

2014 Mathematics Paper 1 (Non-calculator)

National 5

Finalised Marking Instructions

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General Marking Principles for National 5 Mathematics

This information is provided to help you understand the general principles you must apply when marking candidate responses to questions in this Paper. These principles must be read in conjunction with the detailed marking instructions, which identify the key features required in candidate responses.

- (a) Marks for each candidate response must always be assigned in line with these General Marking Principles and the Detailed Marking Instructions for this assessment.
- (b) Marking should always be positive. This means that, for each candidate response, marks are accumulated for the demonstration of relevant skills, knowledge and understanding: they are not deducted from a maximum on the basis of errors or omissions.
- (c) Credit must be assigned in accordance with the specific assessment guidelines.
- (d) Candidates may use any mathematically correct method to answer questions except in cases where a particular method is specified or excluded.
- (e) Working subsequent to an error must be followed through, with possible credit for the subsequent working, provided that the level of difficulty involved is approximately similar. Where, subsequent to an error, the working is easier, candidates lose the opportunity to gain credit.
- (f) Where transcription errors occur, candidates would normally lose the opportunity to gain a processing mark.
- (g) Scored out working which has not been replaced should be marked where still legible. However, if the scored out working has been replaced, only the work which has not been scored out should be marked.
- (h) Where a candidate has made multiple attempts, mark all attempts and award the lowest mark.
- (i) Unless specifically mentioned in the specific assessment guidelines, do not penalise:
 - Working subsequent to a correct answer
 - Correct working in the wrong part of a question
 - Legitimate variations in solutions
 - Bad form
 - Repeated error within a question

Detailed Marking Instructions for each question

Question	Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •			
1.	 Ans: 25/27 •¹ start to multiply fractions •² consistent answer in simplest form 	2	• $\frac{5}{12} \times \frac{20}{9}$ or $2 \times \frac{5}{12} + \frac{2}{9} \times \frac{5}{12}$ • $\frac{25}{27}$			
Notes:						
 Correct answer without working award 2/2. 100 (no working a constant) a counted 1/2. 						

- $\frac{100}{108}$ (no working necessary) award 1/2. 2.
- 2nd mark only available where simplifying is required.
 For subsequent incorrect working, the final mark is not available

eg
$$\frac{25}{27} = 1\frac{2}{27}$$
 award 1/2.

Question	Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
2.	Ans: $6x^2 - 13x - 5$	2	
	• ¹ any three terms correct		• ¹ eg $6x^2 + 2x - 15x$
	• ² fourth term correct and collect like terms		• ² $6x^2 - 13x - 5$
Notes:	· · · ·		

1. Correct answer without working

award 2/2

Que	stion		Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •		
3.			Ans: $(x-7)^2 - 5$	2			
			• ¹ correct bracket with square		• $(x-7)^2$		
			• ² complete process		• ² $(x)^2 - 5$		
Note	Notes:						
1. F	1. For $(x-7)^2 + (-5)$, $(x-7)(x-7) - 5$				award 2/2		
2. For $(x-7)-5$, $(x^2-7)-5$, $(x^2-7)^2-5$, $(x-7x)^2-5$				$(7x)^2 - 5$	award 1/2 ×√		

Que	estion		Expected Answer(s)	Max	Illustrations of evidence for		
			Give one mark for each •	Mark	awarding a mark at each $ullet$		
4.			Ans: $\begin{pmatrix} -4\\10\\3 \end{pmatrix}$	2	(-1)		
			• ¹ calculate 2 u		$egin{array}{c} \mathbf{\bullet}^1 & \mathbf{\bullet}^1 \\ \mathbf{\bullet}^1 & \mathbf{\bullet}^1 \\ 10 \end{array}$		
			• ² solution		• ² $\begin{pmatrix} -4\\ 10\\ 3 \end{pmatrix}$		
Not	Notes:						
1.	1. Correct answer without working			ward 2/2.			
2.	2. Brackets not required						
3.	3. For (-4,10,3)			ward 1/2			
4.	4. For subsequent invalid working, the final mark is not available.						

eg 9(-4+10+3), $\sqrt{125}$ (magnitude) award 1/2

Question		Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
		Ans: 8 cm	3	
		• ¹ correct substitution into sine rule		$\bullet^1 \ \frac{LM}{0.4} = \frac{18}{0.9}$
		• ² know how to solve		• ² (LM =) $\frac{0.4 \times 18}{0.9}$
		• ³ correct calculation		• ³ (LM =) 8
es:				
For -	LM sin0·	$\frac{18}{4} = \frac{18}{\sin 0.9} \rightarrow \frac{18\sin 0.4}{\sin 0.9} = \frac{18}{\sin 0.9}$	8	award 2/3 ×√√
or	LM sin0	$\frac{18}{\cdot 4} = \frac{18}{\sin 0.9} \longrightarrow \frac{LM}{0.4} = \frac{18}{0.9} \longrightarrow$	$\frac{18 \times 0.4}{0.9}$	$\mathbf{x} = 8$ award 2/3 $\mathbf{x}\mathbf{\sqrt{x}}$
	stion es: For -	stion es: For LM sin 0. For LM sin 0	StionExpected Answer(s) Give one mark for each •Ans: 8 cm• 1 correct substitution into sine rule• 2 know how to solve• 2 know how to solve• 3 correct calculationes:For $\frac{LM}{\sin 0.4} = \frac{18}{\sin 0.9} \rightarrow \frac{18 \sin 0.4}{\sin 0.9} = 12000$ For $\frac{LM}{\sin 0.4} = \frac{18}{\sin 0.9} \rightarrow \frac{LM}{0.4} = \frac{18}{0.9} \rightarrow 1200$	stionExpected Answer(s) Give one mark for each •Max MarkAns: 8 cm3• 1 correct substitution into sine rule•• 2 know how to solve • 3 correct calculation•• 3 correct calculation• • 1 correct substitution• • 2 know how to solve • • • • • • • • • • • • • • • • • • •

Que	Question		Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •	
6.	(a)		Ans: C = 15F + 125	3		
			<u>Method 1:</u> $y = mx + c$			
			1		$\bullet^1 \frac{300}{1}$	
			• ' find gradient		20	
			• ² substitute gradient and a point into $y = mx + c$		• ² e.g. $200 = \frac{300}{20} \times 5 + c$	
			• ³ calculate <i>c</i> , then state equation in simplest form in terms of <i>F</i> and <i>C</i>		• ³ <i>C</i> = 15 <i>F</i> + 125 or equivalent	
			<u>Method 2:</u> $y-b=m(x-a)$			
			a ¹ find gradient		. 300	
					$\bullet^1 \frac{363}{20}$	
					20	
			• ² substitute gradient and a point into $y-b=m(x-a)$		• ² e.g. $y - 200 = \frac{300}{20}(x-5)$	
			• ³ expand brackets and rearrange equation into simplest form in terms of <i>F</i> and <i>C</i>		• ³ <i>C</i> = 15 <i>F</i> + 125 or equivalent	
Note	es:			•		
1.	For c	correc	ct answer without working, awar	d 3/3		
2.	For	y=1!	5x+125 awar	d 2/3		
3.	For	y = 1	5 <i>x</i> awar	d 1/3		
4.	Whe	re m	and/or c are incorrect the working	g must be f	ollowed through to give the	
F	possi	ibility	v of awarding 1/3 or 2/3			
э.		e equ	ation is stated incorrectly and the radient or correct wintercost	Te IS NO WO	orking, 1/3 can be awarded for	
6	For a	an inc	correct equation (is both m and c is	ncorrect)	without working	
0.	eg (5 = 12	5F + 15 awar	d 0/3	menoue working,	
				-		
	(b)		Ans: 725 calories	1		
			 ¹ calculate value using the equation 		• ¹ $C = 15 \times 40 + 125 = 725$	
Note	es:	1	1	1		
1.	For a	a corr	ect answer without working awar	d 0/1		
2.	Follo	w th	rough mark from part (a) is only av	/ailable if t	he calculation involves a	
	multiplication or division and an addition or subtraction					

Question	Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •				
7.	Ans: $a = 5$ • 1 know to substitute (-3,4 into $y = ax^2$	2 15)	• 1 45 = $a(-3)^{2}$ or equivalent				
Notes:	• ² solve equation for a		• ² $a = 5$				

1.	For a	correct answer without working	
2.	For	$45 = a \times (-3) \rightarrow a = -15$	

award 2/2 award 0/2

Question	Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
8.	Ans: 9√10	3	
	• ¹ simplify $\sqrt{40}$		 •¹ 2√10
	• ² simplify $\sqrt{90}$		• ² 3\sqrt{10}
	• ³ state answer in simplest form		• ³ 9√10
Notes:		•	

award 0/3

For a correct answer without working
 For subsequent incorrect working, the final mark is not available.

Que	Question		Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •		
9.			Ans: 600 000	3			
			• ¹ know that 80% = 480 000		• ¹ 80% = 480 000		
			• ² begin valid strategy		• ² 10% = 60 000 or equivalent		
			• ³ answer		• ³ 600 000		
Note	es:						
1. F	or 60	0 000) with or without working		award 3/3		
2. F	or 38	4 000) (80% of 480 000) or 576000 (120%	of 480000))		
(i) and evidence of 80% = 480 000				award 1/3			
(i	(ii) otherwise			award 0/3			

Question			Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
10.			Ans: $a = 3, b = -40$	2	
			• ¹ state value of a		• $a = 3$
			• ² state value of b		• $^{2}b = -40$
Note	es:				
1. For $y = 3\sin(x - 40)$			in(x-40)		award 2/2
2. A	2. Accept <i>b</i> = 320				

Que	stion		Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
11.	(a)		Ans: gradient = $-\frac{4}{3}$	2	
			 ¹ start to rearrange ² state gradient 		• $^{1} 3y = -4x + 12$ • $^{2} -\frac{4}{3}$
Note 1. (2. 9	es: Correc Some	ct ans comn	wer without working non answers (no working necessary	award 2/	/2
(a)	-1·3	,-1·33 award 2/2		
((b)	-1.3	award 1/2		
(c)	$-\frac{4}{3}x$	award 1/2		
((d)	$\frac{4}{3}$	award 1/2		
(e)	$\frac{4}{3}x$	award 0/2		
	(b)		Ans: (3,0)	2	
			 ¹ know how to find x- coordinate 		• ¹ $4x+3(0)=12$ or equivalent
			• ² state coordinates (must use brackets)		• ² (3,0)
Note 1. 2. 3.	 Notes: 1. For (3,0) without working 2. For <i>x</i>=3 with or without working 3. For (0,4) with or without working 			award 2 award 1 award 1	/2 /2 /2

Question		Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •	
12.		 Ans: 18 centimetres ¹ marshal facts and recognise right angle 	4	•1 15 12	
		• ² know how to use Pythagoras		• ² $x^2 = 15^2 - 12^2$	
		• ³ correct calculation of PA ²		• ³ 81	
		• ⁴ find length of PQ		• ⁴ 18	
Notes:1. For 18 without valid workingaward 0/4					

Question			Expected Answer(s)	Max	Illustrations of evidence for			
			Give one mark for each •	Mark	awarding a mark at each •			
13.	(a)		Ans: 6 seconds	4				
			• ¹ construct an equation		• 1 16 $t - t^{2}$ = 60			
			• ² rearrange and equate to zero		• ² eg t^2 - 16 t + 60 = 0			
			• ³ correct factorisation		• ³ (t - 6) (t - 10)			
			 ⁴ solve equation and select correct value 		• 4 (<i>t</i> =) 6			
Notes:								
1. Equating to zero must appear prior to solving equation								
e.g. $t^2 - 16 t + 60 \rightarrow (t - 6) (t - 10) \rightarrow (t = 6)$ award 3/4								
2. For the case in Note 1, if 6 is not stated explicitly award 1/4								
3. For an answer of 6 without working award 0/4								
Where a candidate substitutes into the formula								
	(a) $h(6)=60$ and $h(10)=60 \rightarrow 6$ award $4/4$							
	(b) h(6)=60 \rightarrow 6				award 2/4			
	(C) h(6))=60		award 1/4			
	(d) h(10	$0)=60 \rightarrow 10$		award 1/4			

Question		Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •				
13.	(b)	Ans: No, because its maximum height is 64 metres.	3					
		Method 1						
		• ¹ know that turning point is at 8 seconds		• ¹ $t = 8$ (stated or implied)				
		• ² calculate maximum height		• 2 16(8) - 8 2 = 64				
		• ³ communicate conclusion		• ³ no, it only reaches 64 metres.				
		<u>Method 2</u>						
		• ¹ calculate h(8)		• ¹ 64				
		• ² demonstrate that h(8) is maximum height		• ² e.g. h(7)=63 and h(9)=63				
		• ³ communicate conclusion		• ³ no, it only reaches 64 metres.				
		<u>Method 3</u>						
		• ¹ evidence of using $b^2 - 4ac$ in $16t - t^2 = 70$		• ¹ evidence				
		• ² demonstrate that $b^2 - 4ac < 0$		• ² e.g. $256 - 280 < 0$				
		• ³ communicate conclusion		• ³ no, as equation has no real roots.				
Note 1. Fo	Notes: 1. For final mark (Methods 1 and 2), answer must include valid comparison or an implied							
comparison eg 'only' or 'less than'.								

- No, it reaches 64 metres, 64<70 award 3/3 2. Where a trial and improvement method is used
 - (i) accept trials appearing in parts (a) and (b)
 - (ii) accept scored out working as evidence of rejected trials

[END OF MARKING INSTRUCTIONS]