Question Number	Scheme	Marks
9 (a)	$\overrightarrow{AB} = -\mathbf{a} + \mathbf{b}$ $\overrightarrow{OC} = \overrightarrow{OB} + \overrightarrow{BC} \Rightarrow \overrightarrow{OC} = 2\mathbf{b} - 2\mathbf{a} = 2(\mathbf{b}-\mathbf{a})$ (= $2\overrightarrow{AB}$) (oe) (i) Hence, $\overrightarrow{OC}$ and $\overrightarrow{AB}$ are in same direction (ii) And, $\overrightarrow{OC}$ is twice the length of $\overrightarrow{AB}$ Conclusions required *	B1 M1, A1 A1 (4)
(b)	$\dfrac{\text{area of triangle } ODC}{\text{area of triangle } OBC} = \dfrac{0.5\times\text{height}\times 2}{0.5\times\text{height}\times 5} = \dfrac{2}{5}$ $\dfrac{\text{area of triangle } OAB}{\text{area of triangle } OBC} = \dfrac{0.5\times\text{height}\times 1}{0.5\times\text{height}\times 2} = \dfrac{1}{2}$ area of triangle $OBC = \dfrac{5}{2}\times$ area of triangle ODC , and, area of triangle $OBC = 2\times$ area of triangle OAB Therefore, $\dfrac{\text{area of triangle } ODC}{\text{area of triangle } OAB} = \dfrac{4}{5}$ {Or given as ratio, area of triangle ODC ; area of triangle OAB = 4 : 5}	M1A1 M1A1 dM1A1cso (6) **(10)**

(a)	
B1	Correct expression for $\overrightarrow{AB}$
M1	Obtaining $\overrightarrow{OC}$ in terms of **a** and **b**
(i)A1	Using correct expressions for $\overrightarrow{OC}$ and $\overrightarrow{AB}$ to deduce that they are parallel
(ii)A1	NB B1 on e-PEN Deducing the GIVEN ratio $AB:OC$ or $OC:AB$ provided clear which is intended. No vector arrows here. Accept shown or # or similar as a conclusion provided clear which part it refers to.
(b)	
M1	Finding the ratio of the areas of triangles *ODC* and *OBC*, either order
A1	Correct ratio (or fraction), triangles in either order
M1	Finding the ratio of the areas of triangles *OAB* and *OBC*, either order
A1	Correct ratio (or fraction), triangles in either order
dM1	Eliminating area of triangle *OBC* to obtain a value for the required ratio (or fraction) Depends on both the preceding M marks.
A1cso	Correct ratio or fraction (any equivalent). Triangles to be in the correct order. Ratio can be in one of forms 1:1.25, 1:5/4, 0.8: 1, 4/5:1
	NB: b - a (whether bold, underlined or neither) is a vector, not the length of a line. M marks only can be awarded.

	Alternatives for 9(b)	
ALT 1	$\text{Area } \Delta OAB = \frac{1}{2} AB \times OB \sin OBA$	M1 (area either triangle)
	$\text{Area } \Delta ODC = \frac{1}{2} OD \times OC \sin DOC$	A1 (both areas correct)
	$2\left\|\overrightarrow{AB}\right\| = \left\|\overrightarrow{OC}\right\|$ or $2AB = OC$, $\frac{2}{5}\left\|\overrightarrow{OB}\right\| = \left\|\overrightarrow{OD}\right\|$	M1 (either)
	$\angle OBA = \angle DOC$	A1 (all 3 statements correct or used correctly)
	$\therefore \Delta ODC : \Delta OAB = \left(\frac{1}{2}\right) AB \times OB : \left(\frac{1}{2}\right) \times 2AB \times \frac{2}{5} OB$	dM1 (their ratio of lengths)
	$= 4:5$	A1
ALT 2	If $\frac{1}{2} \times \text{base} \times \text{height}$ used:	
	$\text{Area } \Delta OAB = \frac{1}{2} AB \times h$	M1
	$\text{Area } \Delta ODC = \frac{1}{2} OC \times h'$	A1
	$h' = \frac{2}{5} h$ $OC = 2AB$	M1A1
	$\Delta OCD : \Delta OAB = AB \times \frac{2}{5} h : \frac{1}{2} AB \times h$ dM1	
	$= 4:5$ oe	A1
	M1A1 areas of triangles (M1 either correct, A1 both correct) M1A1 ratio of bases and ratio of heights (M1 either correct, A1 both correct) dM1A1 correct completion	