Principal Assessor Report 2002

Assessment Panel:	**Mathematics and Statistics**

Qualification area

Subject(s) and Level(s) included in this report	**Mathematics and Statistics Intermediate 2**

Statistical information: update

Number of entries in 2001	
Pre appeal	11235
Post appeal	11792

Number of entries in 2002	
Pre appeal	12497
Post appeal	

General comments re entry numbers

The number of entries in 2002 was 12,497, an increase of 6% from 2001. The continued increase in the number of candidates is very encouraging.

Grade boundaries at C, B and A for each subject area included in the report

Intermediate2: Pass mark stage

Maximum mark 81		
A	**B**	**C**
72%	60%	49%

General commentary on grade boundaries

Notional percentage cut-offs for each grade

Question papers and their associated marking schemes are designed to be of the required standard and to meet the assessment specification for the subject/level concerned.
For National courses the examination paper(s) are set in order that a score of approximately 50% of the total marks for all components merits a grade C (based on the grade descriptions for that grade), and similarly a score of 70 % for a grade A. The lowest mark for a grade B is set by the computer software as half way between the C and A grade boundaries.

Comments on candidate performance

General comments

Performance in many areas of the syllabus was much improved. Many questions attracted better than 50% averages indicating that staff appear to be becoming more comfortable in the preparation of candidates.

Areas of external assessment in which candidates performed well

Paper 1 (units 1, 2 and 3)	Questions 1, 5(a) & (b)
Paper 2 (units 1, 2 and 3)	Questions 1, 3(a), 10

Areas of external assessment in which candidates had difficulty

Paper 1 (units 1, 2 and 3)	
Question 5(c)	Compare the two boxplots and comment
Question 6(c)	Candidate failed totally to recognise how to calculate the x co-ordinates of A and B.
Paper 1 (units 1, 2 and applications)	
Question 6	Many candidates were unable to solve the resulting equation $3340 = 20(3 \times 50 + h)$. A common wrong answer was 340.
Paper 2 (units 1, 2 and 3)	
Question 2	Performance here was disappointing. Many candidates, including the most able, experienced difficulty in scaling the system of equations.
Question 3(b)	Few candidates were able to interpret and communicate the significance of the increase in standard deviation. An acceptable response would have been "greater spread in prices of cartons of milk bought in local shops".
Question 4	A common error was the use of the cosine rule to find angle ACB even although the diagram clearly showed AB as an arc of a circle. Candidates who managed to have most success here used the approach $\frac{\text{Arc}}{\text{Circumference}} = \frac{\text{angle}}{360°}$

Question 5(b)	Despite candidates being asked to factorise the expressions in x in part (a), few were unaware of how to use their answers to part (a) to simplify the algebraic fraction.
Questions 8	The majority of candidates here received partial credit. Generally working was clearly laid out. A common wrong assumption was that the base of the right angle triangles was 40 metres.
Question 10(a)	A common error was H = 10 + 5sin !0° leading to 15 sin 10°
Question 10(b)	Many candidates did not show appropriate working and hence were unable to be awarded full credit. Appropriate working required $12.5 = 10 + 5 \sin t°$, leading to $\sin t° = \frac{2.5}{5}$ with t = 30 and 150
Paper 2 (units 1, 2 and applications)	
Question 10(a)	Many candidates were unable to calculate correctly 0.2% of 1.5 millions pounds.
Question 10(b)	Few candidates understood and could deal correctly with the concepts of a tax allowance and / or various rates of tax.

Recommendations

Feedback to centres

Candidates should be reminded that full credit will be given only where the solution contains appropriate working.

In view of the poor performance in the algebraic questions, centres should consider how best to provide an appropriate course which caters for the wide range of ability with different experiences that exists at Intermediate 2.

The courses must take account of future, **realistic** plans to provide a motivating experience for all students.

Decisions on appropriate courses should be taken early in the session.

SCOTTISH QUALIFICATIONS AUTHORITY

2002 Mathematics

Intermediate 2 Units 1, 2, 3

Finalised Marking Instructions

Special Instructions

1 The main principle in marking scripts is to give credit for the skills which have been demonstrated. Failure to have the correct method may not preclude a pupil gaining credit for the calculations involved or for the communication of the answer.

Where a candidate has scored zero marks for any question attempted, "0" should be shown against the answer in the place in the margin.

It is of great importance that the utmost care should be exercised in adding up the marks. Where appropriate, all summations for totals and grand totals must be carefully checked.

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4 Working after a correct answer should only be taken into account if it provides **firm** evidence that the requirements of the question have not been met.

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6 Accept answers arrived at by inspection or mentally, where it is possible for the answer to have been so obtained.

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Note that for some questions a method will be specified.

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11 Accept legitimate variations in numerical/algebraic questions.

12 Do not penalise bad form eg $\sin x° = 0.5 = 30°$.

13 A transcription error is not normally penalised except where the question has been simplified as a result.

14 Do not penalise inadvertent use of radians in trigonometry questions, provided its use is consistent within the question.

Paper 1, Units 1, 2, 3

Marking Instructions

<table>
<tr><th>Question No</th><th>Marking Scheme
Give 1 mark for each •</th><th>Illustrations of evidence for awarding a mark at each •</th></tr>
<tr><td>1. (a)</td><td>Ans:
<table><tr><th></th><th>Frequency</th><th>Cumulative Frequency</th></tr><tr><td>70</td><td>2</td><td>2</td></tr><tr><td>71</td><td>3</td><td>5</td></tr><tr><td>72</td><td>3</td><td>8</td></tr><tr><td>73</td><td>3</td><td>11</td></tr><tr><td>74</td><td>2</td><td>13</td></tr><tr><td>75</td><td>2</td><td>15</td></tr><tr><td>76</td><td>1</td><td>16</td></tr></table></td><td></td></tr>
<tr><td></td><td>•[1] communicate: table with correct frequencies

•[2] process: add cumulative frequency column</td><td>•[1] 2, 3, 3, 3, 2, 2, 1 or correct tally marks

•[2] 2, 5, 8, 11, 13, 15, 16</td></tr>
<tr><td colspan="3">NOTES:

(i) Where the frequency table has been constructed incorrectly, the working must be followed through with the possibility of awarding 1/2.</td></tr>
<tr><td>1. (b)</td><td>Ans: $^{5}/_{16}$

•[1] process: calculate probability</td><td>•[1] $\frac{5}{16}$</td></tr>
<tr><td colspan="3">NOTES:</td></tr>
</table>

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
2.	**Ans: $y = \frac{5}{2}x + 5$ or equivalent**	
	$\bullet^1$ process: find gradient	$\bullet^1$ $m = \frac{5}{2}$
	$\bullet^2$ process: state y intercept or c in $y = mx + c$	$\bullet^2$ $c = 5$
	$\bullet^3$ communicate: state correct equation of straight line	$\bullet^3$ $y = \frac{5}{2}x + 5$ **3 marks**

NOTES:

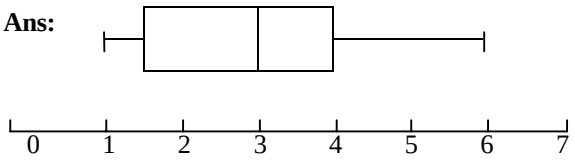
(i) For a correct answer without working, award 3/3.

(ii) For $y = \frac{5}{2}x$, award 1/3.

(iii) Where m and/or c are incorrect, the working must be followed through to give the possibility of awarding 1/3 or 2/3.

(iv) For an incorrect answer, without working eg $y = 5x + \frac{5}{2}$, award 0/3.

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
3.	**Ans: 120, 240** •[1] communicate: state one correct value of x •[2] communicate: state second correct value of x	 •[1] 120 •[2] 240 **2 marks**
NOTES:		
4.	**Ans: $x^3 + x^2 - 13x + 3$** •[1] process: starts to multiply out brackets •[2] process: completes the process of multiplying out brackets correctly •[3] process: collect like terms which must include x^3 term	 •[1] evidence of 3 correct terms (eg $x^3 + 4x^2 - x$) •[2] $x^3 + 4x^2 - x - 3x^2 - 12x + 3$ •[3] $x^3 + x^2 - 13x + 3$ **3 marks**
NOTES:		

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
5. (a)	**Ans: $Q_1 = 1{\cdot}5$, median = 3, $Q_3 = 4$** •[1] communicate state median •[2] communicate: state lower quartile •[3] communicate: state upper quartile	•[1] median = 3 •[2] $Q_1 = 1{\cdot}5$ •[3] $Q_3 = 4$ **3 marks**
NOTES: (i) An incorrect answer for the median must be followed through with the possibility of awarding 2/3.		
(b)	**Ans:**  •[1] communicate: correct endpoints •[2] communicate: correct box	•[1] endpoints at 1 and 6 clearly indicated •[2] box showing median, Q_1, and Q_3 clearly indicated **2 marks**
NOTES: Incorrect answers in (a) must be followed through to give the possibility of awarding 2/2.		

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
5. (c)	**Ans: more spread out or higher median** •[1] communicate: one valid statement	•[1] **1 mark**
NOTES:		
6. (a)	**Ans: (1, – 16)** •[1] communicate: state clearly first coordinate •[2] communicate: state clearly second coordinate	•[1] 1 •[2] – 16 **2 marks**
NOTES: For a correct answer, without working, award 2/2.		

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
6. (b)	**Ans:** x **= 1** •[1] communicate: state equation	 •[1] $x = 1$ **1 mark**

NOTES:

(i) An incorrect x coordinate in part (a) must be followed through to give the possibility of awarding full credit in part (b).

6. (c)	**Ans: AB = 8** •[1] strategy: know to substitute y = 0 in equation •[2] process: solve equation $(x-1)^2 - 16 = 0$ correctly •[3] process: calculate AB	 •[1] $(x-1)^2 - 16 = 0$ •[2] $x = 5$ and -3 •[3] AB = 8 **3 marks**

NOTES:

(i) Where the values for x have been calculated incorrectly, the third mark is still available for an answer consistent with previous working.

(ii) Where the values of x have been stated correctly with no evidence of working, the third mark is the only available mark.

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
7. (a)	**Ans:** $\sqrt{5}$ •[1] process: simplify $\sqrt{45}$ •[2] process: simplify $3\sqrt{5}-2\sqrt{5}$	•[1] $3\sqrt{5}$ •[2] $\sqrt{5}$ **2 marks**
NOTES: (i) For a correct answer without working, award 2/2.		
7. (b)	**Ans:** $\frac{1+x}{x^2}$ •[1] process: state valid denominator •[2] process: state answer in simplest form	•[1] any valid common denominator •[2] $\frac{1+x}{x^2}$ **2 marks**
NOTES:		

TOTAL MARKS FOR PAPER 1
27

Paper 2, Units 1, 2 & 3

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
1.	**Ans: 5438 m^2** •^{1} process: substitutes correctly into area formula •^{2} process: calculates area correctly	•^{1} $\frac{1}{2} \times 100 \times 120 \times \text{Sin}65^\circ$ •^{2} 5438 m^2 (disregard rounding) **2 marks**
NOTES:		
2. (a)	**Ans: $x = 3$, $y = -1$** •^{1} process: scale system of equations •^{2} process: solve for x •^{3} process: solve for y	•^{1} $15x - 10y = 55$ $4x + 10y = 2$ or equivalent •^{2} $x = 3$ •^{3} $y = -1$ **3 marks**
NOTES: (i) For a correct answer obtained from 2 tables of values or solving 2 equations graphically, award 0/3. (ii) For a correct answer without working, award 0/3. (iii) Where an error occurs in scaling the system of equations, marking must be followed through with the possibility of awarding 2/3. (iv) An incorrect answer for x must be followed through with the possibility of awarding 2/3.		

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
3. (a)	**Ans: $\bar{x}$ = 73 and s.d. = 10·5** •[1] process: calculate the mean •[2] process: calculate $(x-\bar{x})^2$ •[3] process: substitute into formula •[4] process: calculate standard deviation	•[1] 73 •[2] 49, 9, 256, 4, 36, 196 •[3] $\sqrt{\frac{550}{5}}$ •[4] 10·5 (disregard rounding) **4 marks**

NOTES:

(i) Use of alternative formula: the second mark can be awarded for calculation of Σx^2 and $(\Sigma x)^2$ leading to 32524 and 191844.

(ii) For a correct answer, without working, award 0/4.

(b)	**Ans: same mean, but prices have greater spread in local shops** •[1] communicate: both results have the same mean •[2] communicate: greater spread in prices of cartons of milk bought in local shops	**2 marks**

NOTES:

(i) Where the mean in part (a) has been incorrectly calculated, the first mark is available for a valid comparison of the two means.

(ii) For the award of the second mark, reference must be made to greater spread or range.

Question No	Marking Scheme Give 1 mark for each •		Illustrations of evidence for awarding a mark at each •
4.	**Ans: 82°**		
	$\bullet^1$ strategy:	marshall facts and recognise link with circumference	$\bullet^1$ $\frac{\text{arc}}{\text{circumference}} = \frac{\text{angle}}{360°}$
	$\bullet^2$ process:	express arc as ratio of circumference	$\bullet^2$ $\frac{28{\cdot}6}{\pi \times 40}$ or equiv.
	$\bullet^3$ strategy:	knows how to find angle	$\bullet^3$ $\frac{28{\cdot}6 \times 360°}{\pi \times 40}$
	$\bullet^4$ process:	calculate angle	$\bullet^4$ 82°
			4 marks

NOTES:

(i) Accept variations in π; disregard premature or incorrect rounding of $\frac{28{\cdot}6}{\pi \times 40}$

(ii) For $\frac{28{\cdot}6}{\pi \times 20}$ x 360°, award 3/4 provided the criteria for the other marks are met.

(iii) For use of πr^2, the third and fourth marks are available.

(iv) For a correct answer without working, award 0/4

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
5. (a)	**Ans: (i) $3y\,(y-2)$** •[1] process: use common factor **(ii) $(y+3)\,(y-2)$** •[1] process: factorise trinomial expression •[2] process: completes factorisation	•[1] $3y\,(y-2)$ **1 mark** •[1] one correct factor •[2] second correct factor **2 marks**
NOTES: For an answer of $(y-3)\,(y+2)$, award 1/2.		
(b)	**Ans:** $\dfrac{3y}{y+3}$ •[1] process: prepares to simplify expression •[2] process: simplifies expression correctly	•[1] $\dfrac{3y\,(y-2)}{(y+3)\,(y-2)}$ •[2] $\dfrac{3y}{y+3}$ **2 marks**
NOTES:		

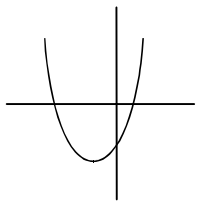
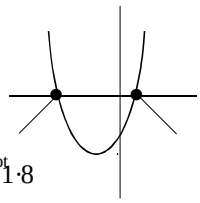
Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
6.	**Ans: 2000 cm^3**	
	•[1] strategy: knows how to calculate volume of container	•[1] evidence of difference in volume of 2 cones
	•[2] process: substitute correctly into formula	•[2] $\frac{1}{3}\pi.8^2.32$
	•[3] process: substitute correctly into formula	•[3] $\frac{1}{3}\pi 5^2.20$
	•[4] process: calculates volume correctly	•[4] 1621 cm^3
	•[5] process: rounds answer to 1 significant figure	•[5] 2000 cm^3 **5 marks**

NOTES:

(i) Accept variations in π.

(ii) The final mark is available for rounding an answer correct to one significant figure. Where the answer requires no rounding, the final mark cannot be awarded.

(iii) For use of $\pi r^2 h$, the second, third and fifth marks are available.

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
7.	**Ans: $x = 0{\cdot}3, x = -1{\cdot}8$** METHOD 1 •[1] strategy: know to use quadratic formula •[2] process: substitutes correctly into quadratic formula •[3] process: calculate $b^2 - 4ac$ correctly •[4] process: states both values of x correct to 1 decimal place METHOD 2 – possible graphical solution •[1] strategy: know to graph $y = 2x^2 + 3x - 1$ or equivalent •[2] communicate: indicate position of roots •[3] communicate: state first root correct to one decimal place •[4] communicate: state second root correct to one decimal place	•[1] evidence •[2] $\frac{-3 \pm \sqrt{3^2 - 4 \times 2 \times (-1)}}{2 \times 2}$ •[3] 17 •[4] 0·3 and – 1·8 **4 marks** •[1] $y = 2x^2 + 3x - 1$  •[2] $y = 2x^2 + 3x - 1$  •[3] – 1·8 •[4] 0·3

NOTES:

(i) The third and fourth marks: where $b^2 - 4ac$ is calculated incorrectly, the fourth mark is available only when $b^2 - 4ac > 0$.

(ii) For a correct answer, without working, award 0/4.

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
8.	**Ans: 23·3 metres**	
	•[1] strategy: know to apply trigonometry to find AT or BT	•[1] evidence of use of sine rule in triangle ATB
	•[2] process: correct application of sine rule in triangle ATB	•[2] $\frac{AT}{Sin25°} = \frac{80}{Sin122°}$ or equiv
	•[3] process: calculates AT or BT correctly	•[3] AT = 39·9 m or BT = 51·4 m
	•[4] strategy: know to use right angled trig to calculate height of triangle ATB or other valid strategy.	•[4] $\frac{h}{39·9}$ = Sin33° or equiv.
	•[5] process: calculate height of triangle ATB correctly	•[5] h = 21·7m (disregard rounding)
	•[6] communicate: state height of flagpole	•[6] 23·3m **6 marks**

NOTES:

(i) Disregard errors due to premature rounding provided there is evidence.

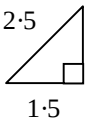
(ii) Variations in answers for a value of AT or BT or a wrong value of AT or BT must be accepted as a basis of calculating the height of triangle ATB.

(iii) Where there is a wrong assumption that the base of the right angle triangles is 40 m, 2 of the last 3 marks are available.

(iv) For a correct answer without working, award 0/6.

(v) Answer obtained by a scale drawing – the award of the first 5 marks

•[1] strategy :	know to use scale drawing	•[1] evidence of appropriate scale clearly stated
•[2] process :	draw base AB consistent with chosen scale	
•[3] process :	measure angles of $(33 \pm 2)^\circ$ and $(25 \pm 2)^\circ$	
•[4] process :	complete triangle ATB and indicate height	
•[5] process :	calculate height of triangle ATB correctly	•[5] h = (21·7 ± 0·3)m

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
9.	**Ans: 0·5 metres** •[1] strategy: marshall facts and recognise right angle •[2] strategy: know to use Pythagoras Theorem •[3] process: calculate x correctly •[4] communicate: state depth, d	•[1]  •[2] $2{\cdot}5^2 = 1{\cdot}5^2 + x^2$ •[3] $x = 2$ •[4] d = 0·5m **4 marks**
NOTES: (i) Where Pythagoras Theorem has been used incorrectly leading to $x \geq 2{\cdot}5$, the fourth mark is not available.		
10.	**Ans: 3 years** •[1] strategy: know how to increase 50000 by 5% annually •[2] process: carry out calculations correctly, continuing for at least 3 years within a valid strategy •[3] strategy: know how to decrease 108000 by 20% annually •[4] process: carry out calculations correctly, continuing for at least 3 years within a valid strategy •[5] communicate: state response which must be based on calculations carried out within valid strategies	•[1] evidence (× 1·05) or equiv. •[2] 57 881. …. •[3] evidence (× 0·8) or equiv. •[4] 55296. ….. •[5] 3 years **5 marks**
NOTES: (i) For a correct answer without working, award 0/5. (ii) In the award of the second and fourth marks, accept legitimate variations in answers due to different methods.		

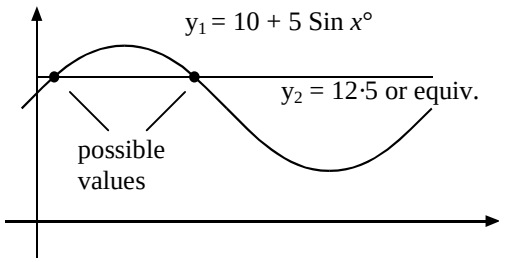
Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
11. (a)	**Ans: $3x$** •[1] process: starts to divide •[2] process: completes division	•[1] 3 •[2] $3x$ **2 marks**
NOTES: Accept $3x^1$ or $3x^{2/2}$		
(b)	**Ans: p = $\frac{r-2t}{3}$** •[1] process: start to rearrange formula •[2] process: continue process	•[1] $r-2t$ •[2] $\frac{r-2t}{3}$ **2 marks**
NOTES:		

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
12. (a)	**Ans: 10·868m** •[1] strategy: knows to substitute in formula •[2] process: calculate H correctly	 •[1] H = 10 + 5 sin 10° •[2] 10·868m (disregard rounding) **2 marks**
NOTES: (i) For a correct answer, without working award 2/2		

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
12. (b)	**Ans: 30 and 150 seconds** •[1] strategy: knows to substitute in formula •[2] process: starts to solve equation •[3] communicate: state one value of t •[4] communicate: state second value of t	 •[1] $12{\cdot}5 = 10 + 5\sin t°$ •[2] $\sin t° = \frac{2{\cdot}5}{5}$ •[3] $t = 30$ •[4] $t = 150$ **4 marks**

NOTES:

(i) Where a graphical solution is used, the second mark is available for indicating what graph(s) was (were) drawn and where the values occur.



(ii) For a correct answer arrived at by trial and improvement, only the first, third and fourth marks are available.

(iii) For a correct answer without working, award 0/4.

TOTAL MARKS FOR PAPER 2
54

TOTAL MARKS FOR PAPER 1 AND PAPER 2
81

[END OF MARKING INSTRUCTIONS]

2002 Mathematics

Intermediate 2 Units 1, 2 and Applications

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Paper 1, Units 1, 2 and App. of Maths

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Give 1 mark for each •</th><th>Illustrations of evidence for awarding a mark at each •</th></tr>
<tr><td>1. (a)</td><td>Ans:
<table><tr><th></th><th>Frequency</th><th>Cumulative Frequency</th></tr><tr><td>70</td><td>2</td><td>2</td></tr><tr><td>71</td><td>3</td><td>5</td></tr><tr><td>72</td><td>3</td><td>8</td></tr><tr><td>73</td><td>3</td><td>11</td></tr><tr><td>74</td><td>2</td><td>13</td></tr><tr><td>75</td><td>2</td><td>15</td></tr><tr><td>76</td><td>1</td><td>16</td></tr></table></td><td></td></tr>
<tr><td></td><td>•[1] communicate: table with correct frequencies

•[2] process: add cumulative frequency column</td><td>•[1] 2, 3, 3, 3, 2, 2, 1 or correct tally marks

•[2] 2, 5, 8, 11, 13, 15, 16</td></tr>
<tr><td colspan="3">NOTES:

(i) Where the frequency table has been constructed incorrectly, the working must be followed through with the possibility of awarding 1/2.</td></tr>
<tr><td>1. (b)</td><td>Ans: $^{5}/_{16}$

•[1] process: calculate probability</td><td>•[1] $\frac{5}{16}$</td></tr>
<tr><td colspan="3">NOTES:</td></tr>
</table>

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
2.	**Ans: £115**	
	•[1] strategy: knows how to calculate pay for Friday and Saturday	•[1] 3 × 4·60 and 7 × 4·60
	•[2] strategy: knows how to calculate overtime pay at time and a half	•[2] 1·5 × 2 × 4·60 or equiv.
	•[3] strategy: knows how to calculate overtime pay at double time	•[3] 2 × 6 × 4·60 or equiv.
	•[4] process: calculates gross pay correctly	•[4] £115 **4 marks**
	ALTERNATIVE METHOD	
	•[1] strategy: an attempt to calculate number of hours to be paid	•[1] 3 + 7 + 2 × 1·5 or 3 + 7 + 2 × 6
	•[2] strategy: knows how to calculate number of hours to be paid	•[2] 3 + 7 + (2 × 1·5) + (2 × 6)
	•[3] strategy: knows how to calculate gross pay	•[3] (3 + 7 + (2 × 1·5) + (2 × 6))× 4·60
	•[4] strategy: calculates gross pay correctly	•[4] £115
NOTES:		

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
3.	**Ans: $y = \frac{5}{2}x + 5$ or equivalent** •[1] process: find gradient •[2] process: state y intercept or c in $y = mx + c$ •[3] communicate: state correct equation of straight line	 •[1] $m = \frac{5}{2}$ •[2] $c = 5$ •[3] $y = \frac{5}{2}x + 5$ **3 marks**

NOTES:

(v) For a correct answer without working, award 3/3.

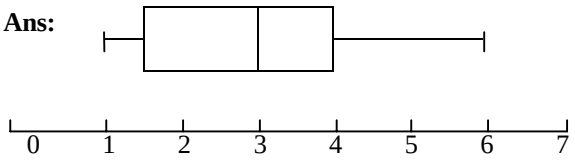
(vi) For $y = \frac{5}{2}x$, award 1/3.

(vii) Where m and/or c are incorrect, the working must be followed through to give the possibility of awarding 1/3 or 2/3.

(viii) For an incorrect answer, without working eg $y = 5x + \frac{5}{2}$, award 0/3.

4.	**Ans: 120, 240** •[1] communicate: state one correct value of x •[2] communicate: state second correct value of x	 •[1] 120 •[2] 240 **2 marks**

NOTES:

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
5. (a)	**Ans: $Q_1 = 1{\cdot}5$, median = 3, $Q_3 = 4$** •[1] communicate state median •[2] communicate: state lower quartile •[3] communicate: state upper quartile	•[1] median = 3 •[2] $Q_1 = 1{\cdot}5$ •[3] $Q_3 = 4$ **3 marks**
NOTES: (i) An incorrect answer for the median must be followed through with the possibility of awarding 2/3.		
(b)	**Ans:**  •[1] communicate: correct endpoints •[2] communicate: correct box	•[1] endpoints at 1 and 6 clearly indicated •[2] box showing median, Q_1 and Q_3 clearly indicated **2 marks**
NOTES: Incorrect answers in (a) must be followed through to give the possibility of awarding 2/2.		

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
5. (c)	**Ans: more spread out or higher median** •[1] communicate: one valid statement	 •[1] **1 mark**
NOTES:		
6.	**Ans: 17** •[1] process: substitute correctly into formula •[2] process: starts to solve equation •[3] process: solves equation correctly	 •[1] $3340 = 20\ (3 \times 50 + h)$ •[2] $167 = 150 + h$ or $3340 = 3000 + 20h$ •[3] $h = 17$ **3 marks**
NOTES: (i) An answer of 340, with working, award 1/3 (ii) Where a trial and improvement method or working backwards approach is used, a correct answer must be supported by working, for full credit (iii) 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 •
7.	**Ans:** $x^3 + x^2 - 13x + 3$ •[1] process: starts to multiply out brackets •[2] process: completes the process of multiplying out brackets correctly •[3] process: collect like terms which must include x^3 term	 •[1] evidence of 3 correct terms (eg $x^3 + 4x^2 - x$) •[2] $x^3 + 4x^2 - x$ $-3x^2 - 12x + 3$ •[3] $x^3 + x^2 - 13x + 3$ **3 marks**
NOTES:		
8. (a)	**Ans: 10** •[1] communicate: state answer	 •[1] 10 **1 mark**
NOTES:		

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
8. (b)	**Ans: NO with reason** •[1] communicate: state correct conclusion which must be based on evidence •[2] communicate: give valid reason	 •[1] NO with evidence •[2] See note (ii) **2 marks**

NOTES:

(i) For an answer of No, without working, award 0/2.

(ii) A valid reason must include connections between

- 120 seconds, 50 calls and a comparison with 75% of 80 or
- 75% of 80 = 60 and linked to more than 120 seconds

TOTAL MARKS FOR PAPER 1
27

Paper 2, Units 1, 2 & App. of Maths

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
1.	**Ans: 5438m^2** •^{1} process: substitutes correctly into area formula •^{2} process: calculates area correctly	•^{1} $\frac{1}{2} \times 100 \times 120 \times \text{Sin}65^\circ$ •^{2} 5438 m^2 (disregard rounding) **2 marks**
NOTES:		
2.	**Ans: $x = 3$, $y = -1$** •^{1} process: scale system of equations •^{2} process: solve for x •^{3} process: solve for y	•^{1} $15x - 10y = 55$ $4x + 10y = 2$ or equivalent •^{2} $x = 3$ •^{3} $y = -1$ **3 marks**
NOTES: (i) For a correct answer obtained from 2 tables of values or solving 2 equations graphically, award 0/3. (ii) For a correct answer without working, award 0/3. (iii) Where an error occurs in scaling the system of equations, marking must be followed through with the possibility of awarding 2/3. (iv) An incorrect answer for x must be followed through with the possibility of awarding 2/3.		

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
3. (a)	**Ans: $\bar{x}$ = 73 and s.d. = 10·5** •[1] process: calculate the mean •[2] process: calculate $(x-\bar{x})^2$ •[3] process: substitute into formula •[4] process: calculate standard deviation	•[1] 73 •[2] 49, 9, 256, 4, 36, 196 •[3] $\sqrt{\frac{550}{5}}$ •[4] 10·5 (disregard rounding) **4 marks**

NOTES:

(iii) Use of alternative formula: the second mark can be awarded for calculation of Σx^2 and $(\Sigma x)^2$ leading to 32524 and 191844.

(ii) For a correct answer, without working, award 0/4.

(b)	**Ans: same mean, but prices have greater spread in local shops** •[1] communicate: both results have the same mean •[2] communicate: greater spread in prices of cartons of milk bought in local shops	**2 marks**

NOTES:

(iii) Where the mean in part (a) has been incorrectly calculated, the first mark is available for a valid comparison of the two means.

(ii) For the award of the second mark, reference must be made to greater spread or range.

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
4.	**Ans: 82°**	
	•[1] strategy: marshall facts and recognise link with circumference	•[1] $\frac{\text{arc}}{\text{circumference}} = \frac{\text{angle}}{360°}$
	•[2] process: express arc as ratio of circumference	•[2] $\frac{28{\cdot}6}{\pi \times 40}$ or equiv.
	•[3] strategy: knows how to find angle	•[3] $\frac{28{\cdot}6 \times 360°}{\pi \times 40}$
	•[4] process: calculate angle	•[4] 82° **4 marks**

NOTES:

(i) Accept variations in π; disregard premature or incorrect rounding of $\frac{28{\cdot}6}{\pi \times 40}$

(ii) For $\frac{28{\cdot}6}{\pi \times 20}$ x 360°, award 3/4 provided the criteria for the other marks are met.

(iii) For use of πr^2, the third and fourth marks are available.

(iv) For a correct answer without working, award 0/4

5.	(a)	**Ans: $3y\,(y-2)$**	
		•[1] process: use common factor	•[1] $3y\,(y-2)$ **1 mark**
	(b)	**$(y+3)\,(y-2)$**	
		•[1] process: factorise trinomial expression	•[1] one correct factor
		•[2] process: completes factorisation	•[2] second correct factor **2 marks**

NOTES:

For an answer of $(y-3)\,(y+2)$, award 1/2

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
6.	**Ans: 2000 cm^3**	
	•[1] strategy: knows how to calculate volume of container	•[1] evidence of difference in volume of 2 cones
	•[2] process: substitute correctly into formula	•[2] $\frac{1}{3}\pi.8^2.32$
	•[3] process: substitute correctly into formula	•[3] $\frac{1}{3}\pi 5^2.20$
	•[4] process: calculates volume correctly	•[4] 1621 cm^3
	•[5] process: rounds answer to 1 significant figure	•[5] 2000 cm^3 **5 marks**

NOTES:

(ii) Accept variations in π.

(ii) The final mark is available for rounding an answer correct to one significant figure. Where the answer requires no rounding, the final mark cannot be awarded.

(iii) For use of $\pi r^2 h$, the second, third and fifth marks are available.

Question No	Marking Scheme Give 1 mark for each •		Illustrations of evidence for awarding a mark at each •
7.	**Ans: £330·75**		
	•[1] interpret:	identify rate	•[1] 5·25%
	•[2] process:	calculates interest correctly	•[2] £315
	•[3] interpret:	evidence of correct path	•[3] × 1·05
	•[4] process:	calculates interest earned correctly	•[4] £330·75 **4 marks**

NOTES:

(i) For correct answer with or without working, award 4/4.

(ii) £324·45 with or without working, award 3/4.

(iii) £309 with or without working, award 1/4.

(iv) £340·20 with or without working, award 3/4.

(v) £324 with or without working, award 1/4.

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
8.	**Ans: 23·3 metres to apply trigonometry**	
	•[1] strategy: know to find AT or BT	•[1] evidence of use of sine rule in triangle ATB
	•[2] process: correct application of sine rule in triangle ATB	•[2] $\frac{AT}{Sin25°} = \frac{80}{Sin122°}$ or equiv
	•[3] process: calculates AT or BT correctly	•[3] AT = 39·9 m or BT = 51·4 m
	•[4] strategy: know to use right angled trig to calculate height of triangle ATB or other valid strategy.	•[4] $\frac{h}{39·9}$ = Sin33° or equiv.
	•[5] process: calculate height of triangle ATB correctly	•[5] h = 21·7m (disregard rounding)
	•[6] communicate: state height of flagpole	•[6] 23·3m **6 marks**

NOTES:

(iii) Disregard errors due to premature rounding provided there is evidence.

(iv) Variations in answers for a value of AT or BT or a wrong value of AT or BT must be accepted as a basis of calculating the height of triangle ATB.

(iii) Where there is a wrong assumption that the base of the right angle triangles is 40 m, 2 of the last 3 marks are available.

(iv) For a correct answer without working, award 0/6.

(v) <u>Answer obtained by a scale drawing</u> – <u>the award of the first 5 marks</u>

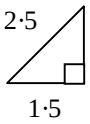
•[1] strategy	:	know to use scale drawing	•[1] evidence of appropriate scale clearly stated
•[2] process	:	draw base AB consistent with chosen scale	
•[3] process	:	measure angles of $(33 \pm 2)^\circ$ and $(25 \pm 2)^\circ$	
•[4] process	:	complete triangle ATB and indicate height	
•[5] process	:	calculate height of triangle ATB correctly	•[5] h = (21·7 ± 0·3)m

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
9.	**Ans: 3 years**	
	•[1] strategy: know how to increase 50000 by 5% annually	•[1] evidence (× 1·05) or equiv.
	•[2] process: carry out calculations correctly, continuing for at least 3 years within a valid strategy	•[2] 57881 ….
	•[3] strategy: know how to decrease 108000 by 20% annually	•[3] evidence (× 0·8) or equiv.
	•[4] process: carry out calculations correctly, continuing for at least 3 years within a valid strategy	•[4] 55296 ….
	•[5] communicate: state response which must be based on calculations carried out within valid strategies	•[5] 3 years **5 marks**

NOTES:

(iii) For a correct answer without working, award 0/5.
(iv) In the award of the second and fourth marks, accept legitimate variations in answers due to different methods.

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
10. (a)	**Ans: £36825**	
	•[1] process: calculates 0·2% of £1500000 correctly	•[1] £3000
	•[2] process: calculate gross salary correctly	•[2] £36825 **2 marks**
NOTES:		
(b)	**Ans: £7681·60**	
	•[1] strategy: know how to calculate taxable income	•[1] £36825 – £4385
	•[2] process: know how to calculate lower rate of tax	•[2] 0·10 × £1520
	•[3] process: know how to calculate middle rate of tax	•[3] 0·22 × £26880
	•[4] process: know how to calculate upper rate of tax	•[4] 0·40 × (32440 – 1520 – 26880)
	•[5] process: calculate total tax bill	•[5] £7681·60 **5 marks**
NOTES:		

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
11.	**Ans: 0·5 metres** •[1] strategy: marshall facts and recognise right angle •[2] strategy: know to use Pythagoras Theorem •[3] process: calculate x correctly •[4] communicate: state depth, d	•[1]  •[2] $2{\cdot}5^2 = 1{\cdot}5^2 + x^2$ •[3] $x = 2$ •[4] d = 0·5m **4 marks**

NOTES:

(i) Where Pythagoras Theorem has been used incorrectly leading to $x \geq 2{\cdot}5$, the fourth mark is not available.

Question No	Marking Scheme Give 1 mark for each •	Illustrations of evidence for awarding a mark at each •
12.	**Ans: 43 years**	
	•[1] process: knows to calculate mid values	•[1] 4·5, 14·5, 24·5, 34·5, 44·5, 54·5, 64·5, 74·5
	•[2] process: knows to calculate mid values $x\ f$	•[2] 18, 130·5, 269·5, 552, 934·5, 981, 1096·5, 372·5
	•[3] process: knows to calculate $\sum f$ and $\sum fx$	•[3] 101 and 4354·5
	•[4] strategy: knows how to calculate mean	•[4] $\frac{\sum fx}{\sum f}$
	•[5] process: calculates mean correctly	•[5] 43 (disregard rounding). **5 marks**

NOTES:

(i) An arithmetic error must be followed through with the possibility of awarding 4/5.

TOTAL MARKS FOR PAPER 2
54

TOTAL MARKS FOR PAPER 1 AND PAPER 2
81

[END OF MARKING INSTRUCTIONS]