OCR
Oxford Cambridge and RSA

Accredited

AS Level Mathematics B (MEI)

H630/01 Pure Mathematics and Mechanics

Sample Question Paper

Date – Morning/Afternoon

Time allowed: 1 hour 30 minutes

OCR supplied materials:
- Printed Answer Booklet

You must have:
- Printed Answer Booklet
- Scientific or graphical calculator

INSTRUCTIONS
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Complete the boxes provided on the Printed Answer Booklet with your name, centre number and candidate number.
- Answer **all** the questions.
- **Write your answer to each question in the space provided in the Printed Answer Booklet.**
- Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the bar codes.
- You are permitted to use a scientific or graphical calculator in this paper.
- Final answers should be given to a degree of accuracy appropriate to the context.
- The acceleration due to gravity is denoted by $g\,\mathrm{m\,s^{-2}}$. Unless otherwise instructed, when a numerical value is needed, use $g = 9.8$.

INFORMATION
- The total number of marks for this paper is **70**.
- The marks for each question are shown in brackets **[ ]**.
- You are advised that an answer may receive **no marks** unless you show sufficient detail of the working to indicate that a correct method is used. You should communicate your method with correct reasoning.
- The Printed Answer Booklet consists of **12** pages. The Question Paper consists of **8** pages.

Formulae AS Level Mathematics B (H630)

Binomial series

$$(a+b)^n = a^n + {}^n\mathrm{C}_1\, a^{n-1}b + {}^n\mathrm{C}_2\, a^{n-2}b^2 + \ \ldots\ + {}^n\mathrm{C}_r\, a^{n-r}b^r + \ \ldots\ + b^n \qquad (n \in \mathbb{N}),$$

where ${}^n\mathrm{C}_r = \binom{n}{r} = \dfrac{n!}{r!(n-r)!}$

$$(1+x)^n = 1 + nx + \frac{n(n-1)}{2!}x^2 + \ \ldots\ + \frac{n(n-1)\ldots(n-r+1)}{r!}x^r + \ \ldots \quad \left(|x| < 1,\ n \in \mathbb{R}\right)$$

Differentiation from first principles

$$\mathrm{f}'(x) = \lim_{h \to 0} \frac{\mathrm{f}(x+h) - \mathrm{f}(x)}{h}$$

Sample variance

$$s^2 = \frac{1}{n-1} S_{xx} \text{ where } S_{xx} = \sum (x_i - \bar{x})^2 = \sum x_i^2 - \frac{\left(\sum x_i\right)^2}{n} = \sum x_i^2 - n\bar{x}^2$$

Standard deviation, $s = \sqrt{\text{variance}}$

The binomial distribution

If $X \sim \mathrm{B}(n,\ p)$ then $\mathrm{P}(X = r) = {}^n\mathrm{C}_r\, p^r q^{n-r}$ where $q = 1 - p$

Mean of X is np

Kinematics

Motion in a straight line

$v = u + at$

$s = ut + \frac{1}{2}at^2$

$s = \frac{1}{2}(u+v)t$

$v^2 = u^2 + 2as$

$s = vt - \frac{1}{2}at^2$

Answer **all** the questions

1 Simplify $\dfrac{\left(2x^2y\right)^3 \times 4x^3y^5}{2xy^{10}}$. **[2]**

2 Find the coefficient of x^4 in the binomial expansion of $\left(x-3\right)^5$. **[3]**

3 Fig. 3 shows a particle of weight 8 N on a rough horizontal table. The particle is being pulled by a horizontal force of 10 N. It remains at rest in equilibrium.

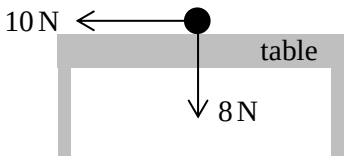

Fig. 3

(i) What information given in the question tells you that the forces shown in Fig. 3 cannot be the only forces acting on the particle? **[1]**

(ii) The only other forces acting on the particle are due to the particle being on the table. State the types of these forces and their magnitudes. **[2]**

4 **(i)** Express x^2+4x+7 in the form $(x+b)^2+c$. **[2]**

(ii) Explain why the minimum point on the curve $y=(x+b)^2+c$ occurs when $x=-b$. **[1]**

5 A particle P moves on a straight line that contains the point O. At time *t* seconds the displacement of P from O is *s* metres, where $s=t^3-3t^2+3$.

(i) Determine the times when the particle has zero **velocity**. **[3]**

(ii) Find the distances of P from O at the times when it has zero velocity. **[2]**

6 Two points, A and B, have position vectors $\mathbf{a}=\mathbf{i}-3\mathbf{j}$ and $\mathbf{b}=4\mathbf{i}+3\mathbf{j}$. The point C lies on the line $y=1$. The lengths of the line segments AC and BC are equal. Determine the position vector of C. **[4]**

7 A car is usually driven along the whole of a 5 km stretch of road at a constant speed of $25\,\text{m s}^{-1}$. On one occasion, during a period of 50 seconds the speed of the car is as shown by the speed-time graph in Fig. 7; the rest of the 5 km is travelled at $25\,\text{m s}^{-1}$.

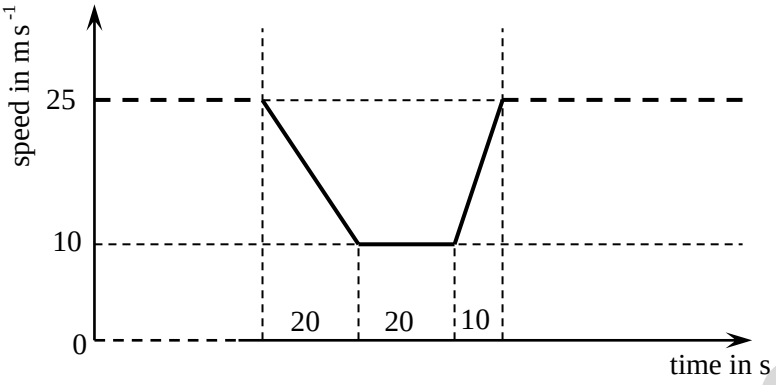

Fig. 7

How much more time than usual did the journey take on this occasion? Show your working clearly. **[4]**

8 A circle has equation $(x-2)^2+(y+3)^2=25$.

(i) Write down

- The radius of the circle.
- The coordinates of the centre of the circle. **[2]**

(ii) Find, in exact form, the coordinates of the points of intersection of the circle with the *y*-axis. **[3]**

(iii) Show that the point $(1, 2)$ lies outside the circle. **[2]**

(iv) The point $P(-1, 1)$ lies on the circle. Find the equation of the tangent to the circle at P. **[4]**

9 A biologist is investigating the growth of bacteria in a piece of bread. He believes that the number, N, of bacteria after t hours may be modelled by the relationship $N = A \times 2^{kt}$, where A and k are constants.

(i) Show that, according to the model, the graph of $\log_{10} N$ against t is a straight line.
Give, in terms of A and k,
- the gradient of the line
- the intercept on the vertical axis. **[4]**

The biologist measures the number of bacteria at regular intervals over 22 hours and plots a graph of $\log_{10} N$ against t. He finds that the graph is approximately a straight line with gradient 0.20; the line crosses the vertical axis at 2.0.

(ii) Find the values of A and k. **[2]**

(iii) Use the model to predict the number of bacteria after 24 hours. **[1]**

(iv) Give a reason why the model may not be appropriate for large values of t. **[1]**

10 **(i)** Sketch the graph of $y = \frac{1}{x} + a$, where a is a positive constant.
- State the equations of the horizontal and vertical asymptotes.
- Give the coordinates of any points where the graph crosses the axes. **[4]**

(ii) Find the equation of the normal to the curve $y = \frac{1}{x} + 2$ at the point where $x = 2$. **[5]**

(iii) Find the coordinates of the point where this normal meets the curve again. **[3]**

11 **In this question you must show detailed reasoning.**
Determine for what values of k the graphs $y = 2x^2 - kx$ and $y = x^2 - k$ intersect. **[6]**

12 A small package hangs from a balloon by means of a light inelastic string. The string is always vertical. The mass of the package is 15 kg.

Catherine initially models the situation by assuming that there is no air resistance to the motion of the package. Use Catherine's model to calculate the tension in the string if

(i) the package is held at rest by the tension in the string, **[1]**

(ii) the package is instantaneously at rest and accelerating **upwards** at $2\,\text{m}\,\text{s}^{-2}$, **[2]**

(iii) the package is moving **downwards** at $3\,\text{m}\,\text{s}^{-1}$ and accelerating **upwards** at $2\,\text{m}\,\text{s}^{-2}$. **[1]**

Catherine now carries out an experiment to find the magnitude of the air resistance on the package when it is moving. At a time when the package is accelerating **downwards** at $1.5\,\text{m}\,\text{s}^{-2}$, she finds that the tension in the string is 140 N.

(iv) Calculate the magnitude of the air resistance at that time. Give, with a reason, the direction of motion of the package. **[5]**

END OF QUESTION PAPER

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…day June 20XX – Morning/Afternoon

AS Level Mathematics B (MEI)

H630/01 Pure Mathematics and Mechanics

SAMPLE MARK SCHEME

Duration: 1 hour 30 minutes

MAXIMUM MARK 70

This document consists of 16 pages

Text Instructions

1. Annotations and abbreviations

Annotation in scoris	Meaning
✓and ✗	
BOD	Benefit of doubt
FT	Follow through
ISW	Ignore subsequent working
M0, M1	Method mark awarded 0, 1
A0, A1	Accuracy mark awarded 0, 1
B0, B1	Independent mark awarded 0, 1
SC	Special case
^	Omission sign
MR	Misread
Highlighting	
Other abbreviations in mark scheme	**Meaning**
E1	Mark for explaining a result or establishing a given result
dep*	Mark dependent on a previous mark, indicated by *
cao	Correct answer only
oe	Or equivalent
rot	Rounded or truncated
soi	Seen or implied
www	Without wrong working
AG	Answer given
awrt	Anything which rounds to
BC	By calculator
DR	This indicates that the instruction **In this question you must show detailed reasoning** appears in the question.

2. Subject-specific Marking Instructions for AS Level Mathematics B

a Annotations should be used whenever appropriate during your marking. The A, M and B annotations must be used on your standardisation scripts for responses that are not awarded either 0 or full marks. It is vital that you annotate standardisation scripts fully to show how the marks have been awarded. For subsequent marking you must make it clear how you have arrived at the mark you have awarded.

b An element of professional judgement is required in the marking of any written paper. Remember that the mark scheme is designed to assist in marking incorrect solutions. Correct solutions leading to correct answers are awarded full marks but work must not be judged on the answer alone, and answers that are given in the question, especially, must be validly obtained; key steps in the working must always be looked at and anything unfamiliar must be investigated thoroughly. Correct but unfamiliar or unexpected methods are often signalled by a correct result following an apparently incorrect method. Such work must be carefully assessed. When a candidate adopts a method which does not correspond to the mark scheme, escalate the question to your Team Leader who will decide on a course of action with the Principal Examiner.
If you are in any doubt whatsoever you should contact your Team Leader.

c The following types of marks are available.

M
A suitable method has been selected and *applied* in a manner which shows that the method is essentially understood. Method marks are not usually lost for numerical errors, algebraic slips or errors in units. However, it is not usually sufficient for a candidate just to indicate an intention of using some method or just to quote a formula; the formula or idea must be applied to the specific problem in hand, e.g. by substituting the relevant quantities into the formula. In some cases the nature of the errors allowed for the award of an M mark may be specified.

A
Accuracy mark, awarded for a correct answer or intermediate step correctly obtained. Accuracy marks cannot be given unless the associated Method mark is earned (or implied). Therefore M0 A1 cannot ever be awarded.

B
Mark for a correct result or statement independent of Method marks.

E
A given result is to be established or a result has to be explained. This usually requires more working or explanation than the establishment of an unknown result.

Unless otherwise indicated, marks once gained cannot subsequently be lost, e.g. wrong working following a correct form of answer is ignored. Sometimes this is reinforced in the mark scheme by the abbreviation isw. However, this would not apply to a case where a candidate passes through the correct answer as part of a wrong argument.

d When a part of a question has two or more 'method' steps, the M marks are in principle independent unless the scheme specifically says otherwise; and similarly where there are several B marks allocated. (The notation 'dep*' is used to indicate that a particular mark is dependent on an earlier, asterisked, mark in the scheme.) Of course, in practice it may happen that when a candidate has once gone wrong in a part of a question, the work from there on is worthless so that no more marks can sensibly be given. On the other hand, when two or more steps are successfully run together by the candidate, the earlier marks are implied and full credit must be given.

e The abbreviation FT implies that the A or B mark indicated is allowed for work correctly following on from previously incorrect results. Otherwise, A and B marks are given for correct work only – differences in notation are of course permitted. A (accuracy) marks are not given for answers obtained from incorrect working. When A or B marks are awarded for work at an intermediate stage of a solution, there may be various alternatives that are equally acceptable. In such cases, what is acceptable will be detailed in the mark scheme. If this is not the case please, escalate the question to your Team Leader who will decide on a course of action with the Principal Examiner.
Sometimes the answer to one part of a question is used in a later part of the same question. In this case, A marks will often be 'follow through'. In such cases you must ensure that you refer back to the answer of the previous part question even if this is not shown within the image zone. You may find it easier to mark follow through questions candidate-by-candidate rather than question-by-question.

f Unless units are specifically requested, there is no penalty for wrong or missing units as long as the answer is numerically correct and expressed either in SI or in the units of the question. (e.g. lengths will be assumed to be in metres unless in a particular question all the lengths are in km, when this would be assumed to be the unspecified unit.) We are usually quite flexible about the accuracy to which the final answer is expressed; over-specification is usually only penalised where the scheme explicitly says so. When a value is given in the paper only accept an answer correct to at least as many significant figures as the given value. This rule should be applied to each case. When a value is not given in the paper accept any answer that agrees with the correct value to 2 s.f. Follow through should be used so that only one mark is lost for each distinct accuracy error, except for errors due to premature approximation which should be penalised only once in the examination. There is no penalty for using a wrong value for *g*. E marks will be lost except when results agree to the accuracy required in the question.

g Rules for replaced work: if a candidate attempts a question more than once, and indicates which attempt he/she wishes to be marked, then examiners should do as the candidate requests; if there are two or more attempts at a question which have not been crossed out, examiners should mark what appears to be the last (complete) attempt and ignore the others. NB Follow these maths-specific instructions rather than those in the assessor handbook.

h For a genuine misreading (of numbers or symbols) which is such that the object and the difficulty of the question remain unaltered, mark according to the scheme but following through from the candidate's data. A penalty is then applied; 1 mark is generally appropriate, though this may differ for some units. This is achieved by withholding one A mark in the question. Marks designated as cao may be awarded as long as there are no other errors. E marks are lost unless, by chance, the given results are established by equivalent working. 'Fresh starts' will not affect an earlier decision about a misread. Note that a miscopy of the candidate's own working is not a misread but an accuracy error.

i If a calculator is used, some answers may be obtained with little or no working visible. Allow full marks for correct answers (provided, of course, that there is nothing in the wording of the question specifying that analytical methods are required). Where an answer is wrong but there is some evidence of method, allow appropriate method marks. Wrong answers with no supporting method score zero. If in doubt, consult your Team Leader.

j If in any case the scheme operates with considerable unfairness consult your Team Leader.

Question			Answer	Marks	AOs	Guidance	
1			$16x^8y^{-2}$ OR $\frac{16x^8}{y^2}$	**B2** **[2]**	**1.1** **1.1**	**B1** for two elements correct out of coefficient, power of *x*, power of *y* as part of a product	
2			−15	**B3** **[3]**	**1.1** **1.1** **1.1**	**B2** for 15 or $5\times(-3)^1$ or better **OR B1** for 5 or 1 5 10 10 5 1 row of Pascal's triangle seen.	Do not accept ${}_5C_4$ as a correct element without evaluation to 5

Question			Answer	Marks	AOs	Guidance	
3	(i)		E.g. The particle is in equilibrium [and the given forces cannot sum to zero as at 90°]	B1 [1]	2.2a	oe	Accept "without another force present, the particle would be moving on a rough surface without a frictional force"
3	(ii)		Friction 10 N [to give horizontal resultant of 0]	B1	3.3	oe Accept 'Because the surface is rough' for 'Friction'	
			Normal reaction from table. 8 N [to give vertical resultant of 0]	B1	1.2	Oe	
			Alternative method				
			One extra force that gives equilibrium. Components 10 N → and 8 N ↑	B1	3.3	oe Accept $\sqrt{164}$ at ≈ 39° to horizontal	
			Components from Friction → and normal reaction ↑	B1	1.2	oe Accept 'because the surface is rough' for 'Friction'	
				[2]			
4	(i)		$(x+2)^2+3$	B1 B1 [2]	1.2 1.1	For $b=2$ For $c=3$ or FT their b	
4	(ii)		Since $(x+b)^2 \geq 0$, the minimum value [or minimum point on the curve] occurs when the expression in the bracket is zero	E1 [1]	2.2a		

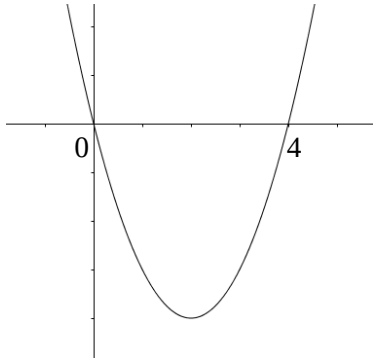
Question			Answer	Marks	AOs	Guidance	
5	(i)		Velocity v is $\frac{\mathrm{d}s}{\mathrm{d}t} = 3t^2 - 6t$	M1	1.1a	Attempt to find $\frac{\mathrm{d}s}{\mathrm{d}t}$	
			$= 0$	M1	1.1	$\frac{\mathrm{d}s}{\mathrm{d}t} = 0$ must be stated	
			$t = 0$ or 2	A1	1.1	Both roots found	
				[3]			
	(ii)		$s(0) = 3$ so distance 3 m	A1	1.1	Accept seeing 3 without comment	
			$s(2) = 8 - 12 + 3 = -1$ so distance is 1 m	A1	3.4	–1 for s must be seen as well as 1 m for distance	
				[2]			
6			Midpoint of AB $= \left(\frac{5}{2}, 0\right)$	M1	3.1a		
			Gradient of perpendicular to AB $= -\frac{1}{2}$	M1	1.1		
			Perpendicular bisector equation is $y = -\frac{1}{2}(x - \frac{5}{2})$ oe	A1	1.1		
			Position vector is $\frac{1}{2}\mathbf{i} + \mathbf{j}$	A1	1.1		
				[4]			
			Alternative method				
			Suppose C has position vector $\mathbf{c} = p\mathbf{i} + \mathbf{j}$	M1	3.1a		
			$\overrightarrow{\mathbf{AC}} = (p-1)\mathbf{i} + 4\mathbf{j}$ oe or $\lvert\mathrm{AC}\rvert^2 = (p-1)^2 + 4^2$ oe				
			$\overrightarrow{\mathbf{BC}} = (p-4)\mathbf{i} - 2\mathbf{j}$ oe or $\lvert\mathrm{BC}\rvert^2 = (p-4)^2 + 2^2$ oe	M1	1.1		
			$(p-1)^2 + 4^2 = (p-4)^2 + 2^2$	A1	1.1	soi	
			Position vector is $\frac{1}{2}\mathbf{i} + \mathbf{j}$	A1	1.1		

Question			Answer	Marks	AOs	Guidance	
7			Find how much less distance travelled in the 50 s	**M1**	**3.1b**	Sensible attempt at method including finding distance as an area	
			Distance is the area (of trapezium and is) $\frac{(25-10)\times(50+20)}{2}=525\,\text{m}$	**A1**	**1.1**	cao. Need not be evaluated. Many correct routes.	
			This distance is made up at $25\,\text{m}\,\text{s}^{-1}$ to give extra time	**M1**	**3.4**		
			Extra time is $\frac{525}{25}=21$	**A1**	**3.2a**	FT their area	
			Alternative method				
			Find the distance travelled in the 50 s	**M1**	**3.1b**	Sensible attempt at method including finding distance as an area	
			Find the time for the rest of the journey + 50 and subtract $\frac{5000}{25}=200$	**M1**	**3.4**	May be scored later. oe	
			Distance travelled in the 50 s is 725 m	**A1**	**1.1**	cao. Many correct routes to find area	
			Extra time is $\frac{(5000-725)}{25}+50-200=21$	**A1**	**3.2a**	FT their area. Many correct routes here.	Award full marks for 21 seen www
				[4]			

Question			Answer	Marks	AOs	Guidance	
8	(i)		Radius $=5$ $(2, -3)$	B1 B1 [2]	1.1 1.1		
8	(ii)		$(y+3)^2=21$ or $y^2+6y-12=0$ Roots $-3+\sqrt{21}$ and $-3-\sqrt{21}$ $\left(0,-3+\sqrt{21}\right)$ and $\left(0,-3-\sqrt{21}\right)$	M1 A1 A1 [3]	1.1a 1.1 1.1	Substituting $x=0$ and rearranging For one y-value All correct	
8	(iii)		$(1-2)^2+(2+3)^2=1^2+5^2$ E.g. This is more than 25 so outside the circle	M1 A1 [2]	1.1 1.1	Or distance of (1, 2) from their centre Or distance of (1, 2) from centre is $\sqrt{26}>5$, so outside the circle	
8	(iv)		Gradient CP $=\frac{1-(-3)}{-1-2}=-\frac{4}{3}$ FT their C(entre) Gradient of tangent $=\frac{3}{4}$ FT their grad CP Equation of tangent $y-1=\frac{3}{4}(x-(-1))$ FT their grad $4y=3x+7$ oe	M1 M1 M1 A1 [4]	1.1a 1.1 1.1 1.1		

Question			Answer	Marks	AOs	Guidance	
9	(i)		$\log_{10} N = \log_{10} A + kt \log_{10} 2$ Equation above is of the form $y = mx + c$ [with $\log_{10} N$ as y and t as x] Gradient $= k \log_{10} 2$ Intercept $= \log_{10} A$	**M1** **E1** **A1** **A1** **[4]**	**1.1** **1.2** **2.2a** **2.2a**		
9	(ii)		$k \log_{10} 2 = 0.2 \Rightarrow k = 0.66[438...]$ $\log_{10} A = 2 \Rightarrow A = 100$	**B1** **B1** **[2]**	**1.1** **1.1**		
9	(iii)		$N = 100 \times 2^{0.66...\times 24} = 6\ 300\ 000$ FT their A, k	**B1** **[1]**	**3.4**	Answer in range 5 860 000 to 6 400 000	
9	(iv)		E.g. the piece of bread may not be sufficient to support the number of bacteria	**E1** **[1]**	**3.5b**	OR bacterial growth may obey different rules for large values of t	

Question			Answer	Marks	AOs	Guidance	
10	(i)		Correct shape for $y = \frac{1}{x}$, translated vertically upward	B1	1.1		
			Crosses x-axis at $x = -\frac{1}{a}$	B1	2.2a		
			Asymptotes $x = 0$ and $y = a$	B2	1.1 2.2a	**B1** for one asymptote correct	
				[4]			
10	(ii)		$\frac{dy}{dx} = -\frac{1}{x^2}$	M1	1.1a		
			When $x = 2$, gradient $= -\frac{1}{4}$	M1	1.1		
			Gradient of normal $= 4$ FT their gradient	M1	2.1	Or gradient of given line is 4 and check $4 \times -\frac{1}{4} = -1$	
			$y - \frac{5}{2} = 4(x - 2)$ FT their gradient	M1	1.1	Or $y = \frac{5}{2}$ at the point on the curve where $x = 2$	
			$2y = 8x - 11$ oe	A1	2.1	At least one correct interim step or clear check that $\left(2, \frac{5}{2}\right)$ is on given line Any simplified form	
				[5]			

Question			Answer	Marks	AOs	Guidance	
10	(iii)		$2\left(\frac{1}{x}+2\right)=8x-11$	M1	3.1a	Substitution	
			$8x^2-15x-2=0$	M1	1.1	Forming quadratic, condone one error	
			Other point is $x=-\frac{1}{8},\ y=-6$	A1	1.1	**BC** $x=2$ not needed in this case	
				[3]			
11			**DR**				
			$2x^2-kx=x^2-k$	B1	3.1a	Equating the two expressions **must** be seen	
			$x^2-kx+k=0$	M1	2.1	Condone one error in rearranging	
			discriminant $=k^2-4k$	B1	1.2		
			$k^2-4k\geq 0$	M1	1.1		
				M1	2.4	Or give table of values, oe	
			$k\leq 0$ or $k\geq 4$	A1	2.5	or $\{k:k\leq 0\}\cup\{k:k\geq 4\}$	
				[6]			

Question			Answer	Marks	AOs	Guidance	
12	(i)		No acceleration so we require the weight $15g$ (147 N)	B1 [1]	3.3	Accept $15g$, $15g$ N, 147 N etc	
12	(ii)		Tension T N, N2L ↑ $T-147=15\times 2$ So $T=177$ and tension is 177 N	 M1 A1 [2]	 3.4 1.1	 Application of N2L	
12	(iii)		177 N	B1 [1]	3.4	FT from (ii)	

Question			Answer	Marks	AOs	Guidance	
12	(iv)		Let the air resistance be $R\uparrow$	**M1**	**3.3**		
			N2L $\uparrow$ gives $R+140-15g=15\times(-1.5)$	**M1**	**1.1**	Finding R using a and then T	
			$R-7=-22.5$				
			$R=-15.5$	**A1**	**1.1**		
			Hence magnitude is 15.5 N	**A1**	**3.4**		
			R is downwards so motion of the package is upwards	**E1**	**3.4**		
				[5]			
			Alternative method				
			Let the total upward force be F N and the air resistance $R\uparrow$				
			N2L $\uparrow$ gives $F-147=15\times(-1.5)$	**M1**	**3.3**	Finding F and hence R using a and then T	
			So $F=124.5$	**A1**	**1.1**		
			Also $F=R+140$ so $R=124.5-140=-15.5$	**A1**	**1.1**		
			Hence magnitude is 15.5 N	**A1**	**3.4**		
			R is downwards so motion of the package is upwards	**A1**	**3.4**		
				[5]			

Question	AO1	AO2	AO3(PS)	AO3(M)	Total
1	2	0	0	0	2
2	3	0	0	0	3
3 i	0	1	0	0	1
3 ii	1	0	0	1	2
4 i	2	0	0	0	2
4 ii	0	1	0	0	1
5 i	3	0	0	0	3
5 ii	1	0	0	1	2
6	3	0	1	0	4
7	1	0	2	1	4
8 i	2	0	0	0	2
8 ii	3	0	0	0	3
8 iii	2	0	0	0	2
8 iv	4	0	0	0	4
9 i	2	2	0	0	4
9 ii	2	0	0	0	2
9 iii	0	0	0	1	1
9 iv	0	0	0	1	1
10 i	2	2	0	0	4
10 ii	3	2	0	0	5
10 iii	2	0	1	0	3
11	2	3	1	0	6
12 i	0	0	0	1	1
12 ii	1	0	0	1	2
12 iii	0	0	0	1	1
12 iv	2	0	0	3	5
Totals	43	11	5	11	70

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OCR
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AS Level Mathematics B (MEI)

H630/01 Pure Mathematics and Mechanics

Printed Answer Booklet

Date – Morning/Afternoon

Time allowed: 1 hour 30 minutes

OCR supplied materials:
- Printed Answer Booklet

You must have:
- Printed Answer Booklet
- Scientific or graphical calculator

First name									
Last name									
Centre number						**Candidate number**				

INSTRUCTIONS
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Complete the boxes provided on the Printed Answer Booklet with your name, centre number and candidate number.
- Answer **all** the questions.
- **Write your answer to each question in the space provided in the Printed Answer Booklet.**
- Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the bar codes.
- You are permitted to use a scientific or graphical calculator in this paper.
- Final answers should be given to a degree of accuracy appropriate to the context.
- The acceleration due to gravity is denoted by g m s^{-2}. Unless otherwise instructed, when a numerical value is needed, use $g = 9.8$.

INFORMATION
- You are advised that an answer may receive **no marks** unless you show sufficient detail of the working to indicate that a correct method is used. You should communicate your method with correct reasoning.
- The Printed Answer Booklet consists of **12** pages. The Question Paper consists of **8** pages.

1	
2	

3 (i)	
3 (ii)	
4 (i)	
4 (ii)	

5 (i)

5 (ii)

6

7

8 (i)

8 (ii)

8 (iii)

8 (iv)	
9 (i)	

9 (ii)	
9 (iii)	
9 (iv)	
10 (i)	

10 (ii)	
10 (iii)	
11	
	(answer space continued on next page)

11	**(continued)**
12 (i)	
12 (ii)	
12 (iii)	

12 (iv)	