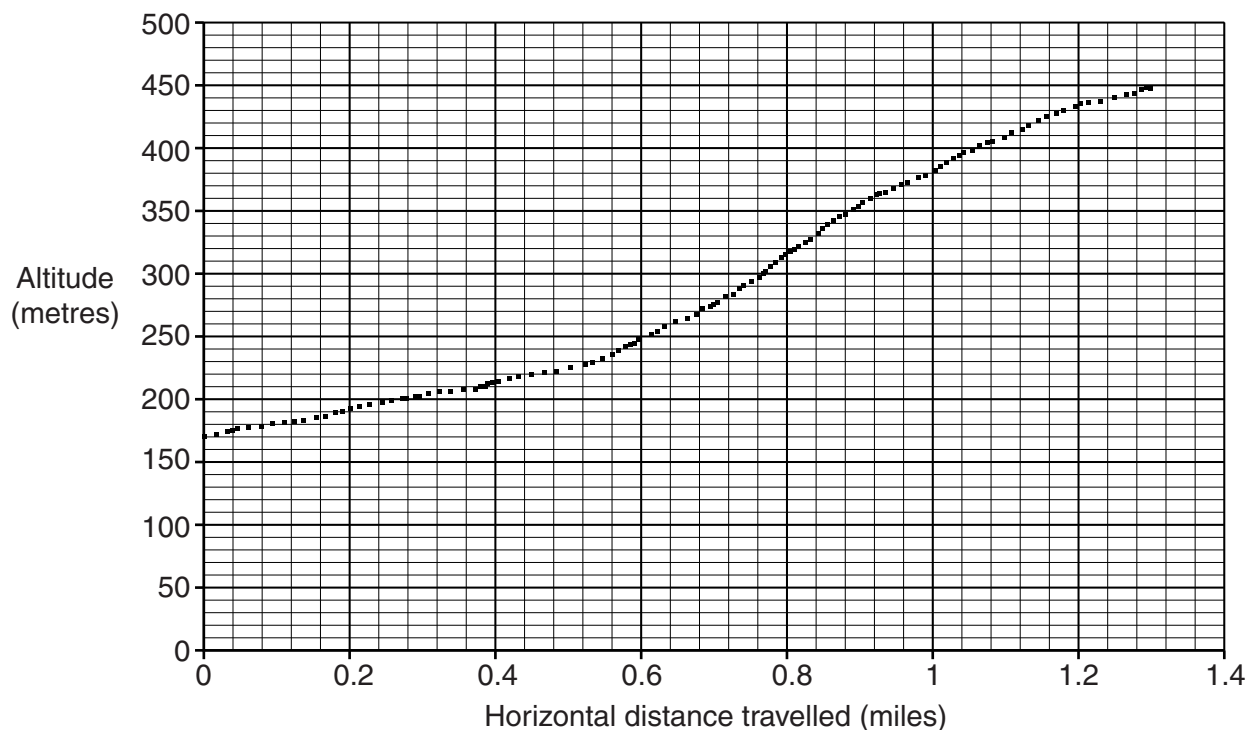**(d)** Solve.

$$2x + 7 = 6x - 8$$

(d) _____ **[3]**

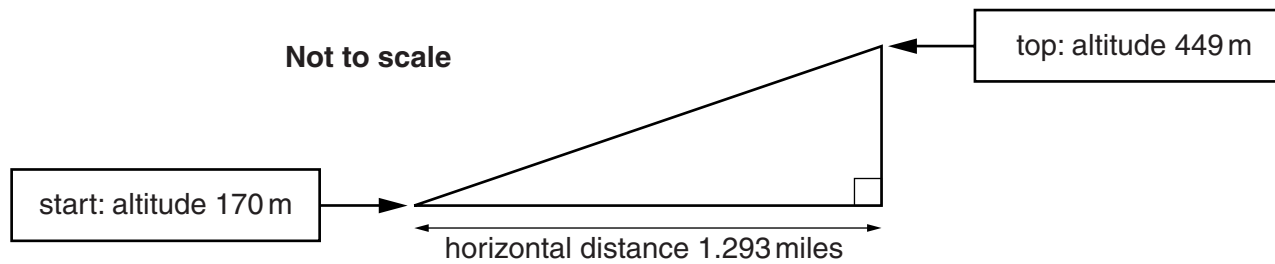**(e)** Rearrange this formula to make x the subject.

$$y = 4x + 6$$

(e) _____ **[2]**

5   Colin and Peter climbed Binsey Hill in the Lake District.
Peter printed out this graph from his satnav.

Colin wanted to know how far they had actually walked.

(a) He used this triangle to estimate the distance they walked going up Binsey Hill.

Calculate the distance in metres along the hypotenuse of this triangle.
Use the fact that 1 mile = 1609 metres.

(a) _____ metres **[5]**

(b) Describe how Colin's method could be improved to calculate a better estimate of the actual
distance they walked on their way up Binsey Hill.
You do not need to carry out any calculations.

_____

_____

_____ **[1]**

6   **(a**   Find the first three terms of the sequence whose nth term is $n^2 + 3$.

                                                      (a) _____   _____   _____ **[2]**

(b)   Here are the first four terms of another sequence.

$$3 \qquad 8 \qquad 13 \qquad 18$$

Write a formula for the nth term of this sequence.

                                                      (b) _____ **[2]**

7 B0, B1, B2, …. , B10 are labels given to different sized sheets of paper.
   The lengths of the sheets are related as follows:

| Length of B10 | $\times \sqrt{2} =$ | Length of B9 |

| Length of B9 | $\times \sqrt{2} =$ | Length of B8 |

and so on from B10, the smallest size, up to B0 the largest size.

(a) The length of B7 paper is 125 mm.

   (i)   What is the **exact** length of B6 paper?

                                                        (a)(i) .... mm **[1]**

   (ii)   What is the length of B5 paper?
            Give your answer in its simplest form.

                                                        (ii) .... mm **[2]**

(b) The length of B1 paper is 1000 mm.

   Find the length of B2 paper.
   Give your answer in the form $k\sqrt{2}$, where k is an integer.

                                                        (b) .... mm **[3]**

8   **(a)**   Here are the first four terms of a sequence.

<div align="center">5   9   13   17</div>

       Find an expression for the nth term of this sequence.

(a) _____ **[2]**

(b)   The nth term of another sequence is 3^n.

     (i)   Work out the first three terms of this sequence.

(b)(i) _____   _____   _____ **[2]**

     (ii)   Find the first number in this sequence which is over 1 million and state which term this is.

(ii) The number is _____

It is the _____th term **[3]**

9 **(a** The nth term of a sequence is $\dfrac{n(n-1)}{2}$.

  (i) Work out the first term of this sequence.

  (a)(i) _____ **[1]**

  (ii) Work out the 10th term of this sequence.

  (ii) _____ **[1]**

(b) Here are the first four terms of another sequence.

  2   6   10   14

  Write an expression for the nth term of this sequence.

  (b) _____ **[2]**

10 The *n*th term of a sequence is $5n - 2$.

Find the largest number in the sequence which is less than 1000.
Find also which term in the sequence this number is.

The largest number in the sequence which is less than 1000 is _____ .

It is the _____ th term.   **[3]**

11 (a   These are the first three terms of a sequence.

    5   10   20

Here is the term-to-term rule for this sequence.

    multiply by 2

The number 1280 is in this sequence.

Find the position of this number in the sequence.

(a) 1280 is the _____ th term **[2]**

(b) The first term of another sequence is 4.

Here is the term-to-term rule for this sequence.

    add 7

(i)   Find the second and third terms of this sequence.

(b)(i) _____   _____ **[1]**

(ii) Find an expression for the nth term of this sequence.

(ii) _____ **[2]**

12　(a)　The nth term of a sequence is $6n - 2$.

　　　Find the first three terms of this sequence.

(a) .... **[2]**

(b)　The nth term of another sequence is $5n^2$.

　　　Is the number 1000 a term in this sequence?
　　　Show how you decide.　　　　　　　　　　　　　　　**[3]**