Mathematics

Mark scheme for Test 1

Tiers 3–5, 4–6, 5–7 and 6–8

KEY STAGE 3

QCA

department for
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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 1 at all tiers. The paper 2 mark scheme is printed in a separate booklet. Questions have been given names so that each one has a unique identifier irrespective of tier.

The structure of the mark schemes

The marking information for questions is set out in the form of tables, which start on page 12 of this booklet. The columns on the left-hand side of each table provide a quick reference to the tier, question number, question part, and the total number of marks available for that question part.

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

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

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

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

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

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

General guidance

Using the mark schemes

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

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

What if …

The pupil's response does not match closely any of the examples given.	Markers should use their judgement in deciding whether the response corresponds with the statement of requirements given in the **Correct response** column. Refer also to the **Additional guidance**.
The pupil has responded in a non-standard way.	Calculations, formulae and written responses do not have to be set out in any particular format. Pupils may provide evidence in any form as long as its meaning can be understood. Diagrams, symbols or words are acceptable for explanations or for indicating a response. Any correct method of setting out working, however idiosyncratic, is acceptable. Provided there is no ambiguity, condone the continental practice of using a comma for a decimal point.
The pupil has made a conceptual error.	In some questions, a method mark is available provided the pupil has made a computational, rather than conceptual, error. A computational error is a slip such as writing 4 t 6 e 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 t 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="5">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>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 ✓ The unit, £ or p, is usually printed in the answer space. Where the pupil writes an answer outside the answer space with **no** units, accept responses that are unambiguous when considered alongside the given units eg with £ given in the answer space, accept 3.20 7 or 7.00 ✓ Given units amended eg with £ crossed out in the answer space, accept 320p 700p	× Incorrect or ambiguous indication of the amount eg £320, £320p or £700p × Ambiguous use of units outside the answer space eg with £ given in the answer space, do not accept 3.20p outside the answer space × Incorrect placement of decimal points, spaces, etc or incorrect use or omission of 0 eg £3.2, £3 200, £32 0, £3-2-0 £7.0

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

Responses involving the use of algebra

For example: *2 p n* *n p 2* *2n* $\frac{n}{2}$ n^2

Accept ✓	**Take care ! Do not accept ×**
✓ Unambiguous use of a different case or variable eg N used for n x used for n	! Unconventional notation eg n t 2 or 2 t n or n2 or n p n for 2n n t n for n^2 n d 2 for $\frac{n}{2}$ or $\frac{1}{2}n$ 2 p 1n for 2 p n 2 p 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 p 2 = 32, 3 t 10 p 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 p 2 tiles or tiles = t = n p 2 for t = n p 2	! Words or units used within equations or expressions eg n tiles p 2 n cm p 2 Do not accept on their own. Ignore if accompanying an acceptable response.
✓ Unambiguous letters used to indicate expressions eg t = n p 2 for n p 2	× Ambiguous letters used to indicate expressions eg n = n p 2 for n p 2

Responses involving time

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

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

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

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

Responses involving coordinates

For example: (5, 7)

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

Responses involving probability

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

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

Accept ✓	Take care ! Do not accept x
✓ 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 $\frac{70}{100}$ e $\frac{18}{25}$	! 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
	x A probability greater than 1 or less than 0

Recording marks awarded on the test paper

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

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

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

Awarding levels

The sum of the marks gained on paper 1, paper 2 and the mental mathematics paper determines the level awarded. Level threshold tables, which show the mark ranges for the award of different levels, will be available on the NAA website *www.naa.org.uk/tests* from Monday 19 June 2006. NAA will also send a copy to each school in July.

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

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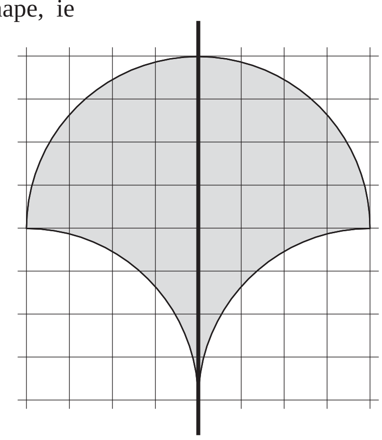
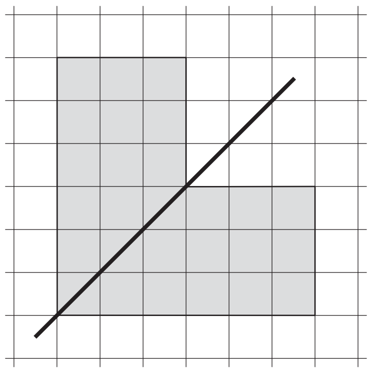
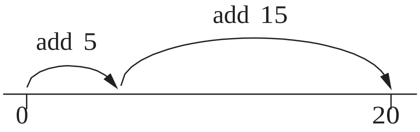
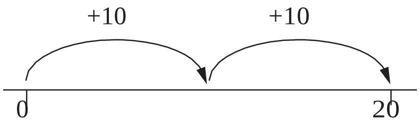
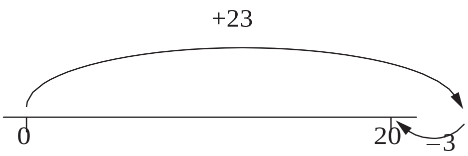
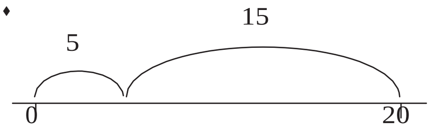
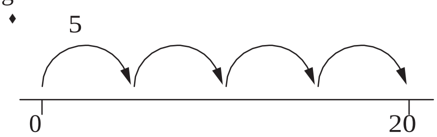
Line symmetry

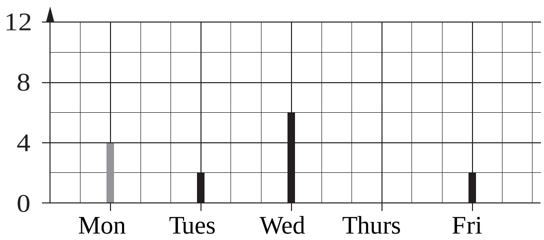
Tier & Question						
3-5	4-6	5-7	6-8		**Correct response**	**Additional guidance**
1						
				1m	Draws only the correct line of symmetry on the first shape, ie 	! ***Lines not ruled, accurate or solid*** Accept lines, even if dotted or dashed, extending at least across the shaded area, provided the pupil's intention is clear
				1m	Draws only the correct line of symmetry on the second shape, ie 	

Tier & Question						
3-5	4-6	5-7	6-8		**Step sizes**	
2					**Correct response**	**Additional guidance**
a				**1m**	Shows a correct way, other than add 8 then add 12, using exactly two steps eg ▪  ▪  ▪ 	✓ ***Add 12 then add 8*** ✓ ***Fractions, decimals or negatives*** ! ***Operations omitted*** Condone, provided the directions of any arrows, if shown, are correct eg, accept ♦  ! ***Arrows not shown or not consistent with their numbers*** Condone, provided the directions of any arrows, if shown, are correct eg, accept ♦ 
b				**1m**	5	! ***Answer shown only on the diagram*** eg ♦  Accept provided there is no ambiguity
c				**1m**	6	
				1m	$2\frac{1}{2}$ or equivalent	
				1m	8	✗ ***Answer of –8***

Temperature

Tier & Question 3-5	4-6	5-7	6-8		Correct response	Additional guidance
3				1m	Indicates 8 on the second thermometer	! ***Inaccurate indication*** Accept provided the indication is nearer to the correct integer than either of the neighbouring integers
				1m	Indicates –2 on the third thermometer	! ***Responses for the second and third thermometers transposed but otherwise correct*** Mark as 0, 1

Attending school

Tier & Question 3-5	4-6	5-7	6-8		Correct response	Additional guidance
4				2m	Completes the graph correctly for all four days, ie 	! ***Bars not ruled or accurate*** Accept provided the pupil's intention is clear and, for Friday, provided the height is nearer to 3 than to either 2 or 4 ! ***Bars drawn with widths different from that given*** Accept provided their intended widths are consistent ! ***Mark inserted to indicate zero on Thursday*** Accept provided the pupil's intention is clear
				or **1m**	Completes the graph correctly for two of the days or The only error is that the intended widths of the bars are inconsistent or Shows or implies the values 2, 6 and 3	✓ ***Values 2, 6 and 3 implied by bars of heights 2, 6 and 3 squares drawn***
				U1		

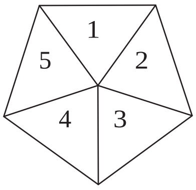
Tier & Question						
3-5	4-6	5-7	6-8			**Lemonade**
5					**Correct response**	**Additional guidance**
a				**1m**	£ 1.17	! ***For parts (a), (b) and (c), costs given in pence without amendment of units*** Penalise only the first occurrence of the cost given in pence within a correct response eg, for the costs as ◆ 117, 110, 109 [with correct bottle sizes] Mark as 0, 1, 1 eg, for the costs as ◆ 110, 109, 117 [with correct bottle sizes] Mark as 0, 0, 1
b				**1m** U1	Gives a complete correct response, ie Two $1\frac{1}{2}$ litre bottles, cost £ 1.10 or A 1 litre bottle and a 2 litre, cost £ 1.09	✓ ***For parts (b) or (c), unambiguous identification*** eg, for the two $1\frac{1}{2}$ litre bottles ◆ One of the middle size, and another ◆ $1\frac{1}{2}$ p $1\frac{1}{2}$ ◆ 55 and 55
c				**1m** U1	Gives a complete correct response that is different from one credited in part (b)	! ***For parts (b) or (c), uses three 1 litre bottles and gives the cost as £1.17*** If their (a) is either 1.10 or 1.09, accept ! ***For parts (b) and (c), correct costs given with incorrect or no identification of bottle sizes*** eg ◆ 1.10, then 1.09 Mark as 0, 1
d				**2m** ***or*** **1m**	13 Shows a complete correct method with not more than one computational error eg ▪ 1.5 2 1.5 2 *4 (error)* 2 2 2 10 4 p 10 e 14 or Shows the value 3, with no evidence of an incorrect method for this value	✗ ***Conceptual error*** eg ◆ 1.5 2 1.5 2 2.10 2 2 2 10 2.10 p 10 e 12.10 ◆ 5 t 2 e 10, 2 t $1\frac{1}{2}$ e $2\frac{1}{2}$ 10 p $2\frac{1}{2}$ e $12\frac{1}{2}$

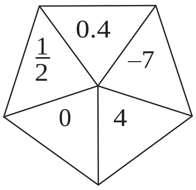
Tier & Question					**Computation**	
3-5	4-6	5-7	6-8			
6					**Correct response**	**Additional guidance**
a				**1m**	83	
				1m	185	
b				**1m**	37	
c				**1m**	62	

Tier & Question				
3-5	4-6	5-7	6-8	
7	1			

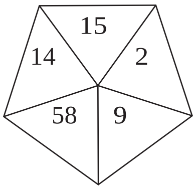
Spinners

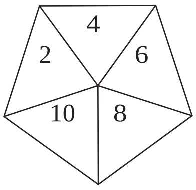
	Correct response	Additional guidance
1m	Gives five numbers less than 6 eg	✓ ***Numbers repeated on the same spinner***

▪ 

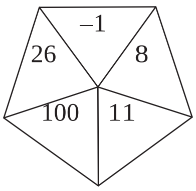
▪ 

1m Gives five numbers with more even numbers than odd numbers
eg

▪ 

▪ 

1m Gives five numbers that are not multiples of 3
eg

▪ 

Additional guidance

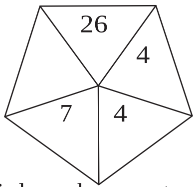
✓ ***Numbers repeated on the same spinner***

! ***Numbers written outside the spinner or on lines between the sections of the spinner***
Accept provided the pupil's intention is clear

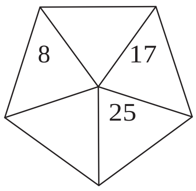
! ***Zero***
Accept zero as an even number, but not as an odd number
Accept zero as a multiple of 3

! ***Negative integers***
Accept numbers of the form 2n as even, numbers of the form 2n p 1 as odd and numbers of the form 3n as multiples of 3, where n is an integer

! ***Section(s) of the spinner left blank***
For the first mark, do not accept
For the second and third marks, accept provided exactly five **digits** have been given and the statement is satisfied
eg, for the second mark accept

♦ 

eg, for the third mark accept

♦ 

Adding three

Tier & Question						
3-5	4-6	5-7	6-8			
8	2				Correct response	Additional guidance
				1m	$4\frac{3}{4}$ or equivalent	
				1m	m2	

Changing numbers

Tier & Question						
3-5	4-6	5-7	6-8			
9	3				Correct response	Additional guidance
a	a			1m	30	
b	b			1m	1012	
c	c			1m	12	

Red Kites

Tier & Question						
3-5	4-6	5-7	6-8			
10	4				Correct response	Additional guidance
a	a			1m	1992	✓ ***Unambiguous indication of year*** eg ♦ 92
b	b			1m	1	! ***Units given*** Ignore
c	c			1m	6	

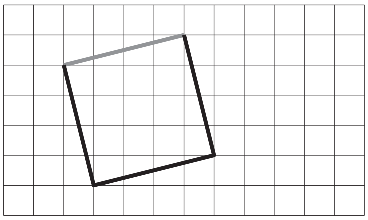
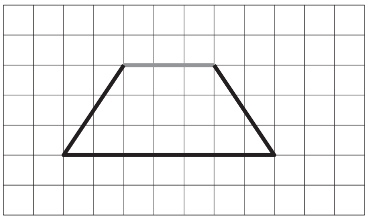
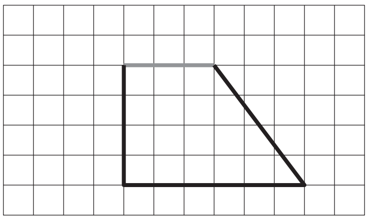
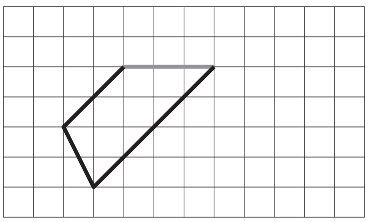
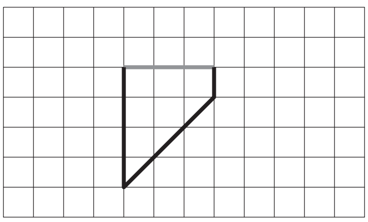
Tier & Question				Red Kites (cont)	
3-5	4-6	5-7	6-8		
10	4			**Correct response**	**Additional guidance**
d	d			**1m** Gives a correct statement that shows or implies that the number of nests has increased over the years eg ▪ The number of nests has increased a lot over the years ▪ The number of nests has nearly always gone up ▪ The ones with eggs increased and the ones without decreased and then increased again ▪ They roughly doubled each year, except from 1994 to 1995 when the number didn't change U1	✓ ***Minimally acceptable statement*** eg ♦ Increased ♦ Got bigger ♦ They multiplied ♦ More with eggs in ♦ They went 2, 4, 9, 21, 21, 39 ! ***Statement states or implies that the number of nests increased every one of the years*** Condone ! ***Statement confuses 'nests' with 'birds' or 'eggs' but is otherwise correct*** Condone ✗ ***Incomplete or incorrect statement*** eg ♦ The ones without eggs decreased and increased ♦ They roughly doubled each year ♦ They went 2, 4, 9, 21, 21, 36 Markers may find the following useful: Year: 91, 92, 93, 94, 95, 96 Eggs: 0, 4, 8, 20, 21, 35 No eggs: 2, 0, 1, 1, 0, 4
				1m Gives a correct statement that shows or implies an appreciation that some have stayed nearby eg ▪ More nests have got further away over the years, as well as some staying nearby ▪ At first they were only in the small circle, but then some went to the outer circle ▪ The range of distances has become bigger ▪ Over the years they gradually spread out over a wider area ▪ It got crowded in the centre so nests were built further away U1	✓ ***Minimally acceptable statement*** eg ♦ Some moved a bigger distance away ♦ There were nests further away ♦ More got further away ♦ They spread out ♦ They expanded ♦ They covered more area ♦ The average distance increased ✗ ***Incomplete statement*** eg ♦ They got further away over the years ♦ The distances increased ♦ They went up

Markers' table (from the guidance column):

Year	91	92	93	94	95	96
Eggs	0	4	8	20	21	35
No eggs	2	0	1	1	0	4

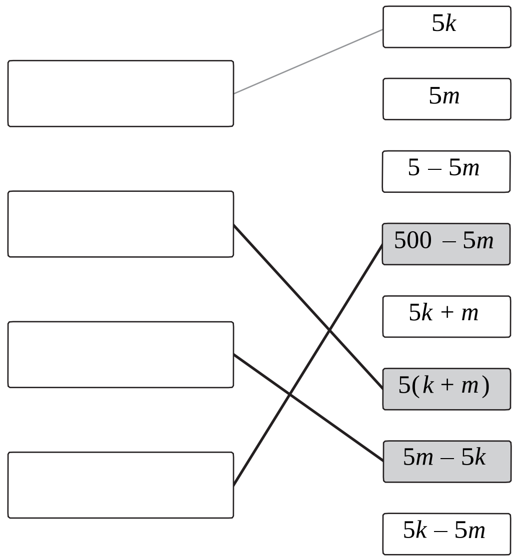
Tier & Question				Place value		
3-5	4-6	5-7	6-8			
11	**5**				**Correct response**	**Additional guidance**
a	a			**1m**	2022	
b	b			**1m**	20.22 or equivalent	! ***Follow through from part (a)*** Accept as their (a) d 100 ! ***Answer of 20 or 20.2*** Do not accept unless 20.22 is also seen, or 20 or 20.2 is from their follow through
c	c			**2m** ***or*** **1m**	0.45 or equivalent Shows the values 5.85 and 5.4 or equivalent or Shows the values 0.2 and 0.25 or equivalent or Shows or implies a complete correct method with not more than one computational error eg ▪ 3.5 3.3 <u>2.35</u> <u>2.1</u> <u>5.85</u> *<u>5.3</u> (error)* Answer: 0.55 ▪ 5.85 m *4.4 (error)* e 1.45	✗ ***Conceptual error within a correct method*** eg ♦ 3.5 p 2.35 e 5.40 ♦ 3.5 p 2.35 e 5.310 ♦ 2.35 is bigger than 2.1 by 0.34

Completing quadrilaterals

Tier & Question 3-5	4-6	5-7	6-8		Correct response	Additional guidance
12	6					
a	a			**1m**	Completes the correct square, ie 	! ***Lines not ruled or accurate*** Accept provided the pupil's intention is clear ! ***For part (a), vertices of the square not on the intersections of the grid*** Accept vertices within 2mm of the intersections of the grid ! ***Given line extended*** Do not accept in part (a), but condone in part (b)
b	b			**1m** U1	Completes a correct trapezium with exactly one pair of parallel sides eg ▪  ▪  ▪  ▪ 	! ***For part (b), vertices of the trapezium not on the intersections of the grid*** Accept provided the pupil's intention is clear and the conditions have been satisfied ! ***For part (b), parallel lines wrongly labelled*** Ignore

Tier & Question					**28 times table**	
3-5	4-6	5-7	6-8			
13	**7**	**1**			**Correct response**	**Additional guidance**
a	a	a		**1m**	Gives a correct method to show that 9 t 28 e 252 eg ▪ 28 t 9 252 [with evidence of the 7 tens] 7 ▪ | 20 8 9 | 180 72 so 72 p 180 ▪ 10 t 28 e 280, 280 m 28 ▪ 9 t 30 m 18 ▪ 2 t 28 e 56, 4 t 28 e 112, 8 t 28 e 224, so 224 p 28 ▪ 28 9 |25⁷2 [with evidence of the 7 tens]	✓ ***Minimally acceptable indication*** eg ♦ 72 p 180 ♦ 280 m 28 ♦ 270 m 18 ! ***Method uses repeated addition*** Accept provided there is evidence of how the addition has been carried out eg, accept ♦ 28 28 : 28 252 7 ♦ 28, 56, 84, 112, 140, 168, 196, 224, 252 ✗ ***Final answer incorrect*** eg ♦ 28 t 9 152 7
b	b	b		**2m** ***or*** **1m**	756 Shows or implies a complete correct method with not more than one computational error The most common correct methods: Use the relationship between 27 t 28 and 9 t 28 eg ▪ 3 t 252 (or their incorrect value from (a)) ▪ 252 p 252 p 252 Calculate 27 t 28 directly eg ▪ 10 t 27 e 270, 270 t 3 e 810, 810 m 54 ▪ | 20 7 20 | 400 140 8 | 160 56 so 400 p 160 p 140 p 56 ▪ 28 t 27 *460 (error)* 196 656	✓ ***For 1m, method uses repeated addition*** ✗ ***Conceptual error*** eg ♦ 28 t 27 ~~56~~ 196 ~~252~~ ♦ 20 t 20 e 400, 7 t 8 e 56 400 p 56 e 456

Matching expressions

3-5	4-6	5-7	6-8		Correct response	Additional guidance
14	8	3				
				1m	Matches the second statement with $5(k + m)$	✗ ***Statement matched with more than one expression*** Note to markers: The following shows the correct responses: 
				1m	Matches the third statement with $5m - 5k$	
				1m	Matches the fourth statement with $500 - 5m$	

Tier & Question						**Paper**
3-5	4-6	5-7	6-8			
15	**9**	**2**			**Correct response**	**Additional guidance**
a	a	a		**3m**	Completes all six entries correctly, ie | | Area | Perimeter | Square A 64 32 Rectangle B 32 24 Square C 16 16	
				or **2m**	Completes at least four entries correctly or Completes either column correctly	
				or **1m**	Completes any one row correctly or Gives an incorrect value for the area of square A, but not 8, then follows through correctly, by halving each time, to find the other two areas eg ▪ Area: Square A *60 (error)*, Rectangle B 30, Square C 15 or Gives the two columns transposed but otherwise correct	
b	b	b		**1m**	32	! ***Follow through from part (a)*** Accept as half their area of square A, provided this was not 8, or their area of rectangle B, provided this was not 4
c	c	c		**1m** U1	Indicates that the perimeter is greater than 24cm and gives a correct explanation eg ▪ $8 + 8 +$ a number bigger than 8 is bigger than 24 ▪ The hypotenuse is longer than 8cm and the other two are 8cm ▪ The diagonal is the longest side so it is greater than 8cm ▪ $8^2 + 8^2 = 128$, $\sqrt{128} > 8$	✓ ***Minimally acceptable explanation*** eg ♦ It doesn't have 3 equal sides ♦ The slope is the biggest side ♦ The fold is 11.(…) (or $\sqrt{128}$) ♦ $128 > 8^2$ ♦ The longer side is about 10 ♦ The perimeter would be more like 26 ! ***Incorrect units inserted*** Ignore ✗ ***Incorrect statement*** eg ♦ The longer side is 10 ♦ The perimeter is 26 Note to markers: The length of the hypotenuse is 11.3cm and the perimeter is 27.3cm, to 3 s.f.

CD player

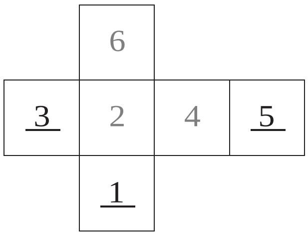
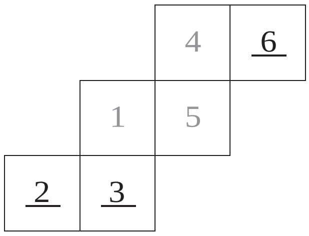
Tier & Question 3-5	4-6	5-7	6-8		Correct response	Additional guidance
16	10	4				
a	a	a		**2m** ***or*** **1m**	Gives all three correct values, ie 8.4 4.2 2.1 or equivalent Gives two correct values	! ***Units given*** Ignore ! ***Follow through*** For 1m, allow follow through from an incorrect value that is correctly divided by 2, provided their values are not 10, 5, $2\frac{1}{2}$ or 84, 42, 21 eg, for 1m accept ♦ *0.84* *(error)* 0.42 0.21 ♦ 8.4 *4.3* *(error)* 2.15
b	b	b		**2m** ***or*** **1m**	£ 98.70 Shows the digits 987 or Shows or implies the addition of the three values corresponding to 10%, 5% and $2\frac{1}{2}$% eg ▪ 8.4 + 4.2 + 2.1 ▪ 14.7 seen ▪ The sum of their 3 values from part (a) seen [with or without addition to 84] or Shows or implies a complete correct method with not more than one computational error eg ▪ 1.175 × 84 ▪ $84 + \frac{17.5}{100} \times 84$	! ***Follow through from part (a)*** For 2m, allow follow through as 84 + the sum of their three values from part (a), provided at least one of their values is not an integer, and the total is rounded or truncated to a whole number of pence

Tier & Question				**Solving**		
3-5	4-6	5-7	6-8			
17	11	5			**Correct response**	**Additional guidance**
				1m	4	! ***Incorrect notation*** eg, as an answer for the first mark ◆ k e t 4 Penalise only the first occurrence
				1m	m7	! ***Incomplete processing*** eg, as an answer for the first mark ◆ k e $\frac{8}{2}$ Penalise only the first occurrence

Tier & Question					**Odd or even?**	
3-5	4-6	5-7	6-8			
18	12	6			**Correct response**	**Additional guidance**
a	a	a		**1m** U1	Indicates that the number must be even and gives a correct explanation The most common correct explanations: State or imply that 4 itself is an even number eg ▪ 4 is even, so all its multiples must be too ▪ 4 is even and even t even e even, and even t odd e even ▪ You add fours together to get the multiples and even numbers added give even answers Show or imply the link between multiples of 4 and even numbers eg ▪ It's 2 t 2 t something, which must be even ▪ To get the 4 times table, you double the 2 times table ▪ Multiples of 4 always end in the evens 0, 2, 4, 6 or 8, eg 4, 8, 12, 16, 20 …	✓ ***Minimally acceptable explanation*** eg ♦ 4 is even (or a multiple of 2) ♦ All the 4 times table is even ♦ If you start with an even number, you end up with one too ♦ If the multiple is odd, the number itself would have to be odd ♦ 4 is a multiple of an even number ♦ Anything t an even number is even ♦ Any multiple of an even number is even ♦ Even p even e even ✓ ***Minimally acceptable explanation*** eg ♦ It's 2 t 2 t something ♦ They're every other even number ♦ It's the 2 times table doubled ♦ They end in 0, 2, 4, 6 or 8 ✗ ***Incomplete or incorrect explanation*** eg ♦ All multiples of 4 are even ♦ Any odd number divided by 4 leaves a remainder ♦ Any even number t even e even ♦ 3 t 4 e 12 which is even ♦ 4, 8, 12, 16, 20 … ♦ They all end in even numbers ♦ They end in 2, 4, 6 or 8
b	b	b		**1m** U1	Indicates that the number could be odd or even and gives a correct explanation that shows or implies at least one odd and one even factor eg ▪ Factors of 20 are 1, 2, 4, 5, 10 and 20, some are odd and some are even ▪ There are two odd factors and four even factors of 20 ▪ It could be 4 (even) or 5 (odd) ▪ 4 t 5 = 20 ▪ 20 is even, but 1 is odd and goes into everything	✓ ***Minimally acceptable explanation*** eg ♦ 1, 2, 4, 5, 10 and 20 ♦ It could be 4 or 5 ! ***Incomplete list of factors given*** Condone, provided none is incorrect and at least one odd and one even factor are shown eg, accept ♦ The factors of 20 are 1, 2, 4 and 5 ✗ ***Incomplete or incorrect explanation*** eg ♦ Factors of 20 can be odd or even ♦ It could be 5 ♦ It could be 2 (even) or 3 (odd)

Hexagon patterns

Tier & Question 3-5	4-6	5-7	6-8		Correct response	Additional guidance
19	13	7				
				2m	61	✗ ***For 2m or 1m, incorrect notation*** eg, for 2m ♦ 61*n*
				or **1m**	Shows the value 21 or 40, with no evidence of an incorrect method or a method using counting on for the value or Shows a correct method for both types of tile with not more than one computational error eg ▪ 20 p 1, 20 t 2 ▪ 20 t 3 p 1 or Shows a correct expression for the total number of hexagons, in which the terms in *n* have been collected together eg ▪ 3*n* p 1 ▪ *n* t 3 p 1	✗ ***For 1m, method shown uses counting on***

Tier & Question						Dice
3-5	4-6	5-7	6-8			
	14	8	1		**Correct response**	**Additional guidance**
				1m	Gives all three numbers correctly for the first net, ie 	
				1m	Gives all three numbers correctly for the second net, ie 	

Sizing

Tier & Question 3-5	4-6	5-7	6-8		Correct response	Additional guidance
	15	9	2			
	a	a	a	**2m**	Gives the four values in the correct order eg ▪ 3^2 2^4 5^2 3^3 smallest largest ▪ 9 16 25 27 smallest largest	
				or **1m**	Shows any three of the values 25, 9, 27, 16, with no evidence of an incorrect method for a correct value or Gives the four values in order of size, largest to smallest	
	b	b	b	**2m**	78 125	✗ ***Follow through using their value for 5^2 from part (a)***
				or **1m**	Shows the value 78 125, even if there is subsequent incorrect working or Shows or implies a complete correct method, with at least some correct processing, with not more than one computational error eg ▪ 3125 t 100 e 312 500, 312 500 d 4 ▪ 3125 t 5 e 15 625 15 625 t 5 ▪ 3125 t 25 *15525 (error)* 62500 78025 ▪ 3125 t 10 d 2 e *15 125 (error)* 15 125 t 10 d 2 e 75 625	✗ ***Conceptual error*** eg ♦ 3125 t 25 15625 6250 21875 ♦ 5^5 e 3125, 5^2 e 25, 3125 p 25 e 3150 ♦ 5^2 e 10, 3125 t 10 e 31 250

Tier & Question				**Operations**		
3-5	4-6	5-7	6-8			
	16	10	3		**Correct response**	**Additional guidance**
				2m	Gives all four correct operations, ie m d p t	
				or **1m**	Gives any two correct operations	

Tier & Question				**Finding *y***		
3-5	4-6	5-7	6-8			
	17	11	4		**Correct response**	**Additional guidance**
				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 ▪ 14 e 2*y* p 1 ▪ 3*y* p 13 e 5*y* ▪ 14 m 1 = 5*y* m 3*y* ▪ 13 = 2*y* ▪ 13 d 2	

Tier & Question				Favourite sport		
3-5	4-6	5-7	6-8			
	18	12	5		**Correct response**	**Additional guidance**
	a	a	a	**1m** U1	Indicates No and gives a correct explanation eg ▪ You can only find the mean of a set of numbers ▪ The data are in words not in figures so the mean cannot be found ▪ You can't add words up then divide by how many there are ▪ There are no numerical values	✓ ***Minimally acceptable explanation*** eg ♦ They are words ♦ You need numbers ♦ There are no quantities (or figures) ♦ You need to add them together ♦ You can't divide them (by 10) ✗ ***Incomplete explanation*** eg ♦ You can't find the mean of sports ♦ You can't have fractions of a word ♦ Not enough information ✗ ***Their explanation shows misconceptions about the mean*** eg ♦ You can't add them up and divide by 5 ♦ You can't divide a word by a word ♦ You can't find the mean of words unless you use the frequencies ♦ It doesn't say whether Hanif asked them to give the sports marks out of ten ♦ You can't put them in order because they are words not numbers ✗ ***Numerical values assigned*** eg ♦ Yes, football and swimming are 8 letters, cricket and netball are 7 and hockey is 6
	b	b	b	**1m**	Indicates Yes and gives a correct explanation eg ▪ The mode is the most common thing, so you can find it for numbers or words ▪ The mode is football as it was chosen most often, by four people ▪ You can see from the table what was the most popular sport	✓ ***Minimally acceptable explanation*** eg ♦ Most common ♦ Most popular ♦ More like football ♦ Highest is football ♦ Football is favourite ✗ ***Mode identified but not explained*** eg ♦ The mode is football ♦ Four of the ten chose football so this is the mode ♦ Football appears more than once ✗ ***Incomplete or incorrect explanation*** eg ♦ Most ♦ You can see how many picked each sport ♦ There's more than one of some results ♦ You can find the mode from both numbers and words ♦ Football was chosen the most as five people said that

<table>
<tr><th colspan="4">Tier & Question</th><th colspan="3">Consideration</th></tr>
<tr><th>3-5</th><th>4-6</th><th>5-7</th><th>6-8</th><th></th><th></th><th></th></tr>
<tr><th></th><th>19</th><th>13</th><th>6</th><th></th><th>Correct response</th><th>Additional guidance</th></tr>
<tr><td></td><td>a</td><td>a</td><td>a</td><td>1m
U1</td><td>Gives a correct counter example, using a value that is less than or equal to one
eg
▪ m4 t 2 = m8 which is not greater than 2
▪ 0.1 t 2 = 0.2, 0.2 < 2
▪ 2 t 1 = 2 which is not greater than 2

or

Gives a correct general explanation
eg
▪ Two times a negative number is less than 2
▪ Double a number between 0 and 1 is not greater than 2</td><td rowspan="2">! Throughout the question, the result of their counter example is not shown and/or the comparison is not explicit
Condone provided only one of these aspects is omitted
eg, for part (a) accept
♦ m4 t 2 = m8
♦ m4 t 2 < 2
However, penalise only the first occurrence of both aspects omitted
eg, for part (a)
♦ m4 t 2

! Throughout the question, their general statement makes no explicit comparison
Condone
eg, for part (a) accept
♦ Multiply it by a negative number
♦ Numbers less than 1
eg, for part (b) accept
♦ Take away a negative number
♦ Numbers less than 0
eg, for part (c) accept
♦ Take a number from 0 to 1 and square it
♦ Positive numbers that are decimals starting with nought point…

! Throughout the question, other numerical examples or general reasoning given alongside a correct response
Ignore other numerical examples, even if they are incorrect or support the given statement
If a correct counter example is given, ignore any general explanation unless it contradicts the counter example given</td></tr>
<tr><td></td><td>b</td><td>b</td><td>b</td><td>1m
U1</td><td>Gives a correct counter example, using a value that is less than or equal to zero
eg
▪ 2 m (m3) = 5, 5 > 2
▪ 2 m 0 = 2 which is not less than 2

or

Gives a correct general explanation
eg
▪ Two minus a negative number is greater than 2</td></tr>
<tr><td></td><td></td><td>c</td><td>c</td><td>1m
U1</td><td>Indicates No and gives a correct counter example, using a value that is greater than or equal to zero and less than or equal to one
eg
▪ $1^2 = 1$ which is equal not bigger
▪ 0 t 0 = 0, so it stays the same
▪ $\left(\frac{1}{2}\right)^2 = \frac{1}{4}$ but $\frac{1}{4} < \frac{1}{2}$
▪ 0.1 t 0.1 = 0.01, not greater than 0.1

or

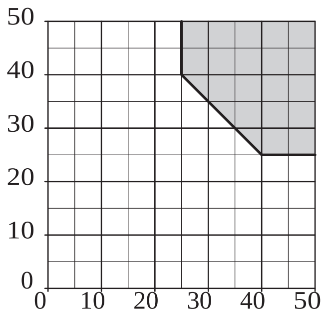
Indicates No and gives a correct general explanation
eg
▪ When you square a number between 0 and 1 the answer gets smaller not bigger
▪ Fractions bigger than zero that are not top heavy get smaller when squared</td><td>✓ For part (c), minimally acceptable counter example
eg
♦ $1^2 = 1$
♦ 0 t 0 is not greater than 0
♦ $\left(\frac{1}{2}\right)^2 < \frac{1}{2}$

✗ For part (c), incorrect response
eg
♦ $(m2)^2$ = m4 which is less than m2
♦ It's not true for negative numbers
♦ It is only true for numbers that are bigger than 1
♦ It is not true for numbers that are smaller than 1
♦ It's not true for decimals or fractions
♦ It's only false when the number is 1</td></tr>
</table>

Test

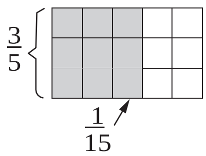
Tier & Question 3-5	4-6	5-7	6-8		Correct response	Additional guidance
	21	14	7			
	a	a	a	**1m**	N	! ***N identified only on scatter graph*** Accept provided unambiguous ! ***Highest total mark given*** Ignore if given with N If N is not given, accept a value between 82 and 83 inclusive
	b	b	b	**1m** U1	Indicates True and gives a correct explanation eg ▪ The range for coursework is 40, but the range for the test is 30 ▪ Coursework goes from 10 to 50, test from 10 to 40 ▪ Both start at 10 but coursework goes to 50 rather than to 40	✓ ***Minimally acceptable explanation*** eg ♦ 30, 40 seen ♦ Highest to lowest is bigger for coursework marks than for test marks ♦ Coursework marks spread over 8 squares of the graph, test marks over 6 squares ♦ The points are more spread out along the x-axis than along the y-axis ♦ They had a wider span of marks ♦ There's more variation in the cwk marks ♦ They're more scattered (or spread out) ♦ C/w results start at the same mark as test results, but finish at a higher mark ! ***Ambiguous notation*** eg ♦ Test marks 10 m 40 Coursework 10 m 50 Condone ! ***Incorrect use of % sign*** Ignore ✗ ***Incomplete explanation*** eg ♦ Coursework has a greater range than test marks ♦ Coursework has lowest 10, highest 50 ♦ Coursework went up to 50, test went up to 40 ♦ Coursework goes from 10 to 50 but test goes from 10 to 30 except for 2 pupils ♦ Coursework marks were varied, but test marks were mostly between 10 and 25 ✗ ***Incorrect explanation*** eg ♦ The range for coursework was 40, but the range for test was 20 ♦ The test marks are more scattered

Test (cont)

Tier & Question 3-5	4-6	5-7	6-8		Correct response	Additional guidance
	21	14	7			
	c	c	c	**1m**	70	✓ ***Value on the line excluded*** eg ♦ More than 70 ♦ Just over 70 ♦ 71 ! ***Range of total marks given*** Accept provided all values win prizes eg, accept ♦ At least 70 ♦ 70 or more eg, do not accept ♦ About 70 ! ***Incorrect use of % sign*** Ignore
		d	d	**2m** ***or*** **1m**	Indicates the correct region, ie  Indicates both the lines $x = 25$ and $y = 25$, even if there are other errors or Indicates the line x p $y = 65$, even if there are other errors	✓ ***Unambiguous indication of region*** eg ♦ Correct region labelled R ! ***For 2m or 1m, lines dotted or dashed*** Accept unless the intention is only to indicate specific points ! ***Lines not ruled or accurate*** Accept provided the pupil's intention is clear ! ***Line(s) drawn 'below' correct position in order to allow the region to include points on the line(s)*** Condone provided their line is parallel to the correct line, and is closer to the correct mark than to the correct mark m5 eg, for x p $y = 65$ accept ♦ Line parallel to x p $y = 65$ and closer to x p $y = 65$ than to x p $y = 60$! ***For 1m, line(s) not full length*** Accept provided each line spans at least 10 marks

Tier & Question			
3-5	4-6	5-7	6-8
	20	15	8

Fractions

Mark	Correct response	Additional guidance
1m	$\frac{7}{12}$ or equivalent	✗ ***For the first and third marks, incorrect notation or incorrect further working*** eg, for the first mark ◆ $\frac{3\frac{1}{2}}{6}$! ***Throughout the question, decimal or percentage values rounded or truncated*** For $\frac{7}{12}$, accept 0.583 or better, or percentage equivalents For $\frac{8}{15}$, accept 0.53 or better, or percentage equivalents For $\frac{1}{3}$, accept 0.33 or better, or percentage equivalents For $\frac{1}{15}$, accept 0.066 or 0.067 or better, or percentage equivalents
1m	For either calculation shows, or implies by a correct answer or otherwise, a correct method that would enable addition or subtraction of fractions The most common correct methods: Show or imply correct fractions with common denominators eg, for the first calculation ▪ $\frac{3}{12}$, $\frac{4}{12}$ seen ▪ $\frac{1}{4} = \frac{15}{60}$, $\frac{1}{3} = \frac{20}{60}$ ▪ $\frac{3\frac{1}{2}}{6}$ eg, for the second calculation ▪ $\left(\frac{3}{5} =\right) \frac{9}{15}$ seen with no attempt to change the denominator of the fraction $\frac{1}{15}$ ▪ $\frac{3}{5} = \frac{18}{30}$, $\frac{1}{15} = \frac{2}{30}$ ▪  Convert correctly to decimals or percentages, even if their value is rounded or truncated eg, for the first calculation ▪ 0.25 and 0.33 seen ▪ 25 and 33.3 seen eg, for the second calculation ▪ 0.6 and 0.067 seen	
1m	$\frac{8}{15}$ or equivalent	

Triangle

Tier & Question 3-5	4-6	5-7	6-8	Mark	Correct response	Additional guidance
		16	9			
				3m	15, with no evidence of an incorrect method	✗ ***Incorrect method*** eg ♦ $180 - 90 = 90$ $90 \div 2 = 45$ $45 \div 3 = 15$ Note to markers: From the three triangles, the following simplified deductions may be made about a and b 1. $2a = b$ 2. $b = 30$ 3. $a + b = 45$
				or 2m	Shows or implies at least two correct deductions about a and b eg - $2a + (180 - b) = 180$, $3b + 90 = 180$ - $2a = b$, $b = 30$ - $b + 2b + 90 = 180$, $2a + 2b + 90 = 180$ - $b = 30$, $a + b = 45$ - $2a = 180 - (180 - b)$, $a + a + 2b = 90$ - $2a = b$, $a + b = 45$ - $(a =)\ 30 \div 2$ or Shows or implies a complete correct method with not more than one computational error eg - $3 \times b + 90 = 180$, $b = 25$ *(error)* $180 - 25 = 155$, $180 - 155 = 2 \times a$, so $a = 25 \div 2$ $= 12.5$	
				or 1m U1	Shows or implies at least one correct deduction about b or about a and b eg - $b = 2 \times a$ - $b = 30$ - $(180 - 90) \div 3 = 30$ - $2b + 2a = 180 - 90$	✓ ***b = 2a implied by values shown*** eg ♦ a as 22.5° and b as 45°

Tier & Question				
3-5	4-6	5-7	6-8	
		17	10	

Multiplication grids

Correct response

3m Completes both multiplication grids correctly, ie

t	8	m5
9	72	m45
m6	m48	30

t	0.2	0.4
3	0.6	1.2
15	3	6

or

2m Completes one of the grids correctly and makes not more than one error or omission in the other grid

or

1m Completes one of the grids correctly

or

Makes not more than one error or omission in each grid

Additional guidance

! ***For 2m or 1m, follow through***

For the first grid, accept follow through only from their m5 but note that their m5 must be negative

eg

♦

t	8	m6 *(error but negative)*
9	72	m54
m6	m48	30

follow through

For the second grid, accept follow through only from their 15

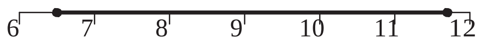
eg

♦

t	0.2	0.4
3	0.6	1.2
10 (error)	2	6

follow through

Building

Tier & Question						
3-5	4-6	5-7	6-8			
		18	11		**Correct response**	**Additional guidance**
		a	a	**1m**	Gives a correct explanation eg ▪ The highest was 11.7, the smallest was 6.5 11.7 m 6.5 = 5.2 ▪ 11.7 m 6.5 ▪ Count up from 6 to 11, that's 5, then count up from 5 to 7 for the 0.2	✓ ***Minimally acceptable explanation*** eg ♦ 6.5 to 11.7 ♦  ! ***Ambiguous notation*** eg ♦ 6.5 m 11.7 Condone ✗ ***Maximum and minimum values given, but with no indication of how the range is found*** eg ♦ 11.7, 6.5 ✗ ***Values not identified or identified incorrectly*** eg ♦ It's the largest – the smallest ♦ 11|7 m 6|5 = 5.2
		b	b	**1m**	8.7 or equivalent	✓ ***Unambiguous indication of correct value*** ! ***Value identified incorrectly*** eg ♦ 8|7 Condone if this error was penalised in part (a), otherwise do not accept
		c	c	**1m**	$33\frac{1}{3}$	! ***Value rounded*** Accept 33 or better

Tier & Question				
3-5	4-6	5-7	6-8	
		19	12	

Quiz

	Correct response	Additional guidance
2m	see below	see below

2m

Correct response

Indicates B can win and gives a correct explanation that makes explicit or implicit reference to the questions still remaining
eg

- A has 54 points, B has 45 points. B could get 10 more right and A none, so B would win on 55
-

	Person A	Person B
Points so far	54	45
Maximum possible	64	55
Minimum possible	54	45

So B could win

- A is 54, B is 45, 45 p 10 = 55
- A = 54, B = 45, 54 m 45 = 9, but there are still 10 questions left
- 10% of 90 is 9, so A is only 9 ahead with 10 remaining

Additional guidance

✓ ***For 2m, minimally acceptable explanation***
eg

- 54, 45
  45 p 10 = 55
- B can get 55, and A is on 54
- A = 54, B = 45, but there are 10 questions left
- A has 54 correct and B has 45 correct
  B can win if she gets all the rest right
- 54 and 45, so B can only win if A gets all the rest wrong
- 10% of 90 is 9, but there are 10 remaining
- A is 9 ahead with 10 remaining

✗ ***For 2m, incomplete explanation***
eg

- A has 54 and B has 45
- A is only 9 ahead of B
- B can win if they get all the rest right and A gets all the rest wrong

or
1m

Shows both the values 54 and 45

or

States or implies that there is a difference of 9 between the scores of A and B
eg

- A is only 9 ahead of B
- 10% of 90 = 9

or

Gives a complete correct explanation that refers to the questions still remaining, with not more than one error, and follows through to make their correct decision

- B is at *45* and 45 p 10 = 55
  A is at *56 (error)* so B cannot win or draw
- A is 60 *(error)*, B is 45, 60 m 45 = 15 but there are only 10 questions left so B cannot win or draw

or

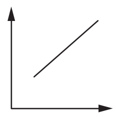
Gives a partially correct explanation that fails to show or imply the actual number of questions still remaining, but with a correct decision
eg

- B can win if they get all the rest right and A gets all the rest wrong

U1

Tier & Question						***x* and *y***
3-5	4-6	5-7	6-8			
		20	13		**Correct response**	**Additional guidance**
				3m	Gives both $x = -1$ and $y = 3$ and shows a complete correct method for solving algebraically eg ▪ $3x + 7y = 18$ $3x + 6y = 15$ so $y = 3$ $x + 6 = 5$ so $x = -1$ ▪ $3(5 - 2y) + 7y = 18$ $15 - 6y + 7y = 18$ $y = 3$, so $x = -1$	✗ ***Method used is trial and improvement***
				or **2m**	Shows a complete correct method for solving algebraically with not more than one error eg ▪ $3x + 7y = 18$ $3x + 6y = 15$ so $y = 4$ *(error)* $x + 8 = 5$ so $x = -3$ ▪ $3(5 - 2y) + 7y = 18$ $15 - 5y$ *(error)* $+ 7y = 18$ $2y = 3$ $y = 1.5$, so $x = 2$ ▪ $18 - 7y = 15 - 6y$ $-y = 3$ *(error)* so $y = -3$ and $x = 5 - (2 \times -3)$ $= 11$	✓ ***For 2m, the only error is to use the wrong operation, spuriously eliminating either x or y*** eg ♦ $3x + 7y = 18$ $3x + 6y = 15$ $13y = 33$, so $y = 2\frac{7}{13}$ $x + 5\frac{1}{13} = 5$ so $x = -\frac{1}{13}$
				or **1m**	Shows two correct equations that would allow elimination of either x or y eg ▪ $3x + 7y = 18$ $3x + 6y = 15$ ▪ $6x + 14y = 36$ $7x + 14y = 35$ or Attempts to solve by substitution and forms a correct equation in only one variable eg ▪ $18 - 7y = 15 - 6y$ ▪ $3(5 - 2y) + 7y = 18$	

Line of best fit

Tier & Question						
3-5	4-6	5-7	6-8			
		21	14		**Correct response**	**Additional guidance**
		a	a	**1m**	Indicates that the correlation is negative	! ***Negative qualified*** Ignore qualifiers that accompany ‘negative’ eg, accept ♦ Strong negative ♦ A bit negative Do not accept without ‘negative’ eg, do not accept ♦ Strong ♦ Inverse ✗ ***Relationship described without reference to correlation*** eg ♦ The more time spent studying, the less time spent watching television
		b	b	**1m**	Gives a correct explanation The most common correct explanations: Use the gradient or its meaning eg ▪ That would be positive correlation, not negative ▪ That would mean the more studying you do the more TV you watch ▪ The gradient should be negative, but $y = x + 40$ has a positive gradient ▪ The gradient is -1, not 1 ▪ It would slope up not down [1m category continued on next page]	✓ ***Minimally acceptable explanation*** eg ♦ It would not be negative [with ‘negative’ given for part (a), implying correlation] ♦ The gradient is not negative ♦ It would need to be $-x$ ♦ It would slope the wrong way ♦ It would go up not down ♦ It would look more like this:  [sketches any positive gradient] ✗ ***Incomplete explanation*** eg ♦ It would not be negative [without ‘negative’ given for part (a)] ♦ The equation needs a minus sign ♦ The line is going in the wrong direction ♦ It’s at the wrong angle

Line of best fit (cont)

Tier & Question 3-5	4-6	5-7	6-8		Correct response	Additional guidance
		21	14			
		b	b	**1m cont**	Refer to the fact that the values of *y* do not go above 40 eg ▪ When *x* is positive, *y* would always be more than 40, but none of the points are like this ▪ Adding 40 to the *x* coordinates of the points gives different *y* coordinates from theirs ▪ Nobody watched TV for more than 40 hours, but this equation would give hours watching TV as hours studying plus 40	✓ ***Minimally acceptable explanation*** eg ♦ The vertical scale only goes up to 40 ♦ All the *y*s are below 40 [condone that this is not true at (0, 40)] ♦ 10 p 40 e 50, the graph doesn't go up that far ♦ Nobody watched TV for more than 40 hours ✗ ***Incomplete explanation*** eg ♦ The scale only goes up to 40 ♦ Everything is below 40 ♦ Everything would be higher on the graph ♦ Nobody studied for more than 40 hours
					Use a point or points on the line of best fit, or the meaning of its coordinates eg ▪ When *x* is 10, *y* e 10 p 40 e 50, but on the graph it is 30 ▪ When *y* is 0, 0 e *x* p 40 so *x* e m40, but the line of best fit goes to (40, 0) ▪ Someone studying for 20 hours would watch TV for about 20 hours, not 60 ▪ *y* = *x* p 40 means that *y* > *x*, but this is not true for some of the points on the line	✓ ***Minimally acceptable explanation*** eg ♦ When *x* e 10, *y* e 30 so *y* ≠ *x* p 40 ♦ Line goes through (40, 0) but *y* e 40 p 40 *y* e 80 ♦ 20 ≠ 20 p 40 ♦ The equation shows that *y* > *x*, but this is not always true for the line ✗ ***Incomplete or incorrect explanation*** eg ♦ 5 ≠ 30 p 40 [indicating use of the cross at (30, 5) rather than a value on the line of best fit]
					Give a correct equation for the line of best fit eg ▪ The line of best fit goes to 40 on both axes so the equation should be *x* p *y* e 40 ▪ It should be *y* e m*x* p 40	✓ ***Minimally acceptable explanation*** eg ♦ *x* p *y* e 40 ♦ *y* e m*x* p 40 ✗ ***For part (b), incorrect statement alongside a correct explanation*** eg ♦ It should be *x* p *y* e 40, *y* e *x* p 40 would be a vertical line ♦ That would be positive correlation, the equation should be *y* = *x* m 40

Tier & Question			
3-5	4-6	5-7	6-8
		22	15

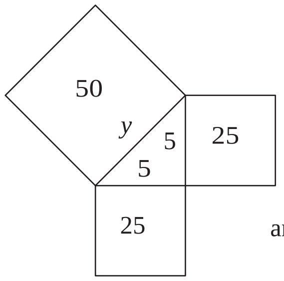
Thinking diagonally

15a — 1m

Correct response

Gives a correct explanation that shows the correct application of Pythagoras' theorem
eg

- 3(5^2 p 5^2) e 3(25 p 25)
- 5 t 5 p 5 t 5 e 50, so y e 350
- y^2 e 5^2 p 5^2
  y^2 e 50
  y e 350
-



so y^2 e 50
and y e 350

- It's an enlargement of a 1, 1, 32 triangle, so it's 532 and 532 = 350

Additional guidance

✓ ***Minimally acceptable explanation***
eg
- 3(5^2 p 5^2)
- 5^2 p 5^2
- 3(25 p 25)
- 3(2 t 25)
- 2 t 25 e 50 [with no evidence of a misconception, eg about area]
- 532 e 3(5^2 t 2)

! ***Throughout the question, incorrect notation or incorrect further working alongside a correct explanation***
Condone
eg, for part (a) accept
- y^2 e 5^2 p 5^2
  y^2 e 50
  y^2 *(error)* e 350
- 5 t 5 p 5 t 5 e 50,
  so length is 350 e *7.5 (error)*

✗ ***Incomplete or incorrect explanation***
eg
- y^2 e 50
- Use Pythagoras
- 325 p 325
- It's 2 t 325
- 5 t 10 e 50 and y e 350
- Area = 5 t 5 t 2
  = 50
- 5 t 5 e 25 which is half the square, so 25 t 2 e 50

15b — 1m

Correct response

Indicates 3200 and gives a correct explanation
eg
- 2350 e 34 t 350 e 3200
- The sides would be 10cm
  3(10^2 p 10^2) e 3200
- 1032 e 3100 t 32 e 3200
- 3100 is 10, 10 d 2 e 5 but the length of the diagonal of the small square is > 5
- 3100 e 10, but 350 ≠ 5

Additional guidance

✓ ***Minimally acceptable explanation***
eg
- 2350 e 34 t 350
- 3(10^2 p 10^2)
- 10^2 p 10^2
- 10 t 10 e 100, 100 t 2

✗ ***Incomplete or incorrect explanation***
eg
- 3200 e 2350
- 1032
- 3100 e 10
- 50 t 2 then t 2 again
- Area = 10 t 10 t 2
  = 200

Tier & Question					**Rounding**	
3-5	4-6	5-7	6-8			
			16		**Correct response**	**Additional guidance**
			a	**2m** ***or*** **1m**	8.7×10^4 Shows the value 86 790, not expressed in any kind of index form or Shows the digits 87	! ***Throughout the question, zero(s) given after the last decimal place within standard form notation*** Condone eg, for 2m in part (a) accept ♦ 8.7000×10^4
			b	**2m** ***or*** **1m**	1×10^{-3} Shows the value 0.000 867 9 or equivalent, not expressed in any kind of index form or Shows the value 0.001 or equivalent eg ▪ 0.1×10^{-2} or Shows the value 0.000 9 or equivalent eg ▪ 9.0×10^{-4} ▪ 0.9×10^{-3}	

Factorising

Tier & Question 3-5	4-6	5-7	6-8		Correct response	Additional guidance
			17			
			a	**1m**	Gives *x* and 4 in either order	**!** ***For part (a), terms in x incorrect, but constants correct*** eg ♦ 2*x* and 4, 2*x* then 10 Mark as 0, 1 **!** ***Throughout the question, unconventional notation*** eg, for the first mark of part (a) ♦ 1 t *x* and 4 eg, for the first 2 marks of part (b) ♦ (*x* m 2) t (*x* p 9) Condone **!** ***Throughout the question, quadratic expressions equated to zero*** Ignore, even if there are errors in a subsequent attempt to solve it eg, for the first 2 marks of part (b) accept ♦ (*x* m 2)(*x* p 9) e 0 so *x* e 2 or *x* e 9 *(error)*
				1m	Gives *x* then 10 or m10 then m*x*	
			b	**2m**	Factorises the expression correctly and fully eg ▪ (*x* m 2)(*x* p 9)	
				or **1m**	Shows one correct factor or Identifies the digits 2 and 9 eg ▪ 9 m 2 e 7, 9 t m2 e m18 ▪ The numbers must be 2 and 9 ▪ m2, m9 ▪ (*x* m 9)(*x* p 2)	
				1m	Factorises the expression correctly and fully eg ▪ (*x* p 7)(*x* m 7)	

Tier & Question					Mean of zero	
3-5	4-6	5-7	6-8			
			18		**Correct response**	**Additional guidance**
				2m	Makes all three correct decisions, ie **Must** be true / **Could** be true / **Cannot** be true Row 1: Could be true ✓ Row 2: Must be true ✓ Row 3: Could be true ✓	
				***or* 1m** U1	Makes two correct decisions	

Tier & Question					**Equation**	
3-5	4-6	5-7	6-8			
			19		**Correct response**	**Additional guidance**
			a	**1m**	(p)20 and m20, in either order	✓ ***Answer of ± 20***
			b	**1m**	Gives a correct explanation eg ▪ The denominator is zero, and fractions with denominators of zero are not defined ▪ $\frac{60}{0}$ isn't defined	✓ ***Minimally acceptable explanation*** eg ♦ The denominator would be zero ♦ You can't divide by 0 ♦ There's nothing to divide 60 by ♦ $\frac{60}{0}$! ***Use of 'infinity'*** Condone eg, accept ♦ The closer the denominator gets to 0, the more the fraction tends towards infinity ♦ Anything divided by 0 e infinity ♦ $\frac{60}{0}$ e ∞ ✗ ***Incomplete or incorrect explanation*** eg ♦ It's $\frac{60}{\sqrt{0}}$ and that's impossible ♦ Because 10 m 10 e 0 ♦ You cannot divide by zero and you cannot find the square root of zero ♦ The denominator would be zero but $\frac{60}{0}$ e 60 ♦ $\frac{60}{0}$ e 0
			c	**1m**	Gives a value less than 10	✓ ***Correct set of values described*** eg ♦ x < 10 ♦ Less than 10

Tier & Question					*Marking overlay available*	**Journeys**
3-5	4-6	5-7	6-8			
			20		**Correct response**	**Additional guidance**
				3m	Draws a complete correct curve within the tolerance as shown on the overlay	✗ ***For 3m, points joined with straight lines for a curve***
				or **2m**	Draws a curve within the tolerance as shown on the overlay between (2, 50) and (5, 20), even if the curve is incorrect or omitted elsewhere or Indicates at least 5 correct points on the graph, even if the points are not joined or joined with straight lines	! ***For 2m or 1m, points inaccurately plotted*** Accept provided the pupil's intention is clear ! ***For 2m or 1m, points not explicitly plotted*** Accept unambiguous indications of the locations of points on the graph, for example the tops of vertical lines
				or **1m**	Indicates at least 3 correct points on the graph or Gives the coordinates of at least 5 correct points with x values greater than 0 but less than or equal to 10	Note to markers: The five points with integer coordinates are (1, 100), (2, 50), (4, 25), (5, 20) and (10, 10)

Tier & Question				
3-5	4-6	5-7	6-8	
			21	

Tangent

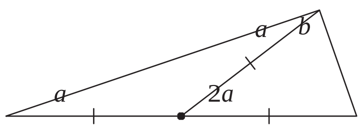
Mark	Correct response	Additional guidance
2m	Gives a correct proof that shows or implies the following three facts:	✓ ***Minimally acceptable proof***

2m

Gives a correct proof that shows or implies the following three facts:

1. AC is a diameter (of the large circle)
2. ∠APC is 90°
3. PC is a radius (of the small circle)

eg

- Because AC is a diameter of the larger circle, ∠APC must be 90°. PC is a radius of the smaller circle and since AP is at right angles to PC, AP must be a tangent of the smaller circle
- PC is a radius ⇐ given
∠APC = 90° ⇐ angle in a semicircle [1 implied]
∴ AP is a tangent
- An angle subtended by a diameter is 90°, [1 implied]
so the line through A and P is at right angles [2 implied]
to a radius of the smaller circle [3 implied]
- 

  $b = \frac{180 - 2a}{2}$ so $b = 90 - a$

  therefore $a + b = 90$ [1 + 2 implied]
and PC is a radius of the small circle

or
1m

States or implies that AC is a diameter (of the large circle)

or

States or implies that ∠APC is 90°

or

States or implies that PC is a radius (of the small circle)

U2

Additional guidance

✓ ***Minimally acceptable proof***

eg

- Since AC goes through B, [1 implied]
angle P is a right angle [2 implied]
and P is joined to the centre [3 implied]
- ABCD goes through the diameters [1 implied]
so AP touches the small circle at right angles [2 implied]
to the radius [3 implied]

✗ ***For 2m, incomplete proof***

eg

- ∠APC is 90, so AP and radius PC are at right angles and AP must be a tangent to the smaller circle [1 omitted]
- AC is a diameter and AP touches the small circle at P where PC is a radius [2 omitted]
- ∠APC = 90° because AP and PC are joined to either end of a diameter, so AP is a tangent as it's at right angles to PC [3 omitted]

Index to mark schemes