Ma

KEY STAGE 3

ALL TIERS

2006

Mathematics tests

Mark scheme for Paper 2

Tiers 3–5, 4–6, 5–7 and 6–8

2006

department for
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QCA

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 mark scheme is printed in a separate booklet. 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 12 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.

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.

Questions with a *Using and applying mathematics element* are identified in the mark scheme by an encircled *U* with a number that indicates the significance of using and applying mathematics in answering the question. The *U* number can be any whole number from 1 to the number of marks in the question.

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.

The 2006 key stage 3 mathematics tests and mark schemes were developed by the Mathematics Test Development Team at Edexcel.

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, negative numbers, algebra, time, coordinates or probability. Unless otherwise specified in the mark scheme, markers should apply the following guidelines in all cases.

What if ...

The pupil's response does not match closely any of the examples given.	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**.
The pupil has responded in a non-standard way.	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.
The pupil has made a conceptual error.	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.
The pupil's accuracy is marginal according to the overlay provided.	Overlays can never be 100% accurate. However, provided the answer is within, or touches, the boundaries given, the mark(s) should be awarded.
The pupil's answer correctly follows through from earlier incorrect work.	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.
There appears to be a misreading affecting the working.	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.
The correct answer is in the wrong place.	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 ...

<table>
<tr><td rowspan="4">The final answer is wrong but the correct answer is shown in the working.</td><td>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;</td><td>If so, award the mark.</td></tr>
<tr><td>in questions not testing accuracy, the correct answer has been given but then rounded or truncated;</td><td>If so, award the mark.</td></tr>
<tr><td>the pupil has continued to give redundant extra working which does not contradict work already done;</td><td>If so, award the mark.</td></tr>
<tr><td>the pupil has continued, in the same part of the question, to give redundant extra working which does contradict work already done.</td><td>If so, do not award the mark. Where a question part carries more than one mark, only the final mark should be withheld.</td></tr>
<tr><td>The pupil's answer is correct but the wrong working is seen.</td><td colspan="2">A correct response should always be marked as correct unless the mark scheme states otherwise.</td></tr>
<tr><td>The correct response has been crossed or rubbed out and not replaced.</td><td colspan="2">Mark, according to the mark scheme, any legible crossed or rubbed out work that has not been replaced.</td></tr>
<tr><td>More than one answer is given.</td><td colspan="2">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.</td></tr>
<tr><td>The answer is correct but, in a later part of the question, the pupil has contradicted this response.</td><td colspan="2">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.</td></tr>
</table>

Marking specific types of question

Responses involving money

For example: £3.20 £7

Accept ✓	Do not accept ×
✓ 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	× Incorrect or ambiguous indication of the amount eg £320, £320p or £700p
✓ The unit, £ or p, is usually printed in the answer space. Where the pupil writes an answer outside the answer space with **no** units, accept responses that are unambiguous when considered alongside the given units eg with £ given in the answer space, accept 3.20, 7 or 7.00	× Ambiguous use of units outside the answer space eg with £ given in the answer space, do not accept 3.20p outside the answer space
✓ Given units amended eg with £ crossed out in the answer space, accept 320p, 700p	× 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

Responses involving negative numbers

For example: –2

Accept ✓	Do not accept ×
	To avoid penalising the error below more than once within each question, do not award the mark for the *first* occurrence of the error within each question. Where a question part carries more than one mark, only the final mark should be withheld. × Incorrect notation eg 2–

Responses involving the use of algebra

For example: $2 + n$ $n + 2$ $2n$ $\frac{n}{2}$ n^2

Accept ✓	Take care ! Do not accept ×
✓ Unambiguous use of a different case or variable eg N used for n x used for n	! Unconventional notation eg $n \times 2$ or $2 \times n$ or $n2$ or $n + n$ for $2n$ $n \times n$ for n^2 $n \div 2$ for $\frac{n}{2}$ or $\frac{1}{2}n$ $2 + 1n$ for $2 + n$ $2 + 0n$ for 2 Within a question that demands simplification, do not accept as part of a final answer involving algebra. Accept within a method when awarding partial credit, or within an explanation or general working.
	× Embedded values given when solving equations eg in solving $3x + 2 = 32$, $3 \times 10 + 2 = 32$ for $x = 10$ To avoid penalising the two types of error below more than once within each question, do not award the mark for the *first* occurrence of each type within each question. Where a question part carries more than one mark, only the final mark should be withheld.
✓ Words used to precede or follow equations or expressions eg $t = n + 2$ tiles or tiles = $t = n + 2$ for $t = n + 2$	! Words or units used within equations or expressions eg n tiles + 2 n cm + 2 Do not accept on their own. Ignore if accompanying an acceptable response.
✓ Unambiguous letters used to indicate expressions eg $t = n + 2$ for $n + 2$	× Ambiguous letters used to indicate expressions eg $n = n + 2$ for $n + 2$

Responses involving time

A time interval *For example: 2 hours 30 minutes*

Accept ✓	Take care ! Do not accept ×
✓ Any unambiguous indication eg 2.5 (hours), 2h 30 ✓ Digital electronic time ie 2:30	× Incorrect or ambiguous time interval eg 2.3(h), 2.30, 2-30, 2h 3, 2.30min ! The unit, hours and/or minutes, is usually printed in the answer space. Where the pupil writes an answer outside the answer space, or crosses out the given unit, accept answers with correct units, unless the question has specifically asked for other units to be used.

A specific time *For example: 8:40am 17:20*

Accept ✓	Do not accept ×
✓ Any unambiguous, correct indication eg 08.40, 8.40, 8:40, 0840, 8 40, 8-40, twenty to nine, 8,40 ✓ Unambiguous change to 12 or 24 hour clock eg 17:20 as 5:20pm, 17:20pm	× Incorrect time eg 8.4am, 8.40pm × Incorrect placement of separators, spaces, etc or incorrect use or omission of 0 eg 840, 8:4:0, 084, 84

Responses involving coordinates

For example: (5, 7)

Accept ✓	Do not accept ×
✓ Unconventional notation eg (05, 07) (five, seven) ($^{x}5$, $^{y}7$) ($x = 5$, $y = 7$)	× Incorrect or ambiguous notation eg (7, 5) ($^{y}7$, $^{x}5$) ($5x$, $7y$) (5^{x}, 7^{y}) ($x - 5$, $y - 7$)

Responses involving probability

A numerical probability should be expressed as a decimal, fraction or percentage only

For example: 0.7 $\frac{7}{10}$ *70%*

Accept ✓	Take care ! Do not accept ×
✓ Equivalent decimals, fractions and percentages eg 0.700, $\frac{70}{100}$, $\frac{35}{50}$, 70.0%	The first **four** categories of error below should be ignored if accompanied by an acceptable response, but should not be accepted on their own. However, to avoid penalising the first **three** types of error below more than once within each question, do not award the mark for the *first* 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.
✓ A probability correctly expressed in one acceptable form which is then incorrectly converted, but is still less than 1 and greater than 0 eg $\frac{70}{100} = \frac{18}{25}$	! A probability that is incorrectly expressed eg 7 in 10 7 over 10 7 out of 10 7 from 10 ! A probability expressed as a percentage without a percentage sign. ! A fraction with other than integers in the numerator and/or denominator. ! A probability expressed as a ratio eg 7 : 10, 7 : 3, 7 to 10 × A probability greater than 1 or less than 0

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 and 6–8.
A total of 121 marks is available in tier 5–7.

Awarding levels

The sum of the marks gained on paper 1, paper 2 and the mental mathematics paper determines the level awarded. Level threshold tables, which show the mark ranges for the award of different levels, will be available on the NAA website *www.naa.org.uk/tests* from Monday 19 June 2006. NAA 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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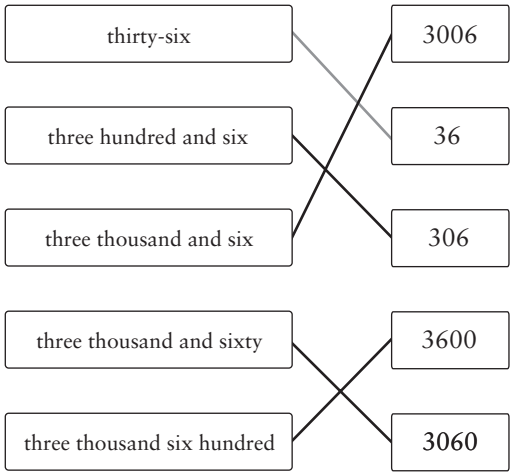
Tier & Question					Matching	
3-5	4-6	5-7	6-8			
1					**Correct response**	**Additional guidance**
				2m	Matches all four sets of words to the correct numbers, ie  	! *Set of words matched to more than one number* For 2m or 1m, do not accept as a correct match
				or **1m**	Matches at least two sets of words to the correct numbers	

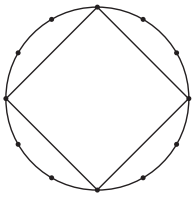
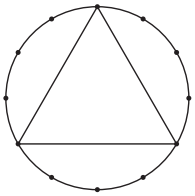
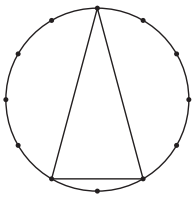
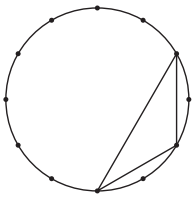
Tier & Question						Pupil list
3-5	4-6	5-7	6-8			
2					**Correct response**	**Additional guidance**
a				**1m**	7	
b				**1m**	Huw Davies	✓ *Unambiguous indication* eg, for part (b) ◆ Huw ◆ Davies ◆ 21/11/92 eg, for part (c) ◆ Leroy ◆ LT ◆ 06/10/92
c				**1m**	Leroy Taylor	
d				**1m**	Gives the correct date eg ■ 07/01/93 ■ 7 Jan 93	! *Date given in different form* Accept only if unambiguous or commonly used eg, accept ◆ 1/7/93 [US notation] × *Year not given* eg ◆ 7th January

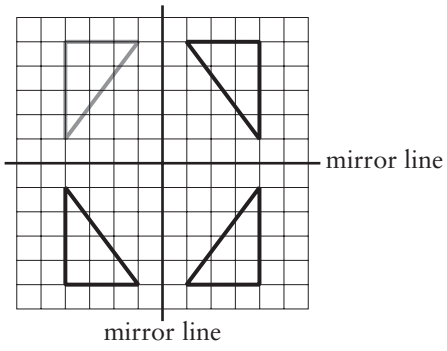
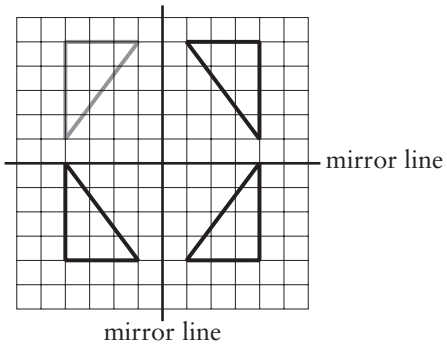
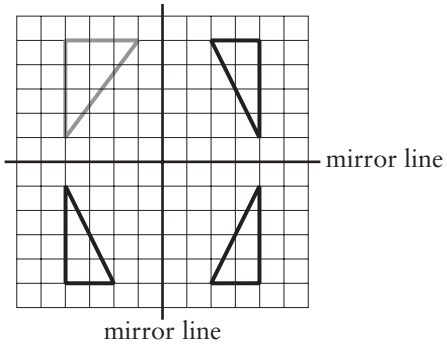
Tier & Question					Thinking angles	
3-5	4-6	5-7	6-8			
3					**Correct response**	**Additional guidance**
a				**1m**	Indicates Angle *d*, ie ☐ ☐ ☐ ☑	
b				**1m**	Gives a correct explanation eg ■ It's a right angle ■ It must be 90°	✓ *Minimally acceptable explanation* eg ◆ Right ◆ Quarter turn ! *Units incorrect or omitted* eg ◆ 90°C ◆ 90% ◆ 90 Condone × *Incomplete explanation* eg ◆ It's a square angle ◆ It's a corner

Tier & Question						
3-5	4-6	5-7	6-8			**Moving on a grid**
4					**Correct response**	**Additional guidance**
a				**1m**	Gives the correct direction eg ■ South 1 ■ 1 S	! *Correct compass point(s) indicated, but indication of the number of squares to move incorrect or omitted* Penalise only the first occurrence eg, for parts (a) and (b) ◆ South 2 [for part (a)] then North 1 East 2 South 3 [for part (b)] Mark as 0, 1
b				**1m**	Gives all three correct directions in a correct order to form a square eg ■ North 1 East 1 South 1 ■ 1 S 1 E 1 N	! *For part (b), response uses additional directions but a square is still formed* eg ◆ West 1 [repeated] South 2 East 2 North 2 Condone

Tier & Question						
3-5	4-6	5-7	6-8			**Cards**
5					**Correct response**	**Additional guidance**
a				**1m**	£ 2.60	! *Final zero omitted* Provided this is the only error, penalise only the first occurrence
b				**1m**	£ 6.10	! *Value given in pence without the corresponding change in units* Provided this is the only error, penalise only the first occurrence
c				**1m**	Gives a correct pair of codes in either order, ie C and D or B and E	✓ *Unambiguous indication* eg, for C and D ◆ Digits 165 and 195 ◆ C and 1.95 eg, for B and E ◆ Digits 125 and 235
				1m (U1)	Gives a correct pair of codes, other than any previously credited	

Tier & Question					Tennis	
3-5	4-6	5-7	6-8			
6					**Correct response**	**Additional guidance**
a				**1m**	3	
b				**1m**	Ed	✓ *Unambiguous indication* eg • E
c				**1m** U1	Gives a correct explanation that one person cannot play against themselves eg ▪ You can't play against yourself ▪ It's where each person is matched with themselves, so there is no game ▪ It's Ann v Ann, Bob v Bob etc and that's impossible ▪ There are five people so only four possible games each	✓ *Minimally acceptable explanation* eg • It's a person matched with themselves • It's Ann v Ann • There are only four possible games each × *Incomplete explanation* eg • There can't be a game • They didn't play • It's impossible

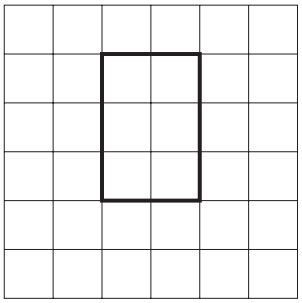
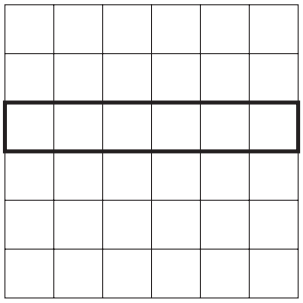
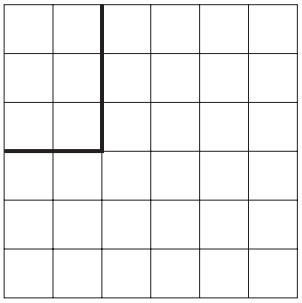
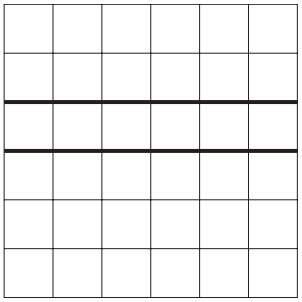
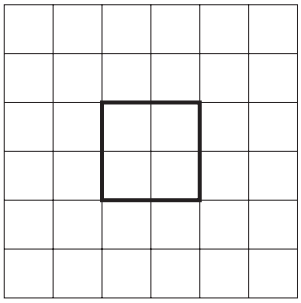
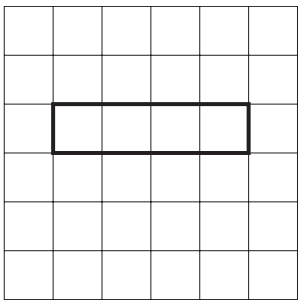
Tier & Question						
3-5	4-6	5-7	6-8			**Joining points**
7					**Correct response**	**Additional guidance**
a				**1m**	Joins only four points to make a square eg ▪ 	! ***Lines not ruled or accurate*** Accept provided the pupil's intention is clear ! ***Points correctly indicated but line(s) incorrect or omitted*** Penalise only the first occurrence
b				**1m**	Joins only three points to make an equilateral triangle eg ▪ 	
c				**1m**	Joins only three points to make an isosceles triangle eg ▪  ▪ 	! ***Equilateral triangle made for part (c)*** Accept provided a set of three points other than one credited for part (b) is used

Tier & Question					Mirror lines	
3-5	4-6	5-7	6-8			
8	1				**Correct response**	**Additional guidance**
				2m	Reflects the triangle correctly in both mirror lines, completing the triangles in all three quadrants correctly, ie  	! *Lines not ruled or accurate* Accept provided the pupil's intention is clear
				or **1m**	Completes the triangles in any two of the three quadrants correctly or Makes an error in the position of one triangle, and follows through correctly if the incorrect image may have been used for further reflection eg ▪  or Makes an error in the position of one vertex, but still draws a right-angled triangle with the hypotenuse in the correct orientation, and follows through correctly if the incorrect image may have been used for further reflection eg ▪  	× *For 1m, error in the orientation of a reflected triangle*

Tier & Question					Using rules	
3-5	4-6	5-7	6-8			
9	2				Correct response	Additional guidance
a	a			**1m**	20, 28	
				1m	36, 108	
				1m	14, $14\frac{1}{2}$ or equivalent	! *First new term for each sequence correct, with second terms all incorrect or omitted* Mark as 0, 0, 1
b	b			**1m**	Indicates No and gives a correct explanation The most common correct explanations:	
					Show that the rule does not work for the third term eg ■ It doesn't work for the second two numbers, 22 – 8 = 14 not 18 ■ If it was subtract 8, the last number would be 14 ■ It's 22 – 4 = 18, not 22 – 8 ■ 22 – 18 = 4 not 8	✓ *Minimally acceptable explanation* eg ◆ 22 – 8 = 14 ◆ When you take away 8, it should be 14 ◆ 18 should be 14 ◆ The third number should be 14 ◆ 22 – 8 ≠ 18 ◆ It's 22 – 4 ◆ 18 to 22 is 4 ✗ *Incomplete or incorrect explanation* eg ◆ 18 is wrong ◆ It should be 14 ◆ It doesn't work for 22 and 18 ◆ You subtract a different number the second time ◆ 8 – 22 = 14 ◆ 22 – 8 = 15
					State what the correct rule could be eg ■ It should be divide by 2, then add 7 ■ The rule is add 14 then halve it ■ You take away half as much each time	✓ *Minimally acceptable explanation* eg ◆ ÷ 2 + 7 ◆ It's take away 8, then take away 4 ◆ –8 and –4 ◆ You halve what you subtract ✗ *Incomplete or incorrect explanation* eg ◆ You subtract a different number each time ◆ You subtract 4 ◆ The rule is subtract 4 ◆ Take away half
				(U1)		

Tier & Question					Cough mixture	
3-5	4-6	5-7	6-8			
10	3				**Correct response**	**Additional guidance**
				2m	Gives a correct justification that shows or implies there is not enough cough mixture The most common correct justifications: Refer to the amount needed for 5 days eg ■ Adult: 10 × 4 × 5 = 200 Children: 5 × 4 × 5 = 100 but there is only 250 ■ 200 + 100 = 300, so no ■ You need 300ml ■ You need 60ml for each of the 5 days, and the bottle only holds 250ml ■ You need 50ml more ■ 250 − 40 − 40 − 40 − 40 − 40 = 50 50 − 20 − 20 = 10, so the child will not have enough for the last 3 days Refer to how long the bottle will last or how many doses it will provide eg ■ Each day they need 60ml so there is only enough for just over 4 days ■ It will last about 4 days ■ They need 15ml each time, but 250 ÷ 15 < 20 × 15 ■ There is only enough for 16 doses, but they need 20	✓ *Minimally acceptable justification* eg ◆ 200, 100 so no ◆ (10 + 5) × 20 > 250 ◆ 300 needed ◆ 50 too little ◆ 250 − 200 = 50 50 − 20 = 30 30 − 20 = 10, so there's not enough ◆ Only 4 days ✗ *For 2m, incomplete justification* eg ◆ 200, 100 ◆ 300 ◆ −50 ◆ 250 − 200 = 50, 50 − 20 = 30, 30 − 20 = 10 ◆ 4 days ◆ It will run out

Tier & Question					Cough mixture (cont)	
3-5	4-6	5-7	6-8			
10	3				**Correct response**	**Additional guidance**
				or **1m**	Shows or implies a correct method for the amount needed for 5 days, or for how long the bottle will last, with not more than one error eg ■ 300 seen [no decision] ■ 300, there is enough [incorrect decision] ■ 200, 100 [no decision] ■ −50 seen [no decision] ■ 4 days [no decision] ■ 16 doses [no decision] ■ 10 × 4 = 40, 5 × 4 = *30 (error)*, 40 + 30 = 70, 70 × 5 = 350, not enough [computational error] ■ 10 + 5 = 15, 15 × 4 × *4 (error)* = 240 needed so there is enough [error in number of days as 4] ■ 10 + 5 then × 5, so yes [error in number of doses per day as 1] ■ 75, so yes [error in number of doses per day as 1] or Shows or implies a correct method for finding the amount for one adult for 5 days eg ■ 10 × 4 × 5 ■ 40, 40, 40, 40, 40 ■ 200, with no evidence of an incorrect method or Shows or implies a correct method for finding the amount for one child for 5 days eg ■ 5 × 4 × 5 ■ 20, 20, 20, 20, 20 ■ 100, with no evidence of an incorrect method or Shows or implies a correct method for finding the total amount needed per day eg ■ 60, with no evidence of an incorrect method ■ 10 + 5 then × 4 ■ 40, 20	
				(U1)		

Tier & Question					Working with areas	
3-5	4-6	5-7	6-8			
11	4				Correct response	Additional guidance
				1m	Draws a rectangle of area 6cm^2 eg ▪  ▪ 	! *Lines not ruled or accurate* Accept provided the pupil's intention is clear ✓ *Grid lines used as side(s) of shape* eg, for the first mark ◆  ◆ 
				1m	Draws a rectangle of area 4cm^2 eg ▪  ▪ 	! *Draws shapes for both grids with correct areas that are not rectangles* Provided the given shapes are not repeated, mark as 0, 1 ! *Shows or implies the totals 6 and 4, but shapes are incorrect or omitted* eg ◆ 6, 4 seen ◆ Rectangles transposed but otherwise correct Mark as 0, 1

Tier & Question						Pregnancy
3-5	4-6	5-7	6-8			
12	5				Correct response	Additional guidance
a	a			1m	Whale	✓ *Unambiguous indication* eg, for part (a) • W • 365
b	b			1m	Seal	
c	c			1m	Dolphin	

Tier & Question						Missing numbers
3-5	4-6	5-7	6-8			
13	6				Correct response	Additional guidance
				1m	40	
				1m	100	
				1m	50	

Tier & Question					Hexagons	
3-5	4-6	5-7	6-8			
14	7				Correct response	Additional guidance
				2m	Indicates only the three hexagons, ie ✓ — ✓ ✓	✓ *For 2m or 1m, unambiguous indication* eg • ✓ for a hexagon, ✗ for not a hexagon
				or **1m**	Indicates only two of the three hexagons with no other errors, ie ✓ or ✓ or *(error)* — — — ✓ *(error)* ✓ *(error)* ✓ ✓	

Tier & Question					Sponsored swim	
3-5	4-6	5-7	6-8			
15	8				Correct response	Additional guidance
a	a			**1m**	£ 400	! *Zeros given after the decimal point* Condone two zeros eg, for part (a) accept • £ 400.00 Penalise only the first occurrence of one zero eg, for parts (a) and (b) • £ 400.0 £ 430.0 Mark as 0, 1
b	b			**1m**	£ 430	

Tier & Question						Cat food
3-5	4-6	5-7	6-8			
18	9	1			Correct response	Additional guidance
a	a	a		**1m**	$\frac{1}{4}$ or equivalent probability	
b	b	b		**1m**	$\frac{1}{3}$ or equivalent probability	**!** ***Probability rounded*** Accept 0.33 or better, or percentage equivalents
c	c	c		**1m**	0.3 or equivalent probability	

Tier & Question						
3-5	4-6	5-7	6-8		**Wine gums**	
16	**10**	**2**			**Correct response**	**Additional guidance**
a	a	a		**3m**	Completes all three rows of the table correctly, ie	! *Inaccurate reading of bar charts for Ravi and Tina* Accept values in the following ranges provided the total for the row is correct eg, accept • Ravi 35 ± 1 15 ± 1 Tina 100 ± 4 100 ± 4 eg, within a 1m response using only percentages, accept • Ravi 70 ± 2 30 ± 2 Tina 50 ± 2 50 ± 2 ! *Incorrect units inserted* Ignore

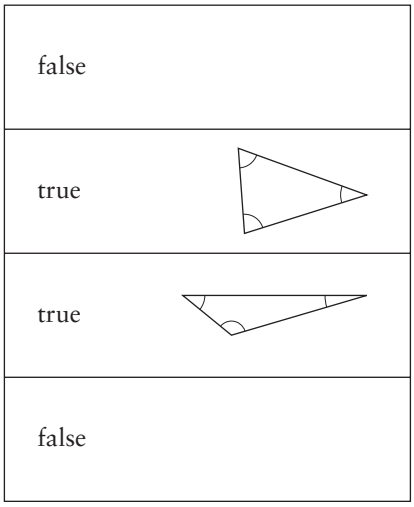
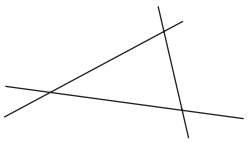
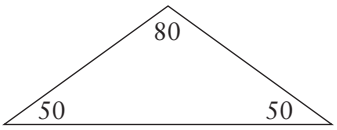
	…can…	…cannot…
Ravi	35	15
Sita	60	40
Tina	100	100

	or	
	2m	Completes two rows of the table correctly or Completes one column of the table correctly or Completes the table with the two columns transposed but otherwise correct
	or	
	1m	Completes either the row for Ravi or the row for Tina correctly or Completes the table using correct percentages from the bar charts, ie

	…can…	…cannot…
Ravi	70	30
Sita	60	40
Tina	50	50

Tier & Question						
3-5	4-6	5-7	6-8		**Wine gums (cont)**	
16	**10**	**2**			**Correct response**	**Additional guidance**
b	b	b		**1m**	Explains that Tina used the largest sample size eg ■ The more tests you do, the more reliable the results ■ Tina asked more people than the others ■ 200 is bigger than 100 or 50	✓ *Minimally acceptable explanation* eg ◆ More tests ◆ More people ◆ More wine gums ◆ 200 is bigger ◆ She asked 200 and the others asked 100 or 50 [comparison implicit] ◆ She asked twice as many people as Sita [comparison with Ravi implicit] ! *Irrelevant information or claim* eg ◆ It was 50/50 ◆ Hers were more evenly split ◆ She asked a wider range of people Ignore if accompanying a correct response × *Incomplete or incorrect explanation* eg ◆ More ◆ She asked 200 people [no comparison] ◆ Her results are more reliable as it was half and half
				(U1)		

Tier & Question						
3-5	4-6	5-7	6-8		**Values**	
17	**11**	**3**			**Correct response**	**Additional guidance**
				2m	Gives all three correct values in the correct positions, ie 18, 30 and 100	! *Incorrect notation* eg, for the value of $8 + k$ ◆ $18k$ Withhold 1 mark only for the first occurrence
				or **1m**	Gives two correct values in the correct positions or Shows all three values 18, 30 and 100, even if their positions are incorrect or Shows correct substitutions, interpreting the addition, multiplication and squaring correctly, but fails to process or processes incorrectly eg ■ $8 + 10$, 3×10, 10×10 seen	

Tier & Question						
3-5	4-6	5-7	6-8		**Thinking triangularly**	
19	**12**	**4**			**Correct response**	**Additional guidance**
				3m	Gives all four correct responses, including examples for the two true statements eg ▪  	✓ ***Unambiguous indication of 'true' and 'false'*** eg ◆ ✓ for true, ✗ for false ! ***'True' example(s) drawn correctly but indication of 'true' omitted*** Condone, provided the examples show unambiguously that the statement is true ! ***Angles in the triangles not marked or marked incorrectly*** Ignore ! ***Triangles not drawn accurately*** Accept provided the pupil's intention is clear eg, for the first 'true' example accept ◆  ◆ 
				or **2m**	Gives any three correct responses, including a correct example for any true statement or Gives correct responses for the two true statements, including correct examples, but leaves the spaces for the false statements blank	! ***Acute or obtuse angles look like right angles*** Do not accept if the angles are 90° ± 1° Otherwise, condone ! ***Example(s) given alongside 'false'*** As these may be trials, ignore
				or **1m**	Gives a correct response for one of the true statements, including a correct example or Correctly labels all four statements 'true' or 'false' but examples for the true statements are incorrect or omitted	
				U1		

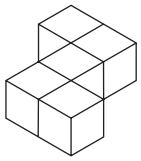
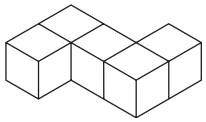
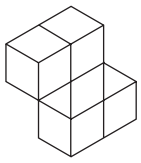
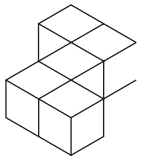
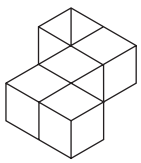
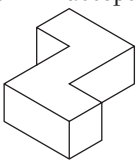
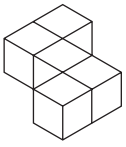
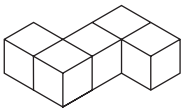
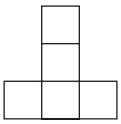
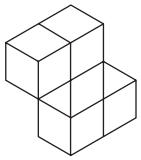
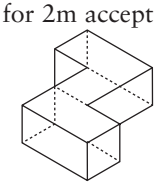
Tier & Question						
3-5	4-6	5-7	6-8		**Toilet rolls**	
22	13	5			**Correct response**	**Additional guidance**
				3m	Indicates the pack of 6 toilet rolls and gives a correct justification, based on a pair of comparable values eg ■ The 6-pack costs £1.25 for 3 rolls, but the 9-pack costs £1.30 for 3 rolls ■ 3.9(0) ÷ 9 = 0.43(…) 2.5(0) ÷ 6 = 0.41(…) ■ For 9 rolls we have 3.90 and 2.50 ÷ 2 × 3 = 3.75 ■ 6 rolls: 390 ÷ 3 × 2 = 260, ie 10p more ■ The 3 extra toilet rolls in the 9-pack cost £1.40, but in the 6-pack 3 rolls cost £1.25 ■ If the 9-pack were decreased by 3 rolls its price should go down by £1.30, but the difference is £1.40 so it's a better reduction ■ 3 extra rolls cost £1.40 so 12 rolls using the large pack is 3.90 + 1.40 = 5.30, whereas 2.50 + 2.50 for the small pack is only 5.00	✗ *For 3m, no decision* ✓ *For 3m, correct decision and any pair of comparable values shown* Note that common pairs (in pounds) are: 1.3 and 1.25 (per 3 rolls) 0.43(…) and 0.41(…) or 0.42 (per 1 roll) (3.9 and) 3.75 (per 9 rolls) 2.6 (and 2.5) (per 6 rolls) 7.8 and 7.5 (per 18 rolls) 15.6 and 15 (per 36 rolls) 23.4 and 22.5 (per 54 rolls) 1.4 and 1.25 [or 1.3] (3 extra rolls) 2.3(…) and 2.4 (rolls per pound) ! *Comparison is per 9 rolls or per 6 rolls but the given price is not restated* Condone eg, for 3m accept • The 6-pack, because 9 rolls should be £3.75
				or **2m**	Shows a correct pair of comparable values but makes either an incorrect or no decision or Attempts to find a pair of comparable values, making not more than one computational or rounding error, then follows through to make their correct decision eg ■ The 6-pack is *£1.30 (error)* for 3 rolls and so is the 9-pack, so they are the same ■ The 9-pack is £3.90 but should be 2.50 ÷ 6 × 9 = *0.41(rounding error)* × 9 = 3.69 so 6-pack is cheaper	! *Units omitted, incorrect or inconsistent* Condone provided the pupil's intention is clear eg, for 3m accept • The 6-pack, because 3.9(0) ÷ 9 = 43 2.5(0) ÷ 6 = 42 ! *Additional incorrect working* Ignore
				or **1m**	Shows, or implies by a correct value, a correct method to calculate at least one value for comparison, even if there are computational or rounding errors or Shows the difference in price for 3, 6, 9 or 18 rolls, even if the comparable values or the methods to calculate them are not shown eg ■ The 6-pack is 5p cheaper ■ The big pack is 10p more ■ 15p difference ■ 30p less U1	Note that common calculations are: 3.9 ÷ 3 or 2.5 ÷ 2 (per 3 rolls) 3.9 ÷ 9 or 2.5 ÷ 6 (per 1 roll) 2.5 ÷ 2 × 3 (per 9 rolls) 3.9 ÷ 3 × 2 (per 6 rolls) 3.9 × 2 or 2.5 × 3 (per 18 rolls) 3.9 × 4 or 2.5 × 6 (per 36 rolls) 3.9 × 6 or 2.5 × 9 (per 54 rolls) 3.9 – 2.5 or 2.5 ÷ 2 [or 3.9 ÷ 3] (3 extra rolls) 9 ÷ 3.9 or 6 ÷ 2.5 (rolls per pound)

Tier & Question						
3-5	4-6	5-7	6-8		**Woodpeckers**	
20	**14**	**6**			**Correct response**	**Additional guidance**
a	a	a		**1m**	Gives all three correct values in the correct order, ie 60 | 10 | 30	
b	b	b		**1m**	1 : 3	✓ *Equivalent ratio* eg • $\frac{1}{3}$: 1 • 10 : 30

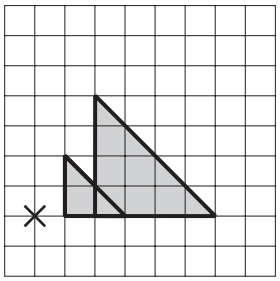
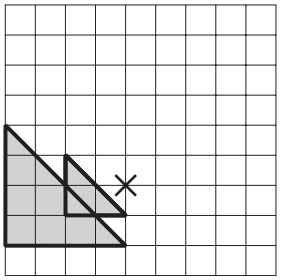
Tier & Question						
3-5	4-6	5-7	6-8		**Changing 120**	
21	**15**	**7**			**Correct response**	**Additional guidance**
				1m	12	
				1m	1.2 or equivalent	✗ *1m 20cm*
				1m	0.12 or equivalent	

Tier & Question						
3-5	4-6	5-7	6-8		**Four angles**	
	16	**8**	**1**		**Correct response**	**Additional guidance**
				3m	Gives all four correct angles, ie $a = 110$ $b = 70$ $c = 50$ $d = 130$	✓ *Angles indicated on the diagram*
				or **2m**	Gives any three correct angles or Gives all four values 110, 70, 50 and 130, but in the incorrect order	
				or **1m**	Gives any two correct angles or Shows three of the angles 110, 70, 50 and 130, but with the links to each letter incorrect or omitted or Gives four different angles (ie no two of the angles are equal) that sum to 360	
				U1		

Tier & Question						
3-5	4-6	5-7	6-8		**Balancing**	
	17	**9**	**2**		**Correct response**	**Additional guidance**
	a	a	a	**1m**	5	
	b	b	b	**1m**	35	! *Answers to parts (a) and (b) transposed but otherwise correct* Mark as 0, 1

Tier & Question						
3-5	4-6	5-7	6-8		**Five cubes**	
	18	**10**	**3**		**Correct response**	**Additional guidance**
				1m	Draws a correct view of the shape from above using the square grid, in either orientation eg ▪  ▪ 	✓ *Internal lines omitted* eg ◆  ! *Throughout the question, lines not ruled or accurate* Accept provided the pupil's intention is clear
				2m *or* **1m**	Draws a correct view of the shape using the isometric grid, in either correct orientation eg ▪  ▪  Shows a shape drawn on the isometric grid that takes the given view as a view from one side rather than from above eg ▪  or The only error is to omit some external lines or to show some hidden lines eg ▪  ▪ 	✓ *For 2m or 1m, internal lines omitted* eg, for 2m accept ◆  ! *Their shape takes the given view as a view from below rather than from above* Condone eg, for 2m accept ◆  or  ! *Their shape takes the given view as a view from one side rather than from above* For 2m, accept only if this error was penalised for the first mark eg ◆  then  Mark as 0, 1, 1 ! *Hidden lines shown* For 2m, accept provided they are clearly indicated as hidden lines eg, for 2m accept ◆  × *Shape with more than 5 cubes drawn*

Tier & Question						
3-5	4-6	5-7	6-8			***n*th term**
	19	**11**	**4**		**Correct response**	**Additional guidance**
	a	a	a	**1m**	Gives a correct expression eg ■ $4n + 2$ ■ $4n + 1 + 1$	! *Unsimplified expression or unconventional notation* eg, for part (a) ◆ $4 \times n + 2$ ◆ $n4 + 2$ Condone
	b	b	b	**1m**	Gives a correct expression eg ■ $3n + 3$ ■ $3(n + 1)$ ■ $\frac{1}{2}(6n + 6)$ ■ $(6n + 6) \div 2$ ■ $\frac{6n}{2} + \frac{6}{2}$	✖ *Necessary brackets omitted* eg, for part (b) ◆ $6n + 6 \div 2$ eg, for part (c) ◆ $2 \times 5n - 3$
	c	c	c	**1m**	Gives a correct expression eg ■ $10n - 6$ ■ $2(5n - 3)$ ■ $(5n - 3) \times 2$	

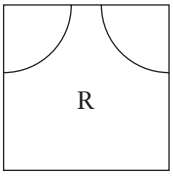
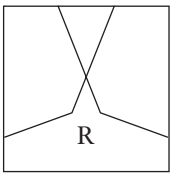
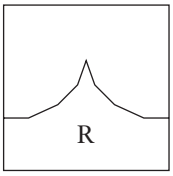
Tier & Question						
3-5	4-6	5-7	6-8		**Enlargement**	
	20	**12**	**5**		**Correct response**	**Additional guidance**
				1m	Indicates the correct centre of enlargement for the first diagram, ie 	! *Centre of enlargement indicated only by intersection of construction lines* Accept provided there is no ambiguity ! *Inaccurate indication* Accept provided their indication is within 2mm of the correct position ! *Incorrect construction lines shown* Ignore
				1m	Indicates the correct centre of enlargement for the second diagram, ie 	

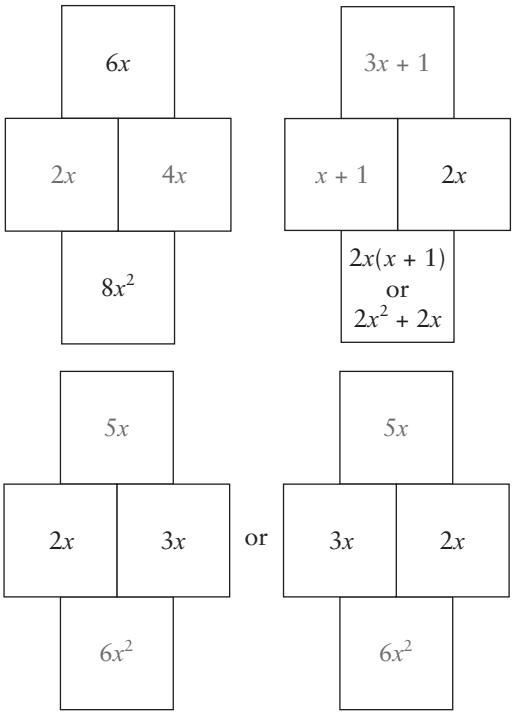
Tier & Question						Error
3-5	4-6	5-7	6-8			
	21	14	6		Correct response	Additional guidance
		a	a	**1m**	120	! *Incorrect use of % sign* Ignore
				1m	84	
		b	b	**2m**	Gives two correct percentages that sum to 100 eg ■ 39 61 ■ 38.8 61.2 ■ 38.83 61.17	! *Values rounded* For 2m, accept percentages correctly rounded to two or more significant figures, provided they sum to 100 Note to markers: Correct percentages are 38.834951456… 61.165048543…
				or **1m**	Gives one correct percentage even if truncated, ie 38 or better, or 61 or better or Shows or implies a correct method for both percentages eg ■ 80 ÷ 206 126 ÷ 206 ■ Digits 38(…) (or 39) and 61(…)	

Tier & Question					Tomatoes	
3-5	4-6	5-7	6-8			
	22	15	7		Correct response	Additional guidance
	a	a	a	**1m**	Gives a value between 7.2 and 7.5 inclusive, or equivalent	
	b	b	b	**1m**	Indicates A and gives a correct explanation The most common correct explanations: Use the trend line for type A eg ■ It is closest to the line for type A ■ (3.2, 5.8) is close to (3, 6) which is on line A ■ Type A have smaller diameters with bigger heights than the other types ■ For A, the height is about double the diameter, and that's roughly true for this one Refer to the diameters of type B being consistently larger than 3.2cm, or to the heights of type A differing from their diameters eg ■ It's between the lines for A and B, but all the type Bs have diameters between 6 and 7 ■ It's too far from the type C line so it's A or B, and the A ones don't have similar diameters and heights	✓ *Minimally acceptable explanation* eg ◆ It's closest to that line ◆ The line goes through (3, 6) which is very close ◆ It is closest to type A [with point correctly plotted on graph] ◆ Type A have small diameters with big heights ◆ For A, height is bigger than diameter ◆ A tomatoes are thin but tall ✗ *Incomplete or incorrect explanation* eg ◆ It is closest to type A ◆ It's in the A section ◆ For A, the height is double the diameter ◆ The graph shows it ◆ It is on A's line ◆ Type A tomatoes have small diameters ✓ *Minimally acceptable explanation* eg ◆ B tomatoes have bigger diameters ◆ A tomatoes have diameters that are not roughly equal to their heights ✗ *Incomplete explanation* eg ◆ It could be A or B but it's more like A

Tier & Question					Tomatoes (cont)	
3-5	4-6	5-7	6-8			
	22	15	7		Correct response	Additional guidance
	c	c	c	**1m**	Indicates B and gives a correct explanation The most common correct explanations:	
					Refer to the position of its line on the graph ■ B's graph is closest to $y = x$ (or $h = d$) ■ The line for B is closest to the line drawn [line $h = d$ correctly indicated on graph]	✓ *Minimally acceptable explanation* eg ◆ B's line is about 45° through the middle ◆ It goes through (0, 0) then when d goes up by 1, so does h ◆ The x and y (or h and d) coordinates are nearly equal
						✗ *Incomplete or incorrect explanation* eg ◆ B's line is at about 45° ◆ B's line is a diagonal through the middle ◆ The graph shows it ◆ B has $h = 2$ and $d = 2$
					Refer to the dimensions of the tomatoes eg ■ The height and the diameter of a sphere are equal and that's also roughly true for B ■ The height and diameter of B are both around 6 ■ A tomatoes are too tall for their diameter, but C tomatoes are too fat for their height	✓ *Minimally acceptable explanation* eg ◆ Same height and diameter ◆ h and d are closest ◆ The two values are nearly equal ◆ The others are either too tall and thin or too short and wide
				(U1)		
		d	d	**2m**	Gives the value 22.4(…) or 22.5	! *For 2m, answer of 22 or 23* Do not accept unless a correct method or a more accurate value is seen
				or **1m**	Shows or implies a correct method with not more than one computational or rounding error eg ■ $3.14 \times 3.5^3 \div 6$ ■ $\frac{1}{6}\pi\ 3.5^2 \times 3.5$ ■ $\pi \div 6 = 0.52$ *(premature rounding)*, $0.52 \times 12.25 \times 3.5 = 22.3$ ■ Answer of 22 or 23, with no correct method or more accurate value	✗ *For 1m, no indication of multiplication* eg ◆ $\frac{1}{6}\pi\ 3.5^2\ 3.5$ ◆ $\frac{1}{6}\pi\ 12.25\ 3.5$ ✗ *For 1m, conceptual error* eg ◆ $\frac{1}{6} \times \pi \times 7 \times 3.5$

Tier & Question						
3-5	4-6	5-7	6-8		**Expressions**	
	23	**13**	**8**		**Correct response**	**Additional guidance**
				2m	$8x + 31$	
				or		
				1m	Shows or implies the four correct terms resulting from multiplying out the brackets, even if there is incorrect further working eg ■ $5x$, 10, 21, $3x$ ■ $5x + 10$ and $21 + 3x$ ■ $5x + 31 + 3x$ ■ $8x + 10 + 21$ or Multiplies out both sets of brackets with not more than one error, then follows through using their expansion to give a fully simplified expression eg ■ $5x + 10 + 27$ *(error)* $+ 3x = 8x + 37$	✗ ***For 1m, incomplete processing in constant terms*** eg, for the first expression ◆ $5x + 5 \times 2 + 3 \times 7 + 3x$
				2m	$x^2 + 7x + 10$	! ***Expression equated to zero*** Condone
				or		
				1m	Shows or implies the four correct terms resulting from multiplying out the brackets, even if there is incorrect further working eg ■ x^2, $2x$, $5x$, 10 ■ $x \times x + 5x$ and $2 \times x + 10$ or The only error in an otherwise correct and simplified expression is to give an incorrect but non-zero constant term, or to leave incomplete processing in the correct constant term eg ■ $x^2 + 2x + 5x + 7$ *(error)* $= x^2 + 7x + 7$ ■ $x^2 + 7x + 2 \times 5$ ■ $x \times x + 7 \times x + 2 \times 5$	

Tier & Question						
3-5	4-6	5-7	6-8	*Marking overlay available*	**Tracking elephants**	
		16	**9**		**Correct response**	**Additional guidance**
				2m	Uses compasses to draw two arcs centred on A and B within the tolerances as shown on the overlay, and indicates the correct region	! *Arcs extended* Ignore ! *Extra arcs drawn* Ignore provided there is no ambiguity
				or **1m**	Draws two arcs centred on A and B within the tolerances as shown on the overlay, even if compasses are not used, and/or an incorrect or no region is indicated or Indicates the correct region for their arcs centred on A and B, even if they are outside the tolerance as shown on the overlay or The only error is that the two arcs are centred on the incorrect vertices of the square	! *For 1m, follow through* Accept unambiguous indication of a correct region formed by an attempt at two symmetrical arcs or sets of lines 'centred' on A and B, even if inaccurately drawn eg, accept ◆  ◆  ◆  Do not accept follow through from only one arc or line, or from non-symmetrical arcs or lines

Tier & Question						
3-5	4-6	5-7	6-8		**Algebra grids**	
		17	**10**		**Correct response**	**Additional guidance**
				3m	Completes all three grids correctly, ie  	! *Unconventional notation* eg, for $6x$ • $x6$ • $6 \times x$ eg, for $8x^2$ • $8 \times x \times x$ Withhold 1 mark only for the first occurrence × *Unsimplified expression(s) and/or incomplete processing* eg, for $6x$ • $2x + 4x$ eg, for $8x^2$ • $2 \times 4 \times x^2$
				or **2m**	Completes the first two grids correctly or Completes the third grid correctly and gives any two correct entries in the first two grids or Completes the third grid correctly, gives any one correct entry in the first grid, makes an error in the right-hand entry of the second grid, but follows through correctly to give their product	
				or **1m**	Gives any two correct entries in the first two grids or Completes the third grid correctly or Gives any one correct entry in the first grid, makes an error in the right-hand entry of the second grid, but follows through correctly to give their product	
				U1		

Tier & Question						
3-5	4-6	5-7	6-8		**Four kites**	
		18	**11**		**Correct response**	**Additional guidance**
				2m	115	
				or		
				1m	Shows the value 230 or 130 or Shows the value 90, provided there is no evidence that this value has been assigned to angle k or Shows or implies a complete correct method with not more than one computational error eg ▪ $\frac{1}{2}\left(320 - \frac{360}{4}\right)$ ▪ $180 - 45 - 20$ ▪ $\frac{1080 - 4 \times 40}{8}$ or Forms a correct equation involving k, even if the 90° angle has not been found eg ▪ $2k = 360 - 40 - x$ ▪ $(k =)\ 160 - \frac{1}{2}x$	

Tier & Question						
3-5	4-6	5-7	6-8		**Volume of 100**	
		19	**12**		**Correct response**	**Additional guidance**
				1m	Gives a correct pair of positive values such that $x^2y = 100$ eg ▪ $x = 2, y = 25$ ▪ $x = 1, y = 100$ ▪ $x = 5, y = 4$ ▪ $x = 10, y = 1$ ▪ $x = 4, y = 6.25$	! *Value(s) rounded* Accept x as $\sqrt{(100 \div \text{their } y)}$ or y as $100 \div$ their x^2 to 3 s.f. or better eg, accept ◆ $x = 3.16, y = 10$ ◆ $x = 3, y = 11.1$ × *Negative value of x*
				1m	Gives a different correct pair of positive values from any credited for the first mark	! *For both marks, values of x and y transposed, but otherwise correct* Mark as 0, 1

Tier & Question					Bias	
3-5	4-6	5-7	6-8			
		20	**13**		**Correct response**	**Additional guidance**
				2m	Indicates the coin is not biased (eg 'Not biased' or 'No') and gives a correct justification eg ■ Of the 200 trials, 110 are heads $\frac{110}{200} = 0.55$ $0.55 < 0.56$ ■ $0.56 \times 200 = 112$ $112 > 110$ ■ The mean number of heads is 11 $20 \times 0.56 = 11.2$, $11 < 11.2$ ■ $0 + 3 + 1 + 1 + 2 + 2 + 1 - 1 + 0 + 1 = 10$, $10 \div 200 = 5\%$, so it's 55% which is less than 56%	✓ *Minimally acceptable justification* eg ◆ 55% ◆ $\frac{110}{200}$ ◆ 110, 112 ◆ 11, 11.2 ! *Response assumes the pupil has already concluded the coin is biased* Condone eg, for 2m accept ◆ 55%, so her conclusion is wrong ! *Irrelevant information* eg ◆ 7 of the 10 sets of results were less than 11.2 Ignore if accompanying a correct response, otherwise do not accept × *For 2m, incomplete or incorrect justification* eg ◆ They add up to 110 ◆ The mean is 11 ◆ $0.56 \times 20 = 11.2$ ◆ Median = 11 and $11 < 11.2$
				or **1m**	Shows a correct estimate of probability based on all 200 results, even if it is written unconventionally, but makes an incorrect or no decision eg ■ 0.55 ■ 55(%) ■ $\frac{110}{200}$ ■ $\frac{11}{20}$ ■ 110 out of 200 or Shows the values 110 and 112, or 11 and 11.2, but makes an incorrect or no decision or Shows or implies a correct method with not more than one computational error, then follows through to make their correct decision eg ■ 5 + 6.5 + 5.5 + 5.5 + … + 5.5 so not biased ■ 10 + 13 + 11 + … + 11 = *114 (error)*, $\frac{114}{200} > 0.56$ so biased U1	

Tier & Question				Area A		
3-5	4-6	5-7	6-8			
		21	14		Correct response	Additional guidance
				2m	45, with no evidence of an incorrect method	✗ *Incorrect method* eg • 3 × (5 + 10)
				or **1m**	Shows or implies that the width of B is 6 eg ■ 15 × 2 ÷ 5 = 6 ■ C is 5 by 3, so B is 5 by 6 ■ B is 5 × 6 ■ 6 correctly marked on diagram ■ The width of A must be 9 or Shows or implies a complete correct method with not more than one computational error eg ■ 5 × (15 − (15 × 2 ÷ 5)) ■ 75 − 15 × 2 ■ 15 × 8 − 15 − 30 − 30 ■ 15 × 2 = 30, 30 ÷ 5 = *5 (error)*, 15 − 5 = 10, 10 × 5 = 50	! *Incorrect units inserted* Ignore ! *For 1m, dimension of 6 for B within incorrect working* As this could represent the height rather than the width, do not accept eg, do not accept • B is 6 by 10
				(U1)		

Tier & Question						Field voles
3-5	4-6	5-7	6-8			
		22	15		Correct response	Additional guidance
			a	**1m**	Gives a value between 0.65 and 0.68 inclusive or equivalent probability eg ■ $\frac{660}{1000}$ [0.66]	
			b	**1m**	Gives a value between 0.5 and 0.61 inclusive or equivalent probability eg ■ $\frac{160}{290}$ [0.5517…] ■ $\frac{150}{290}$ [0.5172…] ■ $\frac{160}{300}$ [0.5333…]	

Tier & Question					Films	
3-5	4-6	5-7	6-8			
			16		Correct response	Additional guidance
				2m	168	
				or **1m**	Shows or implies a complete correct method with not more than one computational error eg ■ $\frac{24}{25} \times 175$ ■ $175 \times 60 \times 24 \div 25 \div 60$ ■ $175 - \frac{175}{25}$ ■ $1440 \times 175 \div 1500$ ■ $252\,000 \div 1500$ ■ $175 \div 25 = 6$ *(error)*, $175 - 6 = 169$ or Shows or implies that the difference in the number of minutes is 7, even if there is incorrect or no further working eg ■ $175 \times 60 = 10\,500$, $10\,500 \div 25 = 420$, $420 \div 60 = 7$ ■ $175 \div 25 = 7$, $175 +$ *(error)* $7 = 182$	! ***For 1m, value of 7 or 182 taken to imply a difference of 7 minutes*** Accept only if a correct method for finding either 7 or 182 is seen Otherwise, do not accept eg, accept ◆ $175 \div 25 = 7$ [without sight of $175 \div 24$] ◆ $175 + 175 \div 25 = 182$ eg, do not accept ◆ $175 \div 24 = 7.291666\ldots \approx 7$ ◆ $\frac{25}{24} \times 175 = 182$

Tier & Question						
3-5	4-6	5-7	6-8		**Equations of lines**	
			17		**Correct response**	**Additional guidance**
			a	**1m**	Gives the equation of a straight line, other than $y = x + 1$, that passes through (0, 1) eg ■ $y = 2x + 1$ ■ $y = -x + 1$ ■ $y + x = 1$ ■ $3y + 3x = 3$ ■ $y = 1$ ■ $x = 0$	! *Throughout the question, unsimplified equation or unconventional notation* eg, for part (a) ◆ $y = 2 \times x + 1$ ◆ $y = x + x + 1$ Condone × *Same equation as the given line, but rearranged* eg ◆ $y - x = 1$ ◆ $y = x + 2 - 1$ ◆ $2y = 2x + 2$
				1m	Gives a correct equation, other than one previously credited	× *Same equation as the given line or one previously credited, but rearranged*
			b	**1m**	Gives the equation of a straight line that is parallel to $x + y = 5$ eg ■ $x + y = 3$ ■ $y = -x + 6$	× *Same equation as the given line, but rearranged* eg ◆ $2x + 2y = 10$ ◆ $y = 5 - x$

Tier & Question					Households	
3-5	4-6	5-7	6-8			
			18		Correct response	Additional guidance
				3m	1.6	✖ *For 3m, equivalent fractions or decimals*
				or		
				2m	Shows the value 98.4, 98.3(...) or 98 or Shows or implies a correct method even if there are rounding or truncation errors eg ■ $100 - \frac{20.97 \times 2.34 \times 100}{49.87}$ ■ $20.97 \times 2.34 = 49.07$ $49.87 - 49.07 = 0.8$ $\frac{0.8}{49.87}$ ■ $(\frac{49.87}{20.97} - 2.34) \times \frac{20.97}{49.87} \times 100$ ■ $\frac{49.87}{2.34} = 21.(...)$, $\frac{21.(...) - 20.97}{21.(...)}$ ■ Gives an answer that rounds or truncates to 1.6, or is equivalent to 1.6 ■ Shows the digits 16(…)	
				or		
				1m	Shows the number of people who did live in households eg ■ 49.0698 million ■ 49.1 million ■ 49.0(…) million or Shows the number of people who did not live in households eg ■ 0.8(…) million ■ 800 200 ■ 800 000 or Shows the number of households there would have been if every person had lived in one eg ■ 21.3(…) million	✓ *For 1m, 'million' omitted* ! *Value of 49 (million) given as the number of people who did live in households* For 1m, do not accept unless a correct method or a more accurate value is seen

Tier & Question					Cuboid	
3-5	4-6	5-7	6-8			
			19		Correct response	Additional guidance
				2m	Gives both correct surface areas, ie 88 and 104	
				or **1m**	Gives one correct surface area or Shows the values 22 and 26 or Shows a complete correct method with not more than one computational error eg ■ 24 ÷ 6 = 4, (4 × 6 + 2 × 1) × 4 and (2 × 6 + 2 × 3 + 2 × 2) × 4 ■ 24 × 6 = 144, 144 − 14 × 4 and 144 − 10 × 4 ■ 24 ÷ 6 = *3 (error)* Answers: 66 and 78 ■ 24 × 6 = *124 (error)* 124 − 14 × 4 = 68 124 − 10 × 4 = 84 or The only error is to take 24 as the area of one face of each small cube, ie gives the answers 528 and 624	! ***For 1m, other working shown*** As these may be trials, ignore
				(U1)		

Tier & Question						
3-5	4-6	5-7	6-8		**Five points**	
			20		**Correct response**	**Additional guidance**
				3m	9	
				or		
				2m	Shows or implies a complete correct method with not more than one error eg ■ EA : EC is 6 : 4 = 3 : 2, AC is $\frac{40-10}{2} = 15$, $\frac{3}{5} \times 15$ ■ 40 − 10 = 30, BCE and ADE similar, ratio 1 : $1\frac{1}{2}$, $1 + 1 + 1\frac{1}{2} + 1\frac{1}{2} = 5$, $30 \div 5 = 6$, $6 \times 1\frac{1}{2}$ ■ (40 − 4 − 6) ÷ 2 = *16 (error)*, 16 ÷ 5 = 3.2, 3.2 × 3 = 9.6	
				or		
				1m	Shows or implies that EA (or ED) is $\frac{3}{5}$ of AC (or BD) eg ■ EA : EC is 6 : 4 ■ BCE and ADE similar, ratio 1 : $1\frac{1}{2}$ ■ 3 : 2 or 2 : 3 or equivalent ratio seen ■ $\frac{3}{5}$ or equivalent seen ■ ÷ 5 × 3 or equivalent seen ■ 18, 12 seen or Shows or implies that the length of AC (or BD) is 15 eg ■ $\frac{40-10}{2}$ ■ 15 seen ■ AE (or DE) = 10, EC (or EB) = 5 [incorrect but total 15]	
				(U1)		

Tier & Question						
3-5	4-6	5-7	6-8		**Three dice**	
			21		**Correct response**	**Additional guidance**
				2m	$\frac{1}{36}$ or equivalent probability	! *For 2m or 1m, values rounded or truncated* For 2m, accept 0.03, 0.028 or 0.027(…), or the percentage equivalents For 2m, do not accept 0.02 unless a correct method or a more accurate value is seen For 1m, accept 0.17 or 0.16(…) for $\frac{1}{6}$, or the percentage equivalents For 1m, do not accept 0.2 for $\frac{1}{6}$ unless a more accurate value is seen
				or **1m**	Shows or implies a complete correct method, even if values are rounded or truncated eg ▪ $\frac{6}{6} \times \frac{1}{6} \times \frac{1}{6}$ ▪ $1 \times \frac{1}{6} \times \frac{1}{6}$ ▪ $\frac{1}{6} \times \frac{1}{6}$ ▪ $\left(\frac{1}{6}\right)^3 \times 6$ ▪ 0.17×0.17 ▪ 0.02 or Shows or implies a correct method to find the total number of possible outcomes eg ▪ 216 ▪ $6 \times 6 \times 6$ ▪ $\left(\frac{1}{6}\right)^3$ or Shows a correct method that uses explicitly the fact that, in this case, the outcome of one dice is irrelevant eg ▪ It doesn't matter what you throw on the first dice, but the other two dice must match it, so it's $\frac{1}{6}$ then $\frac{1}{6}$	

Tier & Question						
3-5	4-6	5-7	6-8		**Population of Wales**	
			22		**Correct response**	**Additional guidance**
				2m	$2\frac{2}{3}$ or equivalent	! *For 2m, value rounded or truncated* Accept 2.7 or 2.66 or better, provided there is no evidence of an incorrect method Do not accept 2.6 unless a correct method or a more accurate value is seen ! *For 2m or 1m, million repeated* eg, for 2m accept ◆ 2 666 667
				or **1m**	Shows or implies that 3 million represents $\frac{9}{8}$ eg ■ $3 \times 8 \div 9$ ■ $3\,000\,000 - 3\,000\,000 \div 9$ ■ 3 = 112.5% or Shows the digits 27 or 266(…), with no evidence of an incorrect method	× *For 2m or 1m, evidence of an incorrect method* eg ◆ $3 \div 8 \times 7$ which is about 2.7 ◆ 2.625, so 2.7

Tier & Question						
3-5	4-6	5-7	6-8			**Leaning tower of Pisa**
			23		**Correct response**	**Additional guidance**
				2m	Gives a complete correct explanation The most common correct explanations:	
					Use 5.5° and 56m to show that 5.2m cannot be correct eg ■ sin 5.5 × 56 = 5.3(…) [or 5.4]	✓ *For 2m, minimally acceptable explanation* eg ◆ sin 5.5 × 56 ≠ 5.2 ◆ $\frac{5.2}{\sin 5.5} \neq 56$ ◆ $\sin^{-1}\left(\frac{5.2}{56}\right) \neq 5.5$ ◆ 5.2 ÷ 56 ≠ sin 5.5
					Use 5.5° and 5.2m to show that 56m cannot be correct eg ■ $\frac{5.2}{\sin 5.5}$ = 54.(...)	✓ *For 2m, correct explanation using the vertical height* eg ◆ $\sqrt{(56^2 - 5.2^2)}$ = 55.7(…) [or 55.8] tan 5.5 = 0.096(…), but 5.2 ÷ 55.7 (…) = 0.093(…) ◆ 56cos 5.5 = 55.(…) [or 56], but 5.2 ÷ tan 5.5 = 54.(…)
					Use 5.2m and 56m to show that 5.5° cannot be correct eg ■ $\sin^{-1}\left(\frac{5.2}{56}\right)$ = 5.3(...) ■ 5.2 ÷ 56 = 0.092(…) [or 0.093] but sin 5.5 = 0.095(…) [or 0.096]	✓ *For 2m, correct explanation using angle of 84.5°* eg ◆ cos 84.5 × 56 = 5.3(…)
						! *For 2m or 1m, other redundant or incorrect working* Ignore alongside correct working eg, for 2m accept ◆ sin 5.5 × 56 = 5.3 not 5.2, $\frac{5.2}{56}$ = 0.09°
						✗ *For 2m or 1m, explanation is based on scale drawing*
				or **1m**	Shows a correct trigonometric ratio involving two of the three values given eg ■ tan 5.5 = $\frac{5.2}{h}$ ■ cos 5.5 = h ÷ 56	✓ *For 1m, correct ratio using angle of 84.5°* ✓ *For 1m, incomplete but unambiguous notation* eg ◆ sin = $\frac{5.2}{56}$
						! *For 1m, their ratio uses all three values* eg ◆ sin 5.5 = 5.2 ÷ 56 Condone
				(U1)		

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Index to mark schemes

EARLY YEARS

NATIONAL CURRICULUM 5–16

GCSE

GNVQ

GCE A LEVEL

NVQ

OTHER VOCATIONAL QUALIFICATIONS

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Tracking elephants

Tier 5–7 Paper 2 Question 16

Tier 6–8 Paper 2 Question 9