National
Qualifications
2014

2014 Mathematics Paper 1 (Non-calculator)

National 5

Finalised Marking Instructions

SQA ©

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:** $\frac{25}{27}$ •[1] start to multiply fractions •[2] consistent answer in simplest form	**2**	•[1] $\frac{5}{12}\times\frac{20}{9}$ or $2\times\frac{5}{12}+\frac{2}{9}\times\frac{5}{12}$ •[2] $\frac{25}{27}$

Notes:

1. Correct answer without working award 2/2.
2. $\frac{100}{108}$ (no working necessary) award 1/2.
3. 2nd mark only available where simplifying is required.
4. 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:** $6x^2-13x-5$ •[1] any three terms correct •[2] fourth term correct and collect like terms	**2**	•[1] eg $6x^2+2x-15x$ •[2] $6x^2-13x-5$

Notes:

1. Correct answer without working award 2/2

Question	Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
3.	**Ans:** $(x-7)^2-5$ •[1] correct bracket with square •[2] complete process	**2**	•[1] $(x-7)^2$ •[2] $(x.....)^2-5$

Notes:

1. For $(x-7)^2+(-5)$, $(x-7)(x-7)-5$ award 2/2
2. For $(x-7)-5$, $(x^2-7)-5$, $(x^2-7)^2-5$, $(x-7x)^2-5$ award 1/2 ×✓

Question	Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
4.	**Ans:** $\begin{pmatrix}-4\\10\\3\end{pmatrix}$ • [1] calculate 2**u** • [2] solution	**2**	 • [1] $\begin{pmatrix}-4\\6\\10\end{pmatrix}$ • [2] $\begin{pmatrix}-4\\10\\3\end{pmatrix}$

Notes:

1. Correct answer without working award 2/2.
2. Brackets not required
3. For $(-4,10,3)$ award 1/2
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 •
5.	**Ans: 8 cm** • [1] correct substitution into sine rule • [2] know how to solve • [3] correct calculation	**3**	 • [1] $\frac{LM}{0\cdot4}=\frac{18}{0\cdot9}$ • [2] $(LM=)\ \frac{0\cdot4\times18}{0\cdot9}$ • [3] (LM =) 8

Notes:

1. For $\frac{LM}{\sin 0\cdot4}=\frac{18}{\sin 0\cdot9} \rightarrow \frac{18\sin 0\cdot4}{\sin 0\cdot9}=8$ award 2/3 ×✓✓
2. For $\frac{LM}{\sin 0\cdot4}=\frac{18}{\sin 0\cdot9} \rightarrow \frac{LM}{0\cdot4}=\frac{18}{0\cdot9} \rightarrow \frac{18\times0\cdot4}{0\cdot9}=8$ award 2/3 ×✓✓

Question			Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
6.	(a)		**Ans: $C = 15F + 125$** **<u>Method 1:</u>** $y = mx + c$ • [1] find gradient • [2] substitute gradient and a point into $y = mx + c$ • [3] calculate c ,then state equation in simplest form in terms of F and C	**3**	• [1] $\frac{300}{20}$ • [2] e.g. $200 = \frac{300}{20} \times 5 + c$ • [3] $C = 15F + 125$ or equivalent
			<u>Method 2:</u> $y - b = m(x - a)$ • [1] find gradient • [2] substitute gradient and a point into $y - b = m(x - a)$ • [3] expand brackets and rearrange equation into simplest form in terms of F and C		• [1] $\frac{300}{20}$ • [2] e.g. $y - 200 = \frac{300}{20}(x - 5)$ • [3] $C = 15F + 125$ or equivalent

Notes:

1. For correct answer without working, award 3/3
2. For $y = 15x + 125$ award 2/3
3. For $y = 15x$ award 1/3
4. Where m and/or c are incorrect the working must be followed through to give the possibility of awarding 1/3 or 2/3
5. If the equation is stated incorrectly and there is no working, 1/3 can be awarded for correct gradient or correct y-intercept
6. For an incorrect equation (ie both m and c incorrect), without working,
eg $C = 125F + 15$ award 0/3

	(b)		**Ans: 725 calories** • [1] calculate value using the equation	**1**	• [1] $C = 15 \times 40 + 125 = 725$

Notes:

1. For a correct answer without working award 0/1
2. Follow through mark from part (a) is only available if the 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 $(-3,45)$ into $y = ax^2$ •[2] solve equation for a	**2**	 •[1] $45 = a(-3)^2$ or equivalent •[2] $a = 5$

Notes:

1. For a correct answer without working award 2/2
2. For $45 = a \times (-3) \rightarrow a = -15$ 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: $9\sqrt{10}$** •[1] simplify $\sqrt{40}$ •[2] simplify $\sqrt{90}$ •[3] state answer in simplest form	**3**	 •[1] $2\sqrt{10}$ •[2] $3\sqrt{10}$ •[3] $9\sqrt{10}$

Notes:

1. For a correct answer without working award 0/3
2. For subsequent incorrect working, the final mark is not available.

Question	Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
9.	**Ans: 600 000** •[1] know that 80% = 480 000 •[2] begin valid strategy •[3] answer	**3**	 •[1] 80% = 480 000 •[2] 10% = 60 000 or equivalent •[3] 600 000

Notes:
1. For 600 000 with or without working award 3/3
2. For 384 000 (80% of 480 000) or 576000 (120% of 480000)
(i) and evidence of 80% = 480 000 award 1/3
(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** • [1] state value of a • [2] state value of b	**2**	 • [1] a = 3 • [2] b = −40
Notes: **1.** For $y = 3\sin(x - 40)$ award 2/2 **2.** Accept b = 320					

Question			Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
11.	(a)		**Ans: gradient =** $-\frac{4}{3}$ • [1] start to rearrange • [2] state gradient	**2**	• [1] $3y = -4x + 12$ • [2] $-\frac{4}{3}$

Notes:
1. Correct answer without working award 2/2
2. Some common answers (no working necessary)

(a) $-1\dot{3}, -1{\cdot}33$ award 2/2

(b) $-1{\cdot}3$ award 1/2

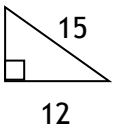
(c) $-\frac{4}{3}x$ award 1/2

(d) $\frac{4}{3}$ award 1/2

(e) $\frac{4}{3}x$ award 0/2

	(b)		**Ans: (3,0)** • [1] know how to find x-coordinate • [2] state coordinates (**must** use brackets)	**2**	• [1] $4x + 3(0) = 12$ or equivalent • [2] (3,0)

Notes:
1. For (3,0) without working award 2/2
2. For x=3 with or without working award 1/2
3. For (0,4) with or without working award 1/2

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 • [2] know how to use Pythagoras • [3] correct calculation of PA^2 • [4] find length of PQ	**4**	• [1]  • [2] $x^2 = 15^2 - 12^2$ • [3] 81 • [4] 18

Notes:
1. For 18 without valid working award 0/4

Question			Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
13.	(a)		**Ans: 6 seconds** • [1] construct an equation • [2] rearrange and equate to zero • [3] correct factorisation • [4] solve equation and select correct value	**4**	 • [1] $16t - t^2 = 60$ • [2] eg $t^2 - 16t + 60 = 0$ • [3] $(t - 6)(t - 10)$ • [4] $(t =) 6$

Notes:

1. Equating to zero **must** appear prior to solving equation
   e.g. $t^2 - 16t + 60 \rightarrow (t - 6)(t - 10) \rightarrow (t =) 6$ 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
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)=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.** **<u>Method 1</u>** • [1] know that turning point is at 8 seconds • [2] calculate maximum height • [3] communicate conclusion **<u>Method 2</u>** • [1] calculate h(8) • [2] demonstrate that h(8) is maximum height • [3] communicate conclusion **<u>Method 3</u>** • [1] evidence of using b^2-4ac in $16t-t^2=70$ • [2] demonstrate that $b^2-4ac<0$ • [3] communicate conclusion	**3**	• [1] $t=8$ (stated or implied) • [2] $16(8)-8^2=64$ • [3] no, it only reaches 64 metres. • [1] 64 • [2] e.g. h(7)=63 and h(9)=63 • [3] no, it only reaches 64 metres. • [1] evidence • [2] e.g. $256-280<0$ • [3] no, as equation has no real roots.

Notes:

1. For final mark (Methods 1 and 2), answer must include valid comparison or an implied comparison eg 'only' or 'less than'.

eg No, it reaches 64 metres award 2/3

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]

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2014 Mathematics Paper 2

National 5

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1.	**Ans: 590** •[1] know how to decrease by 15% •[2] know how to calculate roll •[3] carry out calculations correctly within a valid strategy and round to the nearest ten	**3**	 •[1] $\times 0{\cdot}85$ •[2] $964 \times 0{\cdot}85^3$ •[3] 590

Notes:

1. For an answer of 590 without working award 3/3 ✓✓✓

2. For an answer of 592 or 592·0165 without working award 2/3 ✓✓×

3. Where an incorrect percentage has been used, the working must be followed through to give the possibility of awarding 2/3 ×✓✓

4. For an answer of 2460 $(964 \times 0{\cdot}85 \times 3)$ with working, award 1/3 ✓××

5. For an answer of 530 $(964 - 964 \times 0{\cdot}15 \times 3)$ with working, award 1/3 ✓××

6. For an answer of 430 $(964 \times 0{\cdot}15 \times 3)$ award 0/3 ×××

Question	Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
2.	**Ans: B (8, 4, 10), C (4, 0, 10)** •[1] state coordinates of B •[2] state coordinates of C	**2**	 •[1] (8, 4, 10) •[2] (4, 0, 10)

Notes:

1. For eg B(8, 4, 9) leading to C(4, 0, 9) award 1/2 ×✓
2. The maximum mark available is 1/2 where
   (a) brackets are omitted
   (b) answers are given in component form

Question			Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
3.	(a)		**Ans: $5a + 3c = 158{\cdot}25$** • [1] construct equation	**1**	 • [1] $5a + 3c = 158{\cdot}25$
Notes: **1.** Accept variables other than a and c.					
	(b)		**Ans: $3a + 2c = 98$** • [1] construct equation	**1**	 • [1] $3a + 2c = 98$
Notes:					
	(c)		**Ans: Adult ticket costs £22·50** **Child ticket costs £15·25** • [1] evidence of scaling • [2] follow a valid strategy through to produce values for a and c • [3] calculate correct values for a and c • [4] communicate answers in money	**4**	 • [1] eg $10a + 6c = 316{\cdot}50$ $9a + 6c = 294$ • [2] values for a and c • [3] $a = 22{\cdot}5$ and $c = 15{\cdot}25$ • [4] Adult £22·50 Child £15·25
Notes: **1.** The fourth mark may only be awarded when **all** of the following are given in the final answer: the words "adult" and "child", the £ signs and **both** amounts written with two decimal figures.					

Question			Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
4.	(a)	(i)	**Ans:** $\bar{x} = 56{\cdot}5$ • [1] calculate mean	**1**	• [1] $\bar{x} = 56{\cdot}5$
Notes: **1.** Do not accept 56·5 rounded to 57.					
		(ii)	**Ans:** $s = 2{\cdot}4$ • [1] calculate $\left(x - \bar{x}\right)^2$ • [2] substitute into formula • [3] calculate standard deviation	**3**	• [1] 0·25, 0·25, 2·25, 2·25, 12·25, 12·25 • [2] $\sqrt{\frac{29{\cdot}5}{5}}$ • [3] 2·4(2….)
Notes: **1.** For use of alternative formula, award marks as follows: • [1] calculate $\sum x$ and $\sum x^2$ — • [1] 339, 19183 • [2] substitute into formula — • [2] $\sqrt{\frac{19183 - \frac{339^2}{6}}{5}}$ • [3] calculate standard deviation — • [3] 2·4(2….) **2.** For correct answer without working award 0/3					
	(b)		**Ans: No, standard deviation is greater** **OR No, times are more spread out** • [1] no, with valid explanation	**1**	• [1] e.g. No, standard deviation is greater
Notes: **1.** Answer must be consistent with answer to part (a)(ii). **2.** Accept "No, as 3·2 > 2·4" **3.** Only award the mark if it is clear that the reason is based on standard deviation **only**. **4.** Do not accept "No, times are less consistent" without further explanation.					

Question	Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
5.	**Ans: 3072 cm^3**	**3**	
	•^{1} state linear scale factor		•^{1} $\frac{24}{15}$ or 1·6
	•^{2} state volume scale factor		•^{2} $\left(\frac{24}{15}\right)^3$ or $1{\cdot}6^3$ (= 4·096)
	•^{3} calculate volume (calculation must involve a power of the scale factor) **and state correct units**		•^{3} 3072cm^3

Notes:

1. Some common answers

(a) 3072 award 2/3 ✓✓×

(b)1920cm^3 ($\left(\frac{24}{15}\right)^2 \times 750$) award 2/3 ✓×✓

(c)1200cm^3 ($\left(\frac{24}{15}\right) \times 750$) award 1/3 ✓××

(d)675000000cm^3 ($\left(\frac{24}{15}\right) \times 750^3$) award 1/3 ✓××

(e)183cm^3 ($\left(\frac{15}{24}\right)^3 \times 750$) award 2/3 ×✓✓

(f) 933cm^3 ($\left(\frac{15}{24}\right)^3 \times 750 + 750$) award 2/3 ×✓✓

2. The third mark is not available where premature rounding leads to an incorrect answer.
eg 4·1 × 750 = 3075cm^3 award 2/3 ✓✓×

3. Alternative Method

•^{1} know how to find radius of smaller cylinder •^{1} $\sqrt{\frac{750}{15\pi}}$

•^{2} know how to find radius of larger cylinder •^{2} $\left(\frac{24}{15}\right) \times \sqrt{\frac{750}{15\pi}}$

•^{3} calculate volume **and state correct units** •^{3} 3072cm^3

Question	Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
6.	**Ans: no, with valid reason.**	**4**	
	•[1] valid strategy		•[1] use Converse of Pythagoras' Theorem eg 110^2 and 85^2+75^2
	•[2] evaluation		•[2] 12 100 and 12 850
	•[3] comparison		•[3] e.g. $110^2 \neq 75^2+85^2$
	•[4] valid conclusion		•[4] No, since not right angled

Notes:

1. For alternative methods, award marks as follows:

(i)
- •[1] valid strategy — •[1] use Pythagoras' Theorem eg 85^2+75^2
- •[2] evaluation — •[2] h = 113·36
- •[3] comparison — •[3] e.g. $113\cdot36 > 110$
- •[4] valid conclusion — •[4] No, since not right angled

(ii)
- •[1] valid strategy — •[1] substitute correctly into cosine rule eg $\frac{85^2+75^2-110^2}{2\times85\times75}$
- •[2] evaluation — •[2] $86\cdot6°$
- •[3] comparison — •[3] $86\cdot6° < 90°$
- •[4] valid conclusion — •[4] No, since not right angled

2. There must be an explicit comparison for the award of the third mark.

eg $\sqrt{85^2+75^2} = 113\cdot36.$
No, since not right angled. award 3/4 ✓✓×✓

3. Conclusion **must** involve reference to "not a right angle".

eg $110^2 = 85^2+75^2 \rightarrow 12100 \neq 12850.$
No, Hightown is not due north of Lowtown. award 3/4 ✓✓✓×

4. The final mark is not available where the candidate's only conclusion is an invalid statement involving the word bearing.

eg "No, Hightown is on a bearing of 87° from Lowtown, not 90°"

Question			Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
7.			**Ans: 150 cm^3**	**5**	
			• [1] substitute correctly into formula for volume of cone		• [1] $\frac{1}{3}\times\pi\times4^2\times15$ $(=251\cdot32....)$
			• [2] substitute correctly into formula for volume of sphere **or** hemisphere		• [2] $\frac{4}{3}\times\pi\times3\cdot7^3$ $(=212\cdot17....)$ or $\frac{1}{2}\times\frac{4}{3}\times\pi\times3\cdot7^3$ $(=106\cdot08....)$
			• [3] know to subtract volume of **hemisphere** from volume of cone		• [3] evidence
			• [4] carry out all calculations correctly (must involve difference or sum of two volume calculations)		• [4] 145·24....
			• [5] round **final answer** to 2 significant figures		• [5] 150 (cm^3)

Notes:

1. Accept variations in π.

2. Some common answers (working must be shown):

(i) $39\ (\frac{1}{3}\times\pi\times4^2\times15-\frac{4}{3}\times\pi\times3\cdot7^3)$ award 4/5 ✓✓×✓✓

(ii) $120\ (\frac{1}{3}\times\pi\times4^2\times15-\frac{1}{2}\times\frac{4}{3}\times\pi\times4^3)$ award 4/5 ✓×✓✓✓

(iii) $110\ (\frac{1}{3}\times\pi\times3\cdot7^2\times15-\frac{1}{2}\times\frac{4}{3}\times\pi\times3\cdot7^3)$ award 4/5 ×✓✓✓✓

(iv) $160\ (\frac{1}{3}\times\pi\times8^2\times15-\frac{1}{2}\times\frac{4}{3}\times\pi\times7\cdot4^3)$ award 4/5 ×✓✓✓✓

(v) $360\ (\frac{1}{3}\times\pi\times4^2\times15+\frac{1}{2}\times\frac{4}{3}\times\pi\times3\cdot7^3)$ award 4/5 ✓✓×✓✓

(vi) $460\ (\frac{1}{3}\times\pi\times4^2\times15+\frac{4}{3}\times\pi\times3\cdot7^3)$ award 4/5 ✓✓×✓✓

(vii) $80\ (\frac{1}{3}\times\pi\times3\cdot7^2\times15-\frac{1}{2}\times\frac{4}{3}\times\pi\times4^3)$ award 3/5 ××✓✓✓

(viii) $250\ (\frac{1}{3}\times\pi\times4^2\times15)$ award 2/5 ✓×××✓

3. The final mark is only available where answers to all intermediate steps involve at least three significant figures.

eg $251\cdot32-106\cdot08=250-110=140$ award 4/5 ✓✓✓✓×

Question	Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
8.	**Ans:** $\mathbf{5n^4}$ • [1] simplify powers in numerator • [2] cancel constants • [3] eliminate n from denominator	**3**	• [1] $10n^6$ • [2] $\frac{5n^6}{n^2}$ • [3] $5n^4$

Notes:

1. For $5n^4$ without working — award 3/3
2. For a final answer of $\frac{5n^4}{1}$ — award 2/3 ✓×✓
3. For an answer of $5n^3$
   - (a) (i) $\frac{10n^5}{2n^2}=5n^3$ — award 2/3 ×✓✓
   - (ii) $\frac{10n^6}{2n^2}=5n^3$ — award 2/3 ✓✓×
   - (b) (i) $\frac{n^4\times10}{2n}=\frac{n^4\times10}{2}=5n^3$ — award 1/3 ✓×✓
   - (ii) $5n^3$ without working — award 1/3

Question	Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
9.	**Ans:** $\mathbf{\frac{4x-15}{x(x+5)}}$ • [1] correct common denominator (or correct numerator) • [2] consistent numerator (or denominator) • [3] simplify	**3**	• [1] $x(x+5)$ or $7x-3(x+5)$ • [2] $\frac{7x-3(x+5)}{x(x+5)}$ • [3] $\frac{4x-15}{x(x+5)}$

Notes:

1. Correct answer without working — award 3/3

2. For $\frac{7x}{x(x+5)}-\frac{3(x+5)}{x(x+5)}$ — award 2/3 ✓✓×

3. For subsequent incorrect working, the final mark is not available.

Question			Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
10.	(a)		**Ans: 84·8°** •1 substitute correctly into cosine rule •2 calculate cos B correctly •3 calculate angle ABC correctly	**3**	•1 $\cos B = \frac{8^2 + 11^2 - 13^2}{2 \times 8 \times 11}$ •2 cos B = 0·09……. •3 85 or 84·8…….
Notes: **1.** For 1·48 (uses RAD) or 94·2 (uses GRAD), with working award 3/3 **2.** The 2nd mark can be awarded for $\cos^{-1}\left(\frac{16}{176}\right)$					
	(b)		**Ans: 155·2°** •1 know how to calculate the angle •2 correctly calculate the angle within a valid strategy	**2**	•1 360 – 120 – [answer to (a)] or equivalent •2 155·2
Notes:					

Question			Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
11.			**Ans:** $a = \frac{2(s-ut)}{t^2}$ •1 subtract ut •2 multiply by 2 •3 divide by t^2	**3**	•1 $s - ut = \frac{1}{2}at^2$ •2 $2(s-ut) = at^2$ •3 $a = \frac{2(s-ut)}{t^2}$
Notes: **1.** Correct answer without working award 3/3 **2.** For subsequent incorrect working, the final mark is not available. **3.** For $a = \frac{s-ut}{\frac{1}{2}t^2}$ award 2/3					

Question	Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
12.	**Ans: $x°$ = 63°, 297°** • [1] rearrange equation • [2] find one value of x • [3] find another value of x	**3**	• [1] $\cos x = \frac{5}{11}$ • [2] x = 63 • [3] x = 297

Notes:

1. The 2nd angle must be consistent with the first angle.

2. For x = 1·1,358·9 (uses RAD), award 3/3 (with working), award 2/3 (without working)

3. For x = 70, 290 (uses GRAD), award 3/3 (with working),award 2/3 (without working)

Question	Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •
13.	**Ans: 151·3 m^2** •[1] know how to find area of segment •[2] know to express sector as a fraction of a circle •[3] know how to find area of sector • [4] know how to calculate area of triangle • [5] carry out all calculations correctly within a valid strategy	**5**	•[1] evidence of e.g. major sector + triangle or circle − minor sector + triangle •[2] $\frac{310}{360}$ **or** $\frac{50}{360}$ •[3] $\frac{310}{360}\times\pi\times7^2$ (= 132·56) **or** $\frac{50}{360}\times\pi\times7^2$ (= 21·38) • [4] $\frac{1}{2}\times7\times7\times\sin50$ (=18·77) • [5] 151·3 m^2

Notes for question 13 are on next page.

Question	Expected Answer(s) Give one mark for each •	Max Mark	Illustrations of evidence for awarding a mark at each •

Notes:

1. Accept variations in π; disregard premature or incorrect rounding of $\frac{310}{360}$ or $\frac{50}{360}$.

2. Use of RAD or GRAD (working must be shown)
(a) For 149·9 [uses GRAD] award 5/5
(b) Where the use of RAD leads to an answer of 126·1(−6·43+132·56) or 139·0(6·43+132·56) award 4/5

3. Some common answers (working must be shown):

56·6 $\left(\frac{310}{360}\times\pi\times 14+\frac{1}{2}\times 7\times 7\times\sin 50^\circ\right)$ award 4/5 ✓✓×✓✓

40·1 $\left(\frac{50}{360}\times\pi\times 7^2+\frac{1}{2}\times 7\times 7\times\sin 50^\circ\right)$ award 4/5 ×✓✓✓✓

2·6 $\left(\frac{50}{360}\times\pi\times 7^2-\frac{1}{2}\times 7\times 7\times\sin 50^\circ\right)$ award 4/5 ×✓✓✓✓

24·9 $\left(\frac{50}{360}\times\pi\times 14+\frac{1}{2}\times 7\times 7\times\sin 50^\circ\right)$ award 3/5 ×✓×✓✓

132·6 $\left(\frac{310}{360}\times\pi\times 7^2\right)$ award 2/5 ×✓✓××

21·4 $\left(\frac{50}{360}\times\pi\times 7^2\right)$ award 2/5 ×✓✓××

18·8 $\left(\frac{1}{2}\times 7\times 7\times\sin 50^\circ\right)$ award 1/5 ×××✓×

153·9 $\left(\pi\times 7^2\right)$ award 0/5

4. The fifth mark is only available when the area of triangle MON is calculated using trigonometry.

[END OF MARKING INSTRUCTIONS]