CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International Advanced Level

MARK SCHEME for the October/November 2014 series

9709 MATHEMATICS

9709/32

Paper 3, maximum raw mark 75

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the October/November 2014 series for most Cambridge IGCSE[®], Cambridge International A and AS Level components and some Cambridge O Level components.

® IGCSE is the registered trademark of Cambridge International Examinations.



15317669092

Page 2	Mark Scheme	Syllabus	Paper
	Cambridge International A Level – October/November 2014	9709	32

Mark Scheme Notes

Marks are of the following three types:

- M Method mark, awarded for a valid method applied to the problem. Method marks are not 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. Correct application of a formula without the formula being quoted obviously earns the M mark and in some cases an M mark can be implied from a correct answer.
- 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).
- B Mark for a correct result or statement independent of method marks.
- When a part of a question has two or more "method" steps, the M marks are generally independent unless the scheme specifically says otherwise; and similarly when there are several B marks allocated. The notation DM or DB (or dep*) is used to indicate that a particular M or B mark is dependent on an earlier M or B (asterisked) mark in the scheme. When two or more steps are run together by the candidate, the earlier marks are implied and full credit is given.
- The symbol √^{*} implies that the A or B mark indicated is allowed for work correctly following on from previously incorrect results. Otherwise, A or B marks are given for correct work only. A and B marks are not given for fortuitously "correct" answers or results obtained from incorrect working.
- Note: B2 or A2 means that the candidate can earn 2 or 0. B2/1/0 means that the candidate can earn anything from 0 to 2.

The marks indicated in the scheme may not be subdivided. If there is genuine doubt whether a candidate has earned a mark, allow the candidate the benefit of the doubt. Unless otherwise indicated, marks once gained cannot subsequently be lost, e.g. wrong working following a correct form of answer is ignored.

- Wrong or missing units in an answer should not lead to the loss of a mark unless the scheme specifically indicates otherwise.
- For a numerical answer, allow the A or B mark if a value is obtained which is correct to 3 s.f., or which would be correct to 3 s.f. if rounded (1 d.p. in the case of an angle). As stated above, an A or B mark is not given if a correct numerical answer arises fortuitously from incorrect working. For Mechanics questions, allow A or B marks for correct answers which arise from taking *g* equal to 9.8 or 9.81 instead of 10.

Page 3	Mark Scheme	Syllabus	Paper
	Cambridge International A Level – October/November 2014	9709	32

The following abbreviations may be used in a mark scheme or used on the scripts:

- AEF Any Equivalent Form (of answer is equally acceptable)
- AG Answer Given on the question paper (so extra checking is needed to ensure that the detailed working leading to the result is valid)
- BOD Benefit of Doubt (allowed when the validity of a solution may not be absolutely clear)
- CAO Correct Answer Only (emphasising that no "follow through" from a previous error is allowed)
- CWO Correct Working Only often written by a 'fortuitous' answer
- ISW Ignore Subsequent Working
- MR Misread
- PA Premature Approximation (resulting in basically correct work that is insufficiently accurate)
- SOS See Other Solution (the candidate makes a better attempt at the same question)
- SR Special Ruling (detailing the mark to be given for a specific wrong solution, or a case where some standard marking practice is to be varied in the light of a particular circumstance)

Penalties

- MR –1 A penalty of MR –1 is deducted from A or B marks when the data of a question or part question are genuinely misread and the object and difficulty of the question remain unaltered. In this case all A and B marks then become "follow through √" marks. MR is not applied when the candidate misreads his own figures – this is regarded as an error in accuracy. An MR –2 penalty may be applied in particular cases if agreed at the coordination meeting.
- PA –1 This is deducted from A or B marks in the case of premature approximation. The PA –1 penalty is usually discussed at the meeting.

ww.qyconsu	l t	.COM
------------	-----	------

	更多	咨询请登录	www.qyconsult.com	君	尧咨询	
Pa	age 4		Mark Scheme	Syllabus	Рар	
		Camb	ridge International A Level – October/November 2014	9709	32	
1	Obt		begarithm of a power linear equation in any form, e.g. $x = (x - 2) \ln 3$ = 22.281		M1 A1 A1	[3]
2	(i)		bly ordinates 2, 1.1547, 1, 1.1547 formula, or equivalent, with $h = \frac{1}{6}\pi$ and four ordinates		B1 M1	
		Obtain answ	ver 1.95		A1	[3]
	(ii)	-	inisable sketch of $y = \operatorname{cosec} x$ for the given interval tement that the estimate will be an overestimate		B1 B1	[2]
3	Sub	stitute $x = -$	$\frac{1}{3}$, equate result to zero or divide by $3x + 1$ and equate the remaind	ler to zero		
	and	obtain a corr	rect equation, e.g. $-\frac{1}{27}a + \frac{1}{9}b - \frac{1}{3} + 3 = 0$		B1	
	Sub Obta	stitute $x = 2$	and equate result to 21 or divide by $x - 2$ and equate constant remain equation, e.g. $8a + 4b + 5 = 21$	inder to 21	M1 A1 M1	
4	(i)	ain <i>a</i> = 12 ar Use chain r	ule correctly at least once		A1 M1	[5]
		Obtain eithe	$\operatorname{er} \frac{\mathrm{d}x}{\mathrm{d}t} = \frac{3\sin t}{\cos^4 t}$ or $\frac{\mathrm{d}y}{\mathrm{d}t} = 3\tan^2 t \sec^2 t$, or equivalent		A1	
		Use $\frac{dy}{dx} = \frac{dy}{dx}$	$\frac{v}{dx} \div \frac{dx}{dx}$		M1	
			t dt given answer		A1	[4]
	(ii)	Use Pythag	ect equation for the tangent in any form oras given answer		B1 M1 A1	[3]
5	(i)	Substitute z	$w = 1 + i$ and obtain $w = \frac{1+2i}{1+i}$		B1	
		EITHER:	Multiply numerator and denominator by the conjugate of the deno or equivalent Simplify numerator to $3 + i$ or denominator to 2	ominator,	M1 A1	
			Obtain final answer $\frac{3}{2} + \frac{1}{2}i$, or equivalent		A1	
		OR:	Obtain two equations in x and y, and solve for x or for y $\frac{2}{3}$		M1	
			Obtain $x = \frac{3}{2}$ or $y = \frac{1}{2}$, or equivalent		A1	
			Obtain final answer $\frac{3}{2} + \frac{1}{2}i$, or equivalent			

更多咨询请登录

www.qyconsult.com

群尧咨询

	更多咨询请登录 www.qyconsult.com				
Page 5		Mark Scheme	Syllabus	Pape	er
		Cambridge International A Level – October/November 2014	9709	32	
	(ii)	<i>EITHER</i> : Substitute $w = z$ and obtain a 3-term quadratic equation in z , e.g. $iz^2 + z - i = 0$ Solve a 3-term quadratic for z or substitute $z = x + iy$ and use a comethod to solve for x and y <i>OR</i> : Substitute $w = x + iy$ and obtain two correct equations in x and y real and imaginary parts Solve for x and y Obtain a correct solution in any form, e.g. $z = \frac{-1 \pm \sqrt{3} i}{2i}$ Obtain final answer $-\frac{\sqrt{3}}{2} + \frac{1}{2}i$		B1 M1 B1 M1 A1 A1	[4]
6	(i)	Integrate and reach $bx \ln 2x - c \int x \cdot \frac{1}{x} dx$, or equivalent Obtain $x \ln 2x - \int x \cdot \frac{1}{x} dx$, or equivalent Obtain integral $x \ln 2x - x$, or equivalent Substitute limits correctly and equate to 1, having integrated twice Obtain a correct equation in any form, e.g. $a \ln 2a - a + 1 - \ln 2 = 1$ Obtain the given answer	M1(6	M1* A1 A1 dep*) A1 A1	[6]
	(ii)	Use the iterative formula correctly at least once Obtain final answer 1.94 Show sufficient iterations to 4 d.p. to justify 1.94 to 2d.p. or show that there is a change in the interval (1.935, 1.945).	ı sign	M1 A1 A1	[3]
7	(i)	Separate variables correctly and attempt to integrate at least one side Obtain term ln <i>R</i> Obtain ln <i>x</i> – 0.57 <i>x</i> Evaluate a constant or use limits <i>x</i> = 0.5, <i>R</i> = 16.8, in a solution containing term <i>a</i> ln <i>R</i> and <i>b</i> ln <i>x</i> Obtain correct solution in any form Obtain a correct expression for <i>R</i> , e.g. $R = xe^{(3.80 - 0.57x)}$, $R = 44.7xe^{-0.57x}$ of $R = 33.6xe^{(0.285 - 0.57x)}$		B1 B1 B1 M1 A1	[6]
	(ii)	Equate $\frac{dR}{dx}$ to zero and solve for x State or imply $x = 0.57^{-1}$, or equivalent, e.g. 1.75 Obtain $R = 28.8$ (allow 28.9)		M1 A1 A1	[3]
8	(i)	Use $sin(A + B)$ formula to express $sin3\theta$ in terms of trig. functions of 2θ and θ Use correct double angle formulae and Pythagoras to express $sin3\theta$ in terms of so Obtain a correct expression in terms of $sin\theta$ in any form Obtain the given identity [SR: Give M1 for using correct formulae to express RHS in terms of $sin\theta$ and co then M1A1 for expressing in terms of $sin\theta$ and $sin3\theta$ only, or in terms of $cos\theta$, $sin\theta$, $cos2\theta$ and $sin2\theta$, then A1 for obtaining the given identity.]		M1 M1 A1 A1	[4]

© Cambridge International Examinations 2014

群尧咨询

P						
	age (6	Mark Scheme Sylla	abus	Рар	er
		Caml	bridge International A Level – October/November 2014 97	09	32)
	(ii)	Substitute t	for x and obtain the given answer		B1	[1]
	(11)	Substitute			DI	[-]
	(iii)	•	a correct method to find a value of x		M1	
				+A1	+ A1	[4]
		Solutions	with more than 3 answers can only earn a maximum of $A1 + A1$.]			
_			A B C			
9	(i)	State or im	ply the form $\frac{A}{1-x} + \frac{B}{2-x} + \frac{C}{(2-x)^2}$		B1	
			ect method to determine a constant		M1	
			e of $A = 2, B = -1, C = 3$		A1	
			econd value		A1	
		Obtain a th			A1	[5
		[The altern	tative form $\frac{A}{1-x} + \frac{Dx+E}{(2-x)^2}$, where $A = 2, D = 1, E = 1$ is marked			
		B1M1A1A	1A1 as above.]			
	(ii)	Use correct	t method to find the first two terms of the expansion			
	(11)		$((2-x)^{-1}, (2-x)^{-2}, (1-\frac{1}{2}x)^{-1} \text{ or } (1-\frac{1}{2}x)^{-2}$		M1	
					1.1.1	
			rect unsimplified expansions up to the term in x^2 tial fraction $A1\sqrt{+A}$	1 / +	A 1 /	
		-				
		Obtain fina	al answer $\frac{9}{4} + \frac{5}{2}x + \frac{39}{16}x^2$, or equivalent		A1	[5
		[Symbolic	binomial coefficients, e.g. $\binom{-1}{1}$ are not sufficient for M1. The \checkmark is on A,A	B,C.]		
		if $D \neq 0$, M [In the case	<i>D</i> , <i>E</i> form of partial fractions, give M1 A1 \checkmark A1 \checkmark for the expansions then 11 for multiplying out fully and A1 for the final answer.] e of an attempt to expand $(x^2 - 8x + 9)(1 - x)^{-1}(2 - x)^{-2}$, give M1A1A1 for			
		if $D \neq 0$, M [In the case	[1 for multiplying out fully and A1 for the final answer.]			
10	(i)	if $D \neq 0$, M [In the case the expansi	If for multiplying out fully and A1 for the final answer.] e of an attempt to expand $(x^2 - 8x + 9)(1 - x)^{-1}(2 - x)^{-2}$, give M1A1A1 for ions, M1 for multiplying out fully, and A1 for the final answer.]			
10	(i)	if $D \neq 0$, M [In the case	11 for multiplying out fully and A1 for the final answer.] e of an attempt to expand $(x^2 - 8x + 9)(1 - x)^{-1}(2 - x)^{-2}$, give M1A1A1 for		B1	
10	(i)	if $D \neq 0$, M [In the case the expansi	If for multiplying out fully and A1 for the final answer.] e of an attempt to expand $(x^2 - 8x + 9)(1 - x)^{-1}(2 - x)^{-2}$, give M1A1A1 for ions, M1 for multiplying out fully, and A1 for the final answer.] Find \overrightarrow{AP} (or \overrightarrow{PA}) for a point <i>P</i> on <i>l</i> with parameter λ , e.g. $\mathbf{i} - 17\mathbf{j} + 4\mathbf{k} + \lambda(-2\mathbf{i} + \mathbf{j} - 2\mathbf{k})$	2		
10	(i)	if $D \neq 0$, M [In the case the expansi	Il for multiplying out fully and A1 for the final answer.] e of an attempt to expand $(x^2 - 8x + 9)(1 - x)^{-1}(2 - x)^{-2}$, give M1A1A1 for ions, M1 for multiplying out fully, and A1 for the final answer.] Find \overrightarrow{AP} (or \overrightarrow{PA}) for a point <i>P</i> on <i>l</i> with parameter λ ,	2	B1 M1 A1	
10	(i)	if $D \neq 0$, M [In the case the expansi	If for multiplying out fully and A1 for the final answer.] e of an attempt to expand $(x^2 - 8x + 9)(1 - x)^{-1}(2 - x)^{-2}$, give M1A1A1 for ions, M1 for multiplying out fully, and A1 for the final answer.] Find \overrightarrow{AP} (or \overrightarrow{PA}) for a point <i>P</i> on <i>l</i> with parameter λ , e.g. $\mathbf{i} - 17\mathbf{j} + 4\mathbf{k} + \lambda(-2\mathbf{i} + \mathbf{j} - 2\mathbf{k})$ Calculate scalar product of \overrightarrow{AP} and a direction vector for <i>l</i> and equate to Solve and obtain $\lambda = 3$ Carry out a complete method for finding the length of <i>AP</i>	2	M1	
10	(i)	if $D \neq 0$, M [In the case the expansi	Il for multiplying out fully and A1 for the final answer.] e of an attempt to expand $(x^2 - 8x + 9)(1 - x)^{-1}(2 - x)^{-2}$, give M1A1A1 for ions, M1 for multiplying out fully, and A1 for the final answer.] Find \overrightarrow{AP} (or \overrightarrow{PA}) for a point <i>P</i> on <i>l</i> with parameter λ , e.g. $\mathbf{i} - 17\mathbf{j} + 4\mathbf{k} + \lambda(-2\mathbf{i} + \mathbf{j} - 2\mathbf{k})$ Calculate scalar product of \overrightarrow{AP} and a direction vector for <i>l</i> and equate to Solve and obtain $\lambda = 3$ Carry out a complete method for finding the length of <i>AP</i> Obtain the given answer 15 correctly	, zero	M1 A1	
10	(i)	if $D \neq 0$, M [In the case the expansi	If for multiplying out fully and A1 for the final answer.] e of an attempt to expand $(x^2 - 8x + 9)(1 - x)^{-1}(2 - x)^{-2}$, give M1A1A1 for ions, M1 for multiplying out fully, and A1 for the final answer.] Find \overrightarrow{AP} (or \overrightarrow{PA}) for a point <i>P</i> on <i>l</i> with parameter λ , e.g. $\mathbf{i} - 17\mathbf{j} + 4\mathbf{k} + \lambda(-2\mathbf{i} + \mathbf{j} - 2\mathbf{k})$ Calculate scalar product of \overrightarrow{AP} and a direction vector for <i>l</i> and equate to Solve and obtain $\lambda = 3$ Carry out a complete method for finding the length of <i>AP</i>	, zero	M1 A1 M1	
10	(i)	if <i>D</i> ≠ 0, M [In the case the expansi <i>EITHER</i> :	Il for multiplying out fully and A1 for the final answer.] e of an attempt to expand $(x^2 - 8x + 9)(1 - x)^{-1}(2 - x)^{-2}$, give M1A1A1 for ions, M1 for multiplying out fully, and A1 for the final answer.] Find \overrightarrow{AP} (or \overrightarrow{PA}) for a point <i>P</i> on <i>l</i> with parameter λ , e.g. $\mathbf{i} - 17\mathbf{j} + 4\mathbf{k} + \lambda(-2\mathbf{i} + \mathbf{j} - 2\mathbf{k})$ Calculate scalar product of \overrightarrow{AP} and a direction vector for <i>l</i> and equate to Solve and obtain $\lambda = 3$ Carry out a complete method for finding the length of <i>AP</i> Obtain the given answer 15 correctly Calling $(4, -9, 9)$ <i>B</i> , state \overrightarrow{BA} (or \overrightarrow{AB}) in component form, e.g. $-\mathbf{i} + 17\mathbf{j}$ - Calculate vector product of \overrightarrow{BA} and a direction vector for <i>l</i> ,	, zero	M1 A1 M1 A1	
10	(i)	if <i>D</i> ≠ 0, M [In the case the expansi <i>EITHER</i> :	Il for multiplying out fully and A1 for the final answer.] e of an attempt to expand $(x^2 - 8x + 9)(1 - x)^{-1}(2 - x)^{-2}$, give M1A1A1 for ions, M1 for multiplying out fully, and A1 for the final answer.] Find \overrightarrow{AP} (or \overrightarrow{PA}) for a point <i>P</i> on <i>l</i> with parameter λ , e.g. $\mathbf{i} - 17\mathbf{j} + 4\mathbf{k} + \lambda(-2\mathbf{i} + \mathbf{j} - 2\mathbf{k})$ Calculate scalar product of \overrightarrow{AP} and a direction vector for <i>l</i> and equate to Solve and obtain $\lambda = 3$ Carry out a complete method for finding the length of <i>AP</i> Obtain the given answer 15 correctly Calling $(4, -9, 9)$ <i>B</i> , state \overrightarrow{BA} (or \overrightarrow{AB}) in component form, e.g. $-\mathbf{i} + 17\mathbf{j}$ - Calculate vector product of \overrightarrow{BA} and a direction vector for <i>l</i> , e.g. $(-\mathbf{i} + 17\mathbf{j} - 4\mathbf{k}) \times (-2\mathbf{i} + \mathbf{j} - 2\mathbf{k})$, zero	M1 A1 M1 A1	
10	(i)	if <i>D</i> ≠ 0, M [In the case the expansi <i>EITHER</i> :	Il for multiplying out fully and A1 for the final answer.] e of an attempt to expand $(x^2 - 8x + 9)(1 - x)^{-1}(2 - x)^{-2}$, give M1A1A1 for ions, M1 for multiplying out fully, and A1 for the final answer.] Find \overrightarrow{AP} (or \overrightarrow{PA}) for a point <i>P</i> on <i>l</i> with parameter λ , e.g. $\mathbf{i} - 17\mathbf{j} + 4\mathbf{k} + \lambda(-2\mathbf{i} + \mathbf{j} - 2\mathbf{k})$ Calculate scalar product of \overrightarrow{AP} and a direction vector for <i>l</i> and equate to Solve and obtain $\lambda = 3$ Carry out a complete method for finding the length of <i>AP</i> Obtain the given answer 15 correctly Calling $(4, -9, 9)$ <i>B</i> , state \overrightarrow{BA} (or \overrightarrow{AB}) in component form, e.g. $-\mathbf{i} + 17\mathbf{j} - $ Calculate vector product of \overrightarrow{BA} and a direction vector for <i>l</i> , e.g. $(-\mathbf{i} + 17\mathbf{j} - 4\mathbf{k}) \times (-2\mathbf{i} + \mathbf{j} - 2\mathbf{k})$ Obtain correct answer, e.g. $-30\mathbf{i} + 6\mathbf{j} + 33\mathbf{k}$, zero	M1 A1 M1 A1 B1 M1 A1	
10	(i)	if <i>D</i> ≠ 0, M [In the case the expansi <i>EITHER</i> :	Il for multiplying out fully and A1 for the final answer.] e of an attempt to expand $(x^2 - 8x + 9)(1 - x)^{-1}(2 - x)^{-2}$, give M1A1A1 for ions, M1 for multiplying out fully, and A1 for the final answer.] Find \overrightarrow{AP} (or \overrightarrow{PA}) for a point <i>P</i> on <i>l</i> with parameter λ , e.g. $\mathbf{i} - 17\mathbf{j} + 4\mathbf{k} + \lambda(-2\mathbf{i} + \mathbf{j} - 2\mathbf{k})$ Calculate scalar product of \overrightarrow{AP} and a direction vector for <i>l</i> and equate to Solve and obtain $\lambda = 3$ Carry out a complete method for finding the length of <i>AP</i> Obtain the given answer 15 correctly Calling $(4, -9, 9)$ <i>B</i> , state \overrightarrow{BA} (or \overrightarrow{AB}) in component form, e.g. $-\mathbf{i} + 17\mathbf{j}$ - Calculate vector product of \overrightarrow{BA} and a direction vector for <i>l</i> , e.g. $(-\mathbf{i} + 17\mathbf{j} - 4\mathbf{k}) \times (-2\mathbf{i} + \mathbf{j} - 2\mathbf{k})$ Obtain correct answer, e.g. $-30\mathbf{i} + 6\mathbf{j} + 33\mathbf{k}$ Divide the modulus of the product by that of the direction vector	, zero	M1 A1 M1 A1 B1 M1 A1 M1	
10	(i)	if <i>D</i> ≠ 0, M [In the case the expansi <i>EITHER</i> : <i>OR</i> 1:	Il for multiplying out fully and A1 for the final answer.] e of an attempt to expand $(x^2 - 8x + 9)(1 - x)^{-1}(2 - x)^{-2}$, give M1A1A1 for ions, M1 for multiplying out fully, and A1 for the final answer.] Find \overrightarrow{AP} (or \overrightarrow{PA}) for a point <i>P</i> on <i>l</i> with parameter λ , e.g. $\mathbf{i} - 17\mathbf{j} + 4\mathbf{k} + \lambda(-2\mathbf{i} + \mathbf{j} - 2\mathbf{k})$ Calculate scalar product of \overrightarrow{AP} and a direction vector for <i>l</i> and equate to Solve and obtain $\lambda = 3$ Carry out a complete method for finding the length of <i>AP</i> Obtain the given answer 15 correctly Calling $(4, -9, 9)$ <i>B</i> , state \overrightarrow{BA} (or \overrightarrow{AB}) in component form, e.g. $-\mathbf{i} + 17\mathbf{j}$ - Calculate vector product of \overrightarrow{BA} and a direction vector for <i>l</i> , e.g. $(-\mathbf{i} + 17\mathbf{j} - 4\mathbf{k}) \times (-2\mathbf{i} + \mathbf{j} - 2\mathbf{k})$ Obtain correct answer, e.g. $-30\mathbf{i} + 6\mathbf{j} + 33\mathbf{k}$ Divide the modulus of the product by that of the direction vector Obtain the given answer correctly	, zero	M1 A1 M1 A1 B1 M1 A1 M1 A1	
10	(i)	if <i>D</i> ≠ 0, M [In the case the expansi <i>EITHER</i> :	Il for multiplying out fully and A1 for the final answer.] e of an attempt to expand $(x^2 - 8x + 9)(1 - x)^{-1}(2 - x)^{-2}$, give M1A1A1 for ions, M1 for multiplying out fully, and A1 for the final answer.] Find \overrightarrow{AP} (or \overrightarrow{PA}) for a point <i>P</i> on <i>l</i> with parameter λ , e.g. $\mathbf{i} - 17\mathbf{j} + 4\mathbf{k} + \lambda(-2\mathbf{i} + \mathbf{j} - 2\mathbf{k})$ Calculate scalar product of \overrightarrow{AP} and a direction vector for <i>l</i> and equate to Solve and obtain $\lambda = 3$ Carry out a complete method for finding the length of <i>AP</i> Obtain the given answer 15 correctly Calling $(4, -9, 9)$ <i>B</i> , state \overrightarrow{BA} (or \overrightarrow{AB}) in component form, e.g. $-\mathbf{i} + 17\mathbf{j}$ - Calculate vector product of \overrightarrow{BA} and a direction vector for <i>l</i> , e.g. $(-\mathbf{i} + 17\mathbf{j} - 4\mathbf{k}) \times (-2\mathbf{i} + \mathbf{j} - 2\mathbf{k})$ Obtain correct answer, e.g. $-30\mathbf{i} + 6\mathbf{j} + 33\mathbf{k}$ Divide the modulus of the product by that of the direction vector Obtain the given answer correctly State \overrightarrow{BA} (or \overrightarrow{AB}) in component form	, zero	M1 A1 M1 A1 B1 M1 A1 M1 A1 B1	
10	(i)	if <i>D</i> ≠ 0, M [In the case the expansi <i>EITHER</i> : <i>OR</i> 1:	Il for multiplying out fully and A1 for the final answer.] e of an attempt to expand $(x^2 - 8x + 9)(1 - x)^{-1}(2 - x)^{-2}$, give M1A1A1 for ions, M1 for multiplying out fully, and A1 for the final answer.] Find \overrightarrow{AP} (or \overrightarrow{PA}) for a point <i>P</i> on <i>l</i> with parameter λ , e.g. $\mathbf{i} - 17\mathbf{j} + 4\mathbf{k} + \lambda(-2\mathbf{i} + \mathbf{j} - 2\mathbf{k})$ Calculate scalar product of \overrightarrow{AP} and a direction vector for <i>l</i> and equate to Solve and obtain $\lambda = 3$ Carry out a complete method for finding the length of <i>AP</i> Obtain the given answer 15 correctly Calling $(4, -9, 9)$ <i>B</i> , state \overrightarrow{BA} (or \overrightarrow{AB}) in component form, e.g. $-\mathbf{i} + 17\mathbf{j}$ - Calculate vector product of \overrightarrow{BA} and a direction vector for <i>l</i> , e.g. $(-\mathbf{i} + 17\mathbf{j} - 4\mathbf{k}) \times (-2\mathbf{i} + \mathbf{j} - 2\mathbf{k})$ Obtain correct answer, e.g. $-30\mathbf{i} + 6\mathbf{j} + 33\mathbf{k}$ Divide the modulus of the product by that of the direction vector Obtain the given answer correctly State \overrightarrow{BA} (or \overrightarrow{AB}) in component form Use a scalar product to find the projection of <i>BA</i> (or <i>AB</i>) on <i>l</i>	, zero	M1 A1 M1 A1 B1 M1 A1 M1 A1 B1 M1	
10	(i)	if <i>D</i> ≠ 0, M [In the case the expansi <i>EITHER</i> : <i>OR</i> 1:	Il for multiplying out fully and A1 for the final answer.] e of an attempt to expand $(x^2 - 8x + 9)(1 - x)^{-1}(2 - x)^{-2}$, give M1A1A1 for ions, M1 for multiplying out fully, and A1 for the final answer.] Find \overrightarrow{AP} (or \overrightarrow{PA}) for a point <i>P</i> on <i>l</i> with parameter λ , e.g. $\mathbf{i} - 17\mathbf{j} + 4\mathbf{k} + \lambda(-2\mathbf{i} + \mathbf{j} - 2\mathbf{k})$ Calculate scalar product of \overrightarrow{AP} and a direction vector for <i>l</i> and equate to Solve and obtain $\lambda = 3$ Carry out a complete method for finding the length of <i>AP</i> Obtain the given answer 15 correctly Calling $(4, -9, 9)$ <i>B</i> , state \overrightarrow{BA} (or \overrightarrow{AB}) in component form, e.g. $-\mathbf{i} + 17\mathbf{j}$ - Calculate vector product of \overrightarrow{BA} and a direction vector for <i>l</i> , e.g. $(-\mathbf{i} + 17\mathbf{j} - 4\mathbf{k}) \times (-2\mathbf{i} + \mathbf{j} - 2\mathbf{k})$ Obtain correct answer, e.g. $-30\mathbf{i} + 6\mathbf{j} + 33\mathbf{k}$ Divide the modulus of the product by that of the direction vector Obtain the given answer correctly State \overrightarrow{BA} (or \overrightarrow{AB}) in component form	, zero	M1 A1 M1 A1 B1 M1 A1 M1 A1 B1	

(ii) <i>EITHER</i> : Substitute coordinates of a general point of l in equation of plane and either equate constant terms or equate the coefficient of λ to zero, obtaining an equation in a and b M1* Obtain a correct equation, e.g. $4a - 9b - 27 + 1 = 0$ A1 Obtain a second correct equation, e.g. $-2a + b + 6 = 0$ A1 Solve for a or for b M1(dep*) Obtain $a = 2$ and $b = -2$ A1 <i>OR</i> : Substitute coordinates of a point of l and obtain a correct equation, e.g. $4a - 9b = 26$ B1 <i>EITHER</i> : Find a second point on l and obtain an equation in a and b M1* Obtain a correct equation A1 <i>OR</i> : Calculate scalar product of a direction vector for l and a vector normal to the plane and equate to zero M1* Obtain a correct equation, e.g. $-2a + b + 6 = 0$ A1 Solve for a or for b M1(dep*)	更多咨询	清登录 www.qyconsult.com		群尧咨询	
Cambridge International A Level - October/November 2014970932Obtain the given answer correctlyA1OR3:State \overline{BA} (or \overline{AB}) in component formB1Use a scalar product to find the cosine of ABP M1Obtain correct answer in any form, e.g. $\frac{27}{\sqrt{9}\sqrt{306}}$ A1Use trig, to find the perpendicularM1Obtain the given answer correctlyA1OR4:State \overline{BA} (or \overline{AB}) in component formB1Find a second point $C on I$ and use the cosine rule in triangle ABC to find the cosine of angle A , B , or C , or use a vector product to find the area of ABC M1Obtain correct answer in any formA1Use trig, or area formula to find the perpendicularM1Obtain the given answer correctlyA1OR5:State correct \overline{AP} (or \overline{PA}) for a point P on I with parameter λ in any formUse correct expression in any form, obtain a correct expression in any form, e.g. $(1-2\lambda)^2 + (-17+\lambda)^2 + (4-2\lambda)^2$ A1Carry out a method for finding its minimum (using calculus, algebra or Pythagoras)M1Obtain the given answer correctlyA1If(ii) EITHER:Substitute coordinates of a general point of l in equation of plane and either equate constant terms or equate the coefficient of λ to zero, obtaining an equate constant terms or equate the coefficient of λ to zero, obtaining an equate constant terms or equate the coefficient of λ to zero, obtaining an equate constant terms or equate the coefficient of λ to zero, obtaining an equate constant terms or equate the coefficient of λ to zero, obtaining an equate constant terms or equate th	Page 7	Mark Scheme	Syllabus	s Pap	er
OR3:State \overline{BA} (or \overline{AB}) in component formB1Use a scalar product to find the cosine of ABP M1Obtain correct answer in any form, e.g. $\frac{27}{\sqrt{9}.\sqrt{306}}$ A1Use trig. to find the perpendicularM1Obtain the given answer correctlyA1OR4:State \overline{BA} (or \overline{AB}) in component formB1Find a second point C on l and use the cosine rule in triangle ABC to find the cosine of angle A, B, or C, or use a vector product to find the area of ABCM1Obtain correct answer in any formA1Use trig. or area formula to find the perpendicularM1Obtain the given answer correctlyA1OR5:State correct \overline{AP} (or \overline{PA}) for a point P on l with parameter λ in any formB1Use correct method to express AP^2 (or AP) in terms of λ M1Obtain a correct expression in any form, e.g. $(1-2\lambda)^3 + (-17 + \lambda)^2 + (4-2\lambda)^2$ A1Carry out a method for finding its minimum (using calculus, algebra or Pythagoras)M1Obtain a correct equation, e.g. $4a - 9b - 27 + 1 = 0$ A1Obtain a second correct equation, e.g. $-2a + b + 6 = 0$ A1Solve for a or for bM1(dep*)Obtain a 2 and $b = -2$ A1OR:Substitute coordinates of a point of l and obtain a correct equation, e.g. $4a - 9b - 26$ B1EITHER: Find a second point on l and obtain a correct equation, e.g. $4a - 9b = 26$ B1OR:Calculate scalar product of a direction vector of l and a vector normal to the plane and equate to zeroM1* Obtain a correct equationOR:Calculate sc		Cambridge International A Level – October/November 20	014 9709	32	
OR3:State \overline{BA} (or \overline{AB}) in component formB1Use a scalar product to find the cosine of ABP M1Obtain correct answer in any form, e.g. $\frac{27}{\sqrt{9}.\sqrt{306}}$ A1Use trig. to find the perpendicularM1Obtain the given answer correctlyA1OR4:State \overline{BA} (or \overline{AB}) in component formB1Find a second point C on l and use the cosine rule in triangle ABC to find the cosine of angle A, B, or C, or use a vector product to find the area of ABCM1Obtain correct answer in any formA1Use trig. or area formula to find the perpendicularM1Obtain the given answer correctlyA1OR5:State correct \overline{AP} (or \overline{PA}) for a point P on l with parameter λ in any formB1Use correct method to express AP^2 (or AP) in terms of λ M1Obtain a correct expression in any form, e.g. $(1-2\lambda)^3 + (-17 + \lambda)^2 + (4-2\lambda)^2$ A1Carry out a method for finding its minimum (using calculus, algebra or Pythagoras)M1Obtain a correct equation, e.g. $4a - 9b - 27 + 1 = 0$ A1Obtain a second correct equation, e.g. $-2a + b + 6 = 0$ A1Solve for a or for bM1(dep*)Obtain a 2 and $b = -2$ A1OR:Substitute coordinates of a point of l and obtain a correct equation, e.g. $4a - 9b - 26$ B1EITHER: Find a second point on l and obtain a correct equation, e.g. $4a - 9b = 26$ B1OR:Calculate scalar product of a direction vector of l and a vector normal to the plane and equate to zeroM1* Obtain a correct equationOR:Calculate sc		Obtain the given answer correctly		A1	
Use a scalar product to find the cosine of ABP M1 Obtain correct answer in any form, e.g. $\frac{27}{\sqrt{9}\sqrt{306}}$ A1 Use trig. to find the perpendicular M1 Obtain the given answer correctly A1 OR4: State \overline{BA} (or \overline{AB}) in component form B1 Find a second point C on I and use the cosine rule in triangle ABC to find the cosine of angle A, B, or C, or use a vector product to find the area of ABC M1 Obtain correct answer in any form A1 Use trig. or area formula to find the perpendicular M1 Obtain the given answer correctly A1 OR5: State correct \overline{AP} (or \overline{PA}) for a point P on I with parameter λ in any form B1 Use correct method to express AP^2 (or AP) in terms of λ M1 Obtain a correct expression in any form, e.g. $(1-2\lambda)^2 + (-17 + \lambda)^2 + (4-2\lambda)^2$ A1 Carry out a method for finding its minimum (using calculus, algebra or Pythagoras) M1 Obtain the given answer correctly A1 (ii) EITHER: Substitute coordinates of a general point of I in equation of plane and either equation in a and b M1* Obtain a correct equation, e.g. $-2a + b + 6 = 0$ A1 Solve for a or for b M1(dep*) Obtain a correct equation of a point of I and obtain a correct equation, e.g. $4a - 9b - 26$ B1 EITHER: Find a second point of I and obtain an equation in a and b M1* Obtain a correct equation of a point of I and obtain a correct equation, e.g. $4a - 9b = 26$ B1 EITHER: Find a second point on I and obtain an equation in a and b M1* Obtain a correct equation of a direction vector for I and a vector normal to the plane and equate to zero M1* Obtain a correct equation f a direction vector for I and a vector normal to the plane and equate to zero A1 Solve for a or for b A1 OR: Calculate scalar product of a direction vector for I and a vector normal to the plane and equate to zero A1 Solve for a or for b A	OP				
Obtain correct answer in any form, e.g. $\frac{27}{\sqrt{9}\sqrt{306}}$ A1Use trig. to find the perpendicularM1Obtain the given answer correctlyA1OR4:State \overline{BA} (or \overline{AB}) in component formB1Find a second point C on I and use the cosine rule in triangle ABC to find the cosine of angle A, B, or C, or use a vector product to find the area of ABCM1Obtain correct answer in any formA1Use trig. or area formula to find the perpendicularM1Obtain correct answer correctlyA1OR5:State correct \overline{AP} (or \overline{PA}) for a point P on I with parameter λ in any formB1Use correct method to express AP^2 (or AP) in terms of λ M1Obtain a correct expression in any form, e.g. $(1-2\lambda)^2 + (-17+\lambda)^2 + (4-2\lambda)^2$ A1Carry out a method for finding its minimum (using calculus, algebra or Pythagoras)M1Obtain a correct equation, e.g. $4a - 9b - 27 + 1 = 0$ A1Obtain a second correct equation, e.g. $-2a + b + 6 = 0$ A1Solve for a or for bM1(dep*)Obtain a ecorect equation, e.g. $-2a + b + 6 = 0$ A1Solve for a or for bM1*Obtain a second point of a direction vector for l and a vector normal to the plane and equation in a and bM1*Obtain a correct equationA1OR:Substitute coordinates of a point of a direction vector for l and a vector normal to the plane and equate to zeroM1Obtain a correct equationA1OR:Substitute coordinates of a point of a direction vector for l and a vector normal to the plane and equate to zeroM	UK.				
Use trig. to find the perpendicularM1Obtain the given answer correctlyA1OR4:State \overline{BA} (or \overline{AB}) in component formB1Find a second point C on I and use the cosine rule in triangle ABC to find the cosine of angle A , B , or C , or use a vector product to find the area of ABC M1Obtain correct answer in any formA1A1Use trig. or area formula to find the perpendicularM1Obtain the given answer correctlyA1OR5:State correct \overline{AP} (or \overline{PA}) for a point P on I with parameter λ in any formUse correct method to express AP^2 (or AP) in terms of λ M1Obtain a correct expression in any form, e.g. $(1-2\lambda)^2 + (-17+\lambda)^2 + (4-2\lambda)^2$ A1Carry out a method for finding its minimum (using calculus, algebra or Pythagoras)M1Obtain the given answer correctlyA1(ii) EITHER:Substitute coordinates of a general point of l in equation of plane and either equate constant terms or equate the coefficient of λ to zero, obtaining an equation in a and b M1* Obtain a correct equation, e.g. $-2a + b + 6 = 0$ OR:Substitute coordinates of a point of l and obtain a correct equation, e.g. $4a - 9b = 26$ B1EITHER: Find a second point of l and obtain an equation in a and b M1* Obtain a correct equationOR:Calculate scalar product of a direction vector for l and a vector normal to the plane and equate to zeroM1Obtain a correct equationA1GRCiti $EITHER:$ Find a second point of l and obtain a correct equation, e.g. $4a - 9b = 26$ B1 <td></td> <td>-</td> <td></td> <td></td> <td></td>		-			
Obtain the given answer correctlyA1OR4:State \overline{BA} (or \overline{AB}) in component formB1Find a second point C on l and use the cosine rule in triangle ABC to find the cosine of angle A , B , or C , or use a vector product to find the area of ABC M1Obtain correct answer in any formA1Use trig. or area formula to find the perpendicularM1Obtain correct \overline{AP} (or \overline{PA}) for a point P on l with parameter λ in any formB1Use correct method to express AP^2 (or AP) in terms of λ M1Obtain a correct expression in any form, e.g. $(1-2\lambda)^2 + (-17+\lambda)^2 + (4-2\lambda)^2$ A1Carry out a method for finding its minimum (using calculus, algebra or Pythagoras)M1Obtain the given answer correctlyA1(ii) EITHER:Substitute coordinates of a general point of l in equation of plane and either equate constant terms or equate the coefficient of λ to zero, obtaining an equation in a and b M1* Obtain a correct equation, e.g. $4a - 9b - 27 + 1 = 0$ A1OR:Substitute coordinates of a point of l and obtain a correct equation, solve for a or for b M1(dep*) Obtain a correct equation, e.g. $-2a + b + 6 = 0$ A1OR:Substitute coordinates of a point of l and obtain a correct equation, e.g. $4a - 9b - 27 + 1 = 0$ A1OR:Calculate scalar product of a did obtain a correct equation, e.g. $4a - 9b - 27 + 1 = 0$ A1OR:Substitute coordinates of a point of l and obtain a correct equation, e.g. $4a - 9b - 26$ B1EITHER:Find a second point on l and obtain a correct equation, e.g. $4a - 9b = 26$ <		Obtain correct answer in any form, e.g. $\sqrt{9}.\sqrt{306}$		Al	
Obtain the given answer correctlyA1OR4:State \overline{BA} (or \overline{AB}) in component formB1Find a second point C on l and use the cosine rule in triangle ABC to find the cosine of angle A , B , or C , or use a vector product to find the area of ABC M1Obtain correct answer in any formA1Use trig. or area formula to find the perpendicularM1Obtain correct \overline{AP} (or \overline{PA}) for a point P on l with parameter λ in any formB1Use correct method to express AP^2 (or AP) in terms of λ M1Obtain a correct expression in any form, e.g. $(1-2\lambda)^2 + (-17+\lambda)^2 + (4-2\lambda)^2$ A1Carry out a method for finding its minimum (using calculus, algebra or Pythagoras)M1Obtain the given answer correctlyA1(ii) EITHER:Substitute coordinates of a general point of l in equation of plane and either equate constant terms or equate the coefficient of λ to zero, obtaining an equation in a and b M1* Obtain a correct equation, e.g. $4a - 9b - 27 + 1 = 0$ A1OR:Substitute coordinates of a point of l and obtain a correct equation, solve for a or for b M1(dep*) Obtain a correct equation, e.g. $-2a + b + 6 = 0$ A1OR:Substitute coordinates of a point of l and obtain a correct equation, e.g. $4a - 9b - 27 + 1 = 0$ A1OR:Calculate scalar product of a did obtain a correct equation, e.g. $4a - 9b - 27 + 1 = 0$ A1OR:Substitute coordinates of a point of l and obtain a correct equation, e.g. $4a - 9b - 26$ B1EITHER:Find a second point on l and obtain a correct equation, e.g. $4a - 9b = 26$ <		Use trig. to find the perpendicular		M1	
Find a second point C on I and use the cosine rule in triangle ABC to find the cosine of angle A, B, or C, or use a vector product to find the area of ABCM1 Obtain correct answer in any formA1 Use trig, or area formula to find the perpendicularM1 Obtain the given answer correctlyA1OR5:State correct \overline{AP} (or \overline{PA}) for a point P on I with parameter λ in any formB1 Use correct method to express AP^2 (or AP) in terms of λ M1 Obtain a correct expression in any form, 				A1	
Find a second point C on I and use the cosine rule in triangle ABC to find the cosine of angle A, B, or C, or use a vector product to find the area of ABCM1 Obtain correct answer in any formA1 Use trig, or area formula to find the perpendicularM1 Obtain the given answer correctlyA1OR5:State correct \overline{AP} (or \overline{PA}) for a point P on I with parameter λ in any formB1 Use correct method to express AP^2 (or AP) in terms of λ M1 Obtain a correct expression in any form, e.g. $(1-2\lambda)^2 + (-17+\lambda)^2 + (4-2\lambda)^2$ A1Carry out a method for finding its minimum (using calculus, algebra or Pythagoras)M1 Obtain the given answer correctlyA1(ii) EITHER:Substitute coordinates of a general point of I in equation of plane and either equate constant terms or equate the coefficient of λ to zero, obtaining an equation in a and b Obtain a correct equation, e.g. $-2a + b + 6 = 0$ A1OR:Substitute coordinates of a point of I and obtain a correct equation, e.g. $4a - 9b - 27 + 1 = 0$ A1OR:Substitute coordinates of a point of I and obtain a correct equation, e.g. $4a - 9b - 27 + 1 = 0$ A1OB:M1(dep*) Obtain a correct equation, e.g. $-2a + b + 6 = 0$ A1Obtain a a correct equation, e.g. $-2a + b + 6 = 0$ A1Solve for a or for bM1 M1* Obtain a correct equationA1OR:Substitute coordinates of a point of I and obtain an equation in a and b M1* Obtain a correct equationA1Obtain a correct equation on I and obtain an equation in a and b M1* Obtain a correct equation in e.g. $-2a + b + 6 = 0$ A1Obtain a correct equation on I and obtain an equat	OR4	4: State \overrightarrow{BA} (or \overrightarrow{AB}) in component form		B1	
Obtain correct answer in any formA1 Use trig. or area formula to find the perpendicularA1 M1 Obtain the given answer correctlyA1OR5:State correct \overrightarrow{AP} (or \overrightarrow{PA}) for a point P on I with parameter λ in any formB1 Use correct method to express AP^2 (or AP) in terms of λ M1 Obtain a correct expression in any form, e.g. $(1-2\lambda)^2 + (-17+\lambda)^2 + (4-2\lambda)^2$ A1 Carry out a method for finding its minimum (using calculus, algebra or Pythagoras)M1 Obtain the given answer correctlyM1 A1(ii) EITHER:Substitute coordinates of a general point of I in equation of plane and either equate constant terms or equate the coefficient of λ to zero, obtaining an equation in a and bM1* Obtain a correct equation, e.g. $-2a + b + 6 = 0$ A1 Solve for a or for bOR:Substitute coordinates of a point of I and obtain a correct equation, e.g. $4a - 9b = 26$ B1 EITHER:OR:Calculate scalar product of a direction vector for I and a vector normal to the plane and equate to zeroM1* Obtain a correct equationOR:Calculate scalar product of a direction vector for I and a vector normal to the plane and equate to zeroM1* Obtain a correct equation		Find a second point C on l and use the cosine rule in triang			
Use trig. or area formula to find the perpendicularM1 Obtain the given answer correctlyA1OR5:State correct \overrightarrow{AP} (or \overrightarrow{PA}) for a point P on I with parameter λ in any formB1 Use correct method to express AP^2 (or AP) in terms of λ M1 Obtain a correct expression in any form, e.g. $(1-2\lambda)^2 + (-17 + \lambda)^2 + (4-2\lambda)^2$ A1 Carry out a method for finding its minimum (using calculus, algebra or Pythagoras)M1 Obtain the given answer correctlyA1(ii) EITHER:Substitute coordinates of a general point of I in equation of plane and either equate constant terms or equate the coefficient of λ to zero, obtaining an equation in a and bM1* Obtain a correct equation, e.g. $-2a + b + 6 = 0$ A1 Obtain $a = 2$ and $b = -2$ OR:Substitute coordinates of a point of I and obtain a correct equation, e.g. $4a - 9b = 26$ B1 EITHER:OR:Substitute coordinates of a point of I and obtain a correct equation, e.g. $4a - 9b = 26$ B1 EITHER:OR:Calculate scalar product of a direction vector for I and a vector normal to the plane and equate to zeroM1* Obtain a correct equation, e.g. $-2a + b + 6 = 0$ OR:Calculate scalar product of a direction vector for I and a vector normal to the plane and equate to zeroM1* oDtain a correct equationOB:Calculate scalar product of a direction vector for I and a vector normal to the plane and equate to zeroM1* oDtain a correct equation, e.g. $-2a + b + 6 = 0$ OB:Calculate scalar product of a direction vector for I and a vector normal to the plane and equate to zeroM1* oDtain a correct equation, e.g. $-2a + b + 6 = 0$			he area of <i>ABC</i>		
Obtain the given answer correctlyA1OR5:State correct \overrightarrow{AP} (or \overrightarrow{PA}) for a point P on I with parameter λ in any formB1Use correct method to express AP^2 (or AP) in terms of λ M1Obtain a correct expression in any form,e.g. $(1-2\lambda)^2 + (-17+\lambda)^2 + (4-2\lambda)^2$ A1Carry out a method for finding its minimum (using calculus, algebra or Pythagoras)M1Obtain the given answer correctlyA1[f(ii) EITHER:Substitute coordinates of a general point of I in equation of plane and either equate constant terms or equate the coefficient of λ to zero, obtaining an equation in a and bM1* Obtain a correct equation, e.g. $4a - 9b - 27 + 1 = 0$ Obtain a second correct equation, e.g. $-2a + b + 6 = 0$ A1 Obtain a = 2 and $b = -2$ OR:Substitute coordinates of a point of I and obtain a correct equation, e.g. $4a - 9b = 26$ B1 EITHER:EITHER:Find a second point on I and obtain an equation in a and bM1* M1* Obtain a correct equationOR:Calculate scalar product of a direction vector for I and a vector normal to the plane and equate to zeroM1* M1* Obtain a correct equation, e.g. $-2a + b + 6 = 0$ OR:Calculate scalar product of a direction vector for I and a vector normal to the plane and equate to zeroM1* M1 M1* Obtain a correct equation, e.g. $-2a + b + 6 = 0$					
OR5:State correct \overrightarrow{AP} (or \overrightarrow{PA}) for a point P on I with parameter λ in any formB1Use correct method to express AP^2 (or AP) in terms of λ M1Obtain a correct expression in any form,e.g. $(1-2\lambda)^2 + (-17+\lambda)^2 + (4-2\lambda)^2$ A1Carry out a method for finding its minimum (using calculus, algebraor Pythagoras)M1Obtain the given answer correctlyA1[4](ii) EITHER:Substitute coordinates of a general point of I in equation of plane and either equate constant terms or equate the coefficient of λ to zero, obtaining an equation in a and bM1*Obtain a correct equation, e.g. $4a - 9b - 27 + 1 = 0$ A1Obtain a second correct equation, e.g. $-2a + b + 6 = 0$ A1Solve for a or for bM1(dep*)Obtain a = 2 and $b = -2$ A1OR:Substitute coordinates of a point of I and obtain a correct equation, e.g. $4a - 9b = 26$ B1EITHER:Find a second point on I and obtain an equation in a and bM1* Obtain a correct equationOR:Calculate scalar product of a direction vector for I and a vector normal to the plane and equate to zeroM1* Obtain a correct equation, e.g. $-2a + b + 6 = 0$ Obtain a correct equationA1					
Use correct method to express AP^2 (or AP) in terms of λ M1 Obtain a correct expression in any form, e.g. $(1-2\lambda)^2 + (-17+\lambda)^2 + (4-2\lambda)^2$ A1 Carry out a method for finding its minimum (using calculus, algebra or Pythagoras) M1 Obtain the given answer correctly A1 [5 (ii) <i>EITHER</i> : Substitute coordinates of a general point of l in equation of plane and either equate constant terms or equate the coefficient of λ to zero, obtaining an equation in a and b M1* Obtain a correct equation, e.g. $4a - 9b - 27 + 1 = 0$ A1 Obtain a second correct equation, e.g. $-2a + b + 6 = 0$ A1 Solve for a or for b M1(dep*) Obtain $a = 2$ and $b = -2$ A1 <i>OR</i> : Substitute coordinates of a point of l and obtain a correct equation, e.g. $4a - 9b = 26$ B1 <i>EITHER</i> : Find a second point on l and obtain an equation in a and b M1* Obtain a correct equation A and A M1* Obtain a correct equation A and A M1 <i>OR</i> : Calculate scalar product of a direction vector for l and a vector normal to the plane and equate to zero M1* Obtain a correct equation, e.g. $-2a + b + 6 = 0$ A1 Solve for a or for b M1(dep*) Obtain a correct equation A and A M1* Obtain a correct equation A and A A1 OR: Calculate scalar product of a direction vector for l and a vector normal to the plane and equate to zero M1* Obtain a correct equation, e.g. $-2a + b + 6 = 0$ A1 Solve for a or for b M1(dep*)					
Obtain a correct expression in any form, e.g. $(1-2\lambda)^2 + (-17+\lambda)^2 + (4-2\lambda)^2$ A1Carry out a method for finding its minimum (using calculus, algebra or Pythagoras)M1Obtain the given answer correctlyA1(ii) <i>EITHER</i> :Substitute coordinates of a general point of l in equation of plane and either equate constant terms or equate the coefficient of λ to zero, obtaining an equation in a and b M1*Obtain a correct equation, e.g. $4a - 9b - 27 + 1 = 0$ A1Obtain a second correct equation, e.g. $-2a + b + 6 = 0$ A1Solve for a or for b M1(dep*)Obtain $a = 2$ and $b = -2$ A1OR:Substitute coordinates of a point of l and obtain a correct equation, e.g. $4a - 9b = 26$ B1EITHER:Find a second point on l and obtain an equation in a and b M1* Obtain a correct equationOR:Calculate scalar product of a direction vector for l and a vector normal to the plane and equate to zeroM1* Obtain a correct equation, e.g. $-2a + b + 6 = 0$ Obtain a correct equation, e.g. $-2a + b + 6 = 0$ A1	ORS		$r \lambda$ in any form		
e.g. $(1-2\lambda)^2 + (-17+\lambda)^2 + (4-2\lambda)^2$ A1Carry out a method for finding its minimum (using calculus, algebra or Pythagoras)M1Obtain the given answer correctlyA1(ii) EITHER:Substitute coordinates of a general point of l in equation of plane and either equate constant terms or equate the coefficient of λ to zero, obtaining an equation in a and bM1* Obtain a correct equation, e.g. $4a - 9b - 27 + 1 = 0$ Obtain a second correct equation, e.g. $-2a + b + 6 = 0$ A1 Solve for a or for bM1(dep*) Obtain a correct equation, e.g. $-2a + b + 6 = 0$ OR:Substitute coordinates of a point of l and obtain a correct equation, e.g. $4a - 9b = 26$ B1 EITHER: Find a second point on l and obtain an equation in a and bOR:Calculate scalar product of a direction vector for l and a vector normal to the plane and equate to zeroM1* A1Obtain a correct equation, e.g. $-2a + b + 6 = 0$ A1Solve for a or for bM1(dep*)Obtain a correct equationA1OR:Substitute coordinates of a point of l and obtain an equation in a and bM1* Obtain a correct equationA1OR:Calculate scalar product of a direction vector for l and a vector normal to the plane and equate to zeroM1* Obtain a correct equation, e.g. $-2a + b + 6 = 0$ A1Solve for a or for bM1(dep*)		• · · · · ·		M1	
Carry out a method for finding its minimum (using calculus, algebra or Pythagoras) M1 Obtain the given answer correctly A1 [5] (ii) <i>EITHER</i> : Substitute coordinates of a general point of l in equation of plane and either equate constant terms or equate the coefficient of λ to zero, obtaining an equation in a and b M1* Obtain a correct equation, e.g. $4a - 9b - 27 + 1 = 0$ A1 Obtain a second correct equation, e.g. $-2a + b + 6 = 0$ A1 Solve for a or for b M1(dep*) Obtain $a = 2$ and $b = -2$ A1 <i>OR</i> : Substitute coordinates of a point of l and obtain a correct equation, e.g. $4a - 9b = 26$ B1 <i>EITHER</i> : Find a second point on l and obtain an equation in a and b M1* Obtain a correct equation $A1$ <i>OR</i> : Calculate scalar product of a direction vector for l and a vector normal to the plane and equate to zero M1* Obtain a correct equation, e.g. $-2a + b + 6 = 0$ A1 Solve for a or for b M1(dep*)		- · ·		Λ 1	
or Pythagoras) M1 Obtain the given answer correctly A1 [4] (ii) <i>EITHER</i> : Substitute coordinates of a general point of <i>l</i> in equation of plane and either equate constant terms or equate the coefficient of λ to zero, obtaining an equation in <i>a</i> and <i>b</i> M1* Obtain a correct equation, e.g. $4a - 9b - 27 + 1 = 0$ A1 Obtain a second correct equation, e.g. $-2a + b + 6 = 0$ A1 Solve for <i>a</i> or for <i>b</i> M1(dep*) Obtain $a = 2$ and $b = -2$ A1 <i>OR</i> : Substitute coordinates of a point of <i>l</i> and obtain a correct equation, e.g. $4a - 9b = 26$ B1 <i>EITHER</i> : Find a second point on <i>l</i> and obtain an equation in <i>a</i> and <i>b</i> M1* Obtain a correct equation (<i>a</i> direction vector for <i>l</i> and a vector normal to the plane and equate to zero M1* Obtain a correct equation, e.g. $-2a + b + 6 = 0$ A1 Solve for <i>a</i> or for <i>b</i> M1(dep*)				AI	
Obtain the given answer correctlyA1[4](ii) EITHER:Substitute coordinates of a general point of l in equation of plane and either equate constant terms or equate the coefficient of λ to zero, obtaining an equation in a and bM1* M1* M1* Obtain a correct equation, e.g. $4a - 9b - 27 + 1 = 0$ A1 M1 Obtain a second correct equation, e.g. $-2a + b + 6 = 0$ A1 Solve for a or for bM1(dep*) M1(dep*) Obtain $a = 2$ and $b = -2$ A1 M1 Obtain a correct equation of l and obtain a correct equation, e.g. $4a - 9b = 26$ B1 EITHER: Find a second point of l and obtain an equation in a and b M1* Obtain a correct equationM1* A1 M1* A1OR:Calculate scalar product of a direction vector for l and a vector normal to the plane and equate to zeroM1* M1* M1* Obtain a correct equation, e.g. $-2a + b + 6 = 0$ A1 M1* 			is, algebra	M1	
(ii) <i>EITHER</i> : Substitute coordinates of a general point of l in equation of plane and either equate constant terms or equate the coefficient of λ to zero, obtaining an equation in a and b M1* Obtain a correct equation, e.g. $4a - 9b - 27 + 1 = 0$ A1 Obtain a second correct equation, e.g. $-2a + b + 6 = 0$ A1 Solve for a or for b M1(dep*) Obtain $a = 2$ and $b = -2$ A1 <i>OR</i> : Substitute coordinates of a point of l and obtain a correct equation, e.g. $4a - 9b = 26$ B1 <i>EITHER</i> : Find a second point on l and obtain an equation in a and b M1* Obtain a correct equation A1 <i>OR</i> : Calculate scalar product of a direction vector for l and a vector normal to the plane and equate to zero M1* Obtain a correct equation, e.g. $-2a + b + 6 = 0$ A1 Solve for a or for b M1(dep*)		• •			[5]
equate constant terms or equate the coefficient of λ to zero, obtaining an equation in a and b M1* Obtain a correct equation, e.g. $4a - 9b - 27 + 1 = 0$ A1 Obtain a second correct equation, e.g. $-2a + b + 6 = 0$ A1 Solve for a or for b M1(dep*) Obtain $a = 2$ and $b = -2$ A1 Substitute coordinates of a point of l and obtain a correct equation, e.g. $4a - 9b = 26$ B1 EITHER: Find a second point on l and obtain an equation in a and b M1* Obtain a correct equation A1 OR: Calculate scalar product of a direction vector for l and a vector normal to the plane and equate to zero M1* Obtain a correct equation, e.g. $-2a + b + 6 = 0$ A1 Solve for a or for b M1*		obtain the given answer concerny		211	[9]
equation in a and b M1* Obtain a correct equation, e.g. $4a - 9b - 27 + 1 = 0$ A1 Obtain a second correct equation, e.g. $-2a + b + 6 = 0$ A1 Solve for a or for b Obtain a = 2 and b = -2 OR: Substitute coordinates of a point of l and obtain a correct equation, e.g. $4a - 9b = 26$ EITHER: Find a second point on l and obtain an equation in a and b M1* Obtain a correct equation OR: Calculate scalar product of a direction vector for l and a vector normal to the plane and equate to zero Obtain a correct equation, e.g. $-2a + b + 6 = 0$ M1* Obtain a correct equation, e.g. $-2a + b + 6 = 0$ M1(dep*)	(ii) <i>E</i>	CITHER: Substitute coordinates of a general point of <i>l</i> in equation	of plane and eithe	er	
Obtain a correct equation, e.g. $4a - 9b - 27 + 1 = 0$ A1Obtain a second correct equation, e.g. $-2a + b + 6 = 0$ A1Solve for a or for bM1(dep*)Obtain $a = 2$ and $b = -2$ A1OR:Substitute coordinates of a point of l and obtain a correct equation, e.g. $4a - 9b = 26$ B1EITHER:Find a second point on l and obtain an equation in a and bM1* M1* Obtain a correct equationOR:Calculate scalar product of a direction vector for l and a vector normal to the plane and equate to zeroM1* M1* Obtain a correct equation, e.g. $-2a + b + 6 = 0$ Solve for a or for bM1(dep*)		equate constant terms or equate the coefficient of λ to ze	ro, obtaining an		
Obtain a second correct equation, e.g. $-2a + b + 6 = 0$ A1Solve for a or for bM1(dep*)Obtain $a = 2$ and $b = -2$ A1OR:Substitute coordinates of a point of l and obtain a correct equation, e.g. $4a - 9b = 26$ B1EITHER:Find a second point on l and obtain an equation in a and bM1* M1* Obtain a correct equationOR:Calculate scalar product of a direction vector for l and a vector normal to the plane and equate to zeroM1* A1Solve for a or for bM1* M1(dep*)				M1*	
Solve for a or for bM1(dep*)Obtain $a = 2$ and $b = -2$ A1OR:Substitute coordinates of a point of l and obtain a correct equation, e.g. $4a - 9b = 26$ B1EITHER:Find a second point on l and obtain an equation in a and bM1* M1* Obtain a correct equationOR:Calculate scalar product of a direction vector for l and a vector normal to the plane and equate to zeroM1* Obtain a correct equation, e.g. $-2a + b + 6 = 0$ Solve for a or for bM1(dep*)					
Obtain $a = 2$ and $b = -2$ A1OR:Substitute coordinates of a point of l and obtain a correct equation, e.g. $4a - 9b = 26$ B1EITHER:Find a second point on l and obtain an equation in a and b M1* M1* Obtain a correct equationOR:Calculate scalar product of a direction vector for l and a vector normal to the plane and equate to zeroM1* M1* Obtain a correct equation, e.g. $-2a + b + 6 = 0$ Solve for a or for b M1(dep*)					
OR:Substitute coordinates of a point of l and obtain a correct equation, e.g. $4a - 9b = 26$ B1EITHER:Find a second point on l and obtain an equation in a and bM1* M1* Obtain a correct equationA1OR:Calculate scalar product of a direction vector for l and a vector normal to the plane and equate to zeroM1* M1* Obtain a correct equation, e.g. $-2a + b + 6 = 0$ M1Solve for a or for bM1(dep*)			М	1(dep*)	
e.g. $4a - 9b = 26$ B1EITHER: Find a second point on l and obtain an equation in a and bM1*Obtain a correct equationA1OR:Calculate scalar product of a direction vector for l and a vector normal to the plane and equate to zeroM1*Obtain a correct equation, e.g. $-2a + b + 6 = 0$ A1Solve for a or for bM1(dep*)				A1	
EITHER:Find a second point on l and obtain an equation in a and bM1* M1 M1Obtain a correct equationA1OR:Calculate scalar product of a direction vector for l and a vector normal to the plane and equate to zeroM1* M1* Obtain a correct equation, e.g. $-2a + b + 6 = 0$ Solve for a or for bM1(dep*)	OR:	•	t equation,		
Obtain a correct equationA1OR:Calculate scalar product of a direction vector for l and a vector normal to the plane and equate to zeroM1*Obtain a correct equation, e.g. $-2a + b + 6 = 0$ A1Solve for a or for bM1(dep*)					
OR:Calculate scalar product of a direction vector for l and a vector normal to the plane and equate to zeroM1* M1* Obtain a correct equation, e.g. $-2a + b + 6 = 0$ Solve for a or for bM1(dep*)			on in <i>a</i> and <i>b</i>		
normal to the plane and equate to zeroM1*Obtain a correct equation, e.g. $-2a + b + 6 = 0$ A1Solve for a or for bM1(dep*)				A1	
Obtain a correct equation, e.g. $-2a + b + 6 = 0$ A1Solve for a or for bM1(dep*)			tor <i>l</i> and a vector	3 5 4 -0.	
Solve for a or for b M1(dep*)		· ·			
		·			
Obtain $a = 2$ and $b = -2$ Al [5]			Μ		
		Obtain $a = 2$ and $b = -2$		Al	[5]