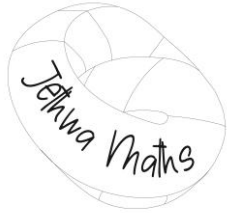


A-Level Starter Activity



Topic: Straight Lines

Chapter Reference: Pure 1, Chapter 5

7
minutes

1. The straight line L1 passes through the points $(-1, 3)$ and $(11, 12)$.

a. Find an equation for L1 in the form $ax + by + c = 0$, where a , b and c are integers. (4)

The line L2 has equation $3y + 4x - 30 = 0$.

b. Find the coordinates of the point of intersection of L1 and L2. (3)

Solutions

1a.

Gradient = $\frac{12-3}{11-1} = \frac{9}{10} = \frac{3}{4}$	M1
Equation of L1: $y - 3 = \frac{3}{4}(x - 1)$	M1
$4y - 12 = 3x + 3$	M1
$3x - 4y + 15 = 0$	M1

1b.

L1: $3x - 4y + 15 = 0$ (x3) L2: $3y + 4x - 30 = 0$ (x4)	M1
L1: $9x - 12y + 45 = 0$ L2: $12y + 16x - 120 = 0$	
$25x - 75 = 0$ $x = 3$	M1
When $x = 3$, $3(3) - 4y + 15 = 0$ $4y = 24$ $y = 6$	M1



Solutions

1a.

Gradient $AB = \frac{6-2}{-1-7} = \frac{4}{-8} = -\frac{1}{2}$	M1
Gradient of bisector = 2	M1
Midpoint $M: (\frac{-1+7}{2}, \frac{6+2}{2}) = (3, 4)$	M1
Equation of perpendicular bisector is: $y - 4 = 2(x - 3)$ $y - 4 = 2x - 6$ $y = 2x - 2$	M1

1b.

$x = p, y = q$ $q = 2p - 2$	M1
$OC = 2,$ $OC^2 = 4$ $p^2 + q^2 = 4$	M1
$p^2 + (2p - 2)^2 = 4$ $p^2 + 4p^2 - 8p + 4 = 4$ $5p^2 - 8p = 0$ $p(5p - 8) = 0$	M1
$p = 0$ $q = -2$	M1
$5p - 8 = 0$ $p = \frac{8}{5}$ $q = \frac{6}{5}$	M1
$(0, -2)$ and $(\frac{8}{5}, \frac{6}{5})$	



A-Level Starter Activity



Topic: Equation of a Line

Chapter Reference: Pure 1, Chapter 5

9

minutes

1. A curve has equation $y = x^2 - 4x + 4$ and a line has equation $y = mx$, where m is a constant.

a. For the case where $m = 1$, the curve and the line intersect at the points A and B . Find the coordinates of the mid-point of AB . (4)

b. Find the non-zero value of m for which the line is a tangent to the curve, and find the coordinates of the point where the tangent touches the curve. (5)

Solutions

1a.

$y = x^2 - 4x + 4$ $y = x$ $x = x^2 - 4x + 4$	M1
$x^2 - 5x + 4 = 0$ $(x - 4)(x - 1) = 0$	M1
$x = 4, x = 1$ $y = 4, y = 1$	M1
Therefore, midpoint AB: $(\frac{1+4}{2}, \frac{1+4}{2})$ $= (\frac{5}{2}, \frac{5}{2})$	M1

1b.

$y = x^2 - 4x + 4$ $y = mx$ $mx = x^2 - 4x + 4$	M1
$x^2 - (4 + m)x + 4 = 0$	M1
As $b^2 - 4ac = 0$ $[-(4 + m)]^2 - (4)(1)(4) = 0$	M1
$(4 + m)^2 = 16$ $4 + m = \pm 4$ $m = -4 \pm 4$ Therefore, $m = 0, m = -8$	M1
When $m = -8$ $x^2 + 4x + 4 = 0$ $x = -\frac{4}{2} = -2$ Therefore $y = 16$	M1



Solutions

1a.

$n = 7d$	M1
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1b.

7 downloads per day	M1
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1c.

1460 days, 4 years, 15 th May 2021.	M1
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