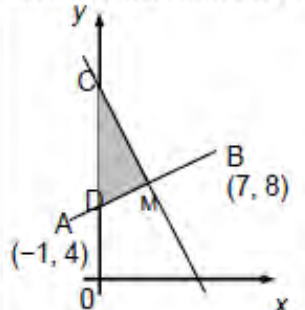


1	i	<p>(3, 6)</p> <p>grad AB = $(8 - 4)/(7 - -1)$ or 4/8 grad normal = -2 or ft</p> <p>perp bisector is $y - 6 = -2(x - 3)$ or ft their grad. of normal (not AB) and/or midpoint correct step towards completion</p>	2	<p>1 each coord</p> <p>M1 indep obtained M1 for use of $m_1 m_2 = -1$; condone stated/used as -2 with no working only if 4/8 seen</p> <p>M1 or M1 for showing grad given line = -2 A1 and M1 for showing (3, 6) fits given line</p>	6
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<p>ii</p>	<p>Bisector crosses y axis at C (0, 12) seen or used AB crosses y axis at D (0, 4.5) seen or used</p> <p>$\frac{1}{2} \times (12 - \text{their } 4.5) \times 3$ (may be two triangles M1 each)</p> <p>45/4 o.e. without surds, isw</p>  <p><u>alt</u> allow integration used: $\int_0^3 (-2x+12)dx [= 27]$</p> <p>obtaining AB is $y - 8 = \text{their } \frac{1}{2}(x - 7)$ oe $[y = \frac{1}{2}x + 4.5]$ $\int_0^3 (\frac{1}{2}x + 4.5)dx$ = 63/4 o.e. cao their area under CB - their area under AB = 45/4 o.e. cao</p>	<p>M1 may be implicit in their area calcn</p> <p>B2 M1 for 4 + their grad AB or for eqn AB is $y - 8 = \text{their } \frac{1}{2}(x - 7)$ oe with coords of A or their M used</p> <p>M2 or M1 for $[MC]^2 = 3^2 + 6^2$ or 45 or $[MD]^2 = 3^2 + 1.5^2$ or 11.25 oe and M1 for $\frac{1}{2} \times \text{their } MC \times MD$; all ft their M</p> <p>A1 <u>MR</u>: AMC used not DMC: lose B2 for D but then allow ft M1 for MC^2 or MA^2 $[=4^2 + 2^2]$ and M1 for $\frac{1}{2} \times MA \times MC$ and A1 for 15</p> <p><u>MR</u>: intrn used as D(0, 4) can score a max of M1, B0, M2 (eg M1 for their $DM = \sqrt{13}$), A0</p> <p>M1 condone poor notation</p> <p>M1 allow if seen, with correct line and limits seen/used as above</p> <p>M1 ft from their AB</p> <p>A1</p> <p>M1 allow only if at least some valid integration/area calculations for these trapezia seen</p> <p>A1 if combined integration, so 63/4 not found separately, mark equivalently for Ms and allow A2 for final answer</p>	<p>6</p>
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2	$3x + 2y = 26$ or $y = -1.5x + 13$ isw	3	M1 for $3x + 2y = c$ or $y = -1.5x + c$ M1 for subst (2, 10) to find c or for or for $y - 10 =$ their gradient $\times (x - 2)$	3
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3	$x + 3(3x + 1) = 6$ o.e. $10x = 3$ or $10y = 19$ o.e. (0.3, 1.9) or $x = 0.3$ <u>and</u> $y = 1.9$ o.e.	M1 A1 A1	for subst <u>or</u> for rearrangement and multn to make one pair of coefficients the same <u>or</u> for both eqns in form 'y =' (condone one error) graphical soln: (must be on graph paper) M1 for each line, A1 for (0.3, 1.9) o.e cao; allow B3 for (0.3, 1.9) o.e.	3
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4	grad BC = $-\frac{1}{4}$ soi $y - 3 = -\frac{1}{4}(x - 2)$ o.e. cao 14 or ft from their BC	2 1 2	M1 for $m_1m_2 = -1$ soi or for grad AB = 4 or grad BC = $\frac{1}{4}$ e.g. $y = -0.25x + 3.5$ M1 for subst $y = 0$ in their BC	5
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5	ii	grad AB = 8/4 or 2 or $y = 2x - 10$ grad BC = 1/-2 or $-1/2$ or $y = -1/2 x + 2.5$ product of grads = -1 [so perp] (allow seen or used)	1 1 1	or M1 for $AB^2 = 4^2 + 8^2$ or 80 and $BC^2 = 2^2 + 1^2$ or 5 and $AC^2 = 6^2 + 7^2$ or 85; M1 for $AC^2 = AB^2 + BC^2$ and 1 for [Pythag.] true so AB perp to BC; if 0, allow G1 for graph of A, B, C	3
		midpt E of AC = (6, 4.5) $AC^2 = (9 - 3)^2 + (8 - 1)^2$ or 85 rad = $1/2 \sqrt{85}$ o.e. $(x - 6)^2 + (y - 4.5)^2 = 85/4$ o.e. $(5-6)^2 + (0-4.5)^2 = 1 + 81/4 [= 85/4]$	1 M1 A1 B2 1	allow seen in (i) only if used in (ii); or $AE^2 = (9 - \text{their } 6)^2 + (8 - \text{their } 4.5)^2$ or rad. ² = 85/4 o.e. e.g. in circle eqn M1 for $(x - a)^2 + (y - b)^2 = r^2$ soi or for lhs correct some working shown; or 'angle in semicircle [=90°]'	
iii	$\overline{BE} = \overline{ED} = \begin{pmatrix} 1 \\ 4.5 \end{pmatrix}$ D has coords (6 + 1, 4.5 + 4.5) ft or (5 + 2, 0 + 9) = (7, 9)	M1 M1 A1	o.e. ft their centre; or f $\overline{BC} = \begin{pmatrix} -2 \\ 1 \end{pmatrix}$ or (9 - 2, 8 + 1); condone mixtures of vectors and coords. throughout part iii allow B3 for (7,9)	3	