Question Number	Scheme	Marks
6.	Perpendicular to direction of motion: $500\sin 40° = P\sin\alpha°$	M1 A1
	Parallel to direction of motion: $500\cos 40° + P\cos\alpha° = 900$	M1 A1
	(i) Form and solve an equation in α $\tan\alpha° = \dfrac{500\sin 40°}{900 - 500\cos 40°}$	M1
	$\alpha = 32$ or better $(31.8683\ldots)$	A1
	(ii) Form and solve an equation in P $P = \dfrac{500\sin 40°}{\sin 31.868\ldots°}$	M1
	$P = 610$ or better $(608.736\ldots)$	A1
	N.B. Penalise over accurate answers only once for the question.	
	ALTERNATIVE USING A TRIANGLE OF FORCES: Cosine Rule**:** $P^2 = 500^2 + 900^2 - 2\times 500\times 900\cos 40^o$ OR: $500^2 = P^2 + 900^2 - 2\times P\times 900\cos\alpha°$ OR: $900^2 = P^2 + 500^2 - 2\times P\times 500\cos(140^o - \alpha°)$	M1 A1
	Sine Rule /Lami's Theorem: $\dfrac{P}{\sin 40^o} = \dfrac{500}{\sin\alpha°} = \dfrac{900}{\sin(140^o - \alpha°)}$ (any two)	M1 A1
	(i) Solve for α $\alpha = 32$ or better $(31.8683\ldots)$	M1 A1
	(ii) Solve for P $P = 610$ or better $(608.736\ldots)$	M1 A1
		(8)
	NOTES	
M1	Form an equation perpendicular to the direction of motion. Correct number of terms, condone sign errors and sin/cos confusion.	
A1	Correct unsimplified equation	
M1	Form an equation parallel to the direction of motion. If using $F = ma$ then must have $a = 0$. Correct number of terms, condone sign errors and sin/cos confusion.	
A1	Correct unsimplified equation	
(i) M1	Form and solve an equation in α (This an M mark so do not penalise accuracy of manipulation)	
A1	Accept 32 or better (i.e 32, 31.9, 31.87,… as their **<u>final</u>** answer)	
(ii) M1		

A1	Form and solve an equation in P (This an M mark so do not penalise accuracy of manipulation) Accept 610 or better (i.e 610, 609, 608.7,… as their **final** answer)	
M1 **A1**	**ALTERNATIVE** Use cosine rule to give an equation in P (and α possibly) Correct equation	
M1 **A1**	Use sine rule to give an equation in P and α Correct equation	
	N.B. They could use the Sine or the Cosine Rule **twice** to obtain their two equations.	
(i) M1 **A1** **(ii) M1** **A1**	Form and solve an equation in α Accept 32 or better (i.e 32, 31.9, 31.87,… as their **final** answer) Form and solve an equation in P Accept 610 or better (i.e 610, 609, 608.7,… as their **final** answer)	