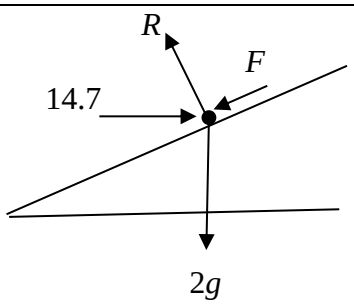
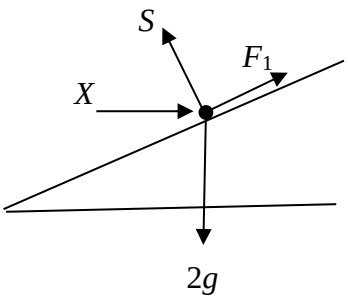
Question Number	Scheme	Marks
3(a)		
	$(\nwarrow),14.7\cos\alpha = 2g\sin\alpha + F$ (could be $-F$) **OR:** $(\rightarrow),14.7 + F\cos\alpha = R\sin\alpha$ $(\uparrow), R\cos\alpha + F\sin\alpha = 2g$ **AND** eliminate R to give an equation in F only. <u>Verificaton methods</u> $14.7\cos\alpha = (11.76) = 2g\sin\alpha$ (i.e. verification that $X = 14.7 \Rightarrow F = 0$) **OR**: $X\cos\alpha = 2g\sin\alpha \Rightarrow X = 14.7$ (i.e. verification that $F = 0 \Rightarrow X = 14.7$)	M1 A1
	so $F = 0$* oe	A1*
		(3)
		
3(b)	$F_1 = 0.5S$	B1
	Two equations taken from: $(\nwarrow), X\cos\alpha + F_1 = 2g\sin\alpha$ $(\nwarrow), S = X\sin\alpha + 2g\cos\alpha$ $(\rightarrow), X + F_1\cos\alpha = S\sin\alpha$ $(\uparrow), S\cos\alpha + F_1\sin\alpha = 2g$	M1A2 M1A2

	N.B. M0 for both equations if they put $X = 14.7$ anywhere	
	$X = 4g/11$, 3.6 or 3.56 or 3.57	A1
	N.B. Enter marks for the equations on ePen in the order in which they appear above.	
		(8)
		(11)
	Notes for question 3	
3(a)	M1 Equation in F only, correct no of terms, condone sign errors and sin/cos confusion (M0 if they use $F = 0.5R$) **N.B**. Allow the equation without F Allow use of m instead of 2 for the Mmark	
	A1 Correct equation	
	A1* cao Must state a conclusion or , if verifying, must state clearly $X = 14.7 \Rightarrow F = 0$ **OR** $F = 0 \Rightarrow X = 14.7$	
3(b)	B1 $F_1 = 0.5S$ *seen* e.g. on a diagram (even if wrong direction)	
	M1 A resolution, correct no of terms, condone sign errors and sin/cos confusion Allow use of m instead of 2 for the A mark	
	A2 Correct equation, -1 each error	
	M1 A resolution, correct no of terms, condone sign errors and sin/cos confusion Allow use of m instead of 2 for the A mark	
	A2 Correct equation, -1 each error	
	A1 cao	