Ma

KEY STAGE 3

ALL TIERS

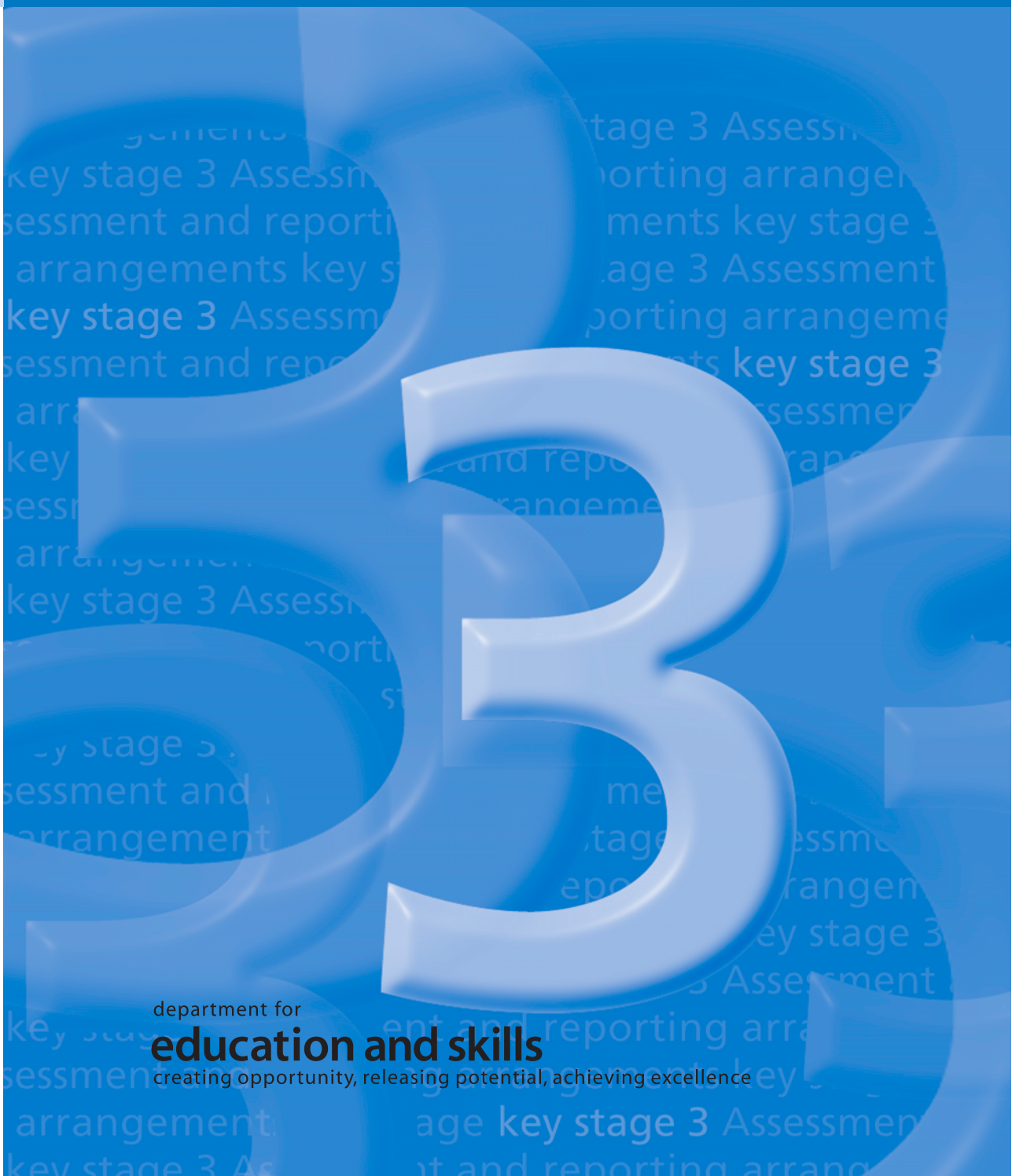
2004

Mathematics tests

Mark scheme for Paper 2

Tiers 3–5, 4–6, 5–7 and 6–8

2004



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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 10 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 *UAM* 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.

The 2004 key stage 3 mathematics tests and mark schemes were developed by the Mathematics Test Development Team at QCA.

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 ...

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:</td><td></td></tr>
<tr><td>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></td><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 use of pounds or pence eg £320, £320p or £700p, or 3.20 or 3.20p not in the answer space.
✓ 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	× 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 time

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

Accept ✓	Take care ! Do not accept ×
✓ Any unambiguous indication eg 2.5 (hours), 2h 30	× Incorrect or ambiguous time interval eg 2.3(h), 2.30, 2-30, 2h 3, 2.30min
✓ Digital electronic time ie 2:30	! 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.

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	× Incorrect time eg 8.4am, 8.40pm
✓ Unambiguous change to 12 or 24 hour clock eg 17:20 as 5:20pm, 17:20pm	× 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 ×
✓ Unambiguous but unconventional notation eg (05, 07) (five, seven) ($\overset{x}{5}$, $\overset{y}{7}$) (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 *first* 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

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

For example: 0.7

Accept ✓	Take care ! Do not accept ×
✓ A correct probability that is correctly expressed as a decimal, fraction or percentage. ✓ Equivalent decimals, fractions or percentages eg 0.700, $\frac{70}{100}$, $\frac{35}{50}$, 70.0% ✓ A probability correctly expressed in one acceptable form which is then incorrectly converted, but is still less than 1 and greater than 0 eg $\frac{70}{100} = \frac{18}{25}$	The following four categories of error should be ignored if accompanied by an acceptable response, but should not be accepted on their own. ! A probability that is incorrectly expressed eg 7 in 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. 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 *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 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.

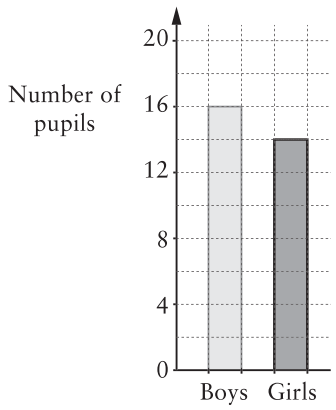
A total of 120 marks is available in tiers 3–5 and 6–8.
A total of 121 marks is available in tiers 4–6 and 5–7.

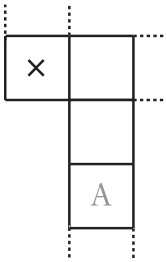
Awarding levels

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 QCA website *www.qca.org.uk* from Monday, 21 June 2004. QCA will also send a copy to each school in July.

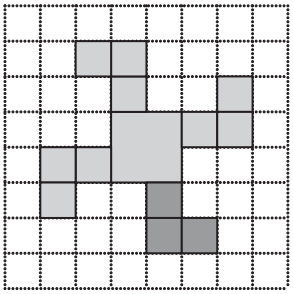
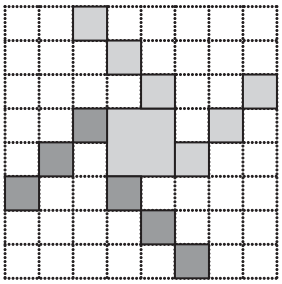
Schools will be notified of pupils' results by means of a marksheet, which will be returned to schools by the external marking agency with the pupils' marked scripts. The marksheet will include pupils' scores on the test papers and the levels awarded.

Tier & Question					Sports	
3-5	4-6	5-7	6-8			
1					**Correct response**	**Additional guidance**
a				**1m**	Shows a correct amount, with units eg ▪ £181.99	! *Value rounded* In part (a), accept £182 but do not accept £181 unless a correct value is also seen In part (b), do not accept £8 unless a correct value is also seen ! *Units omitted* Penalise only the first such occurrence
b				**1m**	Shows a correct amount, with units eg ▪ £8.02	
c				**1m**	3	! *Reference to money left over* Accept the correct change shown eg ◆ 3 r (£)5.03 Do not accept reference to part of a racket eg ◆ 3.3(...)

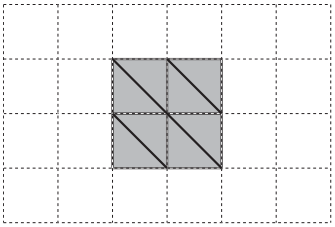
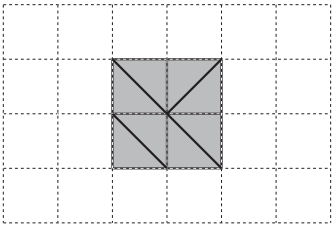
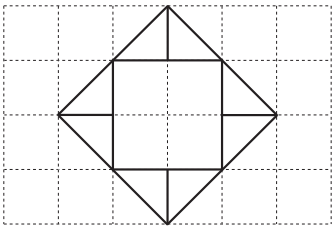
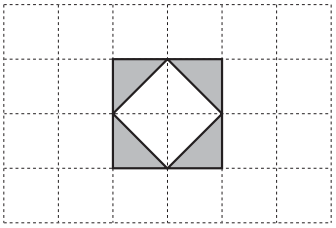
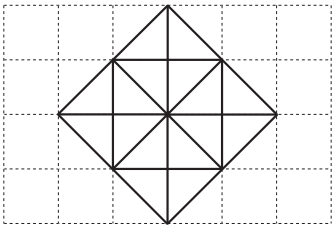
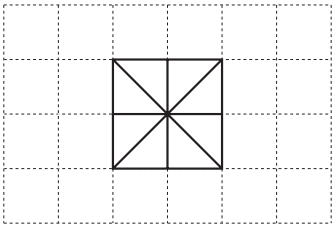
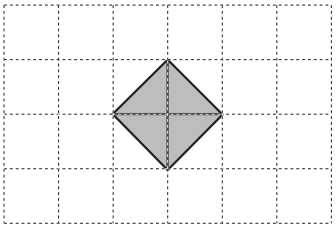
Tier & Question					Travelling by train	
3-5	4-6	5-7	6-8			
2					**Correct response**	**Additional guidance**
a				**1m**	24	
b				**1m**	Completes the bar for girls correctly and in the correct position, ie  	! *Bar not shaded or lines not ruled or accurate* Accept provided the pupil's intention is clear and the top of the bar is not more than 1mm from the line indicating 14
c				**2m** *or* **1m** U2	Gives all four correct entries, ie 0 | 18 4 | 4 Gives at least two correct entries	✓ *For 2m, zero omitted*

Tier & Question					Maze	
3-5	4-6	5-7	6-8			
3					**Correct response**	**Additional guidance**
a				**1m**	Identifies the correct square, ie  	✓ *Unambiguous indication* eg ◆ Correct square marked A
b				**1m**	Indicates the correct set of instructions, ie 6, south 3, east	! *For part (b), 6 south and 2 east given* Condone ✓ *Unambiguous indication* eg, for part (b) ◆ 6.S 3.E ◆ s, 6 e, 3 ✖ *Directions other than compass points used* eg, for part (b) ◆ 6 down 3 right
c				**2m** *or* **1m**	Indicates the correct set of instructions, ie 3, west 2, north The only error is to order the instructions incorrectly, ie 2, north 3, west or One instruction is completely correct and correctly ordered, even if the other instruction is incorrect or omitted or Both compass directions are correct and correctly ordered eg ■ *2* (*error*), W *3* (*error*), N	

Tier & Question					ABC	
3-5	4-6	5-7	6-8			
4					**Correct response**	**Additional guidance**
				1m	34	
				1m	8	
				1m	4	

Tier & Question					Windmills	
3-5	4-6	5-7	6-8			
5					**Correct response**	**Additional guidance**
a				**1m**	Completes the windmill pattern correctly, ie 	! *Squares not shaded* Accept provided the pupil's intention is clear
b				**1m**	Completes the windmill pattern correctly, ie 	

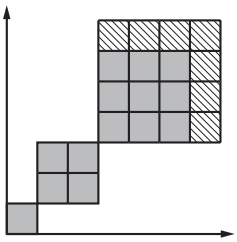
Tier & Question					Odd v even	
3-5	4-6	5-7	6-8			
6					**Correct response**	**Additional guidance**
a				**1m** U1	Gives a correct counter example The most common correct counter examples: Show an even number multiplied by three eg ■ 2 × 3 = 6 which is even ■ 3 × 10 = 30 Give an even number that is shown to be a multiple of 3 eg ■ 18 ÷ 3 = 6 ■ 30 is in the 3 times table ■ 3 goes into 12	! *Other trials shown* Ignore if at least one correct counter example is shown ! *Calculation not processed* Accept if a correct comment is given eg, for part (a) ◆ 6 × 3 isn't odd ◆ 3 × 10 is even ◆ Even × 3 is even Otherwise, do not accept eg, for part (a) ◆ 6 × 3 ◆ Even × 3 ! *Examples use addition or subtraction rather than multiplication or division* For part (a), accept answers of the form $n + n + n$ where n is even, or repeated addition of 3 where the number of 3s is even eg, accept ◆ 2 + 2 + 2 = 6 ◆ 3 + 3 = 6 For part (b), accept answers of the form $2n - n = n$ where n is even, or $n + n = 2n$ where n is even eg, accept ◆ 4 − 2 = 2 ◆ 12 + 12 = 24 ! *Correct counter example accompanied by an incorrect statement* Ignore incorrect statements eg, for part (a) accept ◆ 2 × 3 = 6, 6 isn't odd but most of the time the answer will be odd × *Incorrect notation* eg, for part (a) ◆ 3 ÷ 18 = 6 ◆ 10 = 30
b				**1m** U1	Gives a correct counter example The most common correct counter examples: Show a multiple of four divided by two eg ■ 8 ÷ 2 = 4 which is even ■ $\frac{1}{2}$ of 12 is 6 ■ 16 → 8 Give an even number that is multiplied by two to give another even number eg ■ 2 × 10 = 20	

Tier & Question						
3-5	4-6	5-7	6-8			**Triangular tiles**
7					**Correct response**	**Additional guidance**
a				**1m**	Shows how eight tiles join to make a square eg ▪  ▪ 	! *Lines not ruled or accurate* Accept provided the pupil's intention is clear ! *Internal lines not shown* Diagonal lines must be shown but pupils may use the given grid lines to represent horizontal or vertical lines × *Internal lines incorrect* ! *In both parts (a) and (b), tiles make an internal square even if there is no shading* eg ◆   Mark as 0, 1 ! *In both parts (a) and (b), two tiles taken to be one larger tile* eg ◆   Mark as 0, 1
b				**1m**	Shows how four tiles join to make a square, ie 	

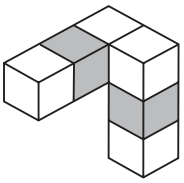
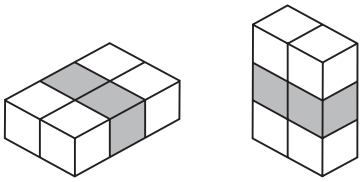
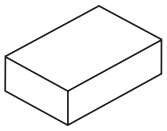
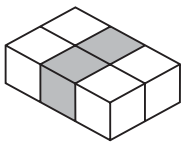
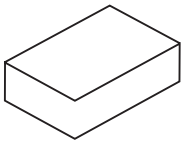
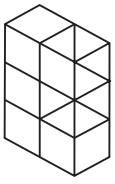
Tier & Question					Recycling rubbish	
3-5	4-6	5-7	6-8			
8	**1**				**Correct response**	**Additional guidance**
a	a			**1m**	Gives a value between 6 and 16 inclusive	✓ *Value qualified* eg • About 10
b	b			**1m**	Indicates only Germany and Norway	✓ *Unambiguous indication* eg • N, G

Tier & Question					Shaded shape	
3-5	4-6	5-7	6-8			
9	**2**				**Correct response**	**Additional guidance**
a	a			**1m**	18	
b	b			**1m**	Draws a rectangle of area 18cm^2 eg ■ 3 by 6 rectangle ■ 2 by 9 rectangle ■ 4 by 4.5 rectangle	✓ *Follow through from part (a)* ! *Lines not ruled or accurate* Accept provided the pupil's intention is clear

Tier & Question					Making 27	
3-5	4-6	5-7	6-8			
10	**3**				**Correct response**	**Additional guidance**
a	a			**1m**	6	
				1m	11	
b	b			**1m**	Gives a correct explanation The most common correct explanations: Refer to the fact that an even number of 5p coins gives an even total, and that addition of 2p coins will keep the total even eg ▪ An even number of 5p coins gives an amount that is even, leaving an odd amount to make up 27p. You can't make an odd number with 2p coins ▪ An even number of 5s is even, adding 2s keeps it even, but 27 is odd ▪ An even number of 5s always ends in zero, leaving you to make an odd number with 2s which is not possible	✓ *Minimally acceptable explanation* eg • An even number of 5s leaves an odd number and you can't make an odd number from 2s • 27 is odd, so you have to have an odd number of 5ps or the 2s would make it even × *Explanation refers only to 5s, or only to 2s* eg • An even number of 5s is even but 27 is odd • An even number of 5s always ends in zero • You can't make an odd number with 2s × *Justification not given* eg • You can only make even totals • You can only do it using an odd number of 5s • Can't both be even • 27 is an odd number
					Produce a set of possible solutions eg ▪ 0 × 5p = 0p leaving 27p, impossible 2 × 5p = 10p leaving 17p, impossible 4 × 5p = 20p leaving 7p, impossible 6 × 5p = 30p, which is too big ▪ You can't make 27, 17 or 7 using 2s	! *Only one case considered* As this is a level 4 mark, condone eg, accept • 2 × 5p = 10p leaving 17p, not possible • 4 × 5p = 20p leaving 7p, can't • You can't make 7 using 2s • Two 5s make 10 and eight 2s that is as close as I can get • Add 2ps to 10, you get 12, 14, 16, 18, 20, 22, 24, 26, 28 ..... × *Justification not given* eg • 26 is as close as I can get • You can make 26 or 28
				(U1)		

Tier & Question					Patterns on a grid	
3-5	4-6	5-7	6-8			
11	**4**				**Correct response**	**Additional guidance**
a	a			**1m**	Gives the correct coordinates, ie (2, 1)	
b	b			**1m**	Gives both pairs of coordinates in either order eg ■ (3, 3) (4, 4)	
c	c			**1m**	Gives both pairs of coordinates in either order eg ■ (16, 16) (17, 17)	
d	d			**2m**	Makes a correct decision and gives a correct explanation that shows or implies 14 and justifies that 16 more are needed eg ■ Yes, $1^2 + 2^2 + 3^2 + 4^2 = 30$ ■ There are enough because 1 + 4 + 9 = 14, 4 × 4 = 16 and 14 + 16 = 30 ■ The next square is 16 tiles (4 by 4 square drawn) and you've used up 14 of them, so there's just enough ■ You have 16 tiles left and 4 × 4 = 16; all the tiles are used	! *16 not justified* Accept only if the response makes it clear that exactly 30 tiles are used eg, for 2m accept ◆ Used 14, got another 16 so you will use up all the 30 tiles ◆ 30 − 14 = 16, so yes you have exactly the correct amount eg, for 2m or 1m, do not accept ◆ 14 used, 16 left so yes you can ◆ 30 − 14 = 16, so yes you have enough
				or **1m**	States or implies that the next square uses 16 tiles eg ■ You need 16 to make the next square ■ Draws a 4 by 4 square with 16 cells ■ 4 × 4 seen or States or implies that exactly 30 tiles will be used, but does not justify that 16 more are needed eg ■ You need all 30 ■ There would be no tiles left over ■ It all adds up to 30 or Identifies the pattern of differences eg ■ +3, +5, +7	! *4 by 4 square drawn correctly, but the number of squares incorrectly processed* For 1m, condone × *Their explanation could imply that 7 more squares are needed, ie a total of 21* eg ◆  so yes, there are enough
				U1		

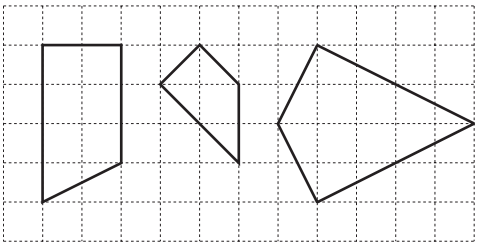
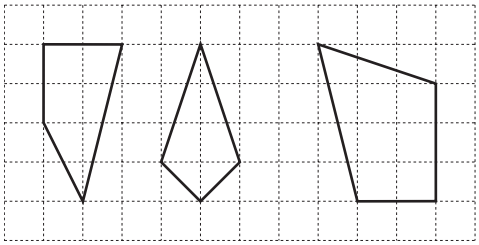
Tier & Question					Caribbean cordial	
3-5	4-6	5-7	6-8			
12	5				Correct response	Additional guidance
a	a			**1m**	$\frac{1}{2}$ or equivalent	! *Change of units* Accept provided the new units are clearly shown eg, for the second mark accept • 750ml • 75cl
				1m	$\frac{3}{4}$ or equivalent	
				1m	450	! *Incorrect units inserted in an otherwise correct response* eg, for the first mark • 0.5g Penalise only the first such occurrence
b	b			**1m**	200	

Tier & Question						
3-5	4-6	5-7	6-8		**Shape rotation**	
13	**6**	**1**			**Correct response**	**Additional guidance**
a	a			**1m**	Indicates the correct four faces eg ▪ 	✓ *Unambiguous indication* eg ◆ Grey faces labelled G
b	b			**2m**	Draws a correct view of the cuboid in either of the orientations below, using the isometric grid 	✓ *Incorrect or no shading* ✓ *For 2m, internal lines omitted* eg ◆  ! *Lines not ruled or accurate* Accept provided the pupil's intention is clear ! *Cuboid enlarged* For 2m or 1m, accept provided a consistent scale factor has been used for all lengths ✖ *Shape is not a cuboid*
				or **1m**	The only error is to draw the cuboid in the wrong orientation eg ▪  or The only error is to omit some external lines or to show some hidden lines eg ▪  ▪ 	

Tier & Question					Multiples	
3-5	4-6	5-7	6-8			
14	**7**				**Correct response**	**Additional guidance**
a	a			**1m**	105	
				1m	108	
b	b			**1m**	Indicates Yes and gives a correct explanation interpreting the word factor eg ■ 140 will divide by 7 with no remainder ■ 140 is a multiple of 7 ■ 140 is in the 7 times table ■ 7 goes into 140 exactly ■ 7 × 20 = 140	✓ *Minimally acceptable explanation* eg • 140 will divide by 7 • 7 goes into 140 • 70 × 2 = 140 ! *Explanation refers to 14 rather than 140* Accept provided the relationship between 7 and 14 is shown or implied eg, accept • 7 goes into 14 • 7 × 2 = 14 • 7 times table goes 7, 14 and so on Otherwise do not accept eg • 14 goes into 140 ! *Use of repeated addition* Condone eg, accept • Keep going up in 7s and you get to 140 ! *Use of 'it' or other ambiguous language* Condone provided either 7 or 140 is used, implying 'it' is the other number eg, accept • 7 goes into it • 140 divides by it Otherwise do not accept eg • It goes into it • You can divide them ! *Response contains an incorrect statement* Condone only if accompanying a correct response eg, accept • Yes, 7 divides into 140 as it is a multiple of 140 eg, do not accept • 7 ÷ 140 = 20 • 7 is a multiple of 140 • 140 will go into 7 • 7 goes into 140 thirty times

Tier & Question					**Nepal**	
3-5	4-6	5-7	6-8			
15	**8**	**2**			**Correct response**	**Additional guidance**
a	a	a		**1m**	8	
b	b	b		**2m**	Draws a bar from −3 to 12, aligned with 5000 on the *y*-axis, and of the correct thickness	! *Lines not ruled or accurate* Accept provided the pupil's intention is clear
				or		
				1m	Indicates that the maximum temperature is 12 eg ■ −3 + 15 = 12 seen ■ Draws a bar with a right-hand end at 12 or Indicates on the graph the correct positioning for −3 or Draws a bar that is 15 units, ie $7\frac{1}{2}$ squares, in length	! *For 1m, bar incorrectly aligned with the 5000, or bar of incorrect thickness* Condone

Tier & Question					Angles	
3-5	4-6	5-7	6-8			
16	9	3			**Correct response**	**Additional guidance**
a	a	a		**1m** U1	Indicates No and gives a correct explanation that shows the angle sum is incorrect eg ■ 30 + 60 + 100 = 190 but it should sum to 180 ■ They should add to 180 but these add to 190 ■ 30 + 60 + 100 is 10 degrees too big	✓ ***Minimally acceptable explanation*** Accept responses that state the angles should not add to 190, or that the angles should add to 180 eg ◆ They add to 190 which is wrong ◆ Angles in a triangle add up to 180 ◆ The angles don't make 180 ◆ They should add to 180 × ***Incomplete or incorrect explanation*** eg ◆ The angles add to 190 ◆ When you add up the angles you get the wrong angle sum ◆ Angles add to *200* (*error*) not 180 ! ***Incorrect units*** Ignore eg, accept within a correct explanation ◆ 180°C
b	b	b		**2m** ***or*** **1m**	130 Shows or implies a correct method with not more than one computational error eg ■ 360 − (70 + 70 + 90) ■ 360 − 230 ■ 2 × 70 + 90 = *200* (*error*), 360 − 200 = 160 ■ 70 + 70 = 140, 140 + 90 = *330* (*error*), answer 30 ■ 180 − 50	

Tier & Question					Right angles	
3-5	4-6	5-7	6-8			
17	10	6			**Correct response**	**Additional guidance**
a	a	a		**1m**	Draws any quadrilateral with exactly two right angles eg ■ 	! *Lines not ruled or accurate* Accept provided the pupil's intention is clear
b	b	b		**1m**	Draws any quadrilateral with exactly one right angle eg ■ 	

Tier & Question						Prime grid
3-5	4-6	5-7	6-8			
18	11	4			Correct response	Additional guidance
a	a	a		**1m** U1	Gives a correct explanation The most common correct explanations: State that 35 is a multiple of 5 and/or 7 eg ■ 35 is a multiple of 5 ■ 7 is a factor of 35 State that prime numbers have only two factors but that 35 has more than two factors eg ■ A prime has 2 factors, 35 has 4 State that the last digit of any prime number greater than 5 is 1, 3, 7 or 9 eg ■ All prime numbers must end in 1, 3, 7 or 9 with the exception of 2 and 5	✓ *Minimally acceptable explanation* eg • 5 goes into it • It's in the 7 times table • 7 × 5 • 1, 5, 7, 35 • It has more than two factors • 35 divides by more than one and itself × *Incomplete explanation* eg • 35 is in some of the times tables • 35 has factors • Because it ends in 5 ! *Correct explanation accompanied by a statement that uses mathematical language incorrectly* Throughout the question, condone eg, for part (a) accept • 35 has more than 2 factors, eg 35 goes into 5 • 5 goes into 35, so it has 2 factors
b	b	b		**1m** U1	Gives a correct explanation The most common correct explanations: State or imply the numbers in column Y will all be multiples of 6 (or 2, or 3) eg ■ They are all in the 6 times table, so they must be multiples of 6 ■ They are all multiples of 3 State or imply the numbers in column Y will all have a factor of 6 (or 2, or 3) eg ■ They all have a factor of 3 ■ 2 is the only prime that is even and all these numbers are even and greater than 2	✓ *Minimally acceptable explanation* eg • It's the 6 times table • You can divide them by 3 • They are all even • The only even prime is 2 • None of the numbers ends in 1, 3, 7 or 9 ✓ *That column Y starts at 6 is not explicitly stated* Condone eg, accept • They are all even and even numbers are never prime × *Incomplete explanation* eg • They are all in times tables • They all divide by something other than one and itself • 6 ÷ 3 = 2 • It goes up 6 each time ! *Misunderstanding of prime* A common misconception is to confuse prime with odd. Hence do not accept statements that refer only to odd eg, do not accept • The numbers are not odd

Tier & Question						
3-5	4-6	5-7	6-8		**Prime grid (cont)**	
18	**11**	**4**			**Correct response**	**Additional guidance**
c	c	c		**1m** U1	Gives a correct explanation The most common correct explanations: State or imply the numbers in column X will all be multiples of 3 eg ▪ They are all in the 3 times table, so they must be multiples of 3 State or imply the numbers in column X will all have a factor of 3 eg ▪ They are all in the 3 times table, so they are all divisible by 3	✓ *Minimally acceptable explanation* eg • They are all in the 3 times table • 3 goes into them ✗ *Incomplete explanation* eg • They are all in times tables • They will all divide by something other than one and itself • All the other numbers have factors • It goes up 3 each time ! *Misunderstanding of prime* A common misconception is to confuse prime with odd. Hence do not accept statements that refer only to odd eg, do not accept • The numbers are not odd

Tier & Question						
3-5	4-6	5-7	6-8		**Crisps**	
19	**12**	**5**			**Correct response**	**Additional guidance**
				1m	40	! *Incorrect units given* Ignore

Tier & Question						
3-5	4-6	5-7	6-8		**Shoe sizes**	
20	**13**	**7**			**Correct response**	**Additional guidance**
				3m	Indicates Yes and gives a correct explanation that shows or implies both of the values 40.75 and 41.375 eg ■ 7 × 1.25 + 32 = 40.75, 7.5 × 1.25 + 32 = 41.375, so they both round to 41 ■ 8.75 + 32 rounds to 41 and so does 9.375 + 32 ■ 8.75 gives 9 and 9.375 gives 9 before adding 32, so they will end up the same	✓*Minimally acceptable explanation* eg, with Yes indicated ◆ They are both 41 ◆ They are 40.75 and 41.375 ! *40.75 rounded or truncated* Accept 41, 40.8 or 40.7 Do not accept 40 ! *41.375 rounded or truncated* Accept 41, 41.4, 41.3, 41.38 or 41.37 Do not accept 42 ! *40.75 from incorrect working* Note that pupils who add 1.25 rather than multiplying generate the shoe sizes 40.25 and 40.75 For 3m or 2m, do not accept explanations based on such misconceptions eg ◆ They are both 41 as 7.5 + 1.25 + 32 = 41 7 + 1.25 + 32 = 41
				or **2m**	Shows or implies both of the values 40.75 and 41.375 even if there is an incorrect or no decision, or incorrect further working eg ■ Tom wears 40.8 and Karl wears 41.4 so they don't wear the same size ■ 40.75 and 41.375 so they both wear 40	
				or **1m**	Shows the value 41.375 or Shows the value 40.75 or 41 with correct working eg ■ 7.5 × 1.25 + 32 = 41 or The only error is to add 1.25 rather than multiplying eg ■ Indicates No and shows the values 40.75 and 40.25 ■ Indicates No and shows the values 41 and 40	

Tier & Question					Same area	
3-5	4-6	5-7	6-8			
21	14	8	1		Correct response	Additional guidance
	a	a		**1m**	8	
	b	b		**2m** ***or*** **1m**	3, with no evidence of an incorrect method Shows the value 12 or Forms a correct equation in w eg ■ $4w = \frac{1}{2}(6 \times 4)$ ■ $4 \times w = 3 \times 4$ or Shows a correct method with not more than one computational error eg ■ $6 \times 4 \div 2 \div 4$ ■ $\frac{3 \times 4}{4}$ ■ $6 \times 4 \div 2 = 20$ *(error)*, $20 \div 4 = 5$ ■ $6 \div 2$	✗ ***Conceptual error*** eg ◆ $6 \times 4 = 24$, $24 \div 4 = 6$

Tier & Question					**Holiday**	
3-5	4-6	5-7	6-8			
22	15	9	2		**Correct response**	**Additional guidance**
	a	a		**2m**	£ 556.75	! *Value rounded* Accept 557 or 560 For 2m, do not accept 556 unless a correct method or a more accurate value is seen
				or **1m**	Shows or implies a complete correct method, even if there are rounding errors eg ■ $\frac{17}{100} \times 3275$ ■ $3275 \div 100 \times 17$ ■ 556 ■ 10% = 327.5(0) 5% = 163.75 1% = 32.75 327.5(0) + 163.75 + 2 × 32.75 ■ 1% = 32.75, *33 (premature rounding)* × 17 = 561 or Shows the digits 55675	
	b	b		**2m**	7.5(...)	! *Value rounded* For 2m, do not accept 7 or 8 unless a correct method or a more accurate value is seen
				or **1m**	Shows or implies a complete correct method eg ■ $\frac{1644}{21842} \times 100$ ■ Shows the digits 75(...) ■ 7 or Gives a value between 7 and 8 inclusive	

Tier & Question						
3-5	4-6	5-7	6-8		**Straight lines**	
	16	**10**	**3**		**Correct response**	**Additional guidance**
	a	a	a	**1m**	Completes the table with any three sets of correct coordinates, indicating for each that $x + y = 4$ eg ▪ <table><tr><td>(x, y)</td><td>(0, 4)</td><td>(1, 3)</td><td>(2, 2)</td></tr><tr><td>$x + y$</td><td>4</td><td>4</td><td>4</td></tr></table>	✓ ***Incomplete processing*** eg, for (1, 3) • 1 + 3 ! ***Values for (x, y) correct but some or all of values for x + y omitted*** Accept provided a correct equation is given in part (b)
	b	b	b	**1m**	Gives a correct equation eg ▪ $x + y = 4$ ▪ $y = 4 - x$ ▪ $x = -y + 4$	
	c	c	c	**1m**	Draws the correct straight line through (0, 6) and (6, 0)	! ***Line not ruled or accurate*** Accept provided the pupil's intention is clear ! ***Partial line drawn*** Do not accept lines that are less than 5cm in length ! ***Points plotted*** Ignore × ***Points not joined***

Tier & Question						Quiz
3-5	4-6	5-7	6-8			
	17	**11**	**4**		**Correct response**	**Additional guidance**
	a	a	a	**1m**	Gives both correct values, ie maximum of 40 and minimum of –20	✗ *Incorrect notation* eg • 20–
	b	b	b	**1m**	14	
	c	c	c	**2m**	Completes both rows correctly, in either order eg ▪ <table><tr><td>13</td><td>2</td><td>5</td></tr><tr><td>14</td><td>4</td><td>2</td></tr></table>	
				or **1m**	Completes one row correctly	

Tier & Question						Cotton reel
3-5	4-6	5-7	6-8			
	18	**12**	**5**		**Correct response**	**Additional guidance**
	a	a	a	**1m**	3π or 9.4 or 9.42(...) or 9.43 with no evidence of an incorrect method	! *Answer of 9* Accept provided a correct method or a more accurate value is seen
	b	b	b	**2m**	970	! *Follow through from part (a)* For 2m, accept 9100 ÷ their (a), rounded correctly to the nearest ten, provided 9100 ÷ their (a) is not a multiple of 10 eg, from their (a) as 7.8, accept for 2m • 1170 eg, from their (a) as 7, do not accept for 2m • 1300
				or **1m**	Shows or implies that the total length should be divided by the circumference, even if the units are incorrect or there are rounding or truncation errors eg ▪ 9100 ÷ 9.42 ▪ 91 ÷ 3π ▪ Digits 96(...) or 97(...) seen	✓ *For 1m, follow through from part (a), even if their (a) is rounded or truncated before being used* eg, from their (a) as 7.8, accept • 9100 ÷ 8

Tier & Question					**Medicine**	
3-5	4-6	5-7	6-8			
	20	**13**	**6**		**Correct response**	**Additional guidance**
		a	a	**2m**	Indicates a correct value, with appropriate units, with a correct method shown eg ■ 80 ÷ 16, 5ml ■ $\frac{20 \times 4}{12 + 4}$, 0.005 litres	✗ *For 2m, incorrect or incomplete method* eg ◆ 20 ÷ 4 = 5ml
				or **1m**	The only error is to omit units or to give incorrect units or Units of ml are given and the method shows or implies correct substitution and understanding of algebraic notation for both multiplication and division eg ■ 20 × 4 ÷ 16, answer 50ml ■ 20 × 4 = *100 (error)*, 12 + 4 = 16 100 ÷ 16 = 6.25ml ■ $\frac{20 \times 4}{12 + 4} = \frac{8}{16}$ (*error* in numerator) = 0.5ml ■ Answer of 10.6(...)ml or 10.7ml or 11ml (only error is to omit necessary brackets when processing) or An answer of 5ml, or equivalent, is given with no working	! *Units other than ml are given* Accept provided the pupil shows such a change is intended and the change has been carried out correctly eg, accept ◆ 20 × 4 ÷ 16 = 50, answer 0.05 litres
		b	b	**2m**	12 (years)	
				or **1m**	Shows a correct equation with the values 15 and 30 correctly substituted eg ■ $15 = \frac{30y}{12 + y}$ ■ $15(12 + y) = 30 \times y$ ■ $1 = \frac{2y}{12 + y}$ or Shows the correct answer of 12 embedded, even if an incorrect value is chosen subsequently as the answer eg ■ $15 = \frac{30 \times 12}{12 + 12}$, answer 15	! *Use of ? or other symbol for y* Accept if consistent eg, for 1m accept ◆ $15 = \frac{30 \times ?}{12 + ?}$! *Units given within an equation* Condone eg, for 1m accept ◆ $15\text{ml} = \frac{30\text{ml} \times y}{12 + y}$

Tier & Question						
3-5	4-6	5-7	6-8		**Recycling**	
	19	**14**	**7**		**Correct response**	**Additional guidance**
	a	a	a	**2m**	8	
				or **1m**	Shows a correct angle for one or more pupils, but not 5 pupils eg ■ 60 ÷ 5 = 12° for each one ■ 3 pupils is 36 or Shows a correct method with not more than one computational error eg ■ 96 ÷ (60 ÷ 5) ■ 96 ÷ 60 = 1.6, 5 × 1.6 ■ One pupil is *13 (error)*, and 96 ÷ 13 = 7.38 so 7 pupils ■ Total pupils = 5 × 6 = 30, $\frac{96}{360} \times 30$ ■ $\frac{5}{60} = 0.083$, 96 × 0.083	
	b	b	b	**2m**	135	
				or **1m**	Shows a correct angle for one or more pupils, but not 24 pupils eg ■ 24 is 360°, 1 is 15° ■ 3 pupils is 45 or Shows a correct method with not more than one computational error eg ■ 9 ÷ 24 × 360 ■ $360 \div \frac{24}{9}$ ■ 360 ÷ 24 = *16 (error)*, 16 × 9 = 144 or Shows $\frac{9}{24}$ as a correct percentage eg ■ 37.5%	! ***37.5 rounded or truncated to an integer*** Do not accept unless a more accurate value is seen × ***37.5 without the percentage sign***

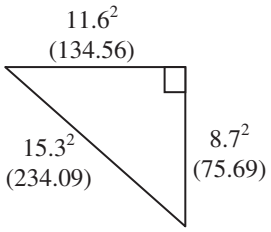
Tier & Question						Russian dolls
3-5	4-6	5-7	6-8			
		15	8		Correct response	Additional guidance
		a	a	**1m**	Indicates both 6 and $10\frac{1}{2}$, in the correct order	✓ *Equivalent fractions or decimals* ! *10.5 rounded or truncated to an integer* Do not accept unless a correct method or a more accurate value is seen
		b	b	**2m** *or* **1m**	Indicates both 5.1 and 7.7, in the correct order Indicates one correct value, even if not rounded eg, for the smallest doll ■ $\frac{36}{7}$ ■ 5.1(...) eg, for the middle doll ■ $\frac{54}{7}$ ■ 7.7(...) or Shows or implies a correct method for both dolls, even if there is evidence of premature rounding eg ■ 9 ÷ 7 × 4, 9 ÷ 7 × 6 ■ $\frac{9}{7}$ = *1.3 (rounded)*, 1.3 × 4 = 5.2, 1.3 × 6 = 7.8	! *5.1(...) or 7.7(...) rounded or truncated to an integer* Do not accept unless a correct method or a more accurate value is seen ! *Answers are 5 and 8, or round to 5 and 8* For 1m to be awarded, 9 ÷ 7 or 1.3 or 1.28(...) must be seen

Tier & Question					Sweets	
3-5	4-6	5-7	6-8			
		16	9		Correct response	Additional guidance
				2m	42, with sufficient working to support a correct method	! *Method is trial and improvement* Accept for 2m, but not for 1m × *Incorrect method* eg ◆ (39 + 40 + 41 + 42 + 43 + 44) ÷ 6 = 42
				or **1m**	Gives the answer 42 with no evidence of an incorrect method or Shows the value 368 or Shows the value 410 or Shows a complete correct method with not more than one computational error eg ■ (10 × 41) − (3 × 39 + 2 × 40 + 41 + 42 + 2 × 44) ■ 117 + 80 + 41 + 42 + *84 (error)* = 364 410 − 364 = 46 ■ 41 − (−2 × 3 + −1 × 2 + 1 + 3 × 2) ■ −6 + −2 + 1 + *4 (error)* = −3 so there are 44 or Shows the overall difference of the values given from the mean is −1 eg ■ 3(−2) + 2(−1) + 0 + 1 + 2(3) = −1 ■ −6 + −2 + 1 + 6 = −1	

Tier & Question					*Marking overlay available*	**Pentagonal pyramid**
3-5	4-6	5-7	6-8			
		17	**10**		**Correct response**	**Additional guidance**
		a	a	**1m**	Gives a correct explanation The most common correct explanations: Show or state that the angles in a pentagon sum to 540, and that angle *a* is 540 ÷ 5 eg ■ The interior angle of a regular pentagon is 108, because 5 – 2 = 3, 3 × 180 = 540 and 540 ÷ 5 Show or state that the exterior angle of a regular pentagon is 72, and that angle *a* is 180 – 72 eg ■ 360 ÷ 5 = 72, 180 – 72 Show or state that the angle at the centre of a regular pentagon is 72, and that angle *a* is 180 – 72 eg ■ 360 ÷ 5 = 72, (180 – 72) ÷ 2 = 54, 54 × 2	✓ *Minimally acceptable explanation* eg ◆ 540 ÷ 5 ◆ 180 – 72 (with the exterior angle of 72 marked correctly on the diagram) ◆ The interior angle of a regular pentagon is 108 ◆ 180 – 72 (with the centre angle of 72 marked correctly on the diagram) × *Incomplete explanation* eg ◆ The angles in a pentagon sum to 540 ◆ 108 × 5 = 540 (with no justification or indication of the relevance of the 540) ◆ 180 – 72 = 108 (with no justification of the 72) ◆ The angle of a regular pentagon is 108 ◆ Angle of 108 marked on the diagram
		b	b	**1m**	Indicates 36 and shows a correct method eg, using a large triangle ■ (180 – 108) ÷ 2 eg, using a small triangle ■ 180 – 2 × 72 eg, using a kite ■ 360 – (3 × 108)	✓ *Minimally acceptable method* eg ◆ 72 ÷ 2 = 36 × *Spurious method* eg ◆ 180 ÷ 5 = 36
		c	c	**2m** *or* **1m**	Completes the perpendicular bisector, fulfilling four conditions below: 1. Ruled 2. Within the tolerance as shown on the overlay, including if their line were to be extended 3. At least 3cm in length 4. Evidence of correct construction arcs that are centred on C and D, or the vertices next to C and D, are of equal radii, and show at least one intersection Completes the perpendicular bisector with all of conditions 1 to 3 fulfilled or Fulfils condition 4, even if the perpendicular bisector is incorrect or omitted	! *Use of construction arcs on the overlay* Note that these are to give a visual guide as to whether the correct centres have been used, and do not indicate tolerance ✓ *Side other than CD used* × *Spurious construction arcs* Do not accept arcs drawn without compasses or arcs that do not show a distinct intersection, eg arcs that just touch

Tier & Question						Running machine
3-5	4-6	5-7	6-8			
		18	11		Correct response	Additional guidance
		a	a	**1m**	6	
		b	b	**1m**	20	
		c	c	**1m**	3	
			d	**2m**	Draws a straight line on the graph joining the points (0935, 0) and (0959, 4)	! *Line not ruled* Accept provided the pupil's intention is clear ! *Line continued beyond (0959, 4)* Accept a horizontal line, but for 2m do not accept the correct line continued
				or		
				1m	Shows or implies the distance travelled is 4km eg ■ $\frac{10}{60} \times 24 = 4$ ■ Their end point is on the line $y = 4$ or The only error is to start at an incorrect time or Shows a correct method for calculating the distance travelled, with not more than one computational error, then follows through correctly to draw their line eg ■ $10 \div 60 \times 24 = 2.7$ *(error)*, then their line drawn from (0935, 0) to (0959, 2.7)	! *Their line is slightly inaccurate* If their line starts at (0935, 0) and passes through (0941, 1) but continues to an incorrect value at 0959, then stops, or continues horizontally, mark as 1, 0

Tier & Question						Squares
3-5	4-6	5-7	6-8			
		19	12		Correct response	Additional guidance
			a	**2m**	Indicates only the values 0 and 1	! *Use of infinity* Ignore eg, for 2m accept • 1, 0, infinity
				or **1m**	Indicates one of the values 0 or 1, with no incorrect values or Indicates both correct values with not more than one incorrect value	! *Answer(s) embedded in working* Accept provided there is no ambiguity and any statements made are correct eg, for 2m accept • $1^2 = 1$, $0^2 = 0$ • 1, 1^2, 0, 0^2 • 1^2, 0^2
			b	**2m**	Indicates values between 0 and 1 not including the values 0 and 1 eg ■ Numbers greater than nought but less than one ■ $0 < x < 1$	✓ *Minimally acceptable indication* eg • Between zero and one • Numbers that begin 0.something • Fractions that are positive and not improper
				or **1m**	Indicates values between 0 and 1 including either 0 or 1 or both or Indicates the correct upper limit, but without including 1 eg ■ Numbers less than 1 ■ All fractions that are not improper or Gives at least one correct example of a number that is a member of this set and its square, with no incorrect examples eg ■ $0.5^2 = 0.25$ ■ $\frac{1}{9} < \frac{1}{3}$ ■ 0.1 and 0.01	! *Response ambiguous about the inclusion of 0 or 1* eg • Numbers from zero to one Mark as 1, 0 × *For 2m or 1m, incomplete indication* eg • Fractions • Decimals × *Incorrect statement* eg • Below 1 and must have 2 or more decimal places

Tier & Question					Triangle calculations	
3-5	4-6	5-7	6-8			
		20	13		Correct response	Additional guidance
				2m	Indicates No and gives a correct justification The most common correct justifications: Use Pythagoras' theorem to show the sides are inconsistent eg ■ $11.6^2 + 8.7^2 \neq 15.3^2$ ■ 134.56 + 75.69 = 210.25, but $15.3^2 = 234.09$ Calculate what one side should be in order to make the triangle consistent eg ■ The hypotenuse should be 14.5 ■ 8.7 should be 9.9764... ■ 11.6 should be 12.5857... Use trigonometry to calculate two angles, which are then shown not to sum to 90 eg, using cosine ■ The angles are 55.3454... and 40.6968... 55.3 + 40.7 ≠ 90 eg, using sine ■ The angles are 49.3031... and 34.6545... 34.6 should be 40.7	Markers may find the following helpful:  ! *Values rounded or truncated* Accept values rounded or truncated to 1 or more decimal place(s). Otherwise, accept provided correct working or a more accurate value is seen × *For 2m or 1m, no indication of how values combine* eg ◆ $11.6^2 = 134.56$ $8.7^2 = 75.69$ $15.3^2 = 234.09$ × *Justification is from construction rather than calculation*
				or **1m**	Shows sufficient working to indicate correct application of Pythagoras' theorem eg ■ $11.6^2 + 8.7^2$ ■ 210.25 ■ $15.3^2 - 11.6^2$ or Shows sufficient working to indicate a correct trigonometric ratio eg ■ $\sin = \frac{8.7}{15.3}$ with the position of the relevant angle indicated on the diagram	× *No indication of which angle is being considered*

Tier & Question					Triangle calculations (cont)	
3-5	4-6	5-7	6-8			
		20	13		Correct response	Additional guidance
				2m	Indicates No and gives a correct justification The most common correct justifications: Use trigonometry to show the sides are inconsistent eg, using sin 50 ■ $\sin^{-1}(0.8)$ is not 50 ■ $\sin 50 \neq 0.8$ ■ sin 50 should be 0.7660..., $\frac{12}{15} = 0.8$ eg, using cos 40 ■ $\cos 40 \neq 0.8$ ■ $15 \times \cos 40 \neq 12$ Calculate what one side should be in order to make the triangle consistent eg ■ $15 \sin 50 = 11.4906...$ not 12 ■ $\frac{12}{\sin 50} = 15.6648...$ not 15 ■ $\sqrt{(15^2 - 12^2)} = 9$ but $15 \times \cos 50 = 9.6418...$ Calculate what one angle should be in order to make the triangle consistent eg ■ $\sin^{-1}(0.8) = 53.1301...$ not 50 ■ The angle should be 53.1 ■ The other angle is 36.8698..., but it should be 40	! *No indication of which angle is being considered* eg ◆ $\sin = \frac{12}{15}$ Accept only if the trigonometric ratio is correct for the angle of 50°
				or **1m**	Shows or implies a correct trigonometric ratio eg ■ $\sin 50 = \frac{12}{15}$ ■ $15 \times \sin 50$ ■ $\frac{12}{\sin 50}$	

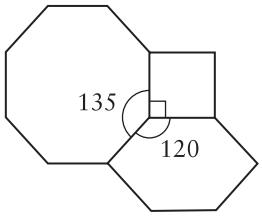
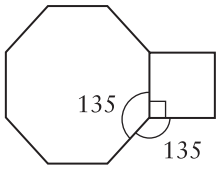
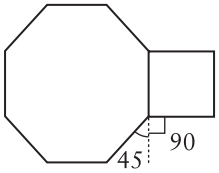
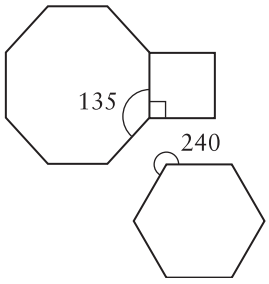
Tier & Question						Algebraic expressions
3-5	4-6	5-7	6-8			
		21	14		Correct response	Additional guidance
			a	**2m**	$6\frac{1}{2}$ or equivalent	
				or		
				1m	Shows or implies a correct first step of algebraic manipulation that either reduces the number of terms or collects unknowns on one side of the equation and numbers on the other eg ■ $2y - 8 = 5$ ■ $5y = 3y + 13$ ■ $2y = 13$ ■ $2y = -3$ (terms in y simplified, error in simplification of numerical values)	
			b	**2m**	-18	
				or		
				1m	Forms a correct equation eg ■ $5y - 8 = 2(3y + 5)$ or Forms the incorrect equation $2(5y - 8) = 3y + 5$ and follows through correctly to give $y = 3$ eg ■ $10y - 16 = 3y + 5$ $7y = 21$ $y = 3$	**!** ***y = 3 without correct working seen*** Accept provided at least the equation $2(5y - 8) = 3y + 5$, or equivalent, is seen. Note that trial and improvement alone, or simply showing $5 \times 3 - 8 = 7$, $3 \times 3 + 5 = 14$, should not be considered as correct working

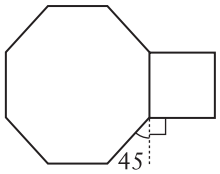
Tier & Question					What fraction?	
3-5	4-6	5-7	6-8			
			15		**Correct response**	**Additional guidance**
				2m	Gives a correct expression eg ■ $\frac{n+2}{2n}$ ■ $(n+2) \div 2n$ ■ $\frac{1}{2}+\frac{1}{n}$ ■ $\frac{2n-(n-2)}{2n}$	✓ *Equivalent expressions* ✗ *For 2m, necessary brackets omitted* eg ◆ $n+2 \div 2n$ ◆ $\frac{2n-n-2}{2n}$
				or **1m**	Shows both the expressions $n + 2$ and $2n$ even if these are subsequently combined incorrectly eg ■ $n + 2 \div 2n$ or Gives an algebraic fraction in which the numerator is $n + 2$ or Gives an algebraic fraction in which the denominator is $2n$	✗ *$n + 2$ seen but not in a fraction*

Tier & Question					Eating	
3-5	4-6	5-7	6-8			
			16		Correct response	Additional guidance
				1m	7 or 6.7 or 6.67	

Tier & Question					Equation solving	
3-5	4-6	5-7	6-8			
			17		Correct response	Additional guidance
				2m	15	
				or 1m	Shows any two of the following three algebraic processes correctly: 1. Cross multiplication to remove the fraction 2. Multiplication or division to remove brackets 3. Collecting like terms together eg ■ $10y - 15 = 6y$ *(error)* $4y = 15$ (Error in process 1) ■ $5(2y - 3) = 9y$ $10y - 3$ *(error)* $= 9y$, so $y = 3$ (Error in process 2) ■ $5(2y - 3) = 9y$ $2y - 3 = 1.6y$ *(error)*, so $0.4y = 3$ (Error in process 2) ■ $10y - 15 = 9y$ (Process 3 not shown)	

Tier & Question					3-D cut	
3-5	4-6	5-7	6-8			
			18		**Correct response**	**Additional guidance**
				2m	30√2 or 42 or 42.(...)	✗ ***For 2m or 1m, length(s) found only through scale drawing***
				or		
				1m	Shows or implies a correct method for the length of one side of the base eg ■ $10\sqrt{2}$ ■ $\sqrt{200}$ ■ $\sqrt{(10^2 + 10^2)}$ ■ 14.14(...) ■ 1.4(...) × 10 ■ $\frac{10}{\sin 45}$ ■ $\frac{10}{\cos 45}$	! ***Length rounded*** Accept 14 or 14.1 provided there is no evidence of an incorrect method

Tier & Question						
3-5	4-6	5-7	6-8			**Tiles**
			19		**Correct response**	**Additional guidance**
				3m	Gives a complete correct justification that encompasses all four conditions below: 1. For the octagon, shows or implies that the interior angle is 135°, or the exterior angle is 45° 2. For the square, shows or implies that the interior or exterior angle is 90° 3. For the hexagon, shows or implies that the interior angle is 120°, or the exterior angle is 60° 4. Justifies why the hexagon will not fit eg ▪  135 + 120 + 90 ≠ 360 ▪  135 ≠ 120 ▪  90 + 45 = 135° which is 15° too big ▪  135 + 90 = 225 but it should be 240	! *Explanation does not identify, on the diagram or otherwise, whether interior or exterior angles are being considered, or to which shape the angles belong* For 3m, accept only if there is no redundant information and the justification is unambiguous eg, accept • 90 + 135 = 225, 360 − 225 = 135 but the angle in a hexagon is 120 • 360 − (90 + 135) > 120

Tier & Question						
3-5	4-6	5-7	6-8		**Tiles (cont)**	
			19		**Correct response**	**Additional guidance**
				or **2m**	Shows at least one correct value from each of the following three sets of angles, even if it is not clear to which shape the angle belongs 135 or 45 90 120 or 60 or Shows or implies the 'gap' is 135° eg ■ 90 + 45 = 135 ■  	✓ *90 implied by a right angle symbol* ! *Explanation confuses the terminology of interior and exterior angles* For 2m or 1m, condone × *For 2m, incorrect angles marked or further working indicates confusion between interior and exterior angles* eg • Angle of 135 marked as 45
				1m U1	Shows at least one correct value from two of the following three sets of angles, even if it is not clear to which shape the angle belongs 135 or 45 90 120 or 60 or Shows at least one correct value from each of the following three sets of angles, even if the angles are ascribed to incorrect shapes 135 or 45 90 120 or 60	

Tier & Question					Dissection	
3-5	4-6	5-7	6-8			
			20		**Correct response**	**Additional guidance**
				3m	Gives a complete correct justification The most common correct justifications: Show the length of CD is 9, then use the similarity of triangles CDE and AEF to show through calculation that EF is 20 eg ■ Scale factor is $\frac{12}{9}$, $\frac{12}{9} \times 15 = 20$ ■ The sides of triangle AEF are a third bigger than the corresponding sides of triangle CDE, $15 \times 1\frac{1}{3} = 20$ Show the length of CD is 9, then use the similarity of triangles CDE and BDF to show through calculation that EF is 20 eg ■ Scale factor is $\frac{21}{9}$ $\frac{21}{9} \times 15 = 35$, $35 - 15 = 20$ ■ $2\frac{1}{3} \times 15 = 35$, $35 = 20 + 15$ ■ Let x = FE, then $\frac{x + 15}{21} = \frac{15}{9}$ $x + 15 = 35$, $x = 20$ Use trigonometry to calculate ∠CDE as 53.1(...)°, or ∠DEC as 36.8(...)°, then use the similarity of triangles CDE and AEF (or CDE and BDF) to show through calculation that EF is 20 (or DF is 35) eg ■ $\sin^{-1}\left(\frac{12}{15}\right) = 53.1$, $12 \div \cos 53.1 = 20$	✓ *EF taken as 20 then used to demonstrate the sides are in the correct ratio for similarity to hold* eg, using triangles CDE and AEF ◆ $\frac{20}{12} = \frac{15}{9}$ ◆ $\frac{20}{15} = \frac{12}{9}$ ◆ $FA^2 = 20^2 - 12^2$, so FA = 16, and $\frac{20}{16} = \frac{15}{12}$ eg, using triangles CDE and BDF ◆ $\frac{15}{9} = \frac{35}{21}$ ◆ $\frac{35}{15} = \frac{21}{9}$! *Values rounded* Accept values shown as rounded, but for 3m do not accept resultant incorrect values eg, for 3m accept ◆ ∠DEC = 37°, $\frac{12}{\sin 37} = 20$ eg, for 3m do not accept ◆ $\frac{15}{9} = \frac{EF}{12}$, $15 \div 9 = 1.7$, $1.7 \times 12 = 20.4$ which rounds to 20 × *For 3m, justification uses only Pythagoras and EF = 20 used within the argument* × *Circular argument* eg ◆ $20^2 - 12^2 = 16^2$ so FA = 16 $16^2 + 12^2 = 400$ so EF is 20

Tier & Question						
3-5	4-6	5-7	6-8		**Dissection (cont)**	
			20		**Correct response**	**Additional guidance**
				or **2m**	Shows or implies a correct scale factor, even if rounded eg, for triangles CDE and AEF ■ $\frac{12}{9}$ ■ $\frac{1}{3}$ bigger eg, for triangles CDE and BDF ■ $\frac{21}{9}$ ■ 2.33 or Using a correct value for ∠CDE or ∠DEC, even if rounded or truncated, gives the corresponding angle within triangle AEF (or BDF) eg ■ ∠AEF (or ∠BDF) is 53.1(...)° ■ ∠EFA (or ∠DFB) is 36.8(...)°	
				or **1m**	Shows or implies the length of CD is 9 eg ■ BD = 21 or Shows ∠CDE is 53.1(...)°, even if the value is rounded or truncated or Shows ∠DEC is 36.8(...)°, even if the value is rounded or truncated or Using their incorrect CD or their incorrect ∠CDE or ∠DEC, even if rounded or truncated, shows their correct scale factor or gives the corresponding angle within triangle AEF	
				(U1)		

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