Higher Maths 2019
Paper 2

(1) (a) $M_{AC} = \left(\frac{-5+(-3)}{2}, \frac{(-12)+6}{2}\right) = (-4, -3)$

$$m_{BM} = \frac{-3-(-8)}{-4-11} = \frac{5}{-15} = -\frac{1}{3}$$

$$y+3 = -\frac{1}{3}(x+4)$$
$$3y+9 = -1(x+4)$$
$$3y+9 = -x-4$$
$$3y = -x-13$$

(b) $$m_{BC} = \frac{6-(-8)}{-3-11} = \frac{14}{-14} = -1$$

$$m_{\perp} = 1$$
$$y+12 = 1(x+5)$$
$$y = x-7$$

(c)
$$3y+x = -13$$
$$y-x = -7$$
$$4y = -20$$
$$y = -5$$

$$-5 - x = -7$$
$$-x = -2$$
$$x = 2$$

$(2, -5)$

Question			Generic scheme	Illustrative scheme	Max mark
1.	(a)		•1 calculate the midpoint of AC •2 calculate the gradient of BD •3 determine equation of BD	•1 (–4, –3) •2 $-\frac{1}{3}$ •3 $3y=-x-13$	3

Notes:

1. •2 is only available to candidates who use a midpoint to find a gradient.
2. •3 is only available as a consequence of using the midpoint of AC and the point B.
3. At •3 accept any arrangement of a candidate's equation where constant terms have been simplified.
4. •3 is not available as a consequence of using a perpendicular gradient.

Commonly Observed Responses:

Candidate A - Perpendicular Bisector of AC

$\text{Midpoint}_{AC}(-4,-3)$ •1 ✓

$m_{AC}=9 \Rightarrow m_{\perp}=-\frac{1}{9}$ •2 ✗

$9y+x+31=0$ •3 ✓ 2

For other perpendicular bisectors award 0/3

Candidate B - Altitude through B

$m_{AC}=9$ •1 ^

$m_{\perp}=-\frac{1}{9}$ •2 ✗

$9y+x=-61$ •3 ✓ 2

Candidate C - Median through A

$\text{Midpoint}_{BC}(4,-1)$ •1 ✗

$m_{AM}=\frac{11}{9}$ •2 ✓ 1

$9y-11x+53=0$ •3 ✓ 2

Candidate D - Median through C

$\text{Midpoint}_{AB}(3,-10)$ •1 ✗

$m_{CM}=-\frac{8}{3}$ •2 ✓ 1

$3y+8x+6=0$ •3 ✓ 2

Question			Generic scheme	Illustrative scheme	Max mark
	(b)		•4 calculate gradient of BC •5 use property of perpendicular lines •6 determine equation of AE	•4 -1 •5 1 •6 $y = x - 7$	3
Notes:					
5. •6 is only available to candidates who find and use a perpendicular gradient. 6. At •6 accept any arrangement of a candidate's equation where constant terms have been simplified.					
Commonly Observed Responses:					
Candidate E Correct gradient from incorrect substitution $m_{BC} = \frac{-3-11}{6+8} = -1$ •4 ✗ $m_{AE} = 1$ •5 ✓ 1 $y = x - 7$ •6 ✓ 1					
	(c)		•7 find x or y coordinate •8 find remaining coordinate of the point of intersection	•7 $x = 2$ or $y = -5$ •8 $y = -5$ or $x = 2$	2
Notes:					
7. For $(2, -5)$ with no working, award 0/2.					
Commonly Observed Responses:					