

AS and A LEVEL

# MATHEMATICS B (MEI)

H630 & H640

## Exploring our Question Papers

Version 1

# We Like to Show Our Working

We've been listening to teacher feedback about what you loved about our specifications and sample assessment materials in A Level Maths.

To help you prepare your students for the first full A Level examination series in 2019, we wanted to share with you our thinking about what makes our specification so easy to teach, and how we're making some small changes to our question papers to make them even better for your students.

## **Our Assessments have been designed to give your students the best experience in the exam**

We've reviewed our question paper layout, and in order to make it clearer we've increased the size of our typeface and the amount of space around the questions. We're keeping our approach of providing a separate question paper and answer booklet – we think this makes it easier for students to better plan their time in the exam and see the entirety of every multi-part question.

## **Our papers are structured to help with revision and exam technique**

We test Pure Maths, then Mechanics and Statistics separately, so that students can focus on one area of the course at a time when they prepare for each paper.

## **We use a range of question types that test students fairly**

We don't use multiple choice questions which can be misleading, instead we use short answer questions which are clear and accessible. Our questions use authentic real world contexts and mathematical context sparingly, so it doesn't distract students from what they need to do.

## **Our specification has been re-designed to make it even easier to use.**

We use a landscape format that puts the AS and A Level Maths content side by side, so that it's easy to use if you're co-teaching AS, or teaching a two year A Level course.



## Use our command words glossary with your students.

It's written in clear and straightforward language so it's easy for them to understand.

## You can teach maths in the way that suits you and your students.

The way we assess Pure Maths alongside both the Mechanic and Statistics means you're free to teach the mathematical content in the way you want to, and if you're teaching Further Maths, you can teach it alongside, as a fully combined course, or as two one-year courses.

*Find out more about our approach to Maths assessment in this booklet, download our re-designed Sample Assessment Materials, and read about the 2018 exam series in our new Examiner Reports, complete with exemplar student responses. In 2019, when you see our live papers, we hope that you'll agree that these small changes add up to make a big difference.*



# Accessibility

We have produced this guide to share the story of our assessment approach and explore our question papers with you.

During the development of our qualifications, we talked to a wide range of teachers, students and other stakeholders to influence the structure of our question papers.

## Our approach to Accessibility means making sure our Assessments use:

- Clear and appropriate language
- A gradient of difficulty throughout each question paper
- A spacious paper layout
- A clear and larger typeface
- Only one typeface - so that students find the question paper easy to read
- Question papers with separate answer booklets - so that students can better plan their time in the exam and can see all of multiple part questions at once

## We have ensured assessments are structured to help with revision and exam technique:

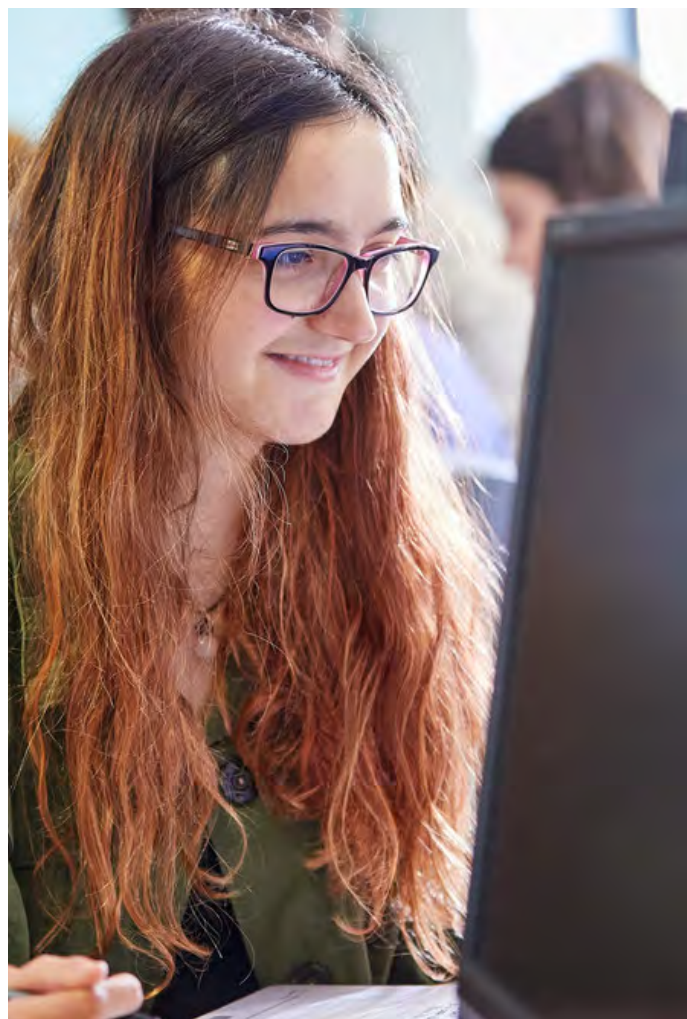
- Testing mechanics and statistics in separate papers
- Enabling weaker students to gain confidence by having easier questions at the start of the paper and harder questions towards the end of the paper
- Having a range of question types that test students fairly eg. short answer questions and not MCQs
- Using authentic real world contexts, and only using mathematical context sparingly.

## In addition, our specifications are easy to teach from:

- Teaching content is set out in landscape format with AS/Year 1 and Year 2 content clearly defined so that you can see how student knowledge should build
- Further Maths A-Level specifications are laid out in the same way to enable seamless progression
- Sections of the Specification are clearly defined such as Command Words and Notation to help you as you plan, prepare and teach.
- Notes and exclusions are included in the specifications to clarify aspects of the content
- Supports separate mechanics and statistics teaching or combined approaches – making it easy to structure a course with a mix of different teachers.

## We provide you with:

- Practice Papers to use as mock exams
- Exam Builder to create your own mocks and tests
- Baseline check-in tests that give you data all the way through the course
- Planning materials and mapping guides to help you see your route through the course
- Full range of endorsed textbooks from Hodder
- Full range of teaching and learning resources, including flexible curriculum planners
- CPD courses and webinars to help you get started and learn more
- Network meetings where you can share ideas
- Support through direct access to maths experts at MEI either by email or through the MEI Staffroom.

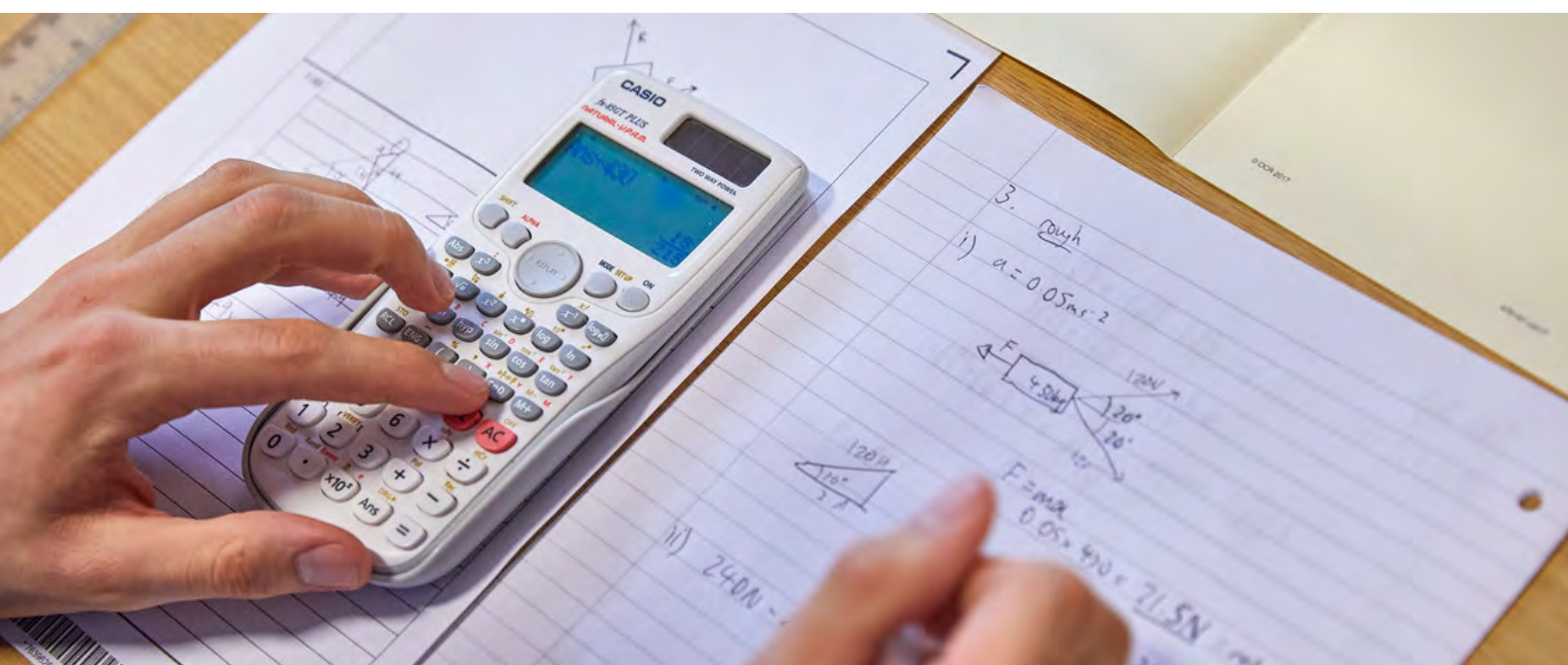


# Our Assessment Principles

The principles underpinning our test construction approach for AS/A Level Mathematics are outlined below.

Group	No.	Accessibility Principle	Why?
Look and feel of the paper	1	<p>Tone (assessing good understanding of maths without letting the language of our questions be an obstacle to understanding what is needed)</p> <ul style="list-style-type: none"> <li>The use of overly complicated language and grammatical constructions will be avoided.</li> <li>Contexts and vocabulary will be considered for currency and appropriateness to learners, e.g. glasses not spectacles.</li> <li>Language used throughout the question will be consistent. For example, usage in the stem matches that throughout the rest of the question and any titles given to any diagrams.</li> <li>Technical words will be used appropriately to underpin the maths being assessed.</li> </ul>	To make it as clear as possible what response is expected.
	2	<p>Text, displayed equations, tables and diagrams will be left aligned.</p> <p>Items in table cells will usually be centred (horizontally and vertically) with 'headers' at the left of rows usually left-aligned. Columns of numerical values will usually be aligned on the decimal point, even when not present.</p>	To align with the principles applied to our modified question papers (left alignment is reported to be easier to understand for a range of visual impairments) and reduce opportunity for errors when processing modified papers.
Assessment approach	3	Command words will be taken from the defined list of command words (with definitions) included in the specification, unless it is inappropriate to do so.	To ensure clarity for centres as to what can be assessed and how all command words will be used.
	4	Negative questions will be kept to a minimum.	Used well, negative questions can be a good way of testing understanding but can also easily lead to confusion. We will only ever use negatives where it is the most appropriate approach.
	5	Where there is a large context provided sentences will be grouped by type of information. Bulleted lists or numbering will be used where it helps indicate multiple demands, methods to be demonstrated or lists of information.	To ensure information is presented in the clearest possible way for candidates.
	6	<p>Italics will only be used in questions where required (for instance denotation of variables in line with standard conventions for the subject).</p> <p>If a specific word requires emphasis, bold font will be used.</p>	Italics can be hard to read if overused.

Group	No.	Accessibility Principle	Why?
	7	We will always ensure that questions indicate where a specific degree of precision is required to gain full credit for a response, e.g. where a calculation requires an answer to a specific number of decimal places/significant figures this will always be clearly stated.	To avoid confusing candidates who may be concerned about the required precision where it is ambiguous.
Images, diagrams, data	8	<p>Images, diagrams and data will only be used where they genuinely support what is required in the question. We will avoid candidates needing to turn pages by aiming to always have images, diagrams and questions on facing pages.</p> <ul style="list-style-type: none"> <li>Where necessary, if there is one, or more than one table or graph, they will be referred to as <b>'Fig. Fig 1</b> or <b>Fig. 1.1'</b>, <b>'Fig 1.2'</b>, <b>Table 1</b> or <b>Table 1.1'</b>, <b>Table 1.2'</b>.</li> <li>Where there is an image/diagram/graph or table, the information will be given before we ask the question. We will make it clear what is information and what is the question.</li> </ul>	To avoid unnecessary page turning and distracting images for the candidates that do not help them understand what is required in the question.
	9	All tables, graphs, images, diagrams and equations will follow standard mathematical practices.	To avoid establishing bad practices for candidates who progress to Further and Higher Education.
	10	Text will not be wrapped around images/diagrams/graphs.	To retain clarity.
	11	If candidates are required to do something with an image/diagram/graph, it will be repeated in the Printed Answer Booklet, centred with sufficient space around it for them to do their working.	To avoid candidates struggling to fit in their response.



# Command Words

## In this question you must show detailed reasoning

When a question includes this instruction, the solution must lead to a conclusion showing a detailed and complete analytical method. There should be sufficient detail to allow the line of argument to be followed. This is not a restriction on a candidate's use of a calculator when tackling the question, e.g. for checking an answer or evaluating a function at a given point, but it is a restriction on what will be accepted as evidence of a complete method.

### Example Question

#### In this question you must show detailed reasoning

Find the coordinates of the stationary point of the curve  $y = x \ln x$ .

#### Example Response

At the stationary point  $\frac{dy}{dx} = 0$

$$\frac{dy}{dx} = 1 \cdot \ln x + x \cdot \frac{1}{x} = \ln x + 1 = 0$$

$$\Rightarrow \ln x = -1 \text{ so } x = \frac{1}{e}$$

$$\text{When } x = \frac{1}{e}, y = \frac{1}{e} \ln \frac{1}{e} = \frac{1}{e} \times (-1) = -\frac{1}{e}$$

So the coordinates of the stationary point are  $\left(\frac{1}{e}, -\frac{1}{e}\right)$

## Show that

Candidates must show that the given result is true. It is not sufficient to substitute the given values to verify the result; an explanation must cover the argument.

### Example Question

Show that the curve  $y = x \ln x$  has a stationary point  $\left(\frac{1}{e}, -\frac{1}{e}\right)$ .

#### Example Response

$$\frac{dy}{dx} = 1 \cdot \ln x + x \cdot \frac{1}{x} = \ln x + 1$$

$$\frac{dy}{dx} = 0 \text{ for stationary point}$$

$$\text{When } x = \frac{1}{e} \Rightarrow \frac{dy}{dx} = \ln \frac{1}{e} + 1 = 0 \text{ so stationary}$$

When  $x = \frac{1}{e}$ ,  $y = \frac{1}{e} \ln \frac{1}{e} \Rightarrow y = -\frac{1}{e}$  so  $\left(\frac{1}{e}, -\frac{1}{e}\right)$  is a stationary point on the curve.

## Determine

Candidates must justify any results found, including working where appropriate.

### Example Question

Determine the coordinates of the stationary point of the curve  
 $y = x \ln x$ .

### Example Response

$$\frac{dy}{dx} = 1 \cdot \ln x + x \cdot \frac{1}{x} = \ln x + 1$$

$$\ln x + 1 = 0 \Rightarrow x = 0.368\dots$$

$$\text{When } x = 0.368\dots, y = 0.368\dots \times \ln \frac{1}{0.368\dots} = -0.368\dots$$

So  $(0.368, -0.368)$

## Verify

A clear substitution of the given value to justify the statement is required.

### Example Question

Verify that the curve  $y = x \ln x$  has a stationary point at  $x = \frac{1}{e}$ .

### Example Response

$$\frac{dy}{dx} = \ln x + 1$$

$$\text{At } x = \frac{1}{e}, \frac{dy}{dx} = \ln \frac{1}{e} + 1 = -1 + 1 = 0 \text{ therefore it is a stationary point.}$$

## Prove

A formal proof requires a high level of mathematical detail, with candidates clearly defining variables, correct algebraic manipulation and a concise conclusion.

### Example Question

Prove that the sum of the squares of any three consecutive positive integers cannot be divided by 3.

### Example Response

Let the three consecutive positive integers be  $n - 1$ ,  $n$  and  $n + 1$

$$(n - 1)^2 + n^2 + (n + 1)^2 = 3n^2 + 2$$

This always leaves a remainder of 2 and so cannot be divided by 3.



## Hence

When a question uses the word 'hence', it is an indication that the next step should be based on what has gone before. The intention is that learners should start from the indicated statement.

You are given that  $f(x) = 2x^3 - x^2 - 7x + 6$ . Show that  $(x-1)$  is a factor of  $f(x)$ .

Hence find the three factors of  $f(x)$ .

## Hence or otherwise

This is used when there are multiple ways of answering a given question. Learners starting from the indicated statement may well gain some information about the solution from doing so, and may already be some way towards the answer. The command phrase is used to direct learners towards using a particular piece of information to start from or to a particular method. It also indicates to learners that valid alternate methods exist which will be given full credit, but that they may be more time-consuming or complex.

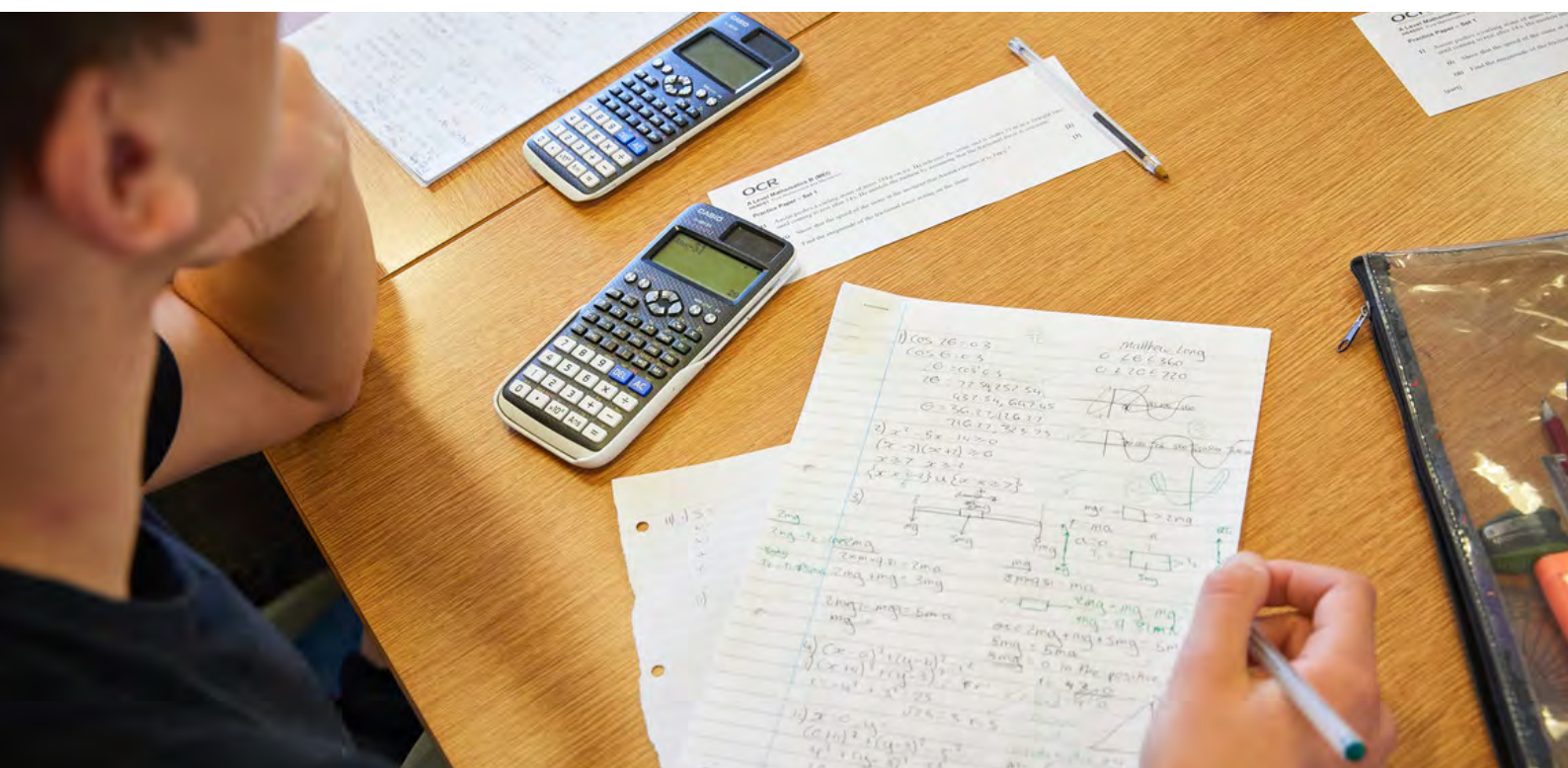
Example:

Show that  $(\cos x + \sin x)^2 = 1 + \sin 2x$  for all  $x$ . Hence or otherwise, find the derivative of  $(\cos x + \sin x)^2$ .

## You may use the result

When this phrase is used it indicates a given result that learners would not normally be expected to know, but which may be useful in answering the question.

The phrase should be taken as permissive; use of the given result is not required.



## Sketch

Learners should draw a diagram, not necessarily to scale, showing the main features of a curve. These are likely to include at least some of the following.

- Turning points
- Asymptotes
- Intersection with the  $y$ -axis
- Intersection with the  $x$ -axis
- Behaviour for large  $x$  (+ or -)

Any other important features should also be shown.

## Plot

Learners should mark points accurately on the graph in their printed answer booklet. They will either have been given the points or have had to calculate them. They may also need to join them with a curve or a straight line, or draw a line of best fit through them.

## Draw

Learners should draw to an accuracy appropriate to the problem. They are being asked to make a sensible judgement about this.

## Other Command Words

Other command words have their ordinary English meaning.

Examples

## Find, State, Write down, Calculate

These command words indicate that neither working nor justification is required, however any working may be rewarded by partial credit as appropriate. A solution could be obtained from the efficient use of a calculator, either graphically or using a numerical method.

### Example Question

Find the coordinates of the stationary point of the curve  $y = x \ln x$ .

### Example Response

(0.368, -0.368)

# Format of our Question Papers

Content Overview	Assessment Overview	
<p><b>H640/01</b></p> <p>Component 01 assesses content from Pure Mathematics and Mechanics</p>	<p>Paper 1: Pure Mathematics and Statistics</p> <p>2 hour written paper</p> <p>100 marks</p>	<p><b>36.4%</b></p> <p>of total</p> <p>A Level</p>
<p><b>H640/02</b></p> <p>Component 02 assesses content from Pure Mathematics and Statistics</p>	<p>Paper 2: Pure Mathematics and Statistics</p> <p>2 hour written paper</p> <p>100 marks</p>	<p><b>36.4%</b></p> <p>of total</p> <p>A Level</p>
<p><b>H640/03</b></p> <p>Component 03 assesses content from Pure Mathematics (Mechanics and Statistics are assumed knowledge)</p>	<p>Paper 3: Pure Mathematics and Comprehension</p> <p>2 hour written paper</p> <p>75 marks</p>	<p><b>27.3%</b></p> <p>of total</p> <p>A Level</p>

Percentages in the table above are rounded to 1 decimal place, exact component proportions are:  $36\frac{4}{11}$ ,  $36\frac{4}{11}$ ,  $27\frac{3}{11}$

OCR's A Level in Mathematics B (MEI) consists of three components that are externally assessed.

All three components (01–03) contain some synoptic assessment, some extended response questions and some stretch and challenge questions.

Stretch and challenge questions are designed to allow the most able learners the opportunity to demonstrate the full extent of their knowledge and skills.

Stretch and challenge questions will support the awarding of A\* grade at A Level, addressing the need for greater differentiation between the most able learners.

The set of assessments in any series will include at least one unstructured problem solving question which addresses multiple areas of the problem solving cycle as set out in the Overarching Themes.

The set of assessments in any series will include at least one extended problem solving question which addresses the first two bullets of assessment objective 3 in combination and at least one extended modelling question which addresses the last three bullets of assessment objective 3 in combination.

Section B will have 15 marks worth of questions on a previously unseen comprehension passage based on the pure mathematics content of the specification, rather than on mechanics or statistics content, to ensure that mechanics and statistics are not over-assessed in some years. The passage may include examples of applications of the pure content (other than those specified in the mechanics and statistics sections). The mechanics and statistics content of the specification is assumed knowledge for component 03 but this assumed knowledge will not be the focus of any of the questions.

# Exemplar annotated exam questions

## H640/01 Q12

12 A model boat has velocity  $\mathbf{v} = ((2t-2)\mathbf{i} + (2t+2)\mathbf{j})$  m s<sup>-1</sup> for  $t \geq 0$ , where  $t$  is the time in seconds.

$\mathbf{i}$  is the unit vector east and  $\mathbf{j}$  is the unit vector north.

When  $t = 3$ , the position vector of the boat is  $(3\mathbf{i} + 14\mathbf{j})$  m.

(a) Show that the boat is never instantaneously at rest. [2]

(b) Determine any times at which the boat is moving directly northwards. [2]

(c) Determine any times at which the boat is north-east of the origin. [5]

Mechanics often uses techniques studied in pure mathematics.

12	(a)	Require both components zero at the same <i>time</i> i component zero only when $t = 1$ and j component only when $t = -1$ so there are no such times	MI A1 [2]	3.1b 2.4	May be implied but must be clear  Or say j component $\geq 2$ since $t \geq 0$	
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Part (a) is a “show that” question so clear explanation must be seen and this must include reference to both components of the velocity.

12	(b)	This requires use of the velocity vector Travelling due north means that the i component is zero and the j component +ve So we need $2t - 2 = 0$ for i component, giving $t = 1$ . This gives j component $4 > 0$ so yes at $t = 1$ .	MI A1 [2]	3.3 2.4	Recognise velocity vector required  Must test j component	
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Part (b) includes the command “determine” so a method must be seen – note that this includes testing that the  $\mathbf{j}$  component is positive.

12	(c)	This requires use of the position vector <b>either</b> $\mathbf{r} = \int \mathbf{v} dt$ so $\mathbf{r} = \int ((2t-2)\mathbf{i} + (2t+2)\mathbf{j}) dt = (t^2 - 2t + C)\mathbf{i} + (t^2 + 2t + D)\mathbf{j}$ $\mathbf{r} = 3\mathbf{i} + 14\mathbf{j}$ when $t = 3$ so $C = 0$ and $D = -1$ so $\mathbf{r} = (t^2 - 2t)\mathbf{i} + (t^2 + 2t - 1)\mathbf{j}$	MI MI A1	3.1b 1.1 1.1	Recognise position vector required  May use + C instead	
		or $\mathbf{a} = 2\mathbf{i} + 2\mathbf{j}$ when $t = 3$ $\mathbf{v} = 4\mathbf{i} + 8\mathbf{j}$ . $\mathbf{r} = (4\mathbf{i} + 8\mathbf{j})(t-3) + \frac{1}{2}(2\mathbf{i} + 2\mathbf{j})(t-3)^2 + 3\mathbf{i} + 14\mathbf{j}$ and so $\mathbf{r} = (t^2 - 2t)\mathbf{i} + (t^2 + 2t - 1)\mathbf{j}$	MI A1	1.1 1.1	Must find a but may omit $3\mathbf{i} + 14\mathbf{j}$	
		the boat is NE of O when the i and j components are equal and +ve we require $t^2 - 2t = t^2 + 2t - 1$ so $t = 0.25$ this gives components of $-0.4375$ so no.	MI A1 [5]	3.2b 2.1	Award even if +ve not mentioned  Must be complete argument	

Part (c) again uses the command “determine” so a full method must be shown, including checking that both components of the position vector are positive.

**H640/02 Q1****1 In this question you must show detailed reasoning.**

Find the coordinates of the points of intersection of the curve  $y = x^2 + x$  and the line  $2x + y = 4$ . [5]

The command to “show detailed reasoning” signals to candidates that drawing the graphs on a graphical calculator and reading off the coordinates of the intersection points is not sufficient to gain the marks – of course, there is nothing to stop candidates with graphical calculators checking their answers in this way. Candidates without graphical calculators can check their answers by substitution.

<b>1</b>		<b>DR</b> $y = 4 - 2x$ $4 - 2x = x^2 + x$ $\Rightarrow x^2 + 3x - 4 = 0$  $\Rightarrow x = 1$ or $x = -4$ $y = 2$ or $y = 12$ $(1,2)$ and $(-4,12)$	<b>M1</b>	<b>2.1</b>	Eliminating x or y must be seen	Or $y^2 - 14y + 24 = 0$
			<b>M1</b>	<b>1.1</b>	Form a quadratic equation	
			<b>A1</b>	<b>1.1</b>		SC1 for one pair of coordinates only
			<b>A1</b>	<b>1.1</b>		
			<b>A1</b>	<b>2.5</b>	For final A mark, corresponding values of x and y must be expressed as coordinates from well set out correct solution	
			<b>[5]</b>			

In the mark scheme, the notation DR shows that detailed reasoning is expected. This includes forming a suitable quadratic equation and expressing it in a form which can be solved (with zero on one side). In this particular case, the resulting quadratic is easy to factorise mentally so there is no mark for factorising. In general, candidates would be expected to show the step of factorising (or another method for solving the quadratic).

**H640/02 Q5****5 In a particular country, 8% of the population has blue eyes. A random sample of 20 people is selected from this population. Find the probability that exactly two of these people have blue eyes. [2]**

Modelling is one of the overarching themes in the specifications; this includes being able to recognise standard models, such as the binomial model.

<b>5</b>		Binomial(20, 0.08) $P(2 \text{ blue}) = 0.27[11]$	<b>M1</b>	<b>3.3</b>	<b>BC</b>
			<b>A1</b>	<b>1.1</b>	
			<b>[2]</b>		

Candidates are expected to find binomial probabilities using their calculators so no working is expected but candidates should show clearly which binomial distribution they are using and which probability they are finding. As this question requires a single probability from a binomial distribution, candidates could

**H640/02 Q11**

- 11** Suppose  $x$  is an irrational number, and  $y$  is a rational number, so that  $y = \frac{m}{n}$ ,  
where  $m$  and  $n$  are integers and  $n \neq 0$ . Prove by contradiction that  $x + y$  is not rational. **[4]**

There is a greater emphasis on formal proof in the reformed content criteria.

Written solutions need to provide a clear argument towards a final conclusion.

<b>11</b>	Suppose $x + y$ is rational	<b>B1</b>	<b>2.1</b>	or stating that the difference of two fractions is rational
	So $x + y = \frac{p}{q}$ , where $p$ and $q$ are integers	<b>B1</b>	<b>2.1</b>	
	$\Rightarrow x = \frac{p}{q} - \frac{m}{n} = \frac{(pn - mq)}{qn}$ which is rational	<b>B1</b>	<b>3.1a</b>	
	$x$ is irrational so this is a contradiction	<b>B1</b> <b>[4]</b>	<b>2.4</b>	

The mark scheme exemplifies the structure of a proof by contradiction, i.e. a clearly stated starting point, correct algebraic manipulation, and an explicit concluding statement.



## H640/02 Q12

12 Fig. 12 shows the curve  $2x^3 + y^3 = 5y$ .

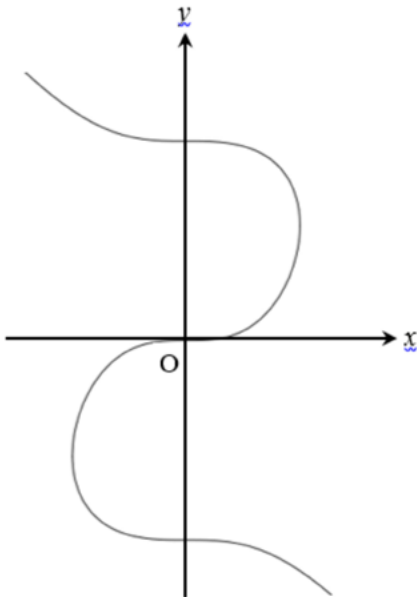


Fig. 12

- (a) Find the gradient of the curve  $2x^3 + y^3 = 5y$  at the point  $(1,2)$ , giving your answer in exact form. [4]
- (b) Show that all the stationary points of the curve lie on the  $y$ -axis. [2]

The use of technology should permeate the teaching and learning of mathematics. The expectation is that it would be natural for candidates in class to draw the curve using technology when doing part (a). This then suggests that stationary points lie on the  $y$ -axis and part (b) is an algebraic confirmation of this. The graph has been drawn so that candidates who do not have a graphical calculator are not disadvantaged.

Question	Answer	Marks	AOs	Guidance
12 (a)	$6x^2 + 3y^2 \frac{dy}{dx} = 5 \frac{dy}{dx} \Rightarrow \frac{dy}{dx} = \frac{6x^2}{5-3y^2}$ <p>when <math>x = 1, y = 2, 6 + 12 \frac{dy}{dx} = 5 \frac{dy}{dx}</math></p> $\Rightarrow \frac{dy}{dx} = -\frac{6}{7}$	M1 A1  M1 A1  [4]	1.1a 1.1  1.1 2.1	implicit differentiation correct substituting $x = 1, y = 2$ cao

Part (a) is a standard implicit differentiation question, it is good practice to give the gradient exactly and candidates are explicitly instructed to do this so that they understand what is expected.

Question	Answer	Marks	AOs	Guidance
12 (b)	$\frac{dy}{dx} = 0 \text{ so } 6x^2 = 0$ <p><math>x = 0</math> so all stationary points lie on <math>y</math>-axis</p>	M1  A1 [2]	1.2  2.1	Substitute $\frac{dy}{dx} = 0$ into their differentiated expression Completion of argument

Part (b) is a "show that" question so the working and reasoning must be clear.

**H640/03 Q6**

6 Fig. 6 shows the curve with equation  $y = x^3 - 6x^2 + 4x + 5$ .

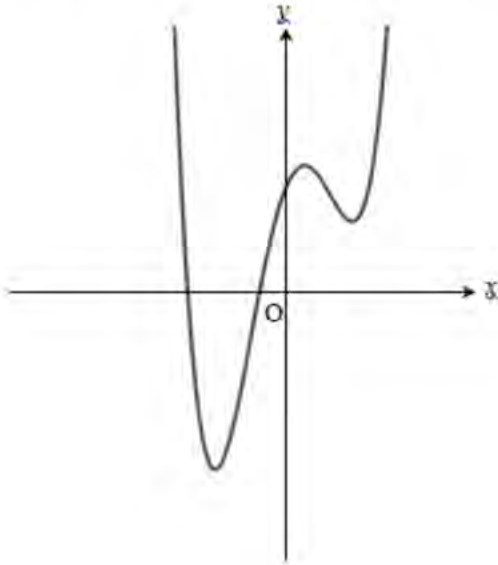


Fig. 6

Find the coordinates of the points of inflection.

[5]

Candidates who have graphical calculators would have an advantage in this question by drawing the graph and being able to see that there are two (non-stationary) points of inflection and that there is one each side of the y-axis. The graph has been given so that all candidates have access to this information.

6		$\frac{dy}{dx} = 4x^3 - 12x + 4$ $\frac{d^2y}{dx^2} = 12x^2 - 12 = 0$ $x = \pm 1$ $(-1, -4) \text{ and } (1, 4)$	<b>M1</b> <b>A1</b> <b>M1</b> <b>A1</b> <b>A1</b> <b>[5]</b>	<b>1.1</b> <b>1.1</b> <b>1.2</b> <b>1.1</b> <b>2.1</b>	Differentiating once First derivative Differentiating a second time and equating to zero	
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Candidates should know that the second derivative being zero is a necessary but not sufficient condition for a point of inflection. In this case, candidates have the graph and can see that there are two points of inflection. There are only two points where the second derivative is zero so these must be the points of inflection. Candidates have not been asked to confirm that the second derivative changes sign either side of the point of inflection so they need not do so.



# Meet the Maths team....



## Assessment Standards Managers

### Will Hornby & Ross Robertson

Will has previously worked as a Senior Assessor for OCR and CIE, as an Associate Lecturer for the Open University and a professional choral singer. Having worked on the development of OCR's reformed GCSE for 2015, he then led the development of OCR's reformed Maths and Further Maths A Level qualifications for 2017. He continues to teach for the Open University.

Ross Previously worked at Cambridge International for 3 years as a Product Manager, managing a portfolio of assessment materials available worldwide including A Level Maths and Further Maths.

## Subject Advisors

### Steven Walker, Ruth Wroe, Neil Ogden & Caroline Hodgson

Following the redevelopment of GCSE (9-1) and the A Level Maths suite, the subject advisor team support the full range of maths qualifications through quality assurance of resources, leading sessions at network events and conferences, and responding to queries from teachers via telephone and email.

Steven joined OCR during the recent qualification reform period. Having worked on the redevelopment of Entry level, GCSE(9-1), FSMQ and the A Level Maths suite he now focuses mainly on the level 3 qualifications

Ruth worked on the development of OCR's reformed Maths and Further Maths A Level qualifications and is currently responsible for the support and promotion of OCR's Core Maths qualifications.

Neil is currently focused on the development of new Functional Skills maths qualifications and can be seen leading sessions around the country on the full range of OCR maths qualifications.

Caroline has worked in the OCR Maths team for over 15 years and has been involved in the development and implementation of many GCSE Maths qualifications, including a number of pilots, and is currently responsible for the support and promotion of GCSE Maths and Entry Level Maths.



## Keith Proffitt - MEI Curriculum Developer

Keith has a BA in Mathematics and a PGCE in Secondary Mathematics. He taught in secondary schools for 25 years, including 13 as Head of Mathematics. He worked for OCR for over 5 years, which included being Qualifications Manager for the MEI A Level specifications in Mathematics and Further Mathematics. He helped to develop the Further Pure with Technology unit and the Quantitative Methods qualifications while working for OCR. He joined MEI in April 2014 where he is responsible for providing support for teachers of MEI specifications.

## OCR & MEI

MEI is an independent curriculum development body and is involved in many different areas of mathematics related work. MEI's work started with a teacher project in the early 1960s to investigate the mathematics which sixth form students would need in further study and in work. OCR A Level Mathematics B (MEI) has been developed in partnership with Mathematics in Education and Industry (MEI), a long established, independent curriculum development body. MEI provides advice and CPD relating to all the curriculum and teaching aspects of the course. It also provides teaching resources, which for this specification can be found on the website ([www.mei.org.uk](http://www.mei.org.uk)).

# Contact Details

If you are already using OCR specifications, you can contact us at: [www.ocr.org.uk](http://www.ocr.org.uk)

If you are not already a registered OCR centre then you can find out more information on the benefits of becoming one at: [www.ocr.org.uk](http://www.ocr.org.uk)

## Get in touch with one of OCR's Subject Advisors:

Email: [maths@ocr.org.uk](mailto:maths@ocr.org.uk)

Twitter: [@OCR\\_Maths](https://twitter.com/OCR_Maths)

Customer Contact Centre: **01223 553998**

Teacher resources, blogs and support: available from: [www.ocr.org.uk](http://www.ocr.org.uk)

## Sign up

For our monthly Maths newsletter, *Total Maths*.

Access CPD, training, events and support through OCR's [CPD Hub](#).

Access our online past papers service that enables you to build your own test papers from past OCR exam questions through OCR's [ExamBuilder](#)

Access our free results analysis service to help you review the performance of individual learners or whole schools through [Active Results](#).

Advice and support is also available from MEI; contact details can be found on [www.mei.org.uk](http://www.mei.org.uk)



[www.ocr.org.uk](http://www.ocr.org.uk)

OCR Customer Contact Centre

### General qualifications

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