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KEY STAGE

3

ALL TIERS

2001

Mathematics tests

Mark scheme for Paper 2

Tiers 3–5, 4–6, 5–7 and 6–8



Department for
Education and Employment



Introduction

The test papers will be marked by external markers. The markers will follow the mark scheme in this booklet, which is provided here to inform teachers.

This booklet contains the mark scheme for paper 2 at all tiers. The paper 1 and the extension paper mark schemes are printed in separate booklets. Questions have been given names so that each one has a unique identifier irrespective of tier.

The structure of the mark schemes

The marking information for questions is set out in the form of tables, which start on page 11 of this booklet. The columns on the left-hand side of each table provide a quick reference to the tier, question number, question part, and the total number of marks available for that question part.

The ‘**Correct response**’ column usually includes two types of information:

- a statement of the requirements for the award of each mark, with an indication of whether credit can be given for correct working, and whether the marks are independent or cumulative;
- examples of some different types of correct response, including the most common and the minimum acceptable.

The ‘**Additional guidance**’ column indicates alternative acceptable responses, and provides details of specific types of response that are unacceptable. Other guidance, such as when ‘follow through’ is allowed, is provided as necessary.

For graphical and diagrammatic responses, including those in which judgements on accuracy are required, marking overlays have been provided as the centre pages of this booklet.

General guidance

Using the mark schemes

Answers that are numerically equivalent or algebraically equivalent are acceptable unless the mark scheme states otherwise.

In order to ensure consistency of marking, the most frequent procedural queries are listed on the following two pages with the prescribed correct action. This is followed by further guidance, relating to marking of questions that involve money, time, coordinates, algebra or probability. Unless otherwise specified in the mark scheme, markers should apply the following guidelines in all cases.

What if ...

<i>The pupil's response does not match closely any of the examples given.</i>	Markers should use their judgement in deciding whether the response corresponds with the statement of requirements given in the 'Correct response' column. Refer also to the additional guidance.
<i>The pupil has responded in a non-standard way.</i>	Calculations, formulae and written responses do not have to be set out in any particular format. Pupils may provide evidence in any form as long as its meaning can be understood. Diagrams, symbols or words are acceptable for explanations or for indicating a response. Any correct method of setting out working, however idiosyncratic, is acceptable. Provided there is no ambiguity, condone the continental practice of using a comma for a decimal point.
<i>The pupil has made a conceptual error.</i>	In some questions, a method mark is available provided the pupil has made a computational, rather than conceptual, error. A computational error is a 'slip' such as writing $4 \times 6 = 18$ in an otherwise correct long multiplication. A conceptual error is a more serious misunderstanding of the relevant mathematics; when such an error is seen no method marks may be awarded. Examples of conceptual errors are: misunderstanding of place value, such as multiplying by 2 rather than 20 when calculating 35×27 ; subtracting the smaller value from the larger in calculations such as $45 - 26$ to give the answer 21; incorrect signs when working with negative numbers.
<i>The pupil's accuracy is marginal according to the overlay provided.</i>	Overlays can never be 100% accurate. However, provided the answer is within, or touches, the boundaries given, the mark(s) should be awarded.
<i>The pupil's answer correctly follows through from earlier incorrect work.</i>	'Follow through' marks may be awarded only when specifically stated in the mark scheme, but should not be allowed if the difficulty level of the question has been lowered. Either the correct response or an acceptable 'follow through' response should be marked as correct.
<i>There appears to be a misreading affecting the working.</i>	This is when the pupil misreads the information given in the question and uses different information. If the original intention or difficulty level of the question is not reduced, deduct one mark only. If the original intention or difficulty level is reduced, do not award any marks for the question part.
<i>The correct answer is in the wrong place.</i>	Where a pupil has shown understanding of the question, the mark(s) should be given. In particular, where a word or number response is expected, a pupil may meet the requirement by annotating a graph or labelling a diagram elsewhere in the question.

What if ...

<i>The final answer is wrong but the correct answer is shown in the working.</i>	Where appropriate, detailed guidance will be given in the mark scheme, and must be adhered to. If no guidance is given, markers will need to examine each case to decide whether:	
	the incorrect answer is due to a transcription error;	If so, award the mark.
	in questions not testing accuracy, the correct answer has been given but then rounded or truncated;	If so, award the mark.
	the pupil has continued to give redundant extra working which does not contradict work already done;	If so, award the mark.
	the pupil has continued, in the same part of the question, to give redundant extra working which does contradict work already done.	If so, do not award the mark. Where a question part carries more than one mark, only the final mark should be withheld.
<i>The pupil's answer is correct but the wrong working is seen.</i>	A correct response should always be marked as correct unless the mark scheme states otherwise.	
<i>The correct response has been crossed (or rubbed) out and not replaced.</i>	Mark, according to the mark scheme, any legible crossed (or rubbed) out work that has not been replaced.	
<i>More than one answer is given.</i>	If all answers given are correct (or a range of answers is given, all of which are correct), the mark should be awarded unless prohibited by the mark scheme. If both correct and incorrect responses are given, no mark should be awarded.	
<i>The answer is correct but, in a later part of the question, the pupil has contradicted this response.</i>	A mark given for one part should not be disallowed for working or answers given in a different part, unless the mark scheme specifically states otherwise.	

Marking specific types of question

Responses involving money <i>For example: £3.20 £7</i>	
Accept ✓	Do not accept ✗
<p>✓ Any unambiguous indication of the correct amount eg £3.20(p), £3 20, £3,20, 3 pounds 20, £3-20, £3 20 pence, £3:20, £7.00</p> <p>✓ The £ sign is usually already printed in the answer space. Where the pupil writes an answer other than in the answer space, or crosses out the £ sign, accept an answer with correct units in pounds and/or pence eg 320p, 700p</p>	<p>✗ Incorrect or ambiguous use of pounds or pence eg £320, £320p or £700p, or 3.20 or 3.20p not in the answer space.</p> <p>✗ Incorrect placement of decimal points, spaces, etc or incorrect use or omission of 0 eg £3.2, £3 200, £32 0, £3-2-0, £7.0</p>

Responses involving time <i>A time interval For example: 2 hours 30 mins</i>	
Accept ✓	Take care ! Do not accept ✗
<p>✓ Any unambiguous indication eg 2.5 (hours), 2h 30</p> <p>✓ Digital electronic time ie 2:30</p>	<p>✗ Incorrect or ambiguous time interval eg 2.3(h), 2.30, 2-30, 2h 3, 2.30min</p> <p>! The time unit, hours or minutes, is usually printed in the answer space. Where the pupil writes an answer other than in the answer space, or crosses out the given unit, accept an answer with correct units in hours or minutes, unless the question has asked for a specific unit to be used.</p>
A specific time For example: 8.40am, 17:20	
Accept ✓	Do not accept ✗
<p>✓ Any unambiguous, correct indication eg 08.40, 8.40, 8:40, 0840, 8 40, 8-40, twenty to nine, 8,40</p> <p>✓ Unambiguous change to 12 or 24 hour clock eg 17:20 as 5:20pm, 17:20pm</p>	<p>✗ Incorrect time eg 8.4am, 8.40pm</p> <p>✗ Incorrect placement of separators, spaces, etc or incorrect use or omission of 0 eg 840, 8:4:0, 084, 84</p>

Responses involving coordinates For example: (5, 7)	
Accept ✓	Do not accept ✗
✓ Unambiguous but unconventional notation eg (05, 07) (five, seven) $\begin{matrix} x & y \\ (5, & 7) \end{matrix}$ $(x = 5, y = 7)$	✗ Incorrect or ambiguous notation eg (7, 5) $(5x, 7y)$ $(x5, y7)$ $(5^x, 7^y)$

Responses involving the use of algebra For example: $2 + n$ $n + 2$ $2n$	
Accept ✓	Take care ! Do not accept ✗
✓ The unambiguous use of a different case eg N used for n ✓ Unconventional notation for multiplication eg $n \times 2$ or $2 \times n$ or $n2$ or $n + n$ for $2n$ $n \times n$ for n^2 ✓ Multiplication by 1 or 0 eg $2 + 1n$ for $2 + n$ $2 + 0n$ for 2 ✓ Words used to precede or follow equations or expressions eg $t = n + 2$ tiles or tiles = $t = n + 2$ for $t = n + 2$ ✓ Unambiguous letters used to indicate expressions eg $t = n + 2$ for $n + 2$ ✓ Embedded values given when solving equations eg $3 \times 10 + 2 = 32$ for $3x + 2 = 32$! Words or units used within equations or expressions should be ignored if accompanied by an acceptable response, but should not be accepted on their own eg do not accept n tiles + 2 n cm + 2 ✗ Change of variable eg x used for n ✗ Ambiguous letters used to indicate expressions eg $n = n + 2$ However, to avoid penalising any of the three types of error above more than once within each question, do not award the mark for the <i>first</i> occurrence of each type within each question. Where a question part carries more than one mark, only the final mark should be withheld. ✗ Embedded values that are then contradicted eg for $3x + 2 = 32$, $3 \times 10 + 2 = 32, x = 5$

Responses involving probability	
<p>A numerical probability should be expressed as a decimal, fraction or percentage only.</p> <p>For example: 0.7</p>	
Accept ✓	Take care ! Do not accept ✗
<p>✓ A correct probability that is correctly expressed as a decimal, fraction or percentage.</p> <p>✓ Equivalent decimals, fractions or percentages eg 0.700, $\frac{70}{100}$, $\frac{35}{50}$, 70.0%</p> <p>✓ A probability correctly expressed in one acceptable form which is then incorrectly converted, but is still less than 1 and greater than 0 eg $\frac{70}{100} = \frac{18}{25}$</p>	<p>The following four categories of error should be ignored if accompanied by an acceptable response, but should not be accepted on their own.</p> <p>! A probability that is incorrectly expressed eg 7 in 10, 7 out of 10, 7 from 10</p> <p>! A probability expressed as a percentage without a percentage sign.</p> <p>! A fraction with other than integers in the numerator and/or denominator.</p> <p>However, each of the three types of error above should not be penalised more than once within each question. Do not award the mark for the <i>first</i> occurrence of each type of error unaccompanied by an acceptable response. Where a question part carries more than one mark, only the final mark should be withheld.</p> <p>! A probability expressed as a ratio eg 7 : 10, 7 : 3, 7 to 10</p> <p>✗ A probability greater than 1 or less than 0</p>

Recording marks awarded on the test paper

All questions, even those not attempted by the pupil, will be marked, with a 1 or a 0 entered in each marking space. Where 2m can be split into 1m gained and 1m lost, with no explicit order, then this will be recorded by the marker as 1
0

The total marks awarded for a double page will be written in the box at the bottom of the right-hand page, and the total number of marks obtained on the paper will be recorded on the front of the test paper.

A total of 120 marks is available in each of tiers 3–5, 4–6, 5–7 and 6–8. The extension paper carries 42 marks.

Awarding levels

The sum of the marks gained on paper 1, paper 2 and the mental arithmetic paper determines the level awarded. Level threshold tables, which show the mark ranges for the award of different levels, will be available on the QCA website (www.qca.org.uk) from Friday 22 June 2001. QCA will also send a copy to each school in July.

Schools will be notified of pupils' results by means of a marksheet, which will be returned to schools by the External Marking Agency with the pupils' marked scripts. The marksheet will include pupils' scores on the test papers and the levels awarded.

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Tier & Question									Cards	
3-5	4-6	5-7	6-8							
1							Correct response		Additional guidance	
a					1m	£ 3.20				
b					1m	£ 102(.00)				
c					1m	14				

Tier & Question									No. 1 Singles	
3-5	4-6	5-7	6-8							
2							Correct response		Additional guidance	
a					1m	7				
b					1m	Madonna				
c					1m	6				
d					1m	Abba and Spice Girls, either order			! <i>Reference to fourth place</i> Ignore	

Tier & Question					Using Number Lines	
3-5	4-6	5-7	6-8			
3					Correct response	Additional guidance
a				1m	50 and 75; correctly placed	
b				1m	20, 40, 60, 80; correctly placed	
c				2m or 1m	40, 80, 120, 160; correctly placed Any three correct, with follow through of steps of 40 from not more than one incorrect value eg <ul style="list-style-type: none"> ■ 40, 80, 120, 170 (<i>error</i>) ■ 40, 90 (<i>error</i>), 130, 170 ■ 50 (<i>error</i>), 90, 130, 170 	
d				1m	4	<p>! Follow through as double their values from part (b) Accept provided their values form an increasing sequence eg, from part (b) as 20, 40, 50, 70 accept for 1m</p> <ul style="list-style-type: none"> ♦ 40, 80, 100, 140 <p>* Follow through values greater than 200</p>

Tier & Question					Map	
3-5	4-6	5-7	6-8			
4					Correct response	Additional guidance
a				1m	5	
b				1m	West	
				1m	North-east	
c				1m	4	<p>✓ Abbreviations eg</p> <ul style="list-style-type: none"> ♦ W ♦ NE <p>✓ Bearings eg, for W</p> <ul style="list-style-type: none"> ♦ 270 <p>eg, for NE</p> <ul style="list-style-type: none"> ♦ 045 ♦ 45 <p>✓ Unconventional but unambiguous notation eg, for North-east</p> <ul style="list-style-type: none"> ♦ East North

Tier & Question							Ruler
3-5	4-6	5-7	6-8				
5						Correct response	Additional guidance
a				1m	1.5		✓ <i>Equivalent fractions or decimals, or use of words</i> ✗ <i>Distance in mm without units specified</i>
				1m	5		
b				2m	Indicates 4.5 and 11.5		✓ <i>Accuracy within $\pm 2mm$</i>
				or 1m	One correct		
					or Scale misread but arrows placed symmetrically about point E		

Tier & Question							Getting There
3-5	4-6	5-7	6-8				
6	1					Correct response	Additional guidance
a	a			1m	64 and 864		
				1m	675		
b	b			1m	2520		
				1m	15		

Tier & Question					Squares	
3-5	4-6	5-7	6-8			
7	2				Correct response	Additional guidance
a	a			1m	9	! Units given Ignore ! Answers for part (c) reversed Mark as 0, 1
b	b			1m	4	
c	c			1m	4	
				1m	14	

Tier & Question					Disco Costs	
3-5	4-6	5-7	6-8			
8	3				Correct response	Additional guidance
a	a			1m	£ 4.(00)	
b	b			1m	Correct explanation. The most common correct explanations: Interpret the spreadsheet to explain why there is one charge eg <ul style="list-style-type: none"> ■ The hire of the hall is a fixed charge. ■ You only hire the hall once. ■ You only hire one hall. Explain the hire is independent of the number of people attending eg <ul style="list-style-type: none"> ■ You pay for the hall however many people come. ■ It is not affected by the other columns. 	✓ Minimally acceptable explanation eg <ul style="list-style-type: none"> ♦ It always costs the same to hire the hall. ✓ Implication that only one hall is available eg <ul style="list-style-type: none"> ♦ You use the same hall no matter how many people there are. ♦ The hall is always the same size. ♦ It's the same hall. ✗ Incomplete explanation that does not interpret the spreadsheet eg <ul style="list-style-type: none"> ♦ It's the hire of the hall. ♦ It's always the same.
c	c			1m	19	! Money quantified Ignore
d	d			1m	27	
e	e			1m	£ 28.50	

Tier & Question							Cooking	
3-5	4-6	5-7	6-8					
9	4					Correct response	Additional guidance	
a	a			1m	51		✓ <i>Correct answer in hours and minutes</i> eg, for part (b) <ul style="list-style-type: none"> ♦ 4 hours 5 minutes 	
b	b			1m	245		! <i>Incorrect conversion to hours and minutes</i> If the correct number of minutes is shown, ignore any further working.	
c	c			2m <i>or</i> 1m	56 Shows either 39 or 95			

Tier & Question							Pieces	
3-5	4-6	5-7	6-8					
10	5					Correct response	Additional guidance	
a	a			1m	Indicates Yes, and gives a correct explanation. The most common correct explanation focuses on the complete area eg <ul style="list-style-type: none"> ■ They're both 8 ■ Both have 7 wholes and 2 halves. ■ 8 is half of 16 		✓ <i>Minimally acceptable explanation</i> eg <ul style="list-style-type: none"> ♦ Same number of squares. ♦ I counted the squares and it was the same. ♦ The one square jutting out fills the two half squares missing on the right hand piece. ✗ <i>Restatement of the question</i> eg <ul style="list-style-type: none"> ♦ Both have same space inside. ✗ <i>Incorrect or incomplete explanation</i> eg <ul style="list-style-type: none"> ♦ Each one has 7 squares. ♦ The area of both is 9 ♦ When you work out area you don't count the halves. ! <i>Units incorrect</i> Ignore	
b	b			1m	Correct piece, ie — — — ✓ —			

Tier & Question						Areas
3-5	4-6	5-7	6-8			
11	6	1		Correct response		Additional guidance
a	a	a		1m	All correct, ie <div style="text-align: center;"> ✓ - ✓ ✓ </div>	
b	b	b		2m <i>or</i> 1m	40 Shows the value 10 or Follows through from an incorrect side length to find the perimeter, provided the side length is not 25 eg <ul style="list-style-type: none"> ■ Side is 8, so perimeter is 32 	

Tier & Question				<i>Marking overlay available</i>		Ferry
3-5	4-6	5-7	6-8			
12	7	2		Correct response		Additional guidance
a	a	a		2m <i>or</i> 1m	The line representing the ferry crossing, within the tolerances shown by the overlay. One angle drawn within the tolerance shown by the overlay, and at least of length as shown by the overlay, even if their angle does not start at the end of the given line.	✓ <i>Line(s) not ruled but within tolerance</i> ! <i>Pupil draws their own base line</i> Accept for 2m provided the base line is the correct length within the tolerance shown. If the base line length is incorrect but the angles are correct, mark as 1, 0
b	b	b		1m	Their length $\pm 2\text{mm}$ (Note that the calculated value is 5.59)	! <i>Rounded to the nearest integer</i> Accept if their measurement is within 2mm of an integer length, otherwise do not accept.
c	c	c		2m <i>or</i> 1m	Correct response using their (b) or their length eg <ul style="list-style-type: none"> ■ Their (b) $\times 20$ and metres given. ■ Their (b) $\times 2000$ and cm given. Their part (b), or their length, multiplied by either 20 or 2000, even if the units are incorrect or omitted. or Shows a correct method with consistent units eg <ul style="list-style-type: none"> ■ $\times 20$ seen, and metres given. ■ $\times 2000$ seen, and centimetres given. 	* <i>Correct units with no length</i>

Tier & Question							Swimming	
3-5	4-6	5-7	6-8					
13	8	3			Correct response	Additional guidance		
a	a	a		1m	48 and 72	✓ <i>No values within the table but correct points plotted on the graph</i>		
b	b	b		2m or 1m	3 or 4 points plotted correctly ± 1 mm, and joined with the correct ruled straight line. 3 or 4 points plotted correctly ± 1 mm, but not joined. or 3 or 4 points plotted correctly ± 1 mm, but joined incorrectly or line not ruled.	! <i>Line ruled but does not pass exactly through the correct points</i> Accept provided the pupil's intention is clear. ! <i>Bar chart drawn</i> Ignore bars. ✓ <i>For 1m, follow through from part (a)</i>		
c	c	c		1m	50 and 64	✓ <i>No values within the table but correct points plotted on the graph</i>		
d	d	d		2m or 1m	3 or 4 points plotted correctly ± 1 mm, and joined with the correct ruled straight line. 3 or 4 points plotted correctly ± 1 mm, but not joined. or 3 or 4 points plotted correctly ± 1 mm, but joined incorrectly or line not ruled.	! <i>Line not ruled</i> Accept if this error has already been penalised in part (b). ! <i>Line does not pass exactly through the correct points</i> Accept provided the pupil's intention is clear. ! <i>Bar chart drawn</i> Ignore bars. ✓ <i>For 1m, follow through from part (c)</i>		
e	e	e		1m	22	✓ <i>Follow through their graph, including non-integer values, even if rounded to the nearest integer</i> ! <i>Their graph shows more than one intersection</i> All such values must be listed. ! <i>Cost shown</i> Ignore.		

Tier & Question						Mints
3-5	4-6	5-7	6-8			
14	9	4			Correct response	Additional guidance
a	a	a		2m	5y + 6 and 6 + 5y, in either order	
				or 1m	Only one of the correct expressions given; the other incorrect or omitted.	
b	b	b		1m	Indicates Yes, and gives a correct explanation eg <ul style="list-style-type: none"> ■ If you take away the 6, then it is divisible by 5 ■ Could be 10 in a packet. ■ $5 \times 10 + 6$ 	✓ <i>Definitive statement</i> eg <ul style="list-style-type: none"> • There must be 10 mints in a packet.

Tier & Question				Drinks Machine	
3-5	4-6	5-7	6-8		
10	5	1		Correct response	Additional guidance
			3m	49	
			or 2m	<p>Shows a complete correct method, with not more than one computational error.</p> <p>The most common correct methods are:</p> <p>Finding the total and dividing by 55</p> <p>eg</p> <ul style="list-style-type: none"> ■ $2695 \div 55$ ■ $15.50 + 4.40 + 4.10 + 2.95$, then $\div 0.55$ ■ $(50 \times 31 + 20 \times 22 + 10 \times 41 + 5 \times 59) \div 55$ ■ $15.5 + 4.40 + 4.10 + 29.50$ (<i>error</i>) = 53.5 $53.5 \div 0.55$ <p>Grouping the money for specific amounts of cans</p> <p>eg</p> <ul style="list-style-type: none"> ■ 31 cans uses $31 \times 50p + 31 \times 5p$; 11 uses $22 \times 20p + 11 \times 10p + 11 \times 5p$; 6 cans uses $30 \times 10p + 6 \times 5p$; 1 can uses the remaining $11 \times 5p$ ■ $31 \times 50p + 31 \times 5p$ is 31 cans; $22 \times 20p + 11 \times 10p + 11 \times 5p$ is 22 (<i>error</i>) cans; $30 \times 10p + 17 \times 5p$ is another 7 cans. <p>Dividing each sub-total by 55</p> <p>eg</p> <ul style="list-style-type: none"> ■ $31 \times 50 = 1550$, that's 28 cans and 10p left. $22 \times 20 = 440$, that's 8 cans. $41 \times 10 = 410$, that's 7 cans and 25p left. $59 \times 5 = 295$, that's 5 cans and 20p left. The money left is enough for one more can. 	
			or 1m	<p>Shows the digits 2695</p> <p>or</p> <p>Shows a correct method for finding the total, but with more than one computational error.</p> <p>or</p> <p>$\div 55$ is seen or implied.</p>	

Tier & Question									Advert	
3-5	4-6	5-7	6-8							
	11	6	2							
	a	a	a	2m	£ 345					
				<i>or</i> 1m	Correct method shown eg <ul style="list-style-type: none"> ■ $15 \times 18 + 75$ ■ Digits 345 seen, other than for the correct response. 					
	b	b	b	2m	36					
				<i>or</i> 1m	Correct method shown eg <ul style="list-style-type: none"> ■ $615 - 75$, then $\div 15$ ■ Digits 36 seen, other than for the correct response. 					

Tier & Question									Speed	
3-5	4-6	5-7	6-8							
	12	7	3							
	a	a	a	1m	Correct response eg <ul style="list-style-type: none"> ■ 7.5 hours. ■ 7 hours 30 minutes. ■ $7\frac{1}{2}$ hours. 					! <i>Answer of 8 hours</i> Accept only if a more accurate value is seen.
	b	b	b	1m	465					
	c	c	c	1m	60					

Tier & Question									Trundle Wheel	
3-5	4-6	5-7	6-8							
	13	8	4							
	a	a	a	2m	157.(...) or 50π					
				or 1m	Correct method eg <ul style="list-style-type: none"> ■ $50 \times \pi$ ■ $3.14 \times 2 \times 25$ 					
	b	b	b	1m	137					✓ Follow through as $87 \times \text{their } (a) \div 100$, rounded to the nearest metre

Tier & Question									Algebra Pairs	
3-5	4-6	5-7	6-8							
	15	14	9	5						
			a	2m	Both pairs correct, and no incorrect, ie					
				or 1m	At least one correct pair identified, with not more than one incorrect pair.					
			b	3m	All three pairs correct, and no incorrect, ie					
				or 2m	At least two correct pairs, and not more than one incorrect pair.					
				or 1m	At least one correct pair, and not more than two incorrect pairs.					

Tier & Question					Marking overlay available		Books																			
3-5	4-6	5-7	6-8																							
	15	10	6		Correct response	Additional guidance																				
	a	a	a	2m or 1m	<p>Pie chart completed within the smaller tolerance as indicated by the overlay, and at least one of their sectors labelled correctly.</p> <p>Pie chart completed within the greater tolerance as indicated by the overlay, and at least one sector labelled correctly.</p> <p>or</p> <p>Pie chart completed within the smaller tolerance as indicated by the overlay, but sectors not labelled or labelled incorrectly.</p> <p>or</p> <p>A correct method for finding an angle or percentage is shown or implied eg</p> <ul style="list-style-type: none"> ■ $13 \div 20 \times 360$ (or $\times 100$) ■ $4 \div 20 \times 360$ (or $\times 100$) ■ $54 \div 3 \times 4 =$ angle for Fantasy 	<p>✓ <i>Angle of 54 measured as $54 \pm 2^\circ$</i></p>																				
	b	b	b	2m or 1m	<p>24</p> <p>Shows a correct method using angles eg</p> <ul style="list-style-type: none"> ■ $360 \div (165 \div 11)$ ■ $\frac{360}{165} \times 11$ ■ $360 \div 15$ <p>or</p> <p>Gives a correct angle for 1 pupil eg</p> <ul style="list-style-type: none"> ■ 15° <p>or</p> <p>Correct number of pupils for other than 165° seen eg</p> <ul style="list-style-type: none"> ■ 180° is 12 	<p>Markers may find the following values helpful:</p> <table style="margin-left: 20px;"> <tr> <td>Non-fiction</td> <td>11</td> <td>165°</td> </tr> <tr> <td>Romance</td> <td>5</td> <td>75°</td> </tr> <tr> <td>Crime</td> <td>3</td> <td>45°</td> </tr> <tr> <td>Fantasy</td> <td>5</td> <td>75°</td> </tr> </table> <p>! <i>Correct method using percentages</i> Accept correct methods eg</p> <ul style="list-style-type: none"> • 46% is 11; 1% is $\frac{11}{46}$; $\frac{11}{46} \times 100$ <p>Accept percentages within the following inclusive ranges:</p> <table style="margin-left: 20px;"> <tr> <td>Non-fiction</td> <td>45 to 46</td> </tr> <tr> <td>Romance</td> <td>20 to 21</td> </tr> <tr> <td>Crime</td> <td>12 to 13</td> </tr> <tr> <td>Fantasy</td> <td>20 to 21</td> </tr> </table> <p>* <i>Number of pupils not given as an integer</i></p>	Non-fiction	11	165°	Romance	5	75°	Crime	3	45°	Fantasy	5	75°	Non-fiction	45 to 46	Romance	20 to 21	Crime	12 to 13	Fantasy	20 to 21
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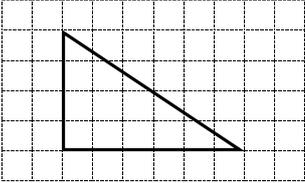
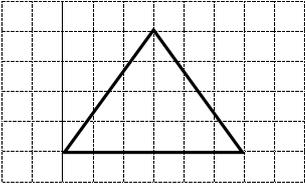
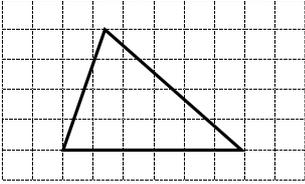
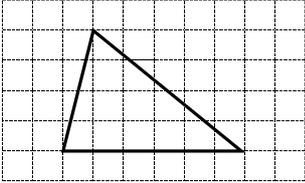
Yoghurt

Tier & Question																										
3-5	4-6	5-7	6-8																							
16	11	7																								
				Correct response	Additional guidance																					
	a	a	2m	3.6	<p>! Answer rounded Do not accept unless a correct method, or a more accurate value, is seen.</p>																					
			or 1m	Shows a correct method eg <ul style="list-style-type: none"> ■ $4.5 \div 125 \times 100$ ■ $4.5 \div 5 \times 4$ ■ $25g = 0.9, 0.9 \times 4$ 																						
	b	b	2m	Indicates A, and gives a correct justification. The most common correct justification compares the same amount of grams eg <ul style="list-style-type: none"> ■ A has 2.22 for 25g but B has 2.183(...) ■ If B were 125g, it would be 10.916(...) ■ If A were 150g, it would be 13.32g. ■ $11.1 \div 125 = 0.088(8)$, $13.1 \div 150 = 0.087(\dots)$ 	<p>Markers may find the following helpful:</p> <table border="1"> <thead> <tr> <th>Grams</th> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>0.0888</td> <td>0.0873(...)</td> </tr> <tr> <td>25</td> <td>2.22</td> <td>2.183(...)</td> </tr> <tr> <td>100</td> <td>8.88</td> <td>8.733(...)</td> </tr> <tr> <td>125</td> <td>11.1 (given)</td> <td>10.916(...)</td> </tr> <tr> <td>150</td> <td>13.32</td> <td>13.1 (given)</td> </tr> <tr> <td>750</td> <td>66.6</td> <td>65.5</td> </tr> </tbody> </table> <p>! Values rounded or truncated Accept provided the comparison can be drawn eg • A has 2.2 for 25g and B has 2.2 Mark as 1, 0</p> <p>! Correct calculations for yoghurt per gram of carbohydrate Accept for 2m if correctly interpreted, otherwise mark as 1, 0 eg, for 2m • A: $125 \div 11.1 = 11.26(\dots)$ B: $150 \div 13.1 = 11.45(\dots)$ so A provides more carbohydrate. eg, for 1m • A: $125 \div 11.1 = 11.26(\dots)$ B: $150 \div 13.1 = 11.45(\dots)$ so B provides more carbohydrate.</p>	Grams	A	B	1	0.0888	0.0873(...)	25	2.22	2.183(...)	100	8.88	8.733(...)	125	11.1 (given)	10.916(...)	150	13.32	13.1 (given)	750	66.6	65.5
Grams	A	B																								
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150	13.32	13.1 (given)																								
750	66.6	65.5																								
			or 1m	Correct method but no, or incorrect, conclusion drawn, even if the values have been truncated or rounded eg <ul style="list-style-type: none"> ■ $6 \times 11.1 = 66.6, 5 \times 13.1 = 65.5$ so B <p>or</p> <p>Correct method with not more than one computational error, with a correct conclusion drawn for their figures.</p>																						

Tier & Question										Missing Side	
3-5	4-6	5-7	6-8								
		12	8								
		a	a	2m	Correct response	Additional guidance					
		a	a	2m	20.8(...) or $\sqrt{433}$	<p>! Answer 21 Do not accept unless a correct method, or a more accurate value, is seen.</p>					
				or 1m	Shows both squaring and adding eg <ul style="list-style-type: none"> ■ $17^2 + 12^2$ ■ 433 seen ■ $289 + 144$ 						
		b	b	2m	9.8(0) or 9.79(...) or $\sqrt{96}$	<p>! Answer truncated to 9.7 Accept if a correct method or more accurate value is seen. Otherwise mark as 1, 0</p> <p>! Answer 10 Do not accept unless a complete correct method, including the need to square root, or a more accurate value is seen eg, mark the following as 1, 0</p> <ul style="list-style-type: none"> • $121 - 25 = 96, 9.6$ so 10 					
				or 1m	Shows both squaring and subtracting eg <ul style="list-style-type: none"> ■ $11^2 - 5^2$ ■ 96 seen ■ $121 - 25$ 						

Tier & Question										Goldcrests	
3-5	4-6	5-7	6-8								
		13	9								
		a	a	1m	4.83 to 4.87 inclusive	<p>✗ Incorrect notation</p> <p>eg</p> <ul style="list-style-type: none"> ♦ $4.8\frac{1}{2}$ 					
		b	b	1m	0.09 to 0.11 inclusive						
		c	c	1m	<p>Indicates (12.5, 4.5) and gives a justification based on the distance from the line of best fit</p> <p>eg</p> <ul style="list-style-type: none"> ■ It's an outlier. ■ It's the furthest away. <p>or</p> <p>Indicates (12.5, 4.5) and gives a justification based on the low mass given the time of day</p> <p>eg</p> <ul style="list-style-type: none"> ■ It's very small and getting late in the day. ■ The mass goes up by about 0.1g every hour so by 3pm the mass would only be about 4.7g which is very low. ■ Because at 12.30 it just weighs the same as it should have done much earlier in the day. <p>or</p> <p>Indicates (1.5, 4.8) or (2.5, 5.0) and gives a justification based on the lack of time to catch up</p> <p>eg</p> <ul style="list-style-type: none"> ■ It's late in the day and that one hasn't eaten much. 	<p>✓ Minimally acceptable explanation</p> <p>eg</p> <ul style="list-style-type: none"> ♦ It's the one that is most different. <p>✓ Minimally acceptable explanation</p> <p>eg</p> <ul style="list-style-type: none"> ♦ Because it is the lightest around that time of the day. ♦ It's the lightest and it is 12.30 <p>✗ No reference to the time of day</p> <p>eg</p> <ul style="list-style-type: none"> ♦ It's very small and will freeze to death. ♦ It's the lightest. <p>✗ No reference to the mass</p> <p>eg</p> <ul style="list-style-type: none"> ♦ It's very late in the day. 					

Triangles

Tier & Question					
3-5	4-6	5-7	6-8		
17	14	10		Correct response	Additional guidance
a	a	a	1m	<p>A right-angled triangle of height 4 eg</p> <ul style="list-style-type: none">  	<p>✓ <i>Lines not ruled</i> Accept provided the pupil's intention is clear.</p>
b	b	b	1m	<p>An isosceles triangle of height 4 eg</p> <ul style="list-style-type: none">  	<p>! <i>AB used as one of the pairs of equal sides</i> Accept if the height is clearly intended to be 4, and the apex is between 1 and 2cm to the right of the point above A (or to the left of the point above B) eg, accept</p> <ul style="list-style-type: none">  <p>Do not accept if the apex is clearly intended to be at an intersection eg</p> <ul style="list-style-type: none"> 

Tier & Question					10	Correct response		Additional guidance	
3-5	4-6	5-7	6-8						
				c	2m	<p>Correct explanation</p> <p>eg</p> <ul style="list-style-type: none"> ■ $AC^2 = 4^2 + 3^2 = 25$, so $AC = 5 = AB$ ■ It's a 3, 4, 5 triangle (correct triangle identified on the diagram), so $AC = 5$ and $AB = 5$ 			<p>✓ <i>Correct use of trigonometry</i></p> <p>eg</p> <ul style="list-style-type: none"> • $\angle B = \tan^{-1} 3 = 71.56\dots$ $\angle A = \tan^{-1} \frac{3}{4} = 36.86\dots$ so $\angle C = 180 - (71.57 + 36.87) = \angle B$
				or	1m	<p>Partial explanation</p> <p>eg</p> <ul style="list-style-type: none"> ■ It's a 3, 4, 5 triangle (no identification) <p>or</p> <p>Shows a complete correct method using trigonometry with not more than one computational error, even if there are rounding errors.</p>			<p>✗ <i>Length of sides stated with no reference to the 3, 4, 5 triangle</i></p> <p>eg</p> <ul style="list-style-type: none"> • One side is 3cm, one is 4cm, the other side is 5cm.
				d	2m	71.6 or 71.57 or 71.56(...)			<p>! <i>Answer 71.5 or 72</i></p> <p>As this could be obtained through measuring, accept only if a correct method or a more accurate value is seen.</p>
				or	1m	<p>Any correct trigonometric ratio seen, even if in part (c)</p> <p>eg</p> <ul style="list-style-type: none"> ■ $\tan ABC = \frac{3}{1}$ ■ $\tan A = \frac{3}{4}$ <p>or</p> <p>Bisects the triangle through CB, then creates a correct trigonometric ratio using their measured half BC</p> <p>eg</p> <ul style="list-style-type: none"> ■ $\cos ABC = 16 \div 50$ 			<p>! <i>Angle not identified</i></p> <p>Accept if referring to the angle at B</p> <p>eg</p> <ul style="list-style-type: none"> • $\tan^{-1} 3$ • $\tan = 3$ <p>Otherwise, do not accept</p> <p>eg</p> <ul style="list-style-type: none"> • $\tan = \frac{3}{4}$

Tier & Question					<i>Marking overlay available</i>		Tree
3-5	4-6	5-7	6-8				
		15	11		Correct response	Additional guidance	
				1m	Draws the straight line parallel to the greenhouse, and both straight lines parallel to the edges of the vegetable plot, within the tolerance, and at least of length, as shown on the overlay.		
				1m	Draws the correct arc within the tolerance, and at least of length, as shown on the overlay.		
				1m	Indicates the complete correct region.		

! Follow through from either or both of the previous marks

Accept from their boundary provided there is no ambiguity.

Tier & Question					Earnings	
3-5	4-6	5-7	6-8			
		16	12	Correct response		Additional guidance
		a	a	2m	51.8	
				or 1m	Shows $6.16 \div 11.89$ or Shows the digits 51(...) or 52	
		b	b	2m	<p>Correct justification. The most common justifications are:</p> <p>For 1998, calculating women's earnings as a % of men's eg <ul style="list-style-type: none"> ■ 72.(...)% </p> <p>Using their value from (a) to calculate what the earnings would have been eg <ul style="list-style-type: none"> ■ 51.8% of 420.30 = £217.72 </p> <p>Using ratio in a form that enables comparison eg <ul style="list-style-type: none"> ■ 1956 male : female earnings was 1.93 : 1; 1998 it was 1.38 : 1, so men got less. </p> <p>Comparing the rate of increase eg <ul style="list-style-type: none"> ■ $420.3 \div 11.89$ is about 35; $303.7 \div 6.16$ is about 49 so women's salaries went up more than men's. </p>	<p>✓ <i>Values not rounded to the nearest penny</i></p> <p>! <i>Further working</i> Ignore eg, accept for 2m <ul style="list-style-type: none"> ♦ $72.3 - 51.8 = 20.5\%$ increase in women's wages. </p> <p>! <i>Values approximated</i> If values are correctly approximated, accept provided the response makes it clear they are approximations and not exact eg, accept <ul style="list-style-type: none"> ♦ 6.16 out of 11.89 is about 50% but 303.70 out of 420.30 is about 75% eg, accept (minimally acceptable) <ul style="list-style-type: none"> ♦ 1998 is about 75% eg, do not accept <ul style="list-style-type: none"> ♦ 1998 is 75% Also accept follow through from part (a), provided it is less than 67% </p>
				or 1m	<p>Any complete correct method with not more than one computational error.</p> <p>or</p> <p>Gives a partial justification eg <ul style="list-style-type: none"> ■ $303.7 \div 420.3 > 51.8\%$ </p> <p>or</p> <p>The only error is to assume that there are equal numbers of male and female employees eg <ul style="list-style-type: none"> ■ $6.16 \div (11.89 + 6.16)$ is 34% but $303.7 \div (420.3 + 303.7)$ is 42% </p>	

Tier & Question					Sale
3-5	4-6	5-7	6-8		
			13		
				Correct response	Additional guidance
				2m 45 or 1m Shows $38.25 \div 85$ eg <ul style="list-style-type: none"> ■ $38.25 \div 85 \times 100$ ■ 0.45 seen 	

Tier & Question					Parabolas
3-5	4-6	5-7	6-8		
			14		
				Correct response	Additional guidance
				a 2m All three correct, ie (0, 16), (4, 0), (-4, 0) or 1m Any two correct. or All three correct but in an incorrect order.	
				b 1m (4, 24)	✓ <i>Follow through from their incorrect coordinates for B</i> eg, for their B as (16, 0) <ul style="list-style-type: none"> • (16, 24)
				c 1m $y = x^2 + 8$, or equivalent expression eg <ul style="list-style-type: none"> ■ $y = 24 - (16 - x^2)$! <i>Follow through from their incorrect coordinates for A</i> Accept provided the y ordinate > 12 eg, for their A as (0, 14) <ul style="list-style-type: none"> • $y = x^2 + 10$ ✗ <i>Incomplete equation</i> eg <ul style="list-style-type: none"> • $x^2 + 8$

Tier & Question					15	Which is Bigger?	
3-5	4-6	5-7	6-8	Correct response		Additional guidance	
			a	2m	Indicates B, and gives a correct justification eg <ul style="list-style-type: none"> ■ $3.2\pi > 3.125\pi$ ■ A is 9.8(...), B is over 10 ■ A is $125\pi \div 40$ but B is $128\pi \div 40$ 	<p>✓ π omitted eg <ul style="list-style-type: none"> • $3.2 > 3.125$ </p> <p>! Rounding Accept area of A as 3.13π or 3.12π or 3.1π but do not accept as 3π</p>	
			or	1m	Shows a correct area for either A or B eg, for A <ul style="list-style-type: none"> ■ 9.8(...) ■ 3.125π eg, for B <ul style="list-style-type: none"> ■ 10.(0...) ■ 10.1 ■ 3.2π 		
					or Shows correct working for both A and B eg <ul style="list-style-type: none"> ■ $\frac{25 \times \pi}{8}, \frac{16 \times \pi}{5}$ 		
			b	2m	Indicates A, and gives a correct justification eg <ul style="list-style-type: none"> ■ $13.92699... > 13.02654...$ 	<p>! Values rounded or truncated Accept values rounded to 2 or more s.f. Accept values rounded or truncated to 1 or more d.p.</p>	
			or	1m	Correct total perimeter seen for A or B eg <ul style="list-style-type: none"> ■ A, 13.9(...) ■ B, 13.0(...) 		
					or Correct arc length seen for both A and B <ul style="list-style-type: none"> ■ A is 3.9(...), B is 5.0(...) ■ A is 1.25π, B is 1.6π 		
			c	2m	2.8 or 2.83 or 2.82(...) or $2\sqrt{2}$		
			or	1m	Correct method shown eg <ul style="list-style-type: none"> ■ $\pi \times 16 \div 2 = \pi \times r^2$ ■ $r^2 = 8$ ■ $r = \sqrt{8}$ 		

Tier & Question					16	Music Concert	
3-5	4-6	5-7	6-8	Correct response		Additional guidance	
				1m	Forms correct equations eg <ul style="list-style-type: none"> ■ $3x + 9y = 120,$ ■ $5x + 5y = 90$ ■ $x + 3y = 40,$ ■ $x + y = 18$ 	<p>! <i>Change of variable from x and y</i> Accept if unambiguous.</p> <p>! <i>Correct values for x and y and/or an answer of 112 from trial and improvement or other non-algebraic method</i> Award the last mark only.</p>	
				1m	Arranges their equations in a form that allows for the elimination of one variable eg <ul style="list-style-type: none"> ■ $15x + 45y = 600,$ ■ $15x + 15y = 270$ ■ $15x + 45y = 600,$ ■ $45x + 45y = 810$ or Rearranges their equation(s) to express one variable in terms of the other eg <ul style="list-style-type: none"> ■ $x = 18 - y$ ■ $x = 40 - 3y$ ■ $y = 18 - x$ ■ $x = \frac{120 - 9y}{3}$ 		
				1m	Solves their equations algebraically for either x or y eg, from correct equations <ul style="list-style-type: none"> ■ $x = 7$ ■ $y = 11$ 		
				1m	112 minutes or Shows correct values for x and y but with no supporting correct algebraic method.		

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