



MATHEMATICS
STANDARD LEVEL
PAPER 1

Candidate session number

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Tuesday 13 May 2014 (afternoon)

1 hour 30 minutes

Examination code

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INSTRUCTIONS TO CANDIDATES

- Write your session number in the boxes above.
- Do not open this examination paper until instructed to do so.
- You are not permitted access to any calculator for this paper.
- Section A: answer all questions in the boxes provided.
- Section B: answer all questions in the answer booklet provided. Fill in your session number on the front of the answer booklet, and attach it to this examination paper and your cover sheet using the tag provided.
- Unless otherwise stated in the question, all numerical answers should be given exactly or correct to three significant figures.
- A clean copy of the **Mathematics SL formula booklet** is required for this paper.
- The maximum mark for this examination paper is [90 marks].



Do **NOT** write solutions on this page.

SECTION B

Answer **all** questions in the answer booklet provided. Please start each question on a new page.

8. [Maximum mark: 17]

The line L_1 passes through the points A(2, 1, 4) and B(1, 1, 5).

(a) Show that $\vec{AB} = \begin{pmatrix} -1 \\ 0 \\ 1 \end{pmatrix}$. [1]

(b) Hence, write down

(i) a direction vector for L_1 ;

(ii) a vector equation for L_1 . [3]

Another line L_2 has equation $\mathbf{r} = \begin{pmatrix} 4 \\ 7 \\ -4 \end{pmatrix} + s \begin{pmatrix} 0 \\ -1 \\ 1 \end{pmatrix}$. The lines L_1 and L_2 intersect at the point P.

(c) Find the coordinates of P. [6]

(d) (i) Write down a direction vector for L_2 .

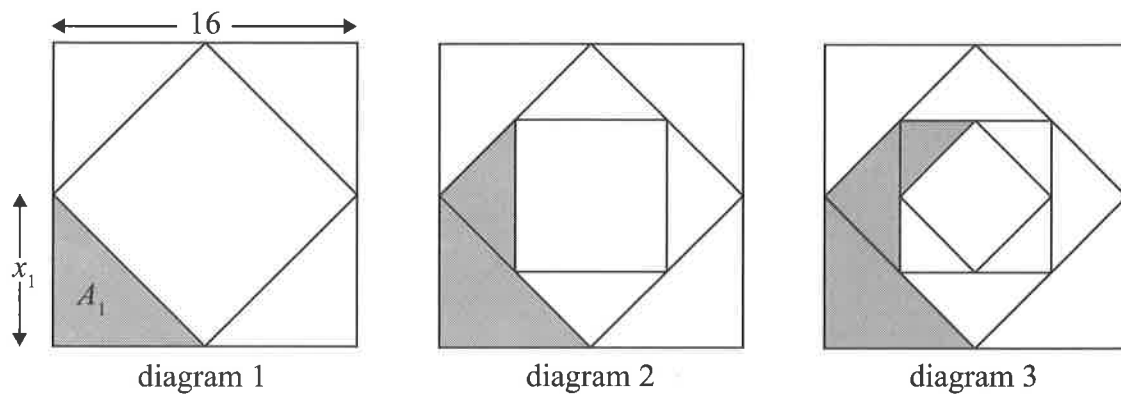
(ii) Hence, find the angle between L_1 and L_2 . [7]



Do **NOT** write solutions on this page.

10. [Maximum mark: 15]

The sides of a square are 16 cm in length. The midpoints of the sides of this square are joined to form a new square and four triangles (diagram 1). The process is repeated twice, as shown in diagrams 2 and 3.



Let x_n denote the length of one of the equal sides of each new triangle.

Let A_n denote the area of each new triangle.

- (a) The following table gives the values of x_n and A_n , for $1 \leq n \leq 3$. **Copy** and complete the table. (Do **not** write on this page.) [4]

n	1	2	3
x_n	8		4
A_n	32	16	

- (b) The process described above is repeated. Find A_6 . [4]

- (c) Consider an initial square of side length k cm. The process described above is repeated indefinitely. The total area of the shaded regions is k cm². Find the value of k . [7]

