Question Number	Answer	Mark
6(a)	$\sqrt{(-5)^2+6^2}$	M1
	$\sqrt{61}$ (N)	A1 (2)
6(b)	e.g. $\tan\alpha=\frac{1}{2}$ or $\frac{2}{1}$ **OR** $\sin\alpha=\frac{1}{\sqrt{5}}$ or $\frac{2}{\sqrt{5}}$ **OR** $\cos\alpha=\frac{1}{\sqrt{5}}$ or $\frac{2}{\sqrt{5}}$ **OR** $\tan\beta=\pm\frac{5}{6}$ or $\pm\frac{6}{5}$ **OR** $\sin\beta=\pm\frac{5}{\sqrt{61}}$ or $\pm\frac{6}{\sqrt{61}}$ **OR** $\cos\beta=\pm\frac{5}{\sqrt{61}}$ or $\pm\frac{6}{\sqrt{61}}$	M1
	$76.75948....^\circ$ or $283.245019....^\circ$	A1
	e.g. Required angle = 103°	A1 (3)
	SC: $\cos^{-1}\left(\frac{(2\mathbf{i}+\mathbf{j}).(-5\mathbf{i}+6\mathbf{j})}{\sqrt{2^2+1^2}\times\sqrt{(-5)^2+6^2}}\right)$ $=\cos^{-1}\left(\frac{-4}{\sqrt{305}}\right)$ **OR** $\cos^{-1}\left(\frac{(5^2+6^2)+(1^2+2^2)-(5^2+7^2)}{2\sqrt{(5^2+6^2)}\sqrt{(1^2+2^2)}}\right)$	M1 A1 M1A1
	= 103°	A1
6(c)	$a(-\mathbf{i}+2\mathbf{j})+b(2\mathbf{i}-3\mathbf{j})=(-5\mathbf{i}+6\mathbf{j})$ with $a\neq b$	M1
	$-a+2b=-5$ and $2a-3b=6$	M1
	$a=-3, b=-4$ seen or implied	A1
	$\mathbf{F}_1=(3\mathbf{i}-6\mathbf{j})$ and $\mathbf{F}_2=(-8\mathbf{i}+12\mathbf{j})$	A1 (4)
	ALT 1	
	$(a\mathbf{i}+b\mathbf{j})+(c\mathbf{i}+d\mathbf{j})=(-5\mathbf{i}+6\mathbf{j})$ **and** $\frac{a}{b}=-\frac{1}{2}$ oe **and** $\frac{c}{d}=-\frac{2}{3}$ oe seen	M1
	Two equations in two unknowns	M1
	$a=3, b=-6, c=-8, d=12$ seen or implied	A1
	$\mathbf{F}_1=(3\mathbf{i}-6\mathbf{j})$ and $\mathbf{F}_2=(-8\mathbf{i}+12\mathbf{j})$	A1 (4)
		(9)
	Notes	
	Allow use of column vectors throughout including for answers	
6(a)	M1: Pythagoras with root	
	A1: Accept 7.8 or better (7.810249676..) (N)	
6(b)	M1: Complete method to find one relevant angle, seen or implied	

	e.g. allow reciprocals or negatives or use of sin or cos	
	A1: Seen or implied by correct answer i.e . $\alpha+\beta$ or $360^o-(\alpha+\beta)$ **N.B.** Accept to the nearest whole number or better.	
	A1: Accept 103° or better (103.2405..) **OR** 257° or better (256.759..)	
6(c)	M1: Correct vector equation in 2 unknowns, seen or implied	
	M1: Complete method to obtain two **scalar** equations in two unknowns **N.B.** This is an independent M mark.	
	A1: Correct values for ALL unknowns **N.B.** Could be implied by two correct forces if neither or only one correct value is seen.	
	A1: Two correct vectors.	