1 A particle of mass 4 kg is moving with velocity $(2\mathbf{i} + 3\mathbf{j})\,\text{m s}^{-1}$ when it receives an impulse of $(7\mathbf{i} - 5\mathbf{j})\,\text{N s}$.

Find the speed of the particle immediately after receiving the impulse.

(5)

(Total for Question 1 is 5 marks)

Question Number	Scheme	Marks
1	Impulse-momentum equation	M1
	$(7\mathbf{i}-5\mathbf{j}) = 4\mathbf{v} - 4(2\mathbf{i}+3\mathbf{j})$	A1
	$\mathbf{v} = \frac{15}{4}\mathbf{i} + \frac{7}{4}\mathbf{j}$	A1
	$\lvert\mathbf{v}\rvert = \frac{1}{4}\sqrt{15^2+7^2}$	M1
	$= \frac{1}{4}\sqrt{274} = 4.1\,(\text{m s}^{-1})$	A1
		(5)
		(5 marks)
	Notes	
	N.B. Column vectors are acceptable throughout	
M1	Use of Impulse-Momentum principle, dimensionally correct, correct number of terms and must be a *difference* of momenta (condone subtraction in wrong order)	
A1	Correct equation oe	
A1	Correct velocity seen or implied	
M1	Use of Pythagoras' on their **v**	
A1	Cao from a correct **v**. 4.1 or better (4.138236…)	