

# Scalar Product

## Question Paper

<b>Level</b>	A Level
<b>Subject</b>	Maths
<b>Exam Board</b>	OCR - MEI
<b>Module</b>	Core 4
<b>Topic</b>	Vectors
<b>Sub Topic</b>	Scalar Product
<b>Booklet</b>	Question Paper

**Time Allowed:** 21 minutes

**Score:** /17

**Percentage:** /100

**Grade Boundaries:**

A*	A	B	C	D	E	U
>85%	'77.5%	70%	62.5%	57.5%	45%	<45%

- 1 The points A, B and C have coordinates  $A(3, 2, -1)$ ,  $B(-1, 1, 2)$  and  $C(10, 5, -5)$ , relative to the origin O. Show that  $\vec{OC}$  can be written in the form  $\lambda\vec{OA} + \mu\vec{OB}$ , where  $\lambda$  and  $\mu$  are to be determined.

What can you deduce about the points O, A, B and C from the fact that  $\vec{OC}$  can be expressed as a combination of  $\vec{OA}$  and  $\vec{OB}$ ? [6]

- 2 Vectors  $\mathbf{a}$  and  $\mathbf{b}$  are given by  $\mathbf{a} = 2\mathbf{i} + \mathbf{j} - \mathbf{k}$  and  $\mathbf{b} = 4\mathbf{i} - 2\mathbf{j} + \mathbf{k}$ .

Find constants  $\lambda$  and  $\mu$  such that  $\lambda\mathbf{a} + \mu\mathbf{b} = 4\mathbf{j} - 3\mathbf{k}$ . [5]

- 3 A triangle ABC has vertices  $A(-2, 4, 1)$ ,  $B(2, 3, 4)$  and  $C(4, 8, 3)$ . By calculating a suitable scalar product, show that angle ABC is a right angle. Hence calculate the area of the triangle. [6]