

Cambridge International AS & A Level

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Mathematics

9709

Paper 1 Pure Mathematics 1

Topic 3-Coordinate Geometry

Question No (18)

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**Question No (18)**

Find the coordinates of the point at which the perpendicular bisector of the line joining (2, 7) to (10, 3) meets the x-axis.

**Solution**

$$A(2, 7), B(10, 3)$$

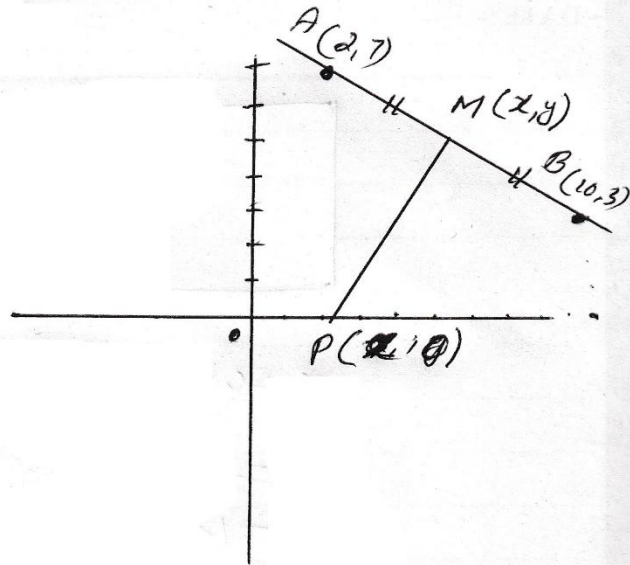
mid-point of AB

$$\left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

$$\left( \frac{2+10}{2}, \frac{7+3}{2} \right)$$

$$\left( \frac{12}{2}, \frac{10}{2} \right)$$

$$(6, 5)$$



HOW TO find gradient  
from two points

$$A(x_1, y_1), B(x_2, y_2)$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Gradient of line joining A(2, 7) and B(10, 3)

$$= \frac{3-7}{10-2}$$

$$= \frac{-4}{8}$$

$$= -\frac{1}{2}$$

if  $m_1$  is the gradient of one line and  $m_2$  is the gradient of second line  
if these are perpendicular to each other then  
 $(m_1)(m_2) = -1$

Hence,  
gradient of the perpendicular bisector  
of the line  $= 2$

Equation of line from one  
point  $P(x_1, y_1)$  and gradient  $m$   
is

$$y - y_1 = m(x - x_1)$$

Equation of perpendicular bisector  
having point  $(6, 5)$  and gradient  $2$

$$y - y_1 = 2(x - x_1)$$

$$y - 5 = 2(x - 6)$$

$$y - 5 = 2x - 12$$

$$y = 2x - 12 + 5$$

$$y = 2x - 7 \rightarrow \textcircled{1}$$

As perpendicular bisector meets the  
 $x$ -axis, so  $y = 0$

Equation  $\textcircled{1}$  becomes

$$0 = 2x - 7$$

$$2x = 7$$

$$x = \frac{7}{2}$$

∴ coordinates of point on x-axis are  
 $(\frac{7}{2}, 0)$