



**2005 Mathematics**

**Intermediate 2 – Units 1, 2 and 3**

**Finalised Marking Instructions**

**These Marking Instructions have been prepared by Examination Teams for use by SQA Appointed Markers when marking External Course Assessments.**

## **2005 Mathematics**

### **Intermediate 2 – Units 1, 2 and 3 Paper 1**

### **Finalised Marking Instructions**

**These Marking Instructions have been prepared by Examination Teams for use by SQA Appointed Markers when marking External Course Assessments.**

## General Marking Principles

These principles describe the approach to be taken when marking Intermediate 2 Mathematics papers. For more detailed guidance please refer to the notes which are included with the Marking Instructions.

- 1 Marks must be assigned in accordance with the Marking Instructions. The main principle in marking scripts is to give credit for the skills demonstrated and the criteria met. Failure to have the correct method may not preclude a candidate gaining credit for the calculations involved or for the communication of the answer.
- 2 The answer to one part of a question, even if incorrect, must be accepted as a basis for subsequent dependent parts of the question. Full marks in the dependent part(s) may be awarded provided the question is not simplified.
- 3 The following should not be penalised:
  - working subsequent to a correct answer (unless it provides firm evidence that the requirements of the question have not been met)
  - omission or misuse of units (unless marks have been specifically allocated for the purpose in the marking scheme)
  - bad form, eg  $\sin x^\circ = 0.5 = 30^\circ$
  - legitimate variation in numerical values / algebraic expressions.
- 4 Solutions which seem unlikely to include anything of relevance must nevertheless be followed through. Candidates still have the opportunity of gaining one mark or more provided the solution satisfies the criteria for the mark(s).
- 5 Full credit should only be given where the solution contains appropriate working. Where the correct answer may be obtained by inspection or mentally, credit may be given, but reference to this will be made in the Marking Instructions.
- 6 In general markers will only be able to give credit for answers if working is shown. A wrong answer without working receives no credit unless specifically mentioned in the Marking Instructions. The rubric on the outside of the question papers emphasises that working must be shown.
- 7 Sometimes the method to be used in a particular question is explicitly stated; no credit should be given where a candidate obtains the correct answer by an alternative method.
- 8 Where the method to be used in a particular question is not explicitly stated, full credit must be given for alternative methods which produce the correct answer.
- 9 Do not penalise the same error twice in the same question.
- 10 Do not penalise a transcription error unless the question has been simplified as a result.
- 11 Do not penalise inadvertent use of radians in trigonometry questions, provided their use is consistent within the question.

## Practical Details

The Marking Instructions should be regarded as a working document and have been developed and expanded on the basis of candidates' responses to a particular paper. While the guiding principles of assessment remain constant, details can change depending on the content of a particular examination paper in a given year.

- 1 Each mark awarded in a question is referenced to one criterion in the marking scheme by means of a bullet point.
- 2 Where a candidate has scored zero marks for any question attempted, "0" should be shown against the answer in the place in the margin.
- 3 Where a marker wishes to indicate how s/he has awarded marks, the following should be used:
  - (a) Correct working should be ticked, ✓.
  - (b) Where working subsequent to an error is followed though, if otherwise correct and can be awarded marks, it should be marked with a crossed tick, ✗.
  - (c) Each error should be underlined at the point in the working where it first occurs.
4. **Do not write any comments, words or acronyms on the scripts.**

**Mathematics – Intermediate 2: Paper 1, Units 1, 2 and 3 (non-calc)**

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
1	<p><b>Ans:</b> <math>\frac{5}{18}</math></p> <p>•<sup>1</sup> process:                      calculate probability</p>	<p>•<sup>1</sup> <math>\frac{5}{18}</math> or equivalent</p> <p style="text-align: right;"><b>1 mark</b></p>
<p><b>NOTES:</b></p>		

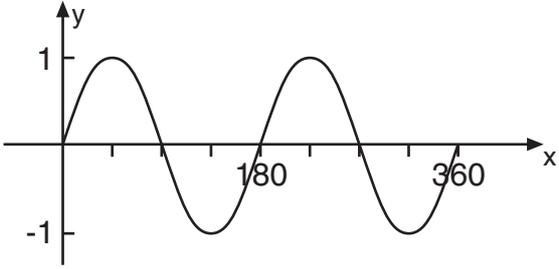
Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
2 (a)	<b>Ans: <math>y = -2x + 8</math></b>  • <sup>1</sup> process: find gradient  • <sup>2</sup> process: state y-intercept or $c$ in $y = mx + c$  • <sup>3</sup> communicate: state correct equation of straight line	• <sup>1</sup> $m = -2$ (or equivalent)  • <sup>2</sup> $c = 8$  • <sup>3</sup> $y = -2x + 8$  <p style="text-align: right;"><b>3 marks</b></p>
<b>NOTES:</b>  1 For correct answer without working award 3/3  2 For $y = -2x$ award 1/3  3 Where $m$ and/or $c$ are incorrect, the working must be followed through to give the possibility of awarding 1/3 or 2/3  4 If the equation is stated incorrectly and there is no working, 1/3 can be awarded for correct gradient or correct y-intercept  5 For an incorrect equation (ie <u>both</u> $m$ and $c$ incorrect), without working eg $y = 8x - 2$ award 0/3		
(b)	<b>Ans: (2, 4)</b>  • <sup>1</sup> process: draw the line $y = 2x$ or correctly solve simultaneous equations or construct a table of values  • <sup>2</sup> communicate: state coordinates of point	• <sup>1</sup> evidence  • <sup>2</sup> (2,4)  <p style="text-align: right;"><b>2 marks</b></p>
<b>NOTES:</b>  1 For correct solution without working award 2/2  2 Where an incorrect solution is given in part (a), full marks are still available for (2, 4) in part (b).		

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
3 (a)	<p><b>Ans: <math>4x^2 - 15x - 10</math></b></p> <ul style="list-style-type: none"> <li>•<sup>1</sup> process: start to multiply out brackets</li> <li>•<sup>2</sup> process: complete process of multiplying out brackets</li> <li>•<sup>3</sup> process: collect like terms which must include <math>x^2</math></li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> evidence of two correct terms (eg <math>4x^2 - 20x</math>)</li> <li>•<sup>2</sup> <math>4x^2 - 20x + 2x - 10</math></li> <li>•<sup>3</sup> <math>4x^2 - 15x - 10</math></li> </ul> <p style="text-align: right;"><b>3 marks</b></p>
(b)	<p><b>Ans: <math>(2p + 3)(p - 4)</math></b></p> <ul style="list-style-type: none"> <li>•<sup>1</sup> process: start to factorise trinomial</li> <li>•<sup>2</sup> process: complete factorisation</li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> evidence (see notes)</li> <li>•<sup>2</sup> <math>(2p + 3)(p - 4)</math></li> </ul> <p style="text-align: right;"><b>2 marks</b></p>
<p><b>NOTES:</b></p> <p>For the following answers award 1/2</p> <p><math>(2p - 3)(p + 4)</math>  <math>(2p + 4)(p - 3)</math>  <math>(2p - 4)(p + 3)</math></p> <p><math>(2p + 6)(p - 2)</math>  <math>(2p - 6)(p + 2)</math>  <math>(2p + 2)(p - 6)</math>  <math>(2p - 2)(p + 6)</math></p> <p><math>(2p + 12)(p - 1)</math>  <math>(2p - 12)(p + 1)</math>  <math>(2p + 1)(p - 12)</math>  <math>(2p - 1)(p + 12)</math></p>		

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
4 (a)	<b>Ans: (i) 82</b> <b>(ii) 78</b> <b>(iii) 84.5</b>  • <sup>1</sup> process: state median  • <sup>2</sup> process: state lower quartile  • <sup>3</sup> process: state upper quartile	• <sup>1</sup> 82  • <sup>2</sup> 78  • <sup>3</sup> 84.5   <p style="text-align: right;"><b>3 marks</b></p>
<p><b>NOTES:</b></p> <p>An incorrect answer for the median must be followed through with the possibility of awarding full marks for parts (ii) and (iii)</p>		
(b)	<b>Ans: 85</b>  • <sup>1</sup> process: state missing number  • <sup>2</sup> communicate: state valid reason	• <sup>1</sup> 85  • <sup>2</sup> reason (see notes)   <p style="text-align: right;"><b>2 marks</b></p>
<p><b>NOTES:</b></p> <p>1 A valid reason could be a revised list indicating quartiles</p> <p>eg      75   78   78   81   83   84   91</p> <p style="padding-left: 100px;">                  ↑                    ↑                    ↑</p> <p>2 If an answer of 83, 84 or 91 is given demonstrating that 4 values from the 5-figure summary match the boxplot <span style="float: right;">award 1/2</span></p> <p>eg      ANSWER 91 with reason</p> <p style="padding-left: 20px;"><u>75</u>   78   78   81   83   84   85</p> <p style="padding-left: 40px;">                  ↑                    ↑                    ↑</p> <p>3 Where a candidate <u>increases</u> the list to 9 numbers <span style="float: right;">award 0/2</span></p>		

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
5	<p><b>Ans: <math>k^2</math></b></p> <ul style="list-style-type: none"> <li>•<sup>1</sup> process: simplify <math>(k^2)^{-3}</math></li> <li>•<sup>2</sup> process: multiply <math>k^8 \times k^{-6}</math></li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>k^{-6}</math></li> <li>•<sup>2</sup> <math>k^2</math></li> </ul> <p style="text-align: right;"><b>2 marks</b></p>
<p><b>NOTES:</b></p> <p>1 For a correct answer without working award 2/2</p> <p>2 For an answer of <math>k^7</math> with or without working award 1/2</p>		



Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
7	<p>Ans:</p>  <ul style="list-style-type: none"> <li data-bbox="339 741 847 808">•<sup>1</sup> process: know that max = 1 and min = -1</li> <li data-bbox="339 842 847 909">•<sup>2</sup> process: show that there are 2 cycles in 360°</li> <li data-bbox="339 943 847 987">•<sup>3</sup> communicate: curve correctly drawn</li> </ul>	<ul style="list-style-type: none"> <li data-bbox="927 741 1230 786">•<sup>1</sup> evidence from graph</li> <li data-bbox="927 842 1094 887">•<sup>2</sup> evidence</li> <li data-bbox="927 943 1094 987">•<sup>3</sup> evidence</li> </ul> <p style="text-align: right; margin-right: 50px;"><b>3 marks</b></p>
<p><b>NOTES:</b></p> <p>1 For a sketch of the graph of <math>y = 2 \sin x^\circ</math>, <math>0 \leq x \leq 360</math>, award 2/3</p> <p>2 Disregard poor draughtsmanship.</p>		

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
8 (a)	<b>Ans: <math>x(x + 2)</math></b>  • <sup>1</sup> process: find expression for area	• <sup>1</sup> $x(x + 2)$ or $x^2 + 2x$  <p style="text-align: right;"><b>1 mark</b></p>
(b)	<b>Ans: <math>1 \text{ cm}^2</math></b>  • <sup>1</sup> strategy: know to compare areas of square and rectangle  • <sup>2</sup> process: find difference in areas	• <sup>1</sup> evidence  • <sup>2</sup> $1 \text{ cm}^2$  <p style="text-align: right;"><b>2 marks</b></p>
<p><b>NOTES:</b></p> <p>1 Any error must be followed through to give the possibility of awarding 2/2</p> <p>2 A correct answer obtained by substituting a numerical value for <math>x</math> into both areas      award 1/2</p> <p>3 A correct answer with no working      award 0/2</p>		

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
9 (a)	<b>Ans: (2,36)</b> • <sup>1</sup> communicate: state x-coordinate of turning point • <sup>2</sup> communicate: state y-coordinate of turning point	• <sup>1</sup> 2 • <sup>2</sup> 36 <p style="text-align: right;"><b>2 marks</b></p>
<b>NOTES:</b> For a correct answer without working, award 2/2		
(b)	<b>Ans: <math>x = 2</math></b> • <sup>1</sup> communicate: state equation of axis of symmetry	• <sup>1</sup> $x = 2$ <p style="text-align: right;"><b>1 mark</b></p>
<b>NOTES:</b> 1 An incorrect answer in (a) must be followed through 2 For 2, award 0/1		
(c)	<b>Ans: (-2,20)</b> • <sup>1</sup> interpret: equal y coordinates • <sup>2</sup> strategy: use of symmetry	• <sup>1</sup> $y = 20$ • <sup>2</sup> $x = -2$ <p style="text-align: right;"><b>2 marks</b></p>
<b>NOTES:</b> 1 For a correct answer, without working award 2/2 2 An incorrect answer in part (a) or part (b) must be followed through		

**TOTAL MARKS FOR PAPER 1**  
**30**

[END OF MARKING INSTRUCTIONS]

## **2005 Mathematics**

### **Intermediate 2 – Units 1, 2 and 3 Paper 2**

### **Finalised Marking Instructions**

**These Marking Instructions have been prepared by Examination Teams for use by SQA Appointed Markers when marking External Course Assessments.**

## General Marking Principles

These principles describe the approach to be taken when marking Intermediate 2 Mathematics papers. For more detailed guidance please refer to the notes which are included with the Marking Instructions.

- 1 Marks must be assigned in accordance with the Marking Instructions. The main principle in marking scripts is to give credit for the skills demonstrated and the criteria met. Failure to have the correct method may not preclude a candidate gaining credit for the calculations involved or for the communication of the answer.
- 2 The answer to one part of a question, even if incorrect, must be accepted as a basis for subsequent dependent parts of the question. Full marks in the dependent part(s) may be awarded provided the question is not simplified.
- 3 The following should not be penalised:
  - working subsequent to a correct answer (unless it provides firm evidence that the requirements of the question have not been met)
  - omission or misuse of units (unless marks have been specifically allocated for the purpose in the marking scheme)
  - bad form, eg  $\sin x^\circ = 0.5 = 30^\circ$
  - legitimate variation in numerical values / algebraic expressions.
- 4 Solutions which seem unlikely to include anything of relevance must nevertheless be followed through. Candidates still have the opportunity of gaining one mark or more provided the solution satisfies the criteria for the mark(s).
- 5 Full credit should only be given where the solution contains appropriate working. Where the correct answer may be obtained by inspection or mentally, credit may be given, but reference to this will be made in the Marking Instructions.
- 6 In general markers will only be able to give credit for answers if working is shown. A wrong answer without working receives no credit unless specifically mentioned in the Marking Instructions. The rubric on the outside of the question papers emphasises that working must be shown.
- 7 Sometimes the method to be used in a particular question is explicitly stated; no credit should be given where a candidate obtains the correct answer by an alternative method.
- 8 Where the method to be used in a particular question is not explicitly stated, full credit must be given for alternative methods which produce the correct answer.
- 9 Do not penalise the same error twice in the same question.
- 10 Do not penalise a transcription error unless the question has been simplified as a result.
- 11 Do not penalise inadvertent use of radians in trigonometry questions, provided their use is consistent within the question.

## Practical Details

The Marking Instructions should be regarded as a working document and have been developed and expanded on the basis of candidates' responses to a particular paper. While the guiding principles of assessment remain constant, details can change depending on the content of a particular examination paper in a given year.

- 1 Each mark awarded in a question is referenced to one criterion in the marking scheme by means of a bullet point.
- 2 Where a candidate has scored zero marks for any question attempted, "0" should be shown against the answer in the place in the margin.
- 3 Where a marker wishes to indicate how s/he has awarded marks, the following should be used:
  - (a) Correct working should be ticked, ✓.
  - (b) Where working subsequent to an error is followed though, if otherwise correct and can be awarded marks, it should be marked with a crossed tick, ✗.
  - (c) Each error should be underlined at the point in the working where it first occurs.
4. **Do not write any comments, words or acronyms on the scripts.**

Mathematics – Intermediate 2: Paper 2, Units 1, 2 and 3

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •												
1	<p><b>Ans: 24·8°</b></p> <ul style="list-style-type: none"> <li>•<sup>1</sup> strategy: know how to decrease by 4%</li> <li>•<sup>2</sup> strategy: know how to calculate expected temperature</li> <li>•<sup>3</sup> process: carry out all calculations correctly within a valid strategy</li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>\times 0.96</math></li> <li>•<sup>2</sup> <math>28 \times 0.96^3</math></li> <li>•<sup>3</sup> 24·8</li> </ul> <p style="text-align: right;"><b>3 marks</b></p>												
<p><b>NOTES:</b></p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 5%; text-align: center;">1</td> <td style="width: 70%;">For an answer of 24·77, with or without working</td> <td style="width: 25%; text-align: right;">award 3/3</td> </tr> <tr> <td style="text-align: center;">2</td> <td>Where an incorrect percentage has been used, the working must be followed through to give the possibility of awarding 2/3 eg an answer of 31·5 (<math>28 \times 1.04^3</math>), with working</td> <td style="text-align: right;">award 2/3</td> </tr> <tr> <td style="text-align: center;">3</td> <td>For an answer of 80·64 (<math>28 \times 0.96 \times 3</math>), with working</td> <td style="text-align: right;">award 1/3</td> </tr> <tr> <td style="text-align: center;">4</td> <td>For an answer of 24·64 (<math>28 \times 0.04 \times 3</math>)</td> <td style="text-align: right;">award 0/3</td> </tr> </table>			1	For an answer of 24·77, with or without working	award 3/3	2	Where an incorrect percentage has been used, the working must be followed through to give the possibility of awarding 2/3 eg an answer of 31·5 ( $28 \times 1.04^3$ ), with working	award 2/3	3	For an answer of 80·64 ( $28 \times 0.96 \times 3$ ), with working	award 1/3	4	For an answer of 24·64 ( $28 \times 0.04 \times 3$ )	award 0/3
1	For an answer of 24·77, with or without working	award 3/3												
2	Where an incorrect percentage has been used, the working must be followed through to give the possibility of awarding 2/3 eg an answer of 31·5 ( $28 \times 1.04^3$ ), with working	award 2/3												
3	For an answer of 80·64 ( $28 \times 0.96 \times 3$ ), with working	award 1/3												
4	For an answer of 24·64 ( $28 \times 0.04 \times 3$ )	award 0/3												

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
2 (a)	<p><b>Ans: 6.6</b></p> <ul style="list-style-type: none"> <li>•<sup>1</sup> process: calculate <math>(x - \bar{x})^2</math></li> <li>•<sup>2</sup> process: substitute into formula</li> <li>•<sup>3</sup> process: calculate standard deviation</li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> 25, 0, 64, 100, 25, 4</li> <li>•<sup>2</sup> <math>\sqrt{\frac{218}{5}}</math></li> <li>•<sup>3</sup> 6.6</li> </ul> <p style="text-align: right;"><b>3 marks</b></p>
<p><b>NOTES:</b></p> <p>For use of alternative formula, award marks as follows</p> <ul style="list-style-type: none"> <li>•<sup>1</sup> <math>\Sigma x = 2400</math> and <math>\Sigma x^2 = 960218</math></li> </ul>		
(b)	<p><b>Ans: YES, because new s &lt; 6.6</b></p> <ul style="list-style-type: none"> <li>•<sup>1</sup> communicate: state result with explanation</li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> YES, with reason</li> </ul> <p style="text-align: right;"><b>1 mark</b></p>
<p><b>NOTES:</b></p> <p>Reason must contain a comparison of standard deviations eg yes, because the new standard deviation is smaller.</p>		

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
3	<p><b>Ans: (3,0)</b></p> <p>•<sup>1</sup> strategy: know to substitute <math>y = 0</math> into equation <b>or</b> draw a straight line</p> <p>•<sup>2</sup> process: state point where line crosses axis</p>	<p>•<sup>1</sup> <math>0 = 12 - 4x</math> or equivalent</p> <p>•<sup>2</sup> (3,0)</p> <p style="text-align: right;"><b>2 marks</b></p>
<p><b>NOTES:</b></p> <p>1 For correct answer, with or without working award 2/2</p> <p>2 For finding where the line crosses the y axis, (0, 4), with working award 1/2</p>		

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
4	<p><b>Ans: bead 1·6cm, pearl 0·4cm</b></p> <ul style="list-style-type: none"> <li>•<sup>1</sup> interpret: interpret the text</li> <li>•<sup>2</sup> interpret: set up second equation</li> <li>•<sup>3</sup> strategy: know to solve a system of equations</li> <li>•<sup>4</sup> process: follow through a valid strategy to produce values for <math>b</math> and <math>p</math></li> <li>•<sup>5</sup> process: correct values for <math>b</math> and <math>p</math> (consistent with original equations)</li> <li>•<sup>6</sup> communicate: state result</li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>2b + 5p = 5\cdot2</math></li> <li>•<sup>2</sup> <math>3b + 2p = 5\cdot6</math></li> <li>•<sup>3</sup> evidence</li> <li>•<sup>4</sup> a value for <math>b</math> <u>and</u> <math>p</math></li> <li>•<sup>5</sup> <math>b = 1\cdot6, p = 0\cdot4</math></li> <li>•<sup>6</sup> bead is 1·6 cm long, pearl is 0·4 cm long</li> </ul> <p style="text-align: right;"><b>6 marks</b></p>

**NOTES:**

- 1 Incorrect equations must be followed through to give the possibility of awarding 4/6 or 5/6
- 2 Any valid strategy must involve the use of two equations
- 3 For  $b = 1\cdot6, p = 0\cdot4$  award 5/6 (loses communication mark)
- 4 For the award of the final mark the lengths of both a bead and a pearl must be clearly stated in centimetres
- 5 For answers obtained without using simultaneous equations
  - <sup>1</sup> •<sup>2</sup> not available (unless the 2 equations are explicitly stated)
  - <sup>3</sup> attempt to substitute in both equations
  - <sup>4</sup> substitute correctly in both equations
  - <sup>5</sup> arrive at solutions for  $b$  and  $p$
  - <sup>6</sup> communicate solutions for one bead and one pearl
- 6 For a wrong answer without working, or based on an invalid strategy, the final mark cannot be awarded
- 7 For the correct answer with no working, award 0/6

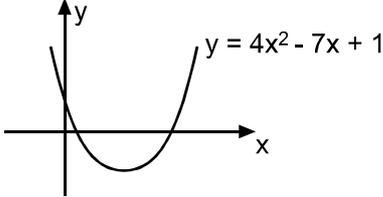
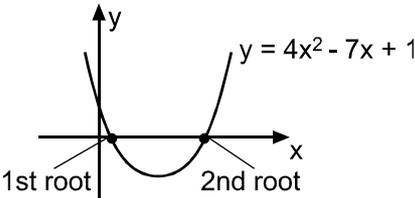
Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
5	<p><b>Ans: 149.9 cm<sup>2</sup></b></p> <ul style="list-style-type: none"> <li>•<sup>1</sup> strategy: express sector as fraction of circle</li> <li>•<sup>2</sup> strategy: know how to find area of sector</li> <li>•<sup>3</sup> process: correctly calculate area of sector</li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>\frac{110}{360}</math></li> <li>•<sup>2</sup> <math>\frac{110}{360} \times \pi \times 12.5^2</math></li> <li>•<sup>3</sup> 149.9 cm<sup>2</sup></li> </ul> <p style="text-align: right;"><b>3 marks</b></p>
<p><b>NOTES:</b></p> <ol style="list-style-type: none"> <li>1 Accept variations in <math>\pi</math>; disregard premature or incorrect rounding of 110/360</li> <li>2 For <math>110/360 \times 2 \times \pi \times 12.5</math> leading to 24.0 award 2/3</li> <li>3 For the award of the final mark, calculations must involve <math>\pi</math> and be of equivalent difficulty</li> </ol>		

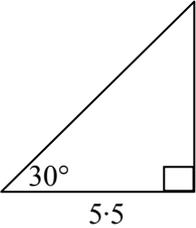
Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
6 (a)	<p><b>Ans: (i) 147°</b> <b>(ii) 101.9 km</b></p> <p><b>(i)</b> •<sup>1</sup> interpret: find angle HKM</p> <p><b>(ii)</b> •<sup>1</sup> strategy: know to apply the cosine rule to find HM •<sup>2</sup> process: correct application of the cosine rule •<sup>3</sup> process: calculate <b>total</b> distance</p>	<p>•<sup>1</sup> 147° (or 213°)</p> <p style="text-align: right;"><b>1 mark</b></p> <p>•<sup>1</sup> evidence of cosine rule</p> <p>•<sup>2</sup> <math>22^2 + 30^2 - 2 \times 22 \times 30 \cos 147^\circ</math> or <math>22^2 + 30^2 - 2 \times 22 \times 30 \cos 213^\circ</math></p> <p>•<sup>3</sup> 101.9km</p> <p style="text-align: right;"><b>3 marks</b></p>
<p><b>NOTES:</b></p> <p>1 Angle HKM need not be explicitly stated. It may be marked on a diagram or stated within the use of the cosine rule.</p> <p>2 For answer by scale drawing <span style="float: right;">award 0/3</span></p> <p>3 For answer obtained by using Sine Rule or Pythagoras <span style="float: right;">award 0/3</span></p> <p>4 For answers of 101.3 km (RAD) } with working <span style="float: right;">award 3/3</span> 99.7 km (GRAD) }</p>		

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
(b)	<b>Ans: 179.7km<sup>2</sup></b> • <sup>1</sup> strategy:            know how to find area • <sup>2</sup> process:                calculate area correctly	• <sup>1</sup> $\frac{1}{2} \times 22 \times 30 \sin 147^\circ$ • <sup>2</sup> 179.7 km <sup>2</sup> <p style="text-align: right;"><b>2 marks</b></p>
<p><b>NOTES:</b></p> <ul style="list-style-type: none"> <li>• The second mark is available for any calculation involving <math>\frac{1}{2} ab \sin C</math></li> <li>• For answers of <math>201.0 \text{ km}^2</math> (RAD)  <math>244.1 \text{ km}^2</math> (GRAD) } with working            award 2/2</li> </ul>		

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
7 (a)	<b>Ans: 0.52 cm<sup>3</sup></b> • <sup>1</sup> process: substitute correctly into formula for volume of sphere • <sup>2</sup> process: calculate volume • <sup>3</sup> process: round volume to 2 significant figures	• <sup>1</sup> $V = \frac{4}{3} \times \pi \times 0.5^3$ • <sup>2</sup> 0.52333 • <sup>3</sup> 0.52 <p style="text-align: right;"><b>3 marks</b></p>
<b>NOTES:</b> 1 For $V = \frac{4}{3} \times \pi \times 0.5^3 = 0.5$ award 2/3 2 For $V = \frac{4}{3} \times \pi \times 0.5^2 = 1.0$ award 2/3		
(b)	<b>Ans: 0.34 cm</b> • <sup>1</sup> process: find volume of cylinder • <sup>2</sup> strategy: equate volume of cylinder with volume of sphere • <sup>3</sup> process: find height	• <sup>1</sup> $\pi \times 0.7^2 \times h$ • <sup>2</sup> $0.52 = \pi \times 0.7^2 \times h$ • <sup>3</sup> 0.34 cm <p style="text-align: right;"><b>3 marks</b></p>
<b>NOTES:</b> 1 An incorrect answer in part (a) must be followed through to allow the possibility of awarding 3/3 2 Accept variations in height due to variations in $\pi$ or premature rounding		

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
8	<p><b>Ans:</b> <math>x = 1.6</math> or <math>0.2</math></p> <p><b>Method 1</b></p> <ul style="list-style-type: none"> <li>•<sup>1</sup> strategy: know to use quadratic formula</li> <li>•<sup>2</sup> process: substitute correctly into quadratic formula</li> <li>•<sup>3</sup> process: calculate <math>b^2 - 4ac</math></li> <li>•<sup>4</sup> process: state both values of <math>x</math> correct to one decimal place</li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> evidence</li> <li>•<sup>2</sup> <math display="block">\frac{7 \pm \sqrt{((-7)^2 - 4 \times 4 \times 1)}}{2 \times 4}</math></li> <li>•<sup>3</sup> 33</li> <li>•<sup>4</sup> 1.6 or 0.2</li> </ul> <p style="text-align: right;"><b>4 marks</b></p>
<p><b>NOTES:</b></p> <p><b>Note for Method 1</b></p> <ul style="list-style-type: none"> <li>• Where <math>b^2 - 4ac</math> is calculated incorrectly, fourth mark is available only if <math>b^2 - 4ac &gt; 0</math></li> <li>• For a correct answer without working <span style="float: right;">award 0/4</span></li> </ul>		

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
	<p><b>Ans:</b> <math>x = 1.6</math>, or <math>0.2</math></p> <p><b>Method 2</b></p> <ul style="list-style-type: none"> <li>•<sup>1</sup> strategy: know to graph <math>y = 4x^2 - 7x + 1</math> or equivalent</li> <li>•<sup>2</sup> communicate: indicate positions of roots</li> <li>•<sup>3</sup> communicate: state first root to 1 dec place</li> <li>•<sup>4</sup> communicate: state second root to 1 dec place</li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup>  </li> <li>•<sup>2</sup>  </li> <li>•<sup>3</sup> 0.2</li> <li>•<sup>4</sup> 1.6</li> </ul> <p style="text-align: right;"><b>4 marks</b></p>
<b>NOTES:</b>		

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
9 (a)	<b>Ans: 30°</b> • <sup>1</sup> process: find the size of angle OBC	• <sup>1</sup> 30°  <p style="text-align: right;"><b>1 mark</b></p>
(b)	<b>Ans: 6.35cm</b>  <b>Method 1</b> • <sup>1</sup> strategy: recognise right angled triangle  • <sup>2</sup> process: use trigonometry to find radius • <sup>3</sup> process: calculate length of OB  <b>Method 2</b> • <sup>1</sup> strategy: know to use sine rule in triangle OBC • <sup>2</sup> process: substitute correctly in sine rule • <sup>3</sup> process: calculate length of OB	• <sup>1</sup>   • <sup>2</sup> $\cos 30^\circ = 5.5/OB$ • <sup>3</sup> 6.35cm  <p style="text-align: right;"><b>3 marks</b></p>          • <sup>1</sup> evidence • <sup>2</sup> $\frac{OB}{\sin 30^\circ} = \frac{11}{\sin 120^\circ}$ • <sup>3</sup> 6.35 cm  <p style="text-align: right;"><b>3 marks</b></p>
<b>NOTES:</b>		

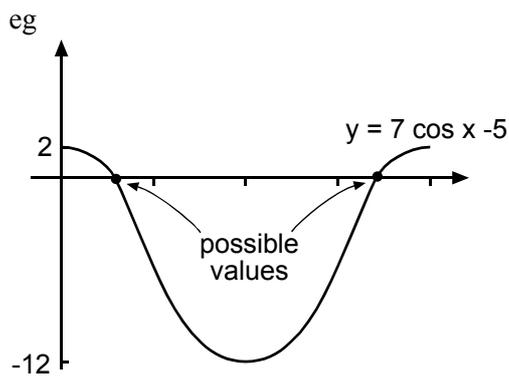
Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
10 (a)	<p>Ans: <math>\frac{7\sqrt{2}}{2}</math></p> <ul style="list-style-type: none"> <li>•<sup>1</sup> strategy: know how to rationalise denominator</li> <li>•<sup>2</sup> process: simplify answer</li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>\frac{7}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}}</math></li> <li>•<sup>2</sup> <math>\frac{7\sqrt{2}}{2}</math></li> </ul> <p style="text-align: right;"><b>2 marks</b></p>
<p><b>NOTES:</b></p> <p>1 For a correct answer with no working award 2/2</p>		
(b)	<p>Ans: <math>\frac{3}{a}</math></p> <ul style="list-style-type: none"> <li>•<sup>1</sup> strategy: know how to multiply</li> <li>•<sup>2</sup> process: simplify answer</li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>\frac{a \times 3b}{b \times a^2}</math> or equivalent</li> <li>•<sup>2</sup> <math>\frac{3}{a}</math></li> </ul> <p style="text-align: right;"><b>2 marks</b></p>
<p><b>NOTES:</b></p> <p>1 For working of <math>\frac{3ab}{ab^2}</math> leading to an answer of <math>\frac{3}{b}</math> award 1/2</p>		

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
(c)	<p>Ans: <math>r = \sqrt{\frac{p-q}{2}}</math></p> <ul style="list-style-type: none"> <li>•<sup>1</sup> process: start to rearrange the formula</li> <li>•<sup>2</sup> process: continue the process</li> <li>•<sup>3</sup> process: make <math>r</math> the subject</li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>p - q = 2r^2</math></li> <li>•<sup>2</sup> <math>r^2 = \frac{p-q}{2}</math></li> <li>•<sup>3</sup> <math>r = \sqrt{\frac{p-q}{2}}</math></li> </ul> <p style="text-align: right;"><b>3 marks</b></p>
<p><b>NOTES:</b></p> <p>1 For a correct answer without working <span style="float: right;">award 3/3</span></p> <p>2 The second mark is available for division by 2</p> <p>3 The third mark is available for taking the square root of an expression for <math>r^2</math></p> <p>4 For an answer of <math>\frac{\sqrt{p-q}}{2}</math>, with or without working <span style="float: right;">award 2/3</span></p>		

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
11 (a)	<p><b>Ans: 44·4° and 315·6°</b></p> <ul style="list-style-type: none"> <li>•<sup>1</sup> process: start to solve equation</li> <li>•<sup>2</sup> process: calculate one value of <math>x</math></li> <li>•<sup>3</sup> process: calculate second value of <math>x</math></li> </ul>	<ul style="list-style-type: none"> <li>•<sup>1</sup> <math>\cos x = 5/7</math></li> <li>•<sup>2</sup> 44·4°</li> <li>•<sup>3</sup> 315·6°</li> </ul> <p style="text-align: right;"><b>3 marks</b></p>

**NOTES:**

- 1 Where  $\cos x$  is calculated incorrectly, the working must be followed through with the possibility of awarding 2/3
- 2 Where a graphical solution has been used, the first mark is available for indicating what graph is drawn and where the values occur



- 3 For a correct answer without working

award 0/3

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
(b)	<b>Ans: <math>\sin x</math></b> • <sup>1</sup> strategy: replace $\tan x$ with $\sin x/\cos x$ • <sup>2</sup> process: cancel $\cos x$	• <sup>1</sup> $\frac{\sin x \cos x}{\cos x}$ • <sup>2</sup> $\sin x^\circ$ <p style="text-align: right;"><b>2 marks</b></p>

**NOTES:**

- |   |  |           |
|---|--|-----------|
| 1 | For an answer of $\sin x$ , without working  | award 0/2 |
| 2 | For a statement of $\tan x = \frac{\sin x}{\cos x}$ in isolation                         | award 0/2 |
| 3 | For a statement of $\tan x = \frac{\sin x}{\cos x}$ followed by $\tan x \cos x = \sin x$ | award 2/2 |

**TOTAL MARKS FOR PAPER 2**  
**50**

[END OF MARKING INSTRUCTIONS]