Daily Question

Day 3 Mechanics – Mark Scheme

Question 1

(a)	$(4\mathbf{i}-6\mathbf{j})+(p\mathbf{i}+q\mathbf{j})=(4+p)\mathbf{i}+(q-6)\mathbf{j}$	M1
	$\frac{(4+p)}{(q-6)}=\frac{2}{1}$ or $-\frac{2}{1}$ **(or** $\frac{1}{2}$ or $-\frac{1}{2}$**)**	**DM**1 A1
	$2q-12=4+p$	
	$p-2q=-16$ GIVEN ANSWER	**DM**1 A1 (5)
b)	$q=3 \Rightarrow p=-10$	B1
	EITHER $0.5\mathbf{a}=-6\mathbf{i}-3\mathbf{j}$ **OR** $\lvert\mathbf{R}\rvert=\sqrt{(-6)^2+(-3)^2}$	M1
	$\mathbf{a}=-12\mathbf{i}-6\mathbf{j}$ $=\sqrt{45}$ oe	A1
	$\lvert\mathbf{a}\rvert=\sqrt{(-12)^2+(-6)^2}$ $0.5a=\sqrt{45}$	M1
	$a=\sqrt{180}=13.4\text{ms}^{-2}$ $a=\sqrt{180}=13.4\text{ms}^{-2}$	A1 (5)
c)	e.g. $\tan\theta=\frac{12}{6} \Rightarrow \theta=63.4°$	M1A1
	Bearing $=180°+63.4°=243°$ (nearest degree)	A1cao (3)
		(13)

Question 2

(a)	$\tan\theta=\frac{3}{1}$	M1
	$\theta=71.565°..$	A1
	Bearing is 162° (nearest degree)	A1 (3)
b)	$(p\mathbf{i}+2\mathbf{j})+(3\mathbf{i}-q\mathbf{j})+(q\mathbf{i}+2p\mathbf{j})=2(\mathbf{i}-3\mathbf{j})$	M1
	$p+q+3=2$	M1
	$2p-q+2=-6$	M1
	$p=-3,\ q=2$	A1; A1 (5)
		(8)