GCE

Mathematics B MEI

H630/01: Pure Mathematics and Mechanics

AS Level

Mark Scheme for June 2024

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support, which keep pace with the changing needs of today's society.

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

© OCR 2024

MARKING INSTRUCTIONS

PREPARATION FOR MARKING
RM ASSESSOR

1. Make sure that you have accessed and completed the relevant training packages for on-screen marking: *RM Assessor Online Training*; *OCR Essential Guide to Marking*.

2. Make sure that you have read and understood the mark scheme and the question paper for this unit. These are posted on the RM Cambridge Assessment Support Portal http://www.rm.com/support/ca

3. Log-in to RM Assessor and mark the **required number** of practice responses ("scripts") and the **number of required** standardisation responses.

MARKING

1. Mark strictly to the mark scheme.

2. Marks awarded must relate directly to the marking criteria.

3. The schedule of dates is very important. It is essential that you meet the RM Assessor 50% and 100% (traditional 40% Batch 1 and 100% Batch 2) deadlines. If you experience problems, you must contact your Team Leader (Supervisor) without delay.

4. If you are in any doubt about applying the mark scheme, consult your Team Leader by telephone or the RM Assessor messaging system, or by email.

5. **Annotations**

Annotation	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
E	Explanation mark 1
SC	Special case
^	Omission sign
MR	Misread
BP	Blank Page
Seen	
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 *. The * may be omitted if only one previous M mark
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 question included the instruction: In this question you must show detailed reasoning.
BP	Blank Page
Seen	
Highlighting	

6. **Subject Specific Marking Instructions**

a. Annotations must be used during your marking. For a response awarded zero (or full) marks a single appropriate annotation (cross, tick, M0 or ^) is sufficient, but not required.

For responses that are not awarded either 0 or full marks, you must make it clear how you have arrived at the mark you have awarded and all responses must have enough annotation for a reviewer to decide if the mark awarded is correct without having to mark it independently.

It is vital that you annotate standardisation scripts fully to show how the marks have been awarded.

Award No Response (NR) if:

- there is nothing written in the answer space

Award Zero '0' if:

- anything is written in the answer space and is not worthy of credit (this includes text and symbols).

Team Leaders must confirm the correct use of the NR button with their markers before live marking commences and should check this when reviewing scripts.

If a candidate uses the answer space for one question to answer another, for example using the space for 8(b) to answer 8(a), then give benefit of doubt unless it is ambiguous for which part it is intended.

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 always 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 method mark may usually be implied by a correct answer unless the question includes the DR statement, the command words "Determine" or "Show that", or some other indication that the method must be given explicitly.

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.
- When a value is not given in the paper accept any answer that agrees with the correct value to 2 s.f. unless a different level of accuracy has been asked for in the question, or the mark scheme specifies an acceptable range.
  NB for Specification A the rubric specifies 3 s.f. as standard, so this statement reads "3 s.f".

Follow through should be used so that only one mark in any question is lost for each distinct accuracy error.
Candidates using a value of 9.80, 9.81 or 10 for g should usually be penalised for any final accuracy marks which do not agree to the value found with 9.8 which is given in the rubric.

g. Rules for replaced work and multiple attempts:
- If one attempt is clearly indicated as the one to mark, or only one is left uncrossed out, then mark that attempt and ignore the others.
- If more than one attempt is left not crossed out, then mark the last attempt unless it only repeats part of the first attempt or is substantially less complete.
- if a candidate crosses out all of their attempts, the assessor should attempt to mark the crossed out answer(s) as above and award marks appropriately.

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 or B mark in the question. Marks designated as cao may be awarded as long as there are no other errors.
If a candidate corrects the misread in a later part, do not continue to follow through. E marks are lost unless, by chance, the given results are established by equivalent working. 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 that there is nothing in the wording of the question specifying that analytical methods are required such as the bold “In this question you must show detailed reasoning”, or the command words “Show” or “Determine”. 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	AO	Guidance
1			$\frac{\sin A}{13} = \frac{\sin 15°}{10}$	**M1**	**1.1a**	Uses the sine rule
			$A = 160.3°$	**A1**	**1.1**	Do not accept $\sin^{-1}\left(\frac{13\sin 15°}{10}\right) = 19.7$ as final answer
				[2]		

Question			Answer	Marks	AO	Guidance
2			$\mathbf{F}_1+\mathbf{F}_2=(-6\mathbf{i}+2\mathbf{j})+(-8\mathbf{i}+\mathbf{j})=-14\mathbf{i}+3\mathbf{j}$	**M1**	**2.1**	Attempt to add vectors
			$\sqrt{(-14)^2+3^2}=\sqrt{205}$ [N]	**A1**	**2.1**	AG Must be clearly shown; do not allow for $\sqrt{-14^2+3^2}$
				[2]		

Question			Answer	Marks	AO	Guidance
3			$n = 2k$ [where k is an integer]			
			$n^3 + 4 = (2k)^3 + 4$	**M1**	**2.1**	Uses the evenness of n in an algebraic form. Allow if they state that the cube of an even number is a multiple of 8
			$= 4\left(2k^3 + 1\right)$			
			Which is a multiple of 4	**A1**	**2.1**	Also allow for a factorised expression, or division by 4. Also allow an argument that each term of the sum is a multiple of 4
			But $\left(2k^3 + 1\right)$ is always odd **so not a multiple of 8**	**A1**	**2.4**	Any clear argument leading to the statement that the expression is not a multiple of 8 www (See appendix for exemplars)
				[3]		

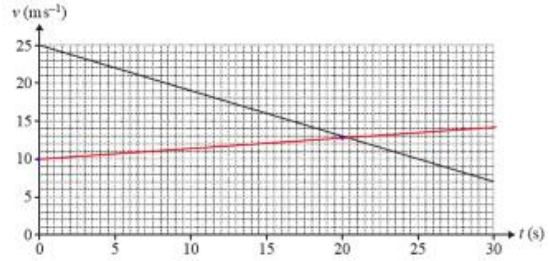
Question			Answer	Marks	AO	Guidance
4			AE $= 4\cos x°$	**M1***	**3.1a**	Uses basic trig to find an expression for either AE or EC
			EC $= 7\sin x°$			
			E is midpoint so $4\cos x° = 7\sin x°$	**M1**	**3.1a**	Equates their expressions
			So $\frac{\sin x°}{\cos x°} = \tan x° = \frac{4}{7}$	**M1(dep)**	**1.2**	Uses a correct trig identity leading to a value for $\tan x$ or equivalent
			So $x = 29.7$	**A1**	**1.1**	cao
			Alternative method			
			Triangles BAE and CDE are similar with scale factor 1.75	**M1***		Identifying similar triangles and the scale factor
			Let AE = y cm = CE			
			DE = $1.75y$	**M1**		Uses scale factor to find expression for DE or BE as $\frac{4}{7}y$
			$\tan x° = \frac{CE}{DE} = \frac{y}{1.75y} = \frac{4}{7}$	**M1(dep)**		Uses basic trig ratio Also allow use of Pythagoras and another trig ratio instead.
			So $x = 29.7$	**A1**		cao
				[4]		

Question			Answer	Marks	AO	Guidance
5	(a)		**DR**			
			$y = x^{-\frac{3}{2}} - 2x^{\frac{3}{2}}$	**M1**	**2.1**	Uses negative or fractional powers, and the laws of indices to rewrite the equation. May be implied by one correct term
			$\frac{dy}{dx} = -\frac{3}{2}x^{-\frac{5}{2}} - 2\times\frac{3}{2}x^{\frac{1}{2}}$	**M1**	**2.1**	Differentiates their non-integer power(s) of x Need not be simplified
			$x = \frac{1}{4} \Rightarrow \frac{dy}{dx} = -\frac{3}{2}\times\left(\frac{1}{4}\right)^{-\frac{5}{2}} - 2\times\frac{3}{2}\times\left(\frac{1}{4}\right)^{\frac{1}{2}}$	**M1**	**2.1**	Substitution seen in their expression for $\frac{dy}{dx}$
			$\frac{dy}{dx}\left[= -\frac{3}{2}\times 32 - 3\times\frac{1}{2}\right] = -\frac{99}{2}$	**A1**	**2.1**	AG Do not allow without clear expression seen
				[4]		
5	(b)		**DR**			
			Tangent is $y - \frac{31}{4} = -\frac{99}{2}\left(x - \frac{1}{4}\right)$	**M1**	**1.1a**	Uses given x- and y-coordinates and gradient in a formula for straight line. Allow if their value for gradient used. Do not allow for gradient 2/99 used
			$396x + 8y - 161 = 0$	**A1**	**1.1**	Must be in the form $ax + by + c = 0$ where a, b, c are integers
			Alternative solution			
			Tangent is $y = -\frac{99}{2}x + c$ So $\frac{31}{4} = -\frac{99}{2}\times\frac{1}{4} + c \Rightarrow c = \frac{161}{8}$	**M1**		Uses $y = -\frac{99}{2}x + c$ and attempts to evaluate c. Allow if their value for gradient used. Do not allow for gradient 2/99 used
			$396x + 8y - 161 = 0$	**A1**		Must be in the form $ax + by + c = 0$ where a, b, c are integers
				[2]		

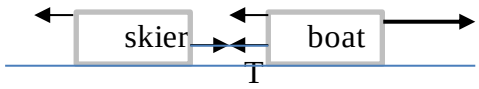
Question			Answer	Marks	AO	Guidance
6	(a)		$f(3)=3^3-4\times3^2+10\times3-21$ $=27-36+30-21=0$	M1	2.1	Substitutes $x=3$ into expression for $f(x)$. Do not allow for algebraic division
			[So by the factor theorem] $(x-3)$ is a factor	A1 [2]	2.2a	Argues from zero clearly seen
6	(b)		Algebraic division gives $f(x)=(x-3)(x^2-x+7)$	M1	3.1a	Attempts to divide by $(x-3)$ as far as linear term. Allow arithmetic slips. Also allow for expanding and equating coefficients.
			So $b=-1$ and $c=7$	A1 [2]	1.1	Allow seen in correct product of factors or correct algebraic division or multiplication grid. Correct factorisation by inspection scores both marks
6	(c)		[$f(x)=0$ when $x=3$] or when $x^2-x+7=0$ Discriminant $(-1)^2-4\times3\times7=-27<0$ So no additional real roots	M1 A1 [2]	2.1 2.5	Finds discriminant. Also allow for equivalent argument using quadratic formula or completing the square. www Clear argument from their negative discriminant. FT their b and c. Condone missing reference to the fact that $x=3$ is a root.

Question			Answer	Marks	AO	Guidance
7	(a)		$v = 0.6t^2 - 2.1t + 1.5 = 0$	M1	3.1b	Form quadratic equation and attempt to solve by any method.
			So stationary when $t = 1, 2.5$	A1	1.1	Cao. May be implied by correct times
				[2]		
7	(b)		$a = 1.2t - 2.1$	M1	3.4	Attempt to differentiate *v*. Do not allow if $0.6t$ seen
			When $t = 1, a = -0.9$ m s^{-2}	A1FT	1.1	FT their **(a)**
				[2]		
7	(c)		$\int_1^{2.5}(0.6t^2 - 2.1t + 1.5)\,\mathrm{d}t$	M1	3.4	Attempt to evaluate definite integral – must be seen but may be evaluated BC. FT their limits for M mark only
			$= \left[-\frac{27}{80}\right]$			
			So distance is $\frac{27}{80} = 0.3375$ m	A1	3.2a	Do not allow if given as the value of the definite integral
				[2]		

Question			Answer	Marks	AO	Guidance
8	(a)		$(x-3)^2+(y-8)^2[=25]$	M1	1.1a	Attempt to complete the square for either x or y terms
			C is $(3,8)$	A1	1.1	cao Ignore arithmetic slips on RHS
				[2]		
8	(b)		Intersects $y=x-2$ when $(x-3)^2+(x-2-8)^2=25$	M1	3.1a	Substituting for y in equation of circle oe substitution for x
			$x^2-6x+9+x^2-20x+100-25=0$ $2x^2-26x+84=0$	M1	1.1	Simplifies to 3 term quadratic in x or y $(2y^2-18y+40=0)$
			Giving $x=6,7$	A1	1.1	Both correct values seen
			So A and B are $(6,4)$ and $(7,5)$	A1	1.1	Correct y-coordinates FT their x-coordinates Allow full credit for fully correct trial and improvement method
			Midpoints (4.5, 6) and (5, 6.5)	M1 A1	3.1a 1.1	Uses the midpoint formula at least once soi Both correct FT their A, B and C
			$A'B'=\sqrt{(5-4.5)^2+(6.5-6)^2}=\frac{\sqrt{2}}{2}$	M1 A1	1.1a 1.1	Uses the distance formula for their A′ and B′ Must be exact. ISW if 0.71 also given
			Alternative for last 4 marks $AB=\sqrt{(7-6)^2+(5-4)^2}=\sqrt{2}$ The triangle CA′B′ is an enlargement scale factor $\frac{1}{2}$ of triangle CAB so $A'B'=\frac{1}{2}\sqrt{2}$	M1 A1 M1 A1		Uses the distance formula for their A and B FT their A and B Uses similar triangles or enlargement to find $A'B'$ Must be exact ISW if 0.71 also given
				[8]		

Question			Answer	Marks	AO	Guidance
9	(a)		The student has found the magnitude of the acceleration and not the actual acceleration which is negative. The argument is not valid.	B1 [1]	2.3	Must comment of the validity of the argument. Allow for a comment that student is wrong which includes statement that the acceleration should be negative or similar.
9	(b)		$v_B = 10 + 0.15t$	B1 [1]	3.3	Award if $v = 10 + 0.15t$ seen
9	(c)			B1 [1]	1.1	Line through coordinates (0,10) and (20,13) FT their linear (b)
9	(d)		Same speed when $25 - 0.6t = 10 + 0.15t$, giving $t = 20$	B1	3.4	Soi FT their (b)
			Displacement of train A is 380 m Displacement of train B is 230 m	M1	3.4	Attempt to use area or *suvat* equation(s) to find the displacement of at least one train at their value for t
			So distance between them is 150 m	A1	1.1	cao
			Alternative for last 2 marks			
			Area of the triangle between graphs is $\frac{1}{2} \times (25 - 10) \times 20$	M1		Soi FT their (b)
			So distance between them is 150 m	A1		cao

Question			Answer	Marks	AO	Guidance
				[3]		
9	**(e)**		[Velocity is zero at 41.7 s.] For large values of *t*, the model predicts that the velocity will be negative but the train will not go backwards as the trains are travelling in the same direction	**B1** **[1]**	**3.5b**	Must compare what happens in the model with what happens to the train. (See appendix for exemplars)

Question			Answer	Marks	AO	Guidance
10	(a)		400N 1200N 2400N  	B1 B1 [2]	1.1 1.1	Driving force and common tension correct and labelled (boat shown on right – allow mirror image) Allow T marked as a thrust if consistent with equations in 10bi and 10bii Both resistances correct and labelled
10	(b)	(i)	N2L for skier $T-400=65a$	B1 [1]	1.1	Allow $-T-400=65a$ if consistent with their diagram
10	(b)	(ii)	N2L for the boat $2400-1200-T=985a$ $1200-T=985a$	M1 A1 [2]	1.1 1.1	Attempt to use N2L with $m=985$ for the boat. Allow missing-or incorrect resistance. (do not allow for weight included) Allow 400 for resistance if 1200 used in (i) Allow -T used for T if consistent with their diagram. Allow if not simplified Allow SC1 for $2400-1200-400=1050a$
10	(c)		Add equations to give acceleration $\frac{800}{1050}=0.762\,\text{m s}^{-2}$	B1 [1]	1.1	Cao Allow if resistances interchanged
10	(d)		$T_{max}=65g$ $65g-400=65a$ gives $a=3.65\ \text{m s}^{-2}$	M1 A1 [2]	3.1b 1.1	Substitute 65g for T in their equation from (b)(i) Accept awrt 3.6 or 3.7

Question			Answer	Marks	AO	Guidance
11	(a)		Gradient $n = \frac{0.376 - 0.254}{0.146 - (-0.097)} = 0.50$	**M1** **A1**	**1.1a** **1.1**	Allow www. Do not allow for reciprocal of gradient Allow for 0.5 or 0.502…seen
			So $k = 10^{0.303} = 2.0$ (2sf)	**M1** **A1**	**1.1a** **1.1b**	Finding the intercept and attempting to find k Maybe implied by 2 or 2.0 etc Must be 2 significant figures. Allow embedded in an equation if not given explicitly
			Alternative method			
			$0.254 = \log k - 0.097n$ $0.376 = \log k + 0.146n$	**M1**		Setting up a pair of simultaneous equations and attempting to solve. Do not allow for $\log T$ and $\log l$ interchanged
			$n = 0.50$	**A1**		Allow for 0.5 or 0.502…seen
			So $k = 10^{0.303} = 2.0$ (2sf)	**M1** **A1**	**1.1a** **1.1b**	Finding the intercept and attempting to find k Maybe implied by 2 or 2.0 etc Must be 2 significant figures. Allow embedded in an equation if not given explicitly
				[4]		
11	(b)		$\log_{10} T = \log_{10} k + \log_{10} l^n$			
			$= \log_{10} kl^n$	**M1**	**1.1a**	Uses laws of logs for powers and products
			So $T = kl^n = 2.0l^{0.50}$	**A1**	**1.1**	FT their n and positive value for k
				[2]		

Question			Answer	Marks	AO	Guidance
12	(a)		$f(x) = k(x+1)(x-2)$	M1	3.1a	Uses product of linear terms in an equation. Condone $k=1$ used
			When $x = 0$, $f(x) = -4$ so $k = 2$	B1	1.1a	Allow if $2x^2$ or $k = 2$ seen
			So $f(x) = 2x^2 - 2x - 4$	A1	1.1	Correct expanded expression
			Alternative method			
			$(-1, 0)$ $0 = a - b + c$ $(2, 0)$ $0 = 4a + 2b + c$	M1		Setting up simultaneous equations for at least a and b
			$c = -4$	B1		Allow for correct constant term or explicit value for c
			$a = 2, b = -2$ gives $f(x) = 2x^2 - 2x - 4$	A1		Correct expanded expression
				[3]		
12	(b)		$y = \int (2x^2 - 2x - 4)\,dx$	M1	3.1a	Attempt to integrate their $f(x)$
			$y = \frac{2}{3}x^3 - x^2 - 4x + c$	A1FT	1.1	FT their $f(x)$. Condone missing $+c$ and missing $y =$
			When $x = 0$, $y = 8$	M1	1.1a	Uses $(0,\ 8)$ to evaluate c May be implied by correct constant term
			So $y = \frac{2}{3}x^3 - x^2 - 4x + 8$	A1	1.1	Cao $y =$ must be seen
				[4]		
12	(c)		$\frac{dy}{dx} = 0$ when $x = -1, 2$	M1	1.1a	Sets $f(x)$ or the derivative of their y to zero and attempts to solve
			$x = -1 \Rightarrow y = \frac{31}{3}$, so $\left(-1, \frac{31}{3}\right)$	A1	1.1	cao
			and $x = 2 \Rightarrow y = \frac{4}{3}$, so $\left(2, \frac{4}{3}\right)$	A1	1.1	cao
				[3]		

APPENDIX

Exemplar responses for Q3 last mark

Response	Mark
$8(k^3+\frac{1}{2})$ so not a multiple of 8	**A1**
$8(k^3+\frac{1}{2})$ so 8 is not a factor	**A0**
$8k^3+4$ so 8 is not a factor so not a multiple of 8	**A1**
$8k^3+4$ so 8 is not a factor	**A0**
$8k^3+4$ cannot take a factor of 8 so it's not a multiple of 8	**A1**
$8k^3+4$ 4 is not a multiple of 8, so not a multiple of 8	**A1**
$8k^3$ is a multiple of 4 and 8 but +4 means multiple of 4 and not 8	**A1**
$\frac{8k^3+4}{8}=k^3+\frac{1}{2}$ so not a multiple of 8	**A1**

Exemplar responses for Q9(e)

Response	Mark
"The velocity might be 0 and it doesn't stop"	**B0**
"The velocity would be negative" on its own	**B0**
"The velocity would be negative which is impossible"	**B0**
"The velocity would be negative and velocity can't be negative"	**B0**
"Because the model would represent the train going backwards"	**B1**
"The velocity would be negative which means going backwards"	**B1**
"The velocity would be negative which means going backwards which it can't do"	**B1**

"The velocity would be negative which means going backwards which it says it doesn't do in this question"	**B1**
"It would give an ever increasing negative velocity"	**B0**
"The model predicts travelling infinitely fast which is not possible"	**B1**
"The model predicts travelling infinitely fast in the opposite direction which is not possible"	**B1**

Need to get in touch?

If you ever have any questions about OCR qualifications or services (including administration, logistics and teaching) please feel free to get in touch with our customer support centre.

Call us on

01223 553998

Alternatively, you can email us on

support@ocr.org.uk

For more information visit

ocr.org.uk/qualifications/resource-finder

ocr.org.uk

Twitter/ocrexams

/ocrexams

/company/ocr

/ocrexams

CAMBRIDGE
UNIVERSITY PRESS & ASSESSMENT

OCR is part of Cambridge University Press & Assessment, a department of the University of Cambridge.

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored. © OCR 2024 Oxford Cambridge and RSA Examinations is a Company Limited by Guarantee. Registered in England. Registered office The Triangle Building, Shaftesbury Road, Cambridge, CB2 8EA.

Registered company number 3484466. OCR is an exempt charity.

OCR operates academic and vocational qualifications regulated by Ofqual, Qualifications Wales and CCEA as listed in their qualifications registers including A Levels, GCSEs, Cambridge Technicals and Cambridge Nationals.

OCR provides resources to help you deliver our qualifications. These resources do not represent any particular teaching method we expect you to use. We update our resources regularly and aim to make sure content is accurate but please check the OCR website so that you have the most up-to-date version. OCR cannot be held responsible for any errors or omissions in these resources.

Though we make every effort to check our resources, there may be contradictions between published support and the specification, so it is important that you always use information in the latest specification. We indicate any specification changes within the document itself, change the version number and provide a summary of the changes. If you do notice a discrepancy between the specification and a resource, please contact us.

Whether you already offer OCR qualifications, are new to OCR or are thinking about switching, you can request more information using our Expression of Interest form.

Please get in touch if you want to discuss the accessibility of resources we offer to support you in delivering our qualifications.