

## TMUA 2021 Paper 2 Question 2

$A(0, 2)$  and  $C(4, 0)$  are opposite vertices of the square  $ABCD$ .



What is the equation of the straight line through  $B$  and  $D$ ?

A  $y = -2x + 5$

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

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

D  $y = x$

E  $y = 2x - 3$

F  $y = 2x + 2$

Let  $L$  be the straight line through  $B$  and  $D$

A point that lies on this line is the midpoint of  $AC$ , we calculate this as follows:

$$\left( \frac{0+4}{2}, \frac{2+0}{2} \right) = (2, 1)$$

average of the x-ordinates      average of the y-ordinates

Let  $m$  be the gradient of  $L$ , then  $m$  will be the negative reciprocal of the gradient of the line segment  $AC$

$$\text{gradient of } AC = \frac{2-0}{0-4} = -\frac{1}{2}$$

Therefore  $m=2$  and taking  $(x_1, y_1) = (2, 1)$  I can form the equation of  $L$  using the formula

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

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

$$y - 1 = 2x - 4$$

$$y = 2x - 3$$

so the correct answer is E.

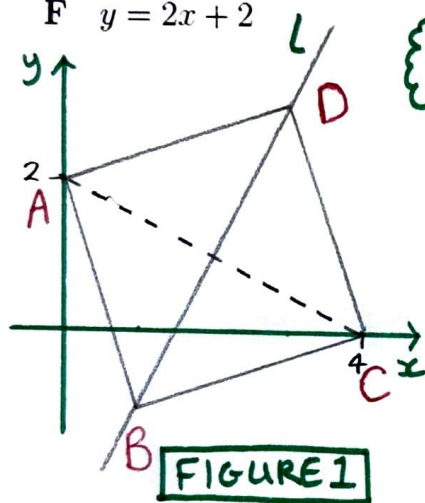


FIGURE 1