Cambridge International AS & A Level

Mathematics 9709

Paper 1 Pure Mathematics 1

Topic 3-Coordinate Geometry

Question No (28)

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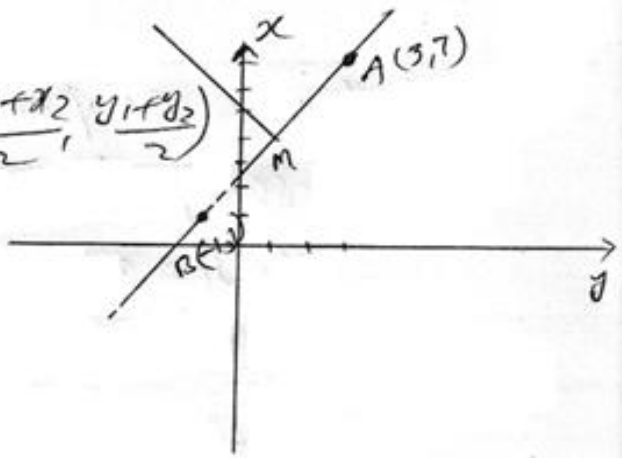
The point M is the mid-point of the line joining the points (3,7) and (−1,1). Find the equation of the line through M which is parallel to the line $\frac{x}{3}+\frac{y}{2}=1$.

Solution



$A(3,7)$, $B(-1,1)$

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

$=\left(\frac{3-1}{2}, \frac{7+1}{2}\right)$

$=(2/2, 8/2)$

$M=(1,4)$

Given equation of line

$$\frac{x}{3}+\frac{y}{2}=1$$

$$\frac{y}{2}=1-\frac{x}{3}$$

$$\frac{y}{2}=-\frac{x}{3}+1$$

$$y=2\left(-\frac{x}{3}+1\right)$$

$$y=-\frac{2}{3}x+2$$

compare with y-intercept form of line

$$y=mx+c$$

$$\Rightarrow m=-\frac{2}{3}$$

Formula

When two lines are parallel then their gradient will be same.

$\Rightarrow$ gradient of the required line $-\frac{2}{3}$

∴ Equation of line passing through $m(1,4)$ and parallel to the given line is

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

$$y - 4 = -\frac{2}{3}(x - 1)$$

$$3(y - 4) = -2(x - 1)$$

$$3y - 12 = -2x + 2$$

$$2x + 3y = 2 + 12$$

$$2x + 3y = 14$$