Ma

KEY STAGE 3

ALL TIERS

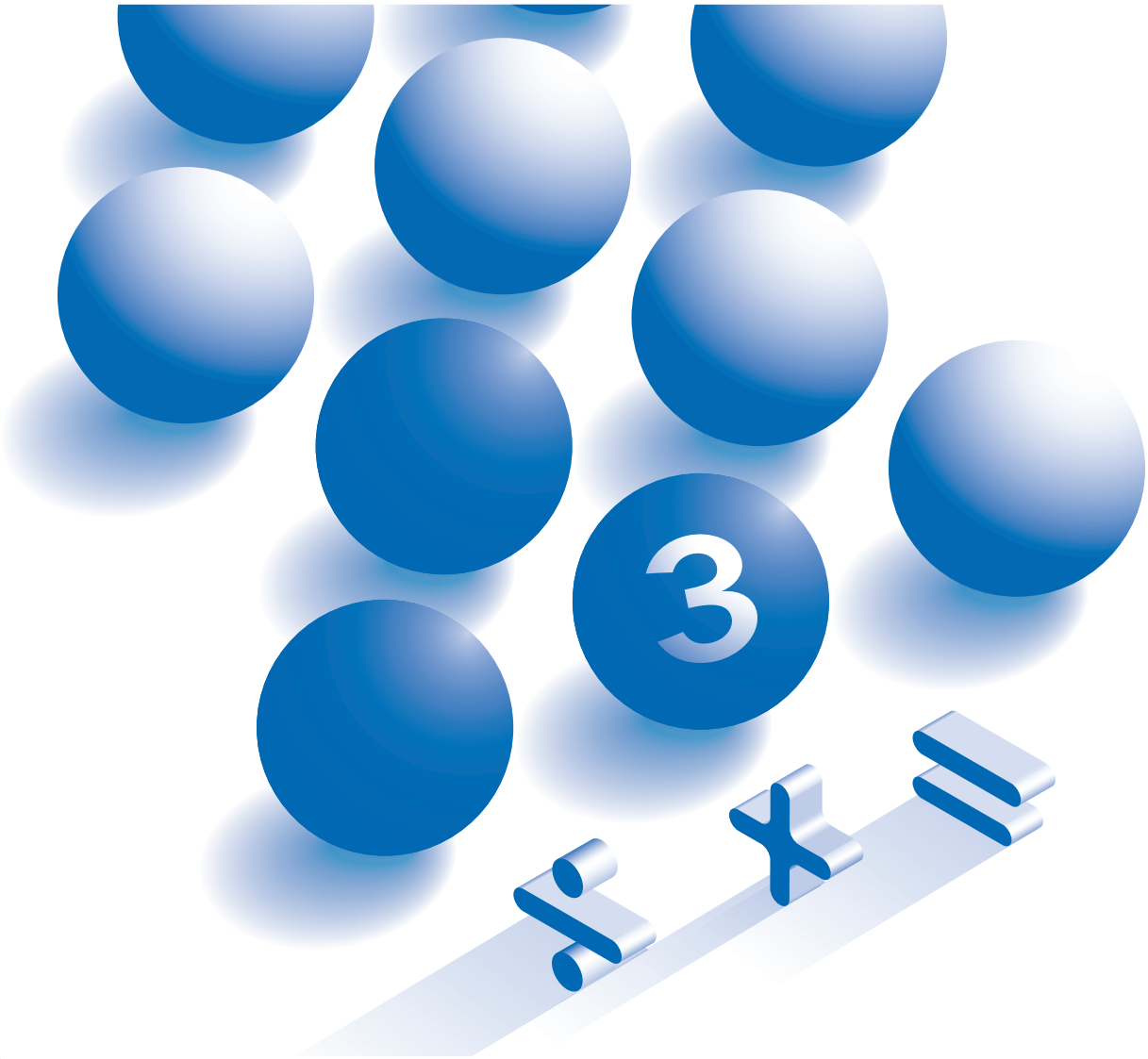
2009

Mathematics tests

Mark scheme

for Paper 2

Tiers 3–5, 4–6, 5–7 and 6–8



National curriculum assessments

Introduction

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 each question 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 *Using and applying mathematics (UAM)* element are identified in the mark scheme by the symbol (U1). The number 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 2009 key stage 3 mathematics tests and mark schemes were developed by the Test Development Team at Pearson Research and Assessment.

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 specifically to the marking of questions that involve money, negative numbers, time, measures, coordinates, probability or algebra. Unless otherwise specified in the mark scheme, markers should apply the following guidelines in all cases.

Recording marks awarded on the test paper

All questions, even those not attempted by the pupil, should 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 $\begin{matrix}1\\0\end{matrix}$

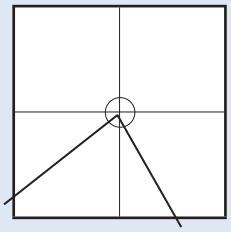
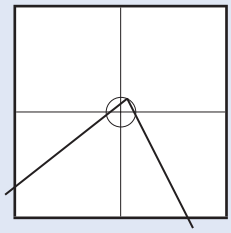
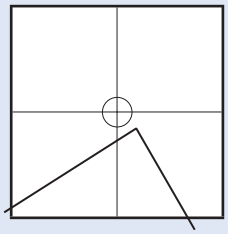
The total marks awarded for a double page should be written in the box at the bottom of the right-hand page, and the total number of marks obtained on the paper should be recorded on the front of the test paper.

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

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 April 2009.

What if…	Marking procedure	
The pupil's response is numerically or algebraically equivalent to the answer in the mark scheme.	Markers should award the mark unless the mark scheme states otherwise.	
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 the 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, should be accepted. Provided there is no ambiguity, condone the continental practice of using a comma for a decimal point.	
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 without altering the original intention or difficulty level of the question. For each misread that occurs, deduct one mark only.	
No answer is given in the expected place, but the correct answer is given elsewhere.	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.	
The final answer is wrong, but the correct answer is shown in the working.	Where appropriate, detailed guidance will be given in the mark scheme and must be adhered to. If no guidance is given, markers will need to examine each case to decide whether:	
	• the incorrect answer is due to a transcription error	If so, award the mark.
	• in questions not testing accuracy, the correct answer has been given but then rounded or truncated	If so, award the mark.
	• the pupil has continued to give redundant extra working which does not contradict work already done	If so, award the mark.
	• the pupil has continued, in the same part of the question, to give redundant extra working which does contradict work already done.	If so, do not award the mark. Where a question part carries more than one mark, only the final mark should be withheld.
The pupil's answer is correct but the wrong working is shown.	A correct response should always be marked as correct unless the mark scheme states otherwise.	

What if…	Marking procedure
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 × 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 correct response has been crossed or rubbed out and not replaced.	Any legible crossed or rubbed out work that has not been replaced should be marked according to the mark scheme. If the work is replaced, then crossed or rubbed out work should not be considered.
More than one answer is given.	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.
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.
The answer is correct but, in a later part of the question, the pupil has contradicted this response.	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.
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 has drawn lines which do not meet at the correct point.	Markers should interpret the phrase 'lines not accurate' to mean meeting within or on a circle of radius 2mm with centre at the correct point.  within the circle accepted  on the circle accepted  outside the circle not accepted

Responses involving money

	✓ Accept	✗ Do not accept
Where the £ sign is given *for example:* *£3.20, £7*	✓ £3.20 £7 £7.00 Any unambiguous indication of the correct amount, eg £3.20p £3 20 pence £3 20 £3,20 £3-20 £3:20 320p with £ sign crossed out	✗ Incorrect placement of pounds or pence, eg £320 £320p Incorrect placement of decimal point, or incorrect use or omission of 0, eg £3.2 £3 200 £32 0 £3-2-0
Where the p sign is given *for example:* *40p*	✓ 40p Any unambiguous indication of the correct amount, eg £0.40p £.40p £0.40 with p sign crossed out	✗ Incorrect or ambiguous use of pounds or pence, eg 0.40p £40p
Where no sign is given *for example:* *£3.20, 40p*	✓ £3.20 320p 40p £0.40 Any unambiguous indication of the correct amount in £ or p as shown above At **levels 3 and 4 only** also accept omission of units, eg 3.20 320 40 0.40	✗ Omission of final zero, eg 3.2 0.4

Responses involving negative numbers

	✓ Accept	✗ Do not accept
For example: *–2*		To avoid penalising the error below more than once within each question, do not award the mark for the *first* occurence 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 time

	✓ Accept	✗ Do not accept
A time interval *for example:* *2 hours 30 minutes*	✓ 2 hours 30 minutes Any unambiguous, correct indication, eg $2\frac{1}{2}$ hours 2.5 hours 2h 30 2h 30 min 2 30 Digital electronic time, ie 2:30	✗ Incorrect or ambiguous time interval, eg 2.3 hours 2.3h 2h 3 2.30 min 2.30 2-30 2,30 2.3
A specific time *for example:* *8:40am, 17:20*	✓ 8:40am 8:40 twenty to nine Any unambiguous, correct indication, eg 08.40 8.40 0840 8 40 8-40 8,40 Unambiguous change to 12 or 24 hour clock, eg 17:20 as 5:20pm or 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 8.4 084 84

Responses involving measures

	✓ Accept	✗ Do not accept
Where units are given *(eg kg, m, l)* *for example:* *8.6kg*	✓ 8.6kg Any unambiguous indication of the correct measurement, eg 8.60kg 8.6000kg 8kg 600g	✗ Incorrect or ambiguous use of units, eg 8600kg

Note

If a pupil leaves the answer box empty but writes the answer elsewhere on the page, then that answer must be consistent with the units given in the answer box and the conditions listed above.

If a pupil changes the unit given in the answer box, then their answer must be equivalent to the correct answer, using the unit they have chosen, unless otherwise indicated in the mark scheme.

Responses involving coordinates

	✓ Accept	✗ Do not accept
For example: *(5, 7)*	✓ Unconventional notation, eg (05, 07) (five, seven) $\begin{matrix} x & y \\ (5, & 7) \end{matrix}$ $(x=5, y=7)$	✗ Incorrect or ambiguous notation, eg (7, 5) $\begin{matrix} y & x \\ (7, & 5) \end{matrix}$ $(5x, 7y)$ $(5^x, 7^y)$ $(x-5, y-7)$

Responses involving probability

	✓ Accept	! Take care ✗ Do not accept
A numerical probability should be expressed as a decimal, fraction or percentage only. *for example:* *0.7* $\frac{7}{10}$ *70%*	✓ 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

Responses involving the use of algebra

	✓ Accept	! Take care ✖ Do not accept
For example: $2 + n$ $n + 2$ $2n$ $\frac{n}{2}$ n^2	✓ 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 $n + 2$

School shop

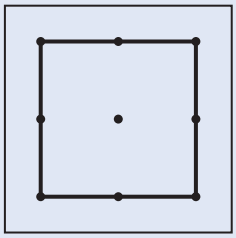
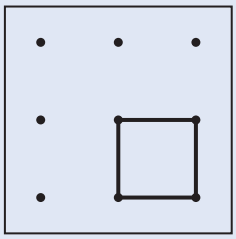
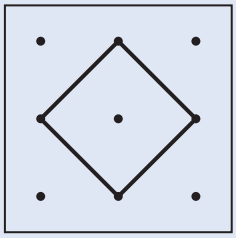
Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
1						
a				1m	19	
b				1m	Friday	✓ ***Unambiguous indication*** eg, for part (b) • F eg, for part (c) • R
c				1m U1	Ruler	

Missing numbers

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
2						
				1m	26	
				1m	3	

Parcels

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
3						
				2m or 1m	£ 6.10 Gives the answer 6.1 or Shows the value 3.9(0) or 390 or Shows a complete correct method with not more than one computational error eg • 1.3(0) × 3 = *3.6(0) (error)*, 10 – 3.6(0) = 6.4(0)	

Tier & Question				Mark	Correct response	Additional guidance
3–5	4–6	5–7	6–8			**Joining**
4				**2m**	Draws all three different sized squares, in any order eg •   	! ***Lines not ruled or accurate*** Accept provided the pupil's intention is clear ! ***Internal lines shown*** Only the outline of any shape drawn should be considered × ***Vertices of square do not use the pins***
				or 1m	Draws any two of the three different sized squares	
				U1		

Spinner

Tier & Question 3–5 4–6 5–7 6–8	Mark	Correct response	Additional guidance
5	**2m**	Makes all four correct decisions, ie True False ☑ ☐ ☐ ☑ ☐ ☑ ☑ ☐	✓ ***Unambiguous indication*** eg • ✓ for True, ✗ for False
	or 1m	Makes three correct decisions	

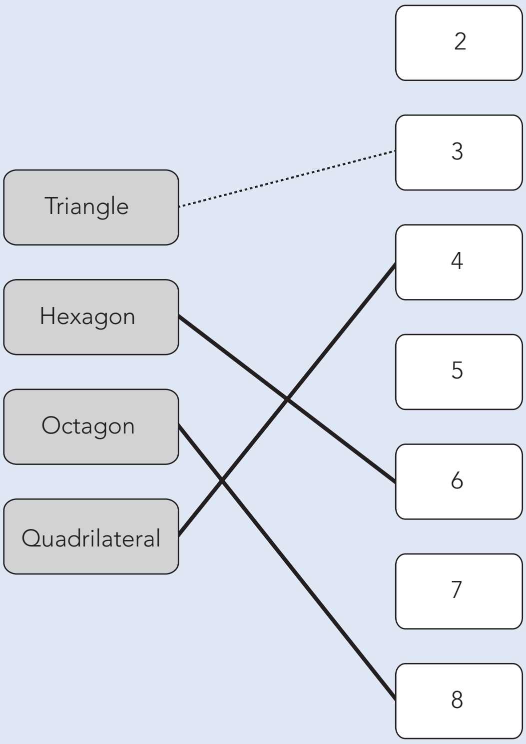
Fractions

Tier & Question 3–5 4–6 5–7 6–8	Mark	Correct response	Additional guidance
6 a	**1m**	Indicates any three squares	! ***Squares not shaded*** Accept any unambiguous indication ! ***Part squares indicated*** Accept provided the pupil's intention is clear
b	**1m**	$\frac{3}{5}$ or equivalent	✗ ***Equivalent decimals***

Number of sides

Tier & Question						
3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
7						

2m Matches all three shapes correctly, ie



or 1m Matches any two shapes correctly

Additional guidance

! ***Shape matched to more than one number***
For 2m or 1m, do not accept as a correct match

! ***Extra shapes added***
Ignore extra shapes and any lines drawn from them

Grid

Tier & Question						
3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
8						

2m Completes the grid correctly, ie

2	3	1
1	2	3
3	1	2

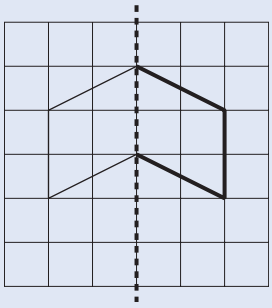
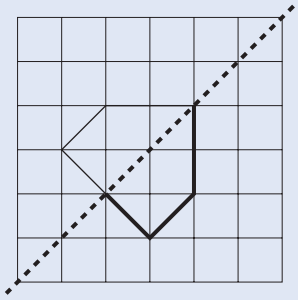
or 1m Completes both the middle column and the bottom row correctly

U2

Digital

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
9				1m	10:45	! *Indication of am or pm* Condone either am or pm shown or implied eg, accept • 10:45 am • 22:45
				1m	Gives a correct description of the time in words eg • Five past ten	! *Words and numbers used in description* Condone, provided the time has been interpreted correctly eg, accept • 5 past 10 × *'Digital time' described in words* eg • Ten O five × *Description of time incorrect or using numbers* eg • Ten five • 10 5

Reflecting

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
10	1			1m	Reflects the shape correctly in the mirror line, ie 	! *Throughout the question, lines not ruled or accurate* Accept provided the pupil's intention is clear ! *Throughout the question, extra lines drawn* Accept provided the pupil's intention is clear
				1m	Reflects the shape correctly in the mirror line, ie 	

Test

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
12	2					
a	a			1m	C	
b	b			1m U1	21	

Rounding

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
13	3					
a	a			1m 1m	2700 3000	
b	b			1m	Gives a value greater than or equal to 795 but less than 805	✓ ***800***

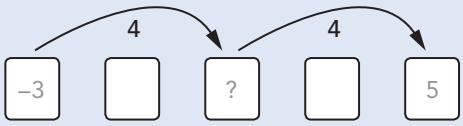
Castle

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
11	4					
				2m ***or*** 1m	£ 5(.00) Shows the value 22(.00) or Shows or implies a complete correct method with not more than one computational error eg • *12.00 (error)* + 9 = 21.00 Answer given as 4.00	

Baby

Tier & Question 3–5	Tier & Question 4–6	Tier & Question 5–7	Tier & Question 6–8	Mark	Correct response	Additional guidance
14	5					
a	a			1m	4	✗ *Any reference to extra days*
b	b			1m	9	✗ *Any reference to extra weeks or days*

Count on

Tier & Question 3–5	Tier & Question 4–6	Tier & Question 5–7	Tier & Question 6–8	Mark	Correct response	Additional guidance
15	6					
a	a			1m	27	
b	b			2m *or* 1m	1 Shows or implies that the size of two steps is 4 eg •  • –3 + 4 or Shows or implies that the size of one step is 2 eg • The gaps are 2 • –3 + 2 • Second number is –1 • Fourth number is 3 • –3 to 5 is 8, 8 ÷ 4	✗ *Shows steps of unequal size*
				U1		

Shoe sizes

Tier & Question 3–5	Tier & Question 4–6	Tier & Question 5–7	Tier & Question 6–8	Mark	Correct response	Additional guidance
16	7					
a	a			1m	12	
b	b			1m	3	
c	c			1m	Indicates Both the same and gives a correct explanation The most common correct explanations: Use given values eg • Range of boys is 4, range of girls is 4 • 8 – 4 is the same as 9 – 5 • 5 to 9 = 4 to 8 Reason generally about spread eg • Boys cover 5 sizes, girls cover 5 sizes	✓ ***Minimally acceptable explanation*** eg • 4, 4 • 8 – 4, 9 – 5 • Both 4 ! ***Ambiguous notation*** eg • 4 – 8, 5 – 9 Condone ✓ ***Minimally acceptable explanation*** eg • Both have the same number of sizes ! ***Explanation implies references to the number of blank sizes*** eg • Boys have one blank, girls have one blank • Because the girls didn't have size 9 and the boys didn't have size 4 Condone ✗ ***Ambiguous or incorrect explanation*** eg • 5 in each • They both have a range of five sizes • Girls: 4, 5, 6, 7, 8 Boys: 5, 6, 7, 8, 9
				U1		

Finding x and y

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
	17	8		1m	652	
				1m	442	

Seventy

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
	18	9		1m U1	Indicates No and gives a correct explanation that shows or implies at least one odd factor eg • Factors of 70 are 1, 2, 5, 7, 10, 14, 35 and 70, so some are odd and some are even • There are four odd factors and four even factors of 70 • It could be 1 (odd) • 5 × 14 = 70 • 70 ÷ 2 = 35 • 70 is even, but 1 is odd and goes into everything	✓ ***Minimally acceptable explanation*** eg • 1, 2, 5, 7, 10, 14, 35 and 70 • 7 ! ***Incomplete list of factors given*** Condone, provided none is incorrect and at least one odd factor is shown eg, accept • The factors of 70 are 1, 2, 5 and 7 ✗ ***Incomplete or incorrect explanation*** eg • 70 has some odd and some even factors • 70 is a factor of 1 • All factors of 70 are odd

Units

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
20	10	1		**2m**	Completes all five rows of the table correctly, ie	

	L	A	V	M
cm	✓			
l			✓	
miles	✓			
g				✓
m^2		✓		
oz				✓

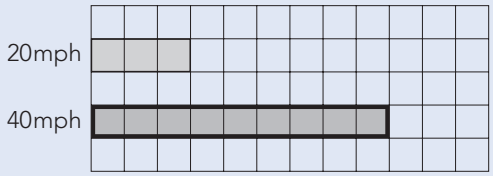
				or	
				1m	Completes at least three rows of the table correctly

Rainforest

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
a	a	a		**1m**	27	
b	b	b		**1m**	175 to 185 inclusive	
c	c	c		**1m**	Indicates January, ie 	

Tier & Question						
3–5	4–6	5–7	6–8			**Doughnuts**
21	**12**	**3**		**Mark**	**Correct response**	**Additional guidance**
				2m	Indicates shop A and gives a correct justification, based on correctly calculating a pair of comparable values eg • At shop A: 2 × 5 = 10, at shop B: 3.5(0) × 3 = 10.5(0) • 3.5 × 3 – 2 × 5 = 0.5 • 2 ÷ 3 = 0.6(…), 3.50 ÷ 5 = 0.7 • For £1 you get $1\frac{1}{2}$ doughnuts or $1\frac{3}{7}$ doughnuts • You pay £1.50 extra for 2 more doughnuts, but at shop A they're less than 75p each so shop A must be a better deal	✗ ***For 2m, no decision*** ✓ ***For 2m, correct decision and any pair of comparable values shown*** Note that common pairs (in pounds) are: 10 and 10.5(0) (per 15 doughnuts) 0.6(…) and 0.7(0) (per 1 doughnut) 2 and 2.1(0) (per 3 doughnuts) 3.3(…) and 3.5(0) (per 5 doughnuts) 1.5 and 1.4(…) (doughnuts per pound) ! ***For 2m or 1m, comparison is per 3 doughnuts or per 5 doughnuts but the given price is not restated*** Condone eg, for 2m accept • At shop B, 3 doughnuts would be £2.10 ! ***Additional incorrect working*** Ignore
				or **1m**	Shows a correct pair of comparable values but makes either an incorrect or no decision or Shows a complete correct method for finding a pair of comparable values with not more than one computational or rounding error, and follows through to make their correct decision eg • 5 × 2, 3 × 3.50, shop A indicated • 2 ÷ 3 = *0.75 (error)*, 3.50 ÷ 5 = 0.7, shop B indicated or Makes a correct decision but the justification uses only the difference between a pair of comparable values eg • A doughnut is 3.3(…)p cheaper at shop A	

Stopping distances

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
22	**13**	**4**				
a	a	a		**1m**	Draws a bar for the stopping distance for 40mph of length 9cm, ie 	! ***Bar incorrectly positioned*** Condone if bar is drawn correctly one line above or below the position shown
b	b	b		**1m**	18	! ***Follow-through*** Allow follow-through as 2 × the length of their bar in (a), provided the result is greater than 12

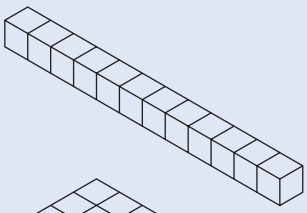
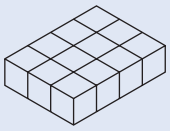
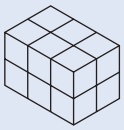
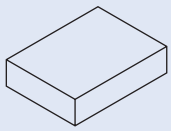
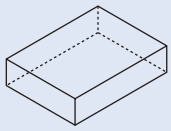
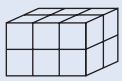
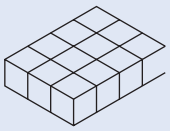
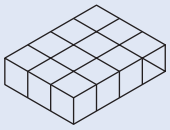
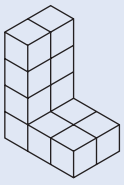
Rotate 180

Marking overlay available

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
23	**14**	**5**				
				2m ***or*** **1m**	Draws the correct shape with all four vertices within the tolerances as shown on the overlay Shows at least three vertices within the tolerances as shown on the overlay or Shows a correct shape in the correct orientation, with all four vertices within the tolerances as shown on the overlay, but in an incorrect position on the grid	! ***Lines not ruled or accurate*** Accept provided the pupil's intention is clear

Value

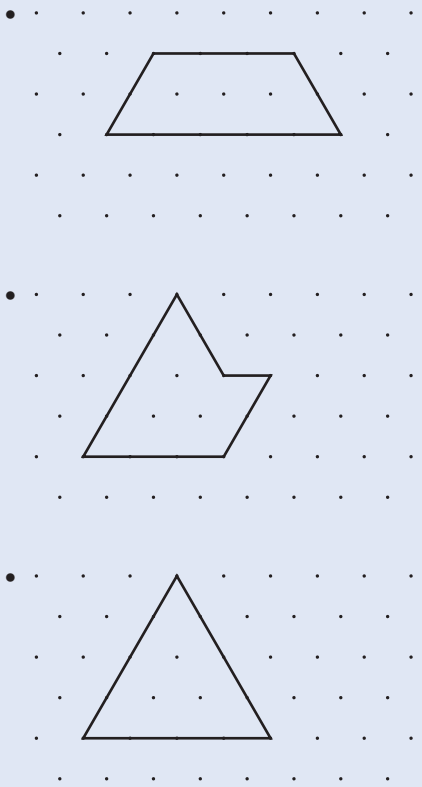
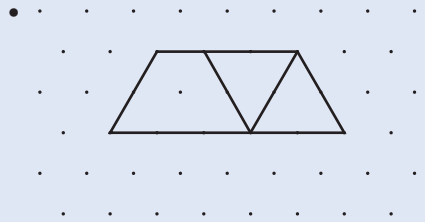
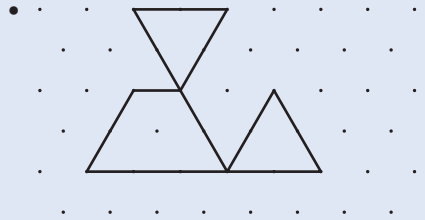
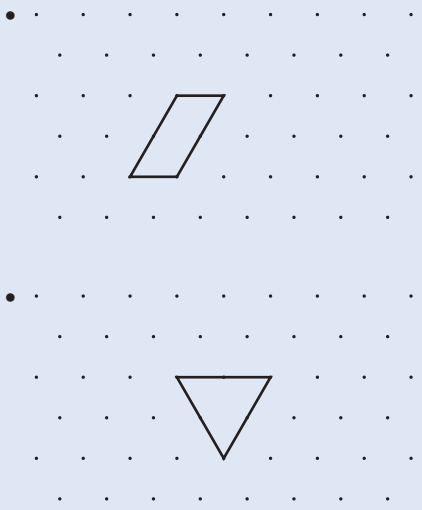
Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
24	**15**	**6**				
				1m	196	× ***Incomplete processing***
				1m	4	
				1m	1225	

Tier & Question						
3–5	4–6	5–7	6–8	Mark	Correct response	**12 cubes** Additional guidance
25	16	7		**2m**	Draws a 1 by 1 by 12, a 1 by 3 by 4 or a 2 by 2 by 3 cuboid, using the isometric grid eg •  •  • 	✗ ***1 by 2 by 6 cuboid repeated*** ✓ ***For 2m or 1m, internal lines omitted*** eg, for 2m accept •  ! ***For 2m or 1m, hidden lines shown*** For 2m, accept provided they are clearly indicated as hidden lines eg, for 2m accept •  ! ***Lines not ruled*** Accept provided the pupil's intention is clear ! ***Drawing not accurate*** Accept vertices within 2mm of the dots of the grid ✗ ***Isometric grid not used correctly*** eg •  ! ***Other shapes drawn*** As these could be trials, ignore
				or **1m**	The only error is to omit some external lines or to show some hidden lines eg •  •  or Correctly draws a possible 3-D shape made from 12 cubes that is not a cuboid, using the isometric grid eg • 	

Cost of delivery

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
26	**17**	**8**				
a	a	a		**1m**	Gives both correct values correctly positioned, ie 7 then 20	✓ ***Range given instead of 20*** eg • 0 – 20
				1m	Gives a correct value with the correct unit for that value eg • 25p • 25 pence • £0.25	
b	b	b		**1m**	18.25	

Shape area

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
27	18	9				
a	a	a		1m	Gives a shape with area $a + 2b$, ie 16 small triangles eg 	! ***Lines not ruled or accurate*** Accept provided the pupil's intention is clear ✓ ***Internal lines shown*** eg, for part (a)  ✘ ***Shape formed with triangles and trapezium not joined side to side*** eg, for part (a)  ! ***Other shapes drawn*** As these could be trials, ignore
b	b	b		1m U1	Gives a shape with area $a - b$, ie 4 small triangles eg 	

Midpoints

Tier & Question				Mark	Correct response	Additional guidance
3–5	4–6	5–7	6–8			
	19	10	1			
				1m	Gives P as (30, 35)	
				1m	Gives Q as (42, 0)	! ***Answers for P and Q transposed but otherwise completely correct*** If this is the only error, ie gives P as (42, 0) and gives Q as (30, 35), mark as 0, 1
				1m	Gives R as (42, 35)	! ***Follow-through for R as (their x coordinate of Q, their y coordinate of P)*** Allow follow-through provided their coordinates for P, Q and R are different
				U1		

Rainfall

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
	20	**11**	**2**	**2m**	Indicates place A and gives a correct justification eg • 10 × 8 + 20 × 4 = 160cm 5 × 10 + 50 × 2 = 150cm • (80 + 80) ÷ 12 = 13.(…)cm per month (50 + 100) ÷ 12 = 12.5cm per month • (80 + 80) ÷ 2 = 80cm per 6 months (50 + 100) ÷ 2 = 75cm per 6 months	✓ ***For 2m, minimally acceptable justification*** eg • 160, 150 seen • 80, 80 and 50, 100 seen • 10 × 8 + 20 × 4 > 5 × 10 + 50 × 2 • 13.(…), 12.5 seen
				or		
				1m	Gives a correct justification, even if the decision is incorrect or omitted or Shows a complete correct method with not more than one computational error, and follows through to make their correct decision eg	
				U1	• 10 × 8 + 20 × 4 = *120 (error)* 5 × 10 + 50 × 2 = 150, so place B	

Thinking distances

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
	21	**12**	**3**			
	a	a	a	**2m**	315	
				or		
				1m	Shows the value 245 or Shows a complete correct method, in which the 'squared' has been correctly interpreted, with not more than one computational error eg • $70 + \frac{70 \times 70}{20}$ • $70^2 = 4900$, 4900 ÷ 20 = *2450 (error)*, 70 + 2450 = 2520	
	b	b	b	**1m**	50	

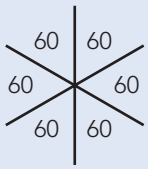
Two shapes

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
	22	**13**	**4**	**2m** *or* **1m**	60 Shows the value 6 or Shows a complete correct method with not more than one computational error eg • 72 ÷ 12 = *8 (error)*, 10 × 8 = 80	
				U1		

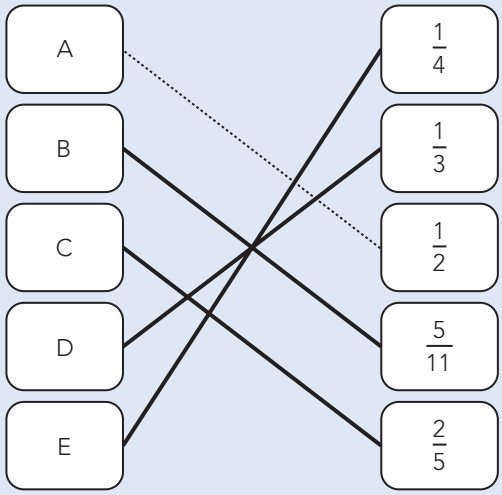
Recycling

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
	23	**14**	**5**	**2m** *or* **1m**	760 000 Shows the value 1 240 000 or Shows a complete correct method with not more than one error eg • 2 000 000 × 0.38 • 38 ÷ 100 × 2 × 1 000 000 • 2 million = *20 000 000 (error)* 20 000 000 × 0.38 = 7 600 000	

Shapes on a grid

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
	24	**15**	**6**			
	a	a	a	**1m**	Gives a correct explanation The most common correct explanations: Refer to the sum of the angles in a triangle eg • The angles are equal and add up to 180, so 180 ÷ 3 = 60 • Angles in a triangle add up to 180, the three angles are equal so 60 + 60 + 60 = 180 Refer to the sum of angles at a point eg • You can see that six of the triangles fit together at a point, so 360 ÷ 6 = 60 •  Total: 360	✓ ***Minimally acceptable explanation*** eg • 180 ÷ 3 • 60 × 3 = 180 • The angles are the same and add up to 180 ✗ ***Incomplete explanation*** eg • The three angles add up to 180 • Angles in a triangle add up to 180 • The three angles are equal • 60 × 3 • It's an equilateral triangle ✓ ***Minimally acceptable explanation*** eg • 360 ÷ 6 • 60 × 6 = 360 ✗ ***Incomplete explanation*** eg • Six of the angles add up to 360 • Angles at a point add up to 360 • 60 × 6
	b	b	b	**2m** ***or*** **1m** **U1**	Gives all three correct angles, ie $a = 60$, $b = 120$ and $c = 240$ Gives two correct angles	! ***For 1m, follow-through*** Provided their b is obtuse, accept c as 2 × their b or 360 – their b

Five bags

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
	25	16	7	2m	Matches all four bags to the correct probabilities, ie 	! ***For 2m or 1m, bag matched to more than one probability*** Do not accept as a correct match
				or 1m	Matches two of the four bags to the correct probabilities	

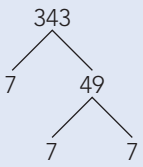
Bicycles

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
	26	17	8	2m	184	
				or 1m	Shows or implies a complete correct method with not more than one computational error eg • $\frac{46}{2} \times 8$ • 46×4 • $46 \div 2 = 22$ *(error)*, $22 \times 8 = 176$ • $\frac{2}{8}$ is 46, so $\frac{4}{8}$ is *82 (error)*, so total is 164	
				U1	• Digits 184 seen	

Tier & Question						
3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
		18	9			**Eggs**
				2m	Indicates the grade is medium and shows or implies a correct method for calculating the mass of the egg that interprets the 'cubed' correctly, even if a final value is not shown eg • Value between 60 and 60.12 inclusive seen • $5.5 \times 5.5 \times 5.5 \times \pi \div 10 \times 1.15$ • $166.375 \times \pi \times 0.115$	
				or 1m	Makes an incorrect or no decision about the grade of the egg, but shows or implies a correct method for calculating the mass of the egg that interprets the 'cubed' correctly, even if a final value is not shown eg • $5.5 \times 5.5 \times 5.5 \times \pi \div 10 \times 1.15$ • $522.7 \div 10 \times 1.15$ or Shows or implies a correct method for calculating the mass of the egg that interprets the 'cubed' correctly, with not more than one computational or rounding error, and makes their correct decision for the grade of the egg eg • $5.5^3 \times$ *3 (error)* $\div 10 \times 1.15 = 57.(\ldots)$, so medium • $5.5^3 =$ *166 (premature rounding)*, $166 \times 3.14 \times 0.115 = 59.9(\ldots)$, so medium	✖ ***For 1m, final value and decision not shown within a method containing a computational or rounding error*** ✖ ***For 1m, conceptual error*** eg • $5.5^3 = 16.5$, $16.5 \times \pi \div 10 \times 1.15 = 5.9(\ldots)$ or 6, so small

Ring size

Tier & Question				Mark	Correct response	Additional guidance
3–5	4–6	5–7 **19**	6–8 **10**			
		a	a	**1m**	57 or 57.1(…) or 57.2	
		b	b	**2m**	Indicates size 6 and gives a correct justification eg • 51 ÷ π = 16.2(…) • 51 ÷ 3.14 = 16.2(…) • 16.5 × π = 51.8(…) or 52 15.7 × π = 49.(…) • 16.5 × π = 51.8(…) and 15.7 × π < 51	✓ ***For 2m, minimally acceptable justification*** eg • 16.2(…) • 49.(…) and 51.8(…) or 52 seen ✗ ***For 2m, incomplete justification*** eg • 51 ÷ π • 51 ÷ 3.14 • 16.5 × π = 51.8(…)
				or 1m	Shows a correct justification but makes an incorrect or no decision or Indicates size 6 and gives an incomplete justification eg • 51 ÷ π • 51 ÷ 3.14 • 51.8(…) or 52 • 49.(…) • 15.7 × π < 51	✗ ***For 1m, incorrect or no justification alongside a correct decision*** eg • 51 ÷ 3 = 17, so size 6 • Because the circumference of a size 6 is 51

Tier & Question						
3–5	4–6	5–7	6–8			**Missing power**
		20	**11**	**Mark**	**Correct response**	**Additional guidance**
				2m	Shows correct working and gives the value of x as 3 eg • $3^5 + 10^2 = 343$ $7 \times 7 \times 7 = 343$ • $3^5 = 243$, $10^2 = 100$ $343 \div 7 = 49$, $49 \div 7 = 7$ •  • $7^3 = 343$	! ***Value embedded*** Accept provided there is no ambiguity and correct working is shown eg, for 2m accept • 7^3 shown in correct working eg, for 2m do not accept • 7^3 on the answer line, even with correct working
				or **1m**	Gives the value of x as 3, even if working is incomplete or omitted or Shows the value 343 or Shows the values 243 and 100	

School size

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
		21	12	2m	Shows that the average number of pupils in a secondary school is about four times as many as the average number in a primary school eg • Primary school: 4 069 385 ÷ 17 642 = 230.(…) (or 231) Secondary school: 3 315 805 ÷ 3385 = 979.(…) (or 980) 979 ÷ 230 = 4.2(…) • 17 642 ÷ 3 385 = 5.2(…) 4 069 385 ÷ 3 315 805 = 1.2(…) 5.2(…) ÷ 1.2(…) = 4.2(…) or 4.3 recurring	✓ ***For 2m, minimally acceptable justification*** eg • 979.(…) ÷ 230.(…) • 980 ÷ 231 • 4 100 000 ÷ 18 000 ÷ (3 300 000 ÷ 3000) • 980, 4 × 230 = 920 • 231, 980 ÷ 4 = 245
				or 1m	Shows the values 230.(…) (or 231) and 979.(…) (or 980) or Shows the intention to divide the total number of pupils by the number of schools for both categories using any reasonably rounded values eg • 4 069 385 ÷ 17 642, 3 315 805 ÷ 3385 • 4 100 000 ÷ 18 000, 3 300 000 ÷ 3000 • 4 000 000 ÷ 18 000, 3 000 000 ÷ 3000	
				U1		

Container

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
		22	13	2m	15	
				or 1m	Shows or implies a complete correct method with not more than one error eg • 12000 ÷ 800 • 12000 ÷ (40 × 20) • Shows the digits 15	

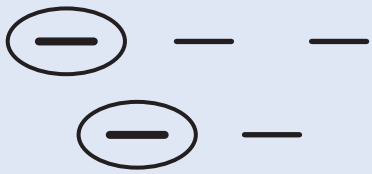
Tier & Question						
3–5	4–6	5–7	6–8			
		23	14	Mark	Correct response	Additional guidance
				3m	Completes all three rows of the table correctly, ie	✓ ***Unambiguous indication of 'Yes' or 'No'***
						✓ ***Space for 4th term left blank for the expression $n + 11$***
				or **2m** ***or*** **1m**	Completes two rows of the table correctly Completes either the row for the expression $11n - 6$ or the row for the expression $n^2(6 - n)$ correctly or Completes the middle column of the table correctly, even if the right-hand column is incorrect or omitted	

*n*th term expressions

Expression	… *n*th term expression?	… 4th term
$5n$	No	✗
$n + 11$	No	✗
$11n - 6$	Yes	38
$n^2(6 - n)$	Yes	32

Tier & Question						Exam
3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
		24	**15**	**2m**	90	✓ ***For 2m, reference to 100 marks*** eg • 90 out of 100 • $\frac{90}{100}$
				or **1m**	Shows or implies a complete correct method eg • Total mark on 6 units must be 80 × 6 = 480 Total so far = 78 × 5 = 390 480 – 390 • 80 × 6 – 78 × 5 • 80 – 78 = 2, 2 × 5 = 10, 80 + 10 or Shows the value 480 or 390 or Shows or implies a complete correct method with not more than one computational error eg • Total mark on 6 units must be 80 × 6 = *420 (error)* 420 – 78 × 5 = 30 • 80 × 6 – 78 × 5 • 80 – 78 = 2, 2 × 5 = 10, 80 + 10	

Equations

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
		a	a	1m	Indicates both correct equations, ie 	
		b	b	1m	Gives two pairs of coordinates for which $y = x + 1$ and gives a correct equation eg • (3, 4) and (0, 1) $y = x + 1$ • (1, 2) and (2, 3) $x = y - 1$ • (–2, –1) and $\left(\frac{1}{2}, 1\frac{1}{2}\right)$ $y - x = 1$	! ***Unconventional notation*** eg, for $y = x + 1$ • $y1 = 1 \times x + 1$ Condone

House sales

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
		a	a	1m	75 000	
		b	b	1m	$33\frac{1}{3}$	! ***Value rounded*** Accept 33 or better
			c	1m	64 000	

Standard form

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
			18	1m	Indicates 2×10^8 and 2.5×10^8, in either order	✓ ***Unambiguous indication*** eg, for part (a) • 200 000 000 and 250 000 000

Greater

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
			a	1m	d, by 7	
			b	1m	f, by 1	

Three years old

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
			20	2m *or* 1m	558 000 Shows the value 557 551.(…) or Shows a complete correct method with not more than one computational or rounding error, even if their value is not rounded to the nearest thousand eg • 546 400 ÷ 98 × 100 • *550 000 (premature rounding)* ÷ 0.98 = 561 224	✓ ***558 thousand*** ✗ ***For 1m, conceptual error*** eg • 0.02 × 546 400 + 546 400 = 557 328

Height

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
			21	**2m**	7.2 or 7.18(…)	✗ ***Method used is accurate or scale drawing***
						! ***For 2m, answer of 7*** Do not accept unless a correct method or a more accurate value is seen
						! ***Units given*** Ignore
				or		
				1m	Shows or implies a correct trigonometric ratio eg • 17 × sin 25 • $\frac{h}{17}$ = sin 25 • 17 × cos 65	

Fewest men

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
			22	**2m**	115	
				or		
				1m	Shows the digits 114(…) or 115 or Shows a complete correct method with not more than one computational or rounding error eg • 100 ÷ 87 × 100 • 100 ÷ 87 = *1.1 (premature rounding)*, 1.1 × 100 = 110	

Daisies

Tier & Question 3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
			a	**1m**	32	
			b	**1m**	7	
			c	**1m**	25	

Tier & Question							
3–5	4–6	5–7	6–8			**Using Pythagoras**	
			24	**Mark**	**Correct response**	**Additional guidance**	
				2m	20.8(…)	! ***Value of 20 or 21*** Do not accept unless a correct method or a more accurate value is seen	
				or			
				1m	Shows or implies a correct method, using Pythagoras' theorem, for calculating the length of the missing side of the right-angled triangle with a hypotenuse of 22cm eg • $x^2 = 22^2 - 20^2$ • $x = \sqrt{84}$ • $\sqrt{(22^2 - 20^2)}$ • $\sqrt{84}$ • $2\sqrt{21}$ • 9.165	! ***For 1m, value rounded or truncated*** Accept 9.1(…) or 9.2 Do not accept 9 unless a correct method or a more accurate value is seen	
				(U1)			

Tier & Question							Booklet
3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance	
			25	**3m** ***or*** **2m**	60 Shows a correct value for the mass of the booklet eg • 59.8752 or Shows or implies a correct method with not more than one error or omission, and follows through to give their value correct to 2 significant figures, provided some rounding is required eg • 297 × 420 × 6 = 748 440, 748 440 × 80 = 59 875 200, so 60 000 000 [failure to convert to m^2] • 297 × 420 ÷ *1000 (error)* = 124.74, 124.74 × 6 × 80 = 59 875.2, so 60 000 [incorrect conversion to m^2] • 0.297 × 0.42 × 80 = 10 [failure to find mass of 6 pages]	! ***For 2m, value rounded or truncated*** Accept 59, 59.8(…) or 59.9
				or **1m**	Shows or implies a correct method with not more than one error or omission, even if their value is not given correct to 2 significant figures eg • 0.297 × 0.42 × 6 × 80 • 297 × 420 × 6 = 748 440, 748 440 × *80 (error)* = 59 875 200 • 0.297 × 0.42 × 80 = 9.9(…)	

Tier & Question						
3–5	4–6	5–7	6–8	Mark	Correct response	Additional guidance
			26			**Hemisphere**
				2m	Completes the table correctly with two fully simplified expressions, ie	

Radius	Volume	Surface area
r	$\frac{2}{3}\pi r^3$	$3\pi r^2$

	or	
	1m	Gives one correct and fully simplified expression or Gives both correct, unsimplified expressions eg

-

Radius	Volume	Surface area
r	$\frac{4}{3}\pi r^3 \div 2$	$2\pi r^2 + \pi r^2$

-

Radius	Volume	Surface area
r	$\frac{4}{6}\pi r^3$	$3\pi r \times r$

Index to mark schemes

National Assessment Agency

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29 Bolton Street
London W1J 8BT

Telephone: 08700 60 60 40
Minicom: 020 7509 6546
Fax: 020 7509 5908

Email: tests@naa.org.uk
Website: www.naa.org.uk/tests

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