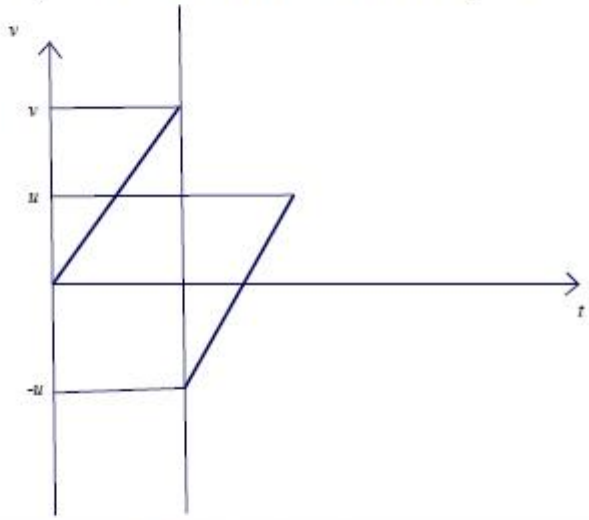
A level Applied Paper 3B Mechanics Practice Paper M14 MARK SCHEME

Question 1

Question Number	Scheme	Marks
a	Using $v^2 = u^2 + 2as$: $v^2 = 4g$, $v = \sqrt{4g}$ or 6.3 or 6.26 (m s^{-1})	M1,A1 (2)
b	Rebounds to 1.5 m, $0 = u^2 - 3g$, $u = \sqrt{3g}$, 5.4 or 5.42 (m s^{-1})	M1A1 (2)
c	Impulse = $0.3(6.3 + 5.4) = 3.5$ (Ns)	M1A1 (2)
d	If speed downwards is taken to be positive:  First line Second line $-u, u,$	B1 B1 B1 (3)
e.	Use of suvat to find t_1 or t_2, $\sqrt{4g} = gt_1 \quad t_1 = \sqrt{\frac{4}{g}} = 0.64$ s $\sqrt{3g} = gt_2 \quad t_2 = \sqrt{\frac{3}{g}} = 0.55$ s Total time = $t_1 + 2t_2 = 1.7$ s or 1.75 s	M1A1 (t_1 or t_2) DM1A1 (4) [13]

Notes for Question
N.B. Deduct only 1 mark in **whole question** for not giving an answer to either 2 sf or 3 sf, following use of g = 9.8 or use of g = 9.81 **Question (a)** M1 is for a complete method for finding speed (usually $v^2=u^2+2as$) A1 for v = 6.3 (ms^{-1}) or 6.26 (ms^{-1}) or $\sqrt{4g}$ (ms^{-1}) (must be positive) *Allow* $0= u^2 - 4g$ *or* $v^2 = 4g$ *but not* $0= u^2 + 4g$ *or* $v^2 = - 4g$ **Question (b)** M1 is for a complete method for finding speed *Allow* $0= u^2 - 3g$ *or* $v^2 = 3g$ *but not* $0= u^2 + 3g$ *or* $v^2 = - 3g$ A1 for 5.4 (ms^{-1}) or 5.42 (ms^{-1}) or $\sqrt{3g}$ (ms^{-1}) (must be positive) **Question (c)** M1 is for ±0.3(their (b) ± their (a)) (unless they are definitely adding the momenta i.e. using $I = m(v + u)$ which is M0). *N.B. Extra g is M0* A1 for 3.5 (Ns) or 3.50 (Ns) (must be positive) **Question (d)** First B1 for a straight line from origin to their v *which must be marked on the axis.* Second B1 for a parallel straight line correctly positioned (*if continuous vertical lines are clearly included as part of the graph then B0)* Third B1 for their $-u$ and u correctly marked, *provided their second line is correctly positioned* **N.B.** A reflection of the graph in the t-axis (upwards +ve) is also acceptable **Question (e)** First M1 for use of *suvat* or area under their v-t graph to find either t_1 or t_2 or $2t_2$ First A1 for correct value for either t_1 or t_2 *(can be in terms of g at this stage or surds or unsimplified e.g.6.3/9.8)* Second M1 **dependent on the first M1** for their $t_1 + 2t_2$ Second A1 for 1.7 (s) or 1.75 (s).

Question 2

Question Number	Scheme	Marks
a	Resolving vertically: $T+2T\left(=3T\right)=W$	M1A1
	Moments about A: $2W=2T\times d$	M1A1
	Substitute and solve: $2W=2\dfrac{W}{3}d$	**DM1**
	$d=3$	A1 (6)
b	Resolving vertically: $T+4T=W+kW \quad \left(5T=W\left(1+k\right)\right)$	M1A1 **ft**
	Moments about A: $2W+4kW=3\times 4T$	M1A1 **ft**
	Substitute and solve: $2W+4kW=\dfrac{12}{5}W\left(1+k\right)$	**DM1**
	$2+4k=\dfrac{12}{5}+\dfrac{12}{5}k$	
	$\dfrac{8}{5}k=\dfrac{2}{5}$, $\quad k=\dfrac{1}{4}$	A1 (6)
		[12]

Notes for Question
N.B. In moments equations, for the M mark, all terms must be force x distance but take care in the cases when the distance is 1.
Question (a)
N.B. If Wg is used, mark as a misread. *If T and 2T are reversed, mark as per scheme NOT as a misread.*
First M1 for an equation in W and T and possibly d (either resolve vertically or moments about any point other than the mid-pt), with usual rules.
First A1 for a correct equation.
Second M1 for an equation in W and T and possibly d (either resolve vertically or moments about any point other than the mid-pt), with usual rules.
Second A1 for a correct equation.
Third M1, dependent on first and second M marks, for solving for d
Third A1 for $d = 3$ cso
N.B. If a single equation is used (see below) by taking moments about the mid-point of the rod, $2T = 2T(d-2)$, this scores M2A2 (-1 each error)
Third M1, dependent on first and second M marks, for solving for d
Third A1 for $d = 3$ cso
Question (b)
N.B. If Wg and kWg are used, mark as a misread.
If they use any results from (a), can score max M1A1 in (b) for one equation.
If T and 4T are reversed, mark as per scheme NOT as a misread.
First M1 for an equation in W and a tension T_1 and possibly their d or their d and k (either resolve vertically or moments about any point), with usual rules.
First A1 **ft** on their d, for a correct equation.
Second M1 for an equation in W and **the same tension** T_1 and possibly their d or their d and k (either resolve vertically or moments about any point), with usual rules.
Second A1 **ft** on their d, for a correct equation.
Third M1, dependent on first and second M marks, for solving to give a numerical value of k
Third A1 for $k = 1/4$ *oe* cso

Question 3

Question Number	Scheme	Marks
a	Resolving horizontally: $T\cos 30° = 6\cos 50°$ $T = 4.45$ (N), 4.5 (N), or better	M1A1 A1 (3)
b	Resolving vertically: $W = 6\cos 40° + T\cos 60°$ = 6.82 (N), 6.8 (N), or better	M1A1 A1 (3)
		[6]

Notes for Question

Question (a)

First M1 for resolving horizontally with correct no. of terms and both T_{AC} and '6' terms resolved.
First A1 for a correct equation in T_{AC} only.
Second A1 for 4.5 (N), 4.45 (N) or better. (4.453363194)
N.B. The M1 is for a *complete method* to find the tension so where two resolution equations, neither horizontal, are used, the usual criteria for an M mark must be applied to *both* equations and the first A1 is for a correct equation in T_{AC} *only* (i.e. W eliminated correctly)

Alternatives:

Triangle of Forces : $\frac{T_{AC}}{\sin 40°} = \frac{6}{\sin 60°}$ (same equation as → resolution) M1A1

Or

Lami's Theorem: $\frac{T_{AC}}{\sin 140°} = \frac{6}{\sin 120°}$ (same equation as → resolution) M1A1

Question (b)

First M1 for resolving vertically with correct no. of terms and both T_{AC} (does not need to be substituted) and '6' terms resolved.
First A1 for a correct equation in T_{AC} and W.
Second A1 for 6.8 (N), 6.82 (N) or better. (6.822948256)

Alternatives:

Triangle of Forces : $\frac{6}{\sin 60°} = \frac{W}{\sin 80°}$ M1A1

Or Lami's Theorem: $\frac{6}{\sin 120°} = \frac{W}{\sin 100°}$ M1A1

Or Resolution in another direction e.g. along one of the strings M1 (usual criteria) A1 for a correct equation.

Question 4

Question Number	Scheme	Marks
(a)	$R = mg\cos 40$	B1
	Use of $F = \mu R$	B1
	$mg\sin 40 - F = \pm ma$	M1A1
	$acc = 2.55$ (m s^{-2}) or 2.5 (m s^{-2})	A1 (5)
(b)	$v^2 = u^2 + 2as = 2\times a\times 3$ Speed at B is 3.9 (m s^{-1}) or 3.91(m s^{-1})	M1A1 (2)
		[7]

Notes for Question

(Deduct only 1 mark in **whole question** for not giving an answer to either 2 sf or 3 sf, following use of g = 9.8)

Question (a)

First B1 for $R = mg\cos 40°$

Second B1 for $F = \mu R$ seen or implied(can be on diagram)

M1 for resolving parallel to plane, correct no. of terms, mg resolved (F does not need to be substituted)

First A1 for a correct equation

Second A1 for 2.5 (ms^{-2}) or 2.55 (ms^{-2}) Must be **positive.**

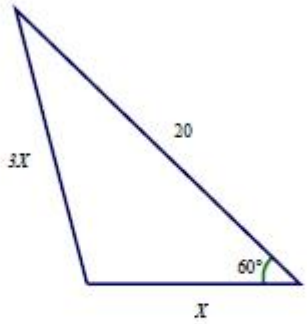
S.C. If m is given a specific numerical value, can score max B1B1M1A0A0

Question (b)

M1 is for a complete method for finding speed (usually $v^2=u^2+2as$)

A1 for 3.9 (ms^{-1}) or 3.91(ms^{-1})

Question 5

Question Number	Scheme	Marks
a	 Resolve and use Pythagoras $(X-20\cos 60)^2+(20\cos 30)^2=(3X)^2$ $8X^2+20X-400=0$ $X=\dfrac{-5\pm\sqrt{25+800}}{4}=5.93$ **(3 SF)**	 M1 A1 A1 M1A1 (5)
a alt	Cosine rule $(3X)^2=20^2+X^2-2.20X\cos 60$ $8X^2+20X-400=0$ $X=\dfrac{-5\pm\sqrt{25+800}}{4}=5.93$ **(3SF)**	M1A1 A1 M1A1 (5)
b	$\lvert\mathbf{P}-\mathbf{Q}\rvert^2=20^2+X^2-2X\times 20\times\cos 120$ $\lvert\mathbf{P}-\mathbf{Q}\rvert=23.5$ (N) **(3SF)**	M1A1 **DM1** A1 (4)
b alt	$\lvert\mathbf{P}-\mathbf{Q}\rvert^2=(X+20\cos 60)^2+(20\cos 30)^2$ $\lvert\mathbf{P}-\mathbf{Q}\rvert=23.5$ (N) **(3SF)**	M1A1 **DM1** A1 (4)
		[9]

Notes for Question
In this question a misquoted Cosine Rule is M0. The question asks for both answers to 3 SF but only penalise under or over accuracy once in this question. **Question (a)** First M1 for a complete method to give an **equation in X only** i.e. producing two components *and* usually squaring and adding and equating to $(3X)^2$ (condone sign errors and consistent incorrect trig. in the components for this M mark **BUT the x-component must be a difference)** First A1 for a correct unsimplified equation in X *only* e.g, allow $(\pm(X - 20\cos60°))^2 + (\pm(20\cos30°))^2 = (3X)^2$ Second A1 for any correct fully numerical *3 term* quadratic = 0 Second M1(**independent**) for solving *a 3 term* quadratic Third A1 for 5.93 **Alternative using cosine rule:** First M1 for use of cosine rule with cos60° **(M0 if they use 120°)** First A1 for a correct equation unsimplified e.g, allow cos60° and $(3X)^2$ Second A1 for any correct fully numerical *3 term* quadratic = 0 Second M1(**independent**) for solving *a 3 term* quadratic Third A1 for 5.93 **Alternative using 2 applications of the sine rule:** First M1 for using $3X / \sin60 = X / \sin a$ **AND** **Either:** $X / \sin a = 20 / \sin(120° - a)$ **Or:** $3X / \sin 60° = 20 / \sin(120° - a)$ (These could be in terms of b where $b = (120° - a)$)

First A1 for two correct equations
Second A1 for $a = 16.778..^\circ$ (or $b = 103.221..^\circ$)
Second M1 for solving:
$X / \sin a = 20 / \sin(120^\circ - a)$ **or** $3X / \sin 60^\circ = 20 / \sin(120^\circ - a)$
with their a or b, to find X
Third A1 for 5.93

Question (b)
First M1 for use of cosine rule unsimplified with $\cos 120^\circ$ **(M0 if they use 60°)**
First A1 for a correct expression for $|\mathbf{P} - \mathbf{Q}|$ in terms of X (does not need to be substituted)
Second M1, **dependent on first M1**, for *substituting for their X and solving for* $|\mathbf{P} - \mathbf{Q}|$
Second A1 for 23.5
Alternative using components:
First M1 for a complete method i.e. producing two components *and* squaring and adding (no square root needed) (condone sign errors and consistent incorrect trig. in the components for this M mark **BUT the x-component must be a sum)**
First A1 for a correct expression for $|\mathbf{P} - \mathbf{Q}|$
(e.g, allow $(\pm(X + 20\cos 60^\circ))^2 + (\pm(20\cos 30^\circ))^2$
Second M1, **dependent on first M1**, for *substituting for their X and solving for* $|\mathbf{P} - \mathbf{Q}|$
Second A1 for 23.5

Question 6

Question Number	Scheme	Marks
a	$\mathbf{F} = m\mathbf{a}$: $3\mathbf{i} - 2\mathbf{j} = 0.5\mathbf{a}$ $\mathbf{a} = 6\mathbf{i} - 4\mathbf{j}$ $\lvert\mathbf{a}\rvert = \sqrt{6^2 + (-4)^2} = 2\sqrt{13}\ (\mathbf{m\ s^{-2}})$ **	M1 A1 M1A1 (4)
b	$v = u + at$: $\mathbf{v} = (\mathbf{i} + 3\mathbf{j}) + 2(6\mathbf{i} - 4\mathbf{j})$	M1A1 ft
	$= 13\mathbf{i} - 5\mathbf{j}\ \mathrm{m\ s^{-1}}$	A1 (3)
c	Distance $= 2\lvert\mathbf{v}\rvert = 2\sqrt{4+1} = 2\sqrt{5} = 4.47\ (\mathbf{m})$	M1A1
		(2)
d	When $t = 3.5$, velocity of P is $(\mathbf{i} + 3\mathbf{j}) + 3.5(6\mathbf{i} - 4\mathbf{j}) = 22\mathbf{i} - 11\mathbf{j}$ Given conclusion reached correctly. E.g. $22\mathbf{i} - 11\mathbf{j} = 11(2\mathbf{i} - \mathbf{j})$	M1A1 ft A1 (3)
		[12]
Notes for Question		

Question (a)

Either:
First M1 for use of $\mathbf{F} = m\,\mathbf{a}$
First A1 for $\mathbf{a} = 6\mathbf{i} - 4\mathbf{j}$
Second M1 for $a = \sqrt{(6^2 + (-4)^2)}$ (Allow $\sqrt{(6^2 + 4^2)}$)
Second A1 for $a = 2\sqrt{13}$ (ms^{-2}) **Given answer**

Or:
First M1 for $F = \sqrt{(3^2 + (-2)^2)}$ (Allow $\sqrt{(3^2 + 2^2)}$)
First A1 $F = \sqrt{13}$
Second M1 for $\sqrt{13} = 0.5\,a$
Second A1 for $a = 2\sqrt{13}$ (ms^{-2}) **Given answer**

Question (b)
M1 for $(\mathbf{i} + 3\mathbf{j}) + (2 \times$ their $\mathbf{a})$
First A1 **ft** for a correct expression
Second A1 for $13\mathbf{i} - 5\mathbf{j}$; isw if they go on to find the speed

Question (c)
M1 for $2\sqrt{(2^2 + (-1)^2)}$ or $\sqrt{(4^2 + (-2)^2)}$
A1 for $2\sqrt{5}$ or $\sqrt{20}$ or 4.5 or 4.47 or better

Question (d)
M1 for $(\mathbf{i} + 3\mathbf{j}) + (3.5 \times$ their $\mathbf{a})$,or possibly, their (b) + (1.5 x their **a**)
First A1 ft for a correct expression *of form* $a\mathbf{i} + b\mathbf{j}$
Second A1 for given conclusion reached correctly *e.g.* $22\mathbf{i} - 11\mathbf{j} = 11(2\mathbf{i} - \mathbf{j})$ oe **Given answer**

Question 7

Question Number	Scheme	Marks	Notes
(a)	Resolving vertically: $Y + P\cos\theta = W$	M1	Needs all 3 terms. Condone sign errors and sin/cos confusion. Condone Wg
		A1	
	Moments about A: $Wl\cos\theta = 2lP$	M1	Terms need to be of the correct structure, but condone l implied if not seen.
		A1	
	$P = \frac{W\cos\theta}{2} \Rightarrow Y = W - \frac{W\cos^2\theta}{2} = \frac{W}{2}\left(2 - \cos^2\theta\right)$ **	DM1	Substitute for P to obtain simplified Y Requires both preceding M marks
		A1 (6)	Obtain **given result** correctly.
	NB $W + Y = P\cos\theta$ with correct conclusion is possible		
	They need to find two independent equations that do not include X. If they have equations involving X they need to attempt to eliminate X before they score any marks		
(b)	$\theta = 45° \Rightarrow Y = \frac{3W}{4}$	B1	
	$X = P\sin 45$	M1	Resolving horizontally. Accept in terms of θ.
	$= \frac{W\cos 45}{2}.\sin 45\left(= \frac{W}{4}\right)$	DM1	Express X in terms of W. Accept in terms of θ. Requires preceding M mark.
		A1	Correct unsimplified but substituted.
	Resultant at $A = \frac{W}{4}\sqrt{3^2 + 1^2} = \frac{W\sqrt{10}}{4}$	DM1	Use of Pythagoras with X, Y in terms of W only. Dependent on the first M1
	$(0.79W)$	A1 (6)	Or equivalent $(0.79W$ or better)
	Alternative moments equations: about the centre $Pl + X\sin\theta l = y\cos\theta l$		
	About the point where the lines of action of P and X intersect $Y \times \frac{2l}{\cos\theta} = W\left(\frac{2l}{\cos\theta} - l\cos\theta\right)$		

Question 8

Question Number	Scheme	Marks
(a)	$4mg - T = 4ma$	M1A1
	$T - 3mg = 3ma$	M1A1
	Condone the use of $4mg - 3mg = 4ma + 3ma$ in place of one of these equations.	M1A1
	Reach **given answer** $a = \frac{g}{7}$ correctly ***	A1
	Form an equation in T: $T = 3mg + 3\left(mg - \frac{T}{4}\right)$, $T = 3mg + 3m\frac{g}{7}$, or $T = 4mg - 4m\frac{g}{7}$	M1
	$T = \frac{24}{7}mg$ or equivalent, $33.6m$, $34m$	A1 (7)
(b)	$v^2 = u^2 + 2as = 2 \times \frac{g}{7} \times 0.7 = 1.96$, $v = 1.4$ ms^{-1}	M1A1 (2)
(c)	$3mg - T = 3ma$ $T - 2mg = 2ma$ $a = \frac{g}{5}$	M1A1 A1 A1 (4)
(d)	$0 = 1.96 - 2 \times \frac{g}{5} \times s$	M1
	$s = \frac{5 \times 1.96}{2g} = 0.5$ (m)	A1
	Total height = $0.7 + 0.5 = 1.2$ (m)	A1 **ft** (3)
Alt d	Using energy: $3mgs - 2mgs = \frac{1}{2}3m \times 1.4^2 + \frac{1}{2}2m \times 1.4^2$	M1
	$s = \frac{2.5 \times 1.96^2}{g} = 0.5$ (m)	A1
	Total height = $0.7 + 0.5 = 1.2$ (m)	A1 **ft** (3)
		[16]

Notes for Question

Question (a)(i) and (ii)

First M1 for resolving vertically (up or down) for $B+C$, with correct no. of terms.
First A1 for a correct equation.
Second M1 for resolving vertically (up or down) for A, with correct no. of terms.
Second A1 for a correct equation.
Third A1 for $g/7$, obtained correctly. **Given answer (1.4 A0)**

Third M1 for an equation in T only
Fourth A1 for $24mg/7$ oe or $33.6m$ or $34m$

N.B. If they omit m throughout (which gives $a = g/7$), can score max M1A0M1A0A0M1A0 for part (a) BUT CAN SCORE ALL OF THE MARKS in parts (b), (c) and (d).

Question (b)

M1 for an equation in v only (usually $v^2=u^2+2as$)
A1 for 1.4 (ms^{-1}) allow $\sqrt{(g/5)}$ oe.

Question (c)

First M1 for resolving vertically (up or down) for A or B, with correct no. of terms. (**N.B.** M0 if they use the tension from part (a))
First A1 for a correct equation for A.
Second A1 for a correct equation for B.
N.B. 'Whole system' equation: $3mg - 2mg = 5ma$ earns first 3 marks but any error loses all 3
Third A1 for g/5 oe or 1.96 or 2.0 (ms^{-2}) (*allow a negative answer)*

Question (d)

M1 for an equation in s only using their v from (b) and a from (c).
either $0 = 1.4^2 - 2(g/5)s$ or $1.4^2 = 0 + 2(g/5)s$
First A1 for $s = 0.5$ (m) correctly obtained
Second A1 **ft** for their 0.5 + 0.7 =1.2 (m)

Alternative using conservation of energy

M1 for an equation in s only, with correct number of terms, using their v from (b):-
$(3mgs - 2mgs) = ½\ 3m\ (1.4)^2 + ½\ 2m\ (1.4)^2$
First A1 for $s = 0.5$ (m) correctly obtained
Second A1 **ft** for their 0.5 + 0.7 =1.2 (m)

Question 9

Question Number	Scheme	Marks	Notes
(a)	Integrate: $\mathbf{v} = \left(t^3 - 2t^2\right)\mathbf{i} + \left(3t^2 - 5t\right)\mathbf{j} + \mathbf{C}$	M1	At least 3 powers going up. Condone errors in constants. Must be two separate component equations if not in vector form. Could be in column vector form. Allow with no "+ **C**"
		A2	-1 each integration error. i.e. All correct A1A1 1 error A1A0, 2 or more errors A0A0 Allow with no "+ **C**"
	$t = 3 : \mathbf{v} = 9\mathbf{i} + 12\mathbf{j} + \mathbf{C} = 11\mathbf{i} + 10\mathbf{j}$ $\mathbf{C} = 2\mathbf{i} - 2\mathbf{j}$ $\mathbf{v} = \left(t^3 - 2t^2 + 2\right)\mathbf{i} + \left(3t^2 - 5t - 2\right)\mathbf{j}$	DM1 A1 (5)	Substitute given values to find **C**. Dependent on the previous M mark Correct velocity (any equivalent form)
(b)	Parallel to **i** $\Rightarrow 3t^2 - 5t - 2 = 0$	M1	Set **j** component of their **v** equal to zero and solve for t Correct answers imply method, but incorrect answers need to show method clearly.
	$(3t+1)(t-2) = 0,$ $t = 2$	A1	Correct only. Ignore $-\frac{1}{3}$ if present.
	$\lvert\mathbf{v}\rvert = 8 - 8 + 2 = 2\ (\text{m s}^{-1})$	DM1 A1 (4)	Substitute their t to find **v**. Dependent on the previous M mark. The **answer must be a scalar** – the Q asks for speed. Results from negative t must be rejected.
		[9]	
	A candidate who has no "+C" can score at most M1A2M0A0 M1A0M1A0		

Question 10

Question Number	Scheme	Marks	Notes
(a)	**Considering energy:** $\frac{1}{2}m\times14^2=\frac{1}{2}m\times10^2+mgh$ $h=\frac{48}{g}=4.90$	M1 A2 A1 (4)	All terms required. Terms need to be of the correct form but condone sign errors. -1 each error in the unsimplified equation Accept $\frac{48}{g}$. Maximum 3 s.f. if they go in to decimals.
alt(a)	Initial $v_y=14\sin\alpha$ Final $v_y=\sqrt{100-14^2\cos^2\alpha}$ $100-196\cos^2\alpha=196\sin^2\alpha-2gh$ $h=\frac{48}{g}=4.90$	 M1A2 A1 (4)	Using $v^2=u^2+2as$ on the vertical components of speed. -1 each error in the unsimplified equation Accept in exact form. Maximum 3 s.f. if they go in to decimals.
NB	Using $v^2=u^2+2as$ with 10 and 14 is M0		
NB	In part (a) they must be solving the general case, not using 0.85. However, the marks in (b) are all available if they solve the specific case in (a).		
(b)	Vertical distance: $h=14\sin\alpha t-\frac{1}{2}\times9.8t^2$ $4.9t^2-11.9t+h=0$ $t=\frac{11.9\pm\sqrt{11.9^2-4\times4.9^2}}{9.8}$ $t=1.903.....$ **Horizontal distance:** $x=14\cos\alpha\times t$ =14.0 (m)	M1 A2 DM1 A1 M1 A1 A1 (8)	A complete method to find an equation in t. Must involve trig condone sin/cos confusion Correct in h or their h. -1 each error Solve a 3 term quadratic for t. Needs their value for h now. 1.9 or better Method for the horizontal distance. Condone consistent sin/cos confusion Correct for their positive t Accept 14
Alt (b)	**Vertical speed** = $\sqrt{100-(14\cos\alpha)^2}$ (=6.75) $v=u+at=14\times0.85-9.8t$ $(-6.75=11.9-9.8t)$ $t=1.903.....$ **Horizontal distance:** $x=14\cos\alpha\times t$ =14.0 (m)	M1 A2 DM1 A1 M1 A1 A1 (8)	A complete method to find the vertical component of the speed at B. Correct insimplified. -1 each error. Use their vertical component to find t 1.9 or better Method for the horizontal distance. Correct for their positive t Accept 14
		[12]	
NB	Candidates with a false method leading to 4.9 in (a) score at most M1A1A1DM1A0M1A1A0 if they use their result in (b). This error does not affect the alt (b) approach		