Cambridge International AS & A Level

Mathematics

9709

Paper 1 Pure Mathematics 1

Topic 3-Coordinate Geometry

Question No (11)

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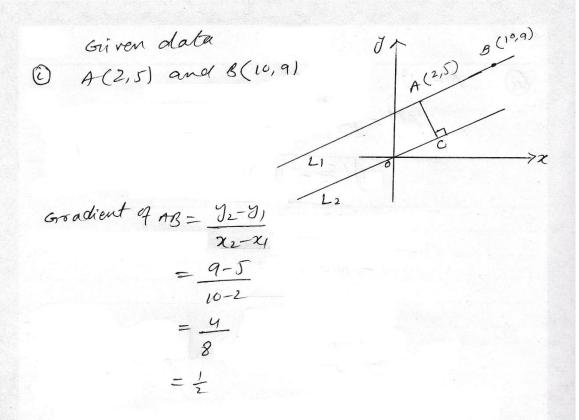
Question No (11)

The line L_1 passes through the points A (2, 5) and B (10, 9). The line L_2 is parallel to L_1 and passes through the origin. The point C lies on L_2 such that AC is perpendicular to L_2 . Find

- (i) the coordinates of C,
- (ii) the distance AC.

Solution

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Given AC is perpendicular to L2 (ACIL)

: gradient of AC = -2

Equation of line Ac passing Through A(2,5) and gradient -2, we have J-J1=-2 (x-2)

$J-S = -2 (\chi-2)$ $y-S = -2\chi+4$ $J = -2\chi+4+5$ $y = -2\chi+4+5$ $\chi = -4\chi+18$ $\chi $		
y = -2x + 4+5 $y = -2x + 4+5$ $y = -2x + 4$		
y = -2x + 4+5 $y = -2x + 4+5$ $y = -2x + 4$		
y = -2x + 4+5 $y = -2x + 4+5$ $y = -2x + 4$	$y-5=-2(\chi-2)$	
AS LI IS parallel to Lz (LILLZ). gradient of Lz is \(\frac{1}{2} = \text{gradient of Li} \) Equation of line Lz passing Through osigin (0,0) and chaving gradient \(\frac{1}{2} \) \(\frac{1}{2} = \frac{1}{2} (\chi - \chi 1) \)		
As Li is parallel to Lr (Liller). gradient of Lr is \(\frac{1}{2} \) = gradient of the Equation of line Lr passing through oxigin (0,0) and chaving gradient \(\frac{1}{2} \) \[\frac{1}{2} = \frac{1}{2} (\text{X} - \text{X}) \] \[\frac{1}{2} = \frac{1}{2} (\text{X} - \text{X} -	J = -2x + 4+5	
gradient of Lz is \(\frac{1}{2} \) = gradient of \(\text{List} \) \(\frac{1}{2} \) E quation of line \(\text{List} \) passing \(\text{Enrough} \) ONGIN (0,0) and chaving gradient \(\frac{1}{2} \) \(\frac{1}{2} - \frac{1}{2} \) \(\frac{1}{2} - \frac{1}{2} \) Ye = \(\frac{1}{2} \) (\(\frac{1}{2} - \frac{1}{2} \) Now we \(\text{Find point C}, \) Saling \(\frac{1}{2} - \frac{1}	$y = -2n + 9 \rightarrow 0$	
gradient of Lz is \(\frac{1}{2} \) = gradient of \(\text{List} \) \(\frac{1}{2} \) E quation of line \(\text{List} \) passing \(\text{Enrough} \) ONGIN (0,0) and chaving gradient \(\frac{1}{2} \) \(\frac{1}{2} - \frac{1}{2} \) \(\frac{1}{2} - \frac{1}{2} \) Ye = \(\frac{1}{2} \) (\(\frac{1}{2} - \frac{1}{2} \) Now we \(\text{Find point C}, \) Saling \(\frac{1}{2} - \frac{1}		
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gradient of Lz is \(\frac{1}{2} \) = gradient of \(\text{List} \) \(\frac{1}{2} \) E quation of line \(\text{List} \) passing \(\text{Enrough} \) ONGIN (0,0) and chaving gradient \(\frac{1}{2} \) \(\frac{1}{2} - \frac{1}{2} \) \(\frac{1}{2} - \frac{1}{2} \) Ye = \(\frac{1}{2} \) (\(\frac{1}{2} - \frac{1}{2} \) Now we \(\text{Find point C}, \) Saling \(\frac{1}{2} - \frac{1}	AS 1. 51 0000 (100 to 1 (1 111)	
Equation of line is passing through oxigin (0,0) and chaving gradient $\frac{1}{2}$ $1-9_1 = \frac{1}{2}(x-x_1)$ $y = \frac{1}{2}(x-x_1)$ $y = \frac{1}{2}(x-x_1)$ Now we find point $x = x_1 = x_2$ put Grating in $x = x_1 = x_2$		
	1	
	Equalm of live in passing inrough	
$y=0=\frac{1}{2}(x)$ $y=0=0$ y	081900 (CO10) according 100	
$J = \frac{\chi}{2} - 30$ Now we Find point C, saling 1 80, put Gratmo in D $\frac{\chi}{2} = -2x + 9$		
Now we Find point C, salving 1 80, put Equation 2 in 1 $ \frac{\chi}{z} = -2x + 9 $		
put Equating in D		
~ -4248	Now are find point C, saling () 8(2)	
~ -4248	you grain g or ()	
$\chi = -4 \chi + 18$ $\chi + 4 \chi = 18$ $5 \chi = 18$ $\chi = \frac{18}{5}$	$\frac{\chi}{z} = -2\chi + 9$	
$\begin{array}{c} \chi + 4\chi = 18 \\ 5\chi = 18 \\ \chi = \frac{18}{5} \end{array}$	$\chi = -4 \chi + 18$	
7-3	2 + 4N = 18 $52 = 18$	
	$\chi = \frac{18}{5}$	

Put
$$x = \frac{12}{5}$$
 in equation (3)
$$y = \frac{1}{5}$$

$$y = \frac{9}{5}$$
So coordinates $q \in ase (\frac{12}{5}, \frac{9}{5})$.

(i)
As $A(2,5)$ and $C(\frac{18}{5}, \frac{9}{5})$.

[Distance Formular]
$$|AC| = \int (2z-7i)^2 + (9z-9i)^2$$

$$= \int (\frac{18}{5}-2)^2 + (\frac{9}{5}-5)^2$$

$$= \int (\frac{3}{5})^2 + (\frac{-16}{5})^2$$

$$= \int \frac{69}{25} + \frac{256}{25}$$

$$= \int \frac{69}{25} + \frac{256}{25}$$

$$= \frac{815}{5}$$