

Question Number	Scheme	Marks
4(a)	$\overrightarrow{DC} = (11\mathbf{i} - p\mathbf{j}) - (4\mathbf{i} - 2p\mathbf{j}) = 7\mathbf{i} + p\mathbf{j} = \overrightarrow{AB}$ OR: $\overrightarrow{BC} = (11\mathbf{i} - p\mathbf{j}) - (7\mathbf{i} + p\mathbf{j}) = 4\mathbf{i} - 2p\mathbf{j} = \overrightarrow{AD}$ Parallel and equal in length \therefore Parallelogram	M1A1 A1cso (3)
(b)	$\overrightarrow{BD} = (4\mathbf{i} - 2p\mathbf{j}) - (7\mathbf{i} + p\mathbf{j}) = -3\mathbf{i} - 3p\mathbf{j}$ (or $3(-\mathbf{i} - p\mathbf{j})$) oe $\sqrt{9 + (3p)^2} = 3\sqrt{10}$ ($\Rightarrow 9 + 9p^2 = 90$) $p = \pm 3$	B1 M1 A1 (3)
(c)	$(\pm) \frac{1}{3\sqrt{10}}(-3\mathbf{i} - 9\mathbf{j})$ oe	B1ft (1)
		[7]
(a)	Accept column vectors throughout.	
M1	Attempt $\pm \overrightarrow{DC}$ or $\pm \overrightarrow{BC}$ using the difference of 2 appropriate vectors in component form.	
A1	Show that $\pm \overrightarrow{DC}$ or $\pm \overrightarrow{BC} = \pm \overrightarrow{AB}$ or $\pm \overrightarrow{AD}$	
A1cso	Suitable conclusion with reason from correct working. One pair of vectors only needed if reason is “parallel and equal”. Both pairs needed if reason is “2 pairs of sides parallel/equal”.	
(b)		
B1	For a correct \overrightarrow{BD} or \overrightarrow{DB} . No simplification needed.	
M1	Use the given length of \overrightarrow{BD} with the length of their \overrightarrow{BD} to form an equation	
A1	Obtain correct values for p . Both needed.	
(c)		
B1ft	Use their positive value for p to obtain a unit vector (no simplification needed)	