Mathematics tests

Mark scheme for Paper 1
Tiers 3–5, 4–6, 5–7 and 6–8

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 × 6 = 18 in an otherwise correct long multiplication. A conceptual error is a more serious misunderstanding of the relevant mathematics; when such an error is seen no method marks may be awarded. Examples of conceptual errors are: misunderstanding of place value, such as multiplying by 2 rather than 20 when calculating 35 × 27; subtracting the smaller value from the larger in calculations such as 45 – 26 to give the answer 21; incorrect signs when working with negative numbers.
The pupil's accuracy is marginal according to the overlay provided.	Overlays can never be 100% accurate. However, provided the answer is within, or touches, the boundaries given, the mark(s) should be awarded.
The pupil's answer correctly follows through from earlier incorrect work.	Follow through marks may be awarded only when specifically stated in the mark scheme, but should not be allowed if the difficulty level of the question has been lowered. Either the correct response or an acceptable follow through response should be marked as correct.
There appears to be a misreading affecting the working.	This is when the pupil misreads the information given in the question and uses different information. If the original intention or difficulty level of the question is not reduced, deduct one mark only. If the original intention or difficulty level is reduced, do not award any marks for the question part.
The correct answer is in the wrong place.	Where a pupil has shown understanding of the question, the mark(s) should be given. In particular, where a word or number response is expected, a pupil may meet the requirement by annotating a graph or labelling a diagram elsewhere in the question.

What if …

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 seen.	A correct response should always be marked as correct unless the mark scheme states otherwise.	
The correct response has been crossed or rubbed out and not replaced.	Mark, according to the mark scheme, any legible crossed or rubbed out work that has not been replaced.	
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 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.	

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: $2 + n$ $n + 2$ $2n$ $\dfrac{n}{2}$ n^2

Accept ✓	Take care ! Do not accept ✗

✓ Unambiguous use of a different case or variable
    eg N used for n
        x used for n
	! Unconventional notation
	    eg $n \times 2$ or $2 \times n$ or $n2$
	        or $n + n$ for $2n$
	        $n \times n$ for n^2
	        $n \div 2$ for $\dfrac{n}{2}$ or $\dfrac{1}{2}n$
	        $2 + 1n$ for $2 + n$
	        $2 + 0n$ for 2
	Within a question that demands simplification, do not accept as part of a final answer involving algebra. Accept within a method when awarding partial credit, or within an explanation or general working.
	
	✗ Embedded values given when solving equations
	    eg in solving $3x + 2 = 32$,
	        $3 \times 10 + 2 = 32$ for $x = 10$
	
	To avoid penalising the two types of error below more than once within each question, do not award the mark for the *first* occurrence of each type within each question. Where a question part carries more than one mark, only the final mark should be withheld.

✓ Words used to precede or follow equations or expressions
    eg $t = n + 2$ tiles or
        tiles $= t = n + 2$
        for $t = n + 2$
	! Words or units used within equations or expressions
	    eg n tiles $+ 2$
	        n cm $+ 2$
	Do not accept on their own.
	Ignore if accompanying an acceptable response.

✓ Unambiguous letters used to indicate expressions
    eg $t = n + 2$ for $n + 2$
	✗ Ambiguous letters used to indicate expressions
	    eg $n = n + 2$ for $n + 2$

Responses involving time
A time interval   For example: 2 hours 30 minutes

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

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

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

Responses involving coordinates
For example: (5, 7)

Accept ✓	Do not accept ✗
✓ Unconventional notation 　　eg　(05, 07) 　　　　(five, seven) 　　　　$(\overset{x}{5}, \overset{y}{7})$ 　　　　(x = 5, y = 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 $\frac{7}{10}$ 70%

Accept ✓	Take care ! Do not accept ✗

✓ Equivalent decimals, fractions and percentages
 	
   eg   0.700, $\frac{70}{100}$, $\frac{35}{50}$, 70.0%
	The first **four** categories of error below should be ignored if accompanied by an acceptable response, but should not be accepted on their own. However, to avoid penalising the first **three** types of error below more than once within each question, do not award the mark for the *first* occurrence of each type of error unaccompanied by an acceptable response. Where a question part carries more than one mark, only the final mark should be withheld.
	
	! A probability that is incorrectly expressed
	   eg 7 in 10
	        7 over 10
	        7 out of 10
	        7 from 10

✓ 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 expressed as a percentage without a percentage sign.
	
	! A fraction with other than integers in the numerator and/or denominator.
	
	! A probability expressed as a ratio
	   eg 7 : 10, 7 : 3, 7 to 10
	
	✗ A probability greater than 1 or less than 0

Recording marks awarded on the test paper

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

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

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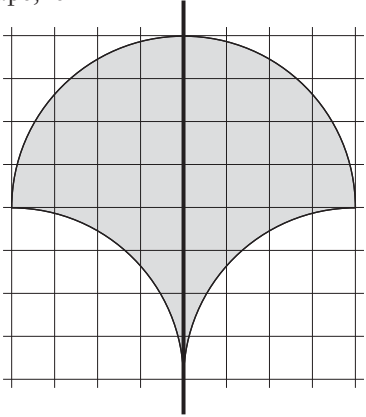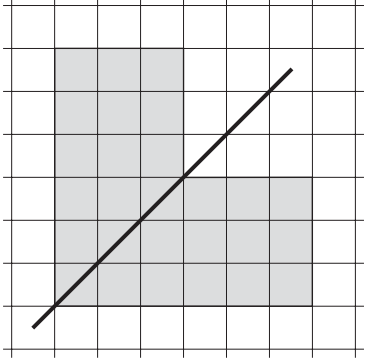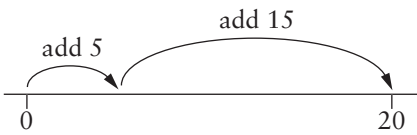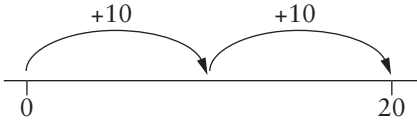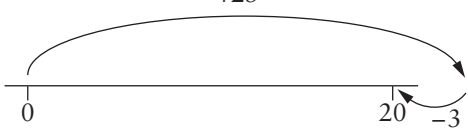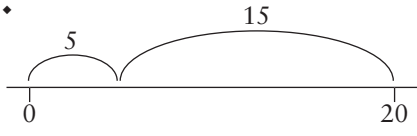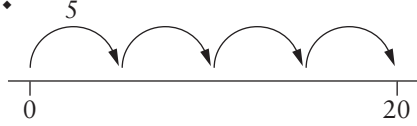
Awarding levels

The sum of the marks gained on paper 1, paper 2 and the mental mathematics paper determines the level awarded. Level threshold tables, which show the mark ranges for the award of different levels, will be available on the NAA website *www.naa.org.uk/tests* from Monday 19 June 2006. NAA will also send a copy to each school in July.
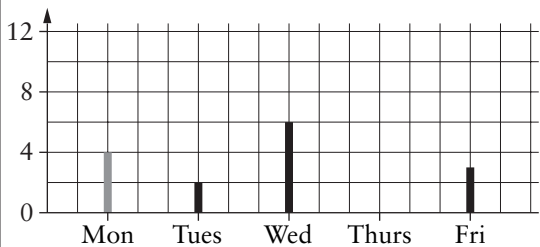
Schools will be notified of pupils' results by means of a marksheet, which will be returned to schools by the external marking agency with the pupils' marked scripts. The marksheet will include pupils' scores on the test papers and the levels awarded.

BLANK PAGE

Tier & Question					Line symmetry	
3-5	4-6	5-7	6-8			
1					**Correct response**	**Additional guidance**

	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					Step sizes	
3-5	**4-6**	**5-7**	**6-8**			
2					**Correct response**	**Additional guidance**
a				**1m**	Shows a correct way, other than add 8 then add 12, using exactly two steps eg ■ add 5 add 15 0 20 ■ +10 +10 0 20 ■ +23 0 20 −3	✓ *Add 12 then add 8* ✓ *Fractions, decimals or negatives* ! *Operations omitted* Condone, provided the directions of any arrows, if shown, are correct eg, accept ◆ 5 15 0 20 ! *Arrows not shown or not consistent with their numbers* Condone, provided the directions of any arrows, if shown, are correct eg, accept ◆ add 10 add 10 0 20
b				**1m**	5	! *Answer shown only on the diagram* eg ◆ 5 0 20 Accept provided there is no ambiguity
c				**1m**	6	
				1m	$2\frac{1}{2}$ or equivalent	
				1m	8	✗ *Answer of −8*
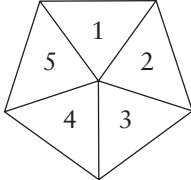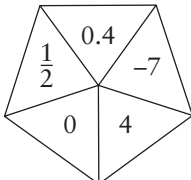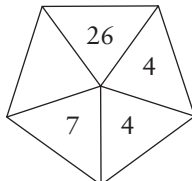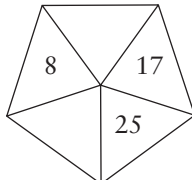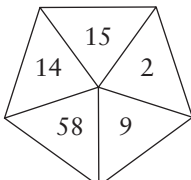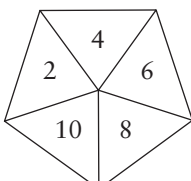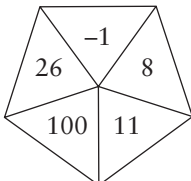
Tier & Question						
3-5	**4-6**	**5-7**	**6-8**			
3						**Temperature**

	Correct response	Additional guidance
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

Tier & Question						
3-5	**4-6**	**5-7**	**6-8**			
4						**Attending school**

	Correct response	Additional guidance
2m	Completes the graph correctly for all four days, ie (bar chart: Mon 4, Tues 2, Wed 6, Thurs 0, Fri 3; vertical axis labelled 0, 4, 8, 12; horizontal axis Mon Tues Wed Thurs Fri)	**!** *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 　◆ $1\frac{1}{2}$ + $1\frac{1}{2}$ 　◆ 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 + 10 = 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 　　　　　　　　$\frac{2}{10}$ 　　　　　　　10　　2.10 + 10 = 12.10 　◆ 5 × 2 = 10, 2 × $1\frac{1}{2}$ = $2\frac{1}{2}$ 　　10 + $2\frac{1}{2}$ = $12\frac{1}{2}$

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						**Spinners**
3-5	**4-6**	**5-7**	**6-8**			
7	**1**				**Correct response**	**Additional guidance**

1m	Gives five numbers less than 6 eg ■ ■ 	✓ *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 2*n* as even, numbers of the form 2*n* + 1 as odd and numbers of the form 3*n* as multiples of 3, where *n* is an integer
1m	Gives five numbers with more even numbers than odd numbers eg ■ ■ 	! *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 ◆
1m	Gives five numbers that are not multiples of 3 eg ■ 	

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

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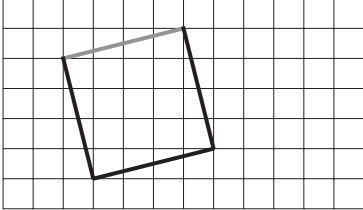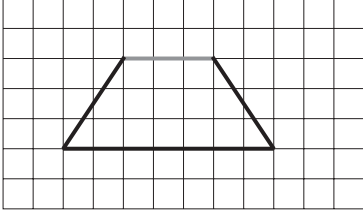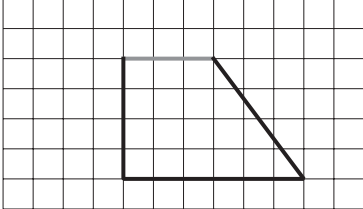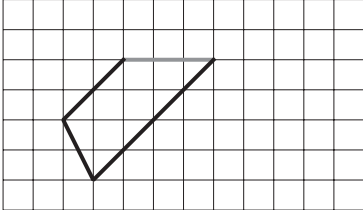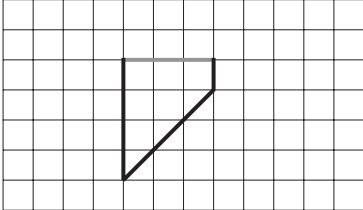
Tier & Question					**Red Kites**	
3-5	**4-6**	**5-7**	**6-8**			
10	**4**				Correct response	Additional guidance
a	a			1m	1992	✓ *Unambiguous indication of year* eg ◆ 92
b	b			1m	1	! *Units given* Ignore
c	c			1m	6	

Red Kites (cont)

Tier & Question					Correct response	Additional guidance
3-5	4-6	5-7	6-8			
10	4					

| 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 | ✓ *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

| | | | | (U1) | | |

| | | | | 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 | ✓ *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 |

| | | | | (U1) | | |

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) ÷ 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 − 4.4 *(error)* = 1.45	✘ *Conceptual error within a correct method* eg ♦ 3.5 + 2.35 = 5.40 ♦ 3.5 + 2.35 = 5.310 ♦ 2.35 is bigger than 2.1 by 0.34	

Completing quadrilaterals

Tier & Question					
3-5	4-6	5-7	6-8		
12	6			Correct response	Additional guidance

| a | a | | **1m** | Completes the correct square, ie | **!** *Lines not ruled or accurate* |

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** | Completes a correct trapezium with exactly one pair of parallel sides |

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

(U1)

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

28 times table

13	7	1			**Correct response**	**Additional guidance**

a a a **1m**

Gives a correct method to show that
$9 \times 28 = 252$
eg
- $\begin{array}{r} 28 \\ \times\ \underline{9} \\ 252 \\ \scriptstyle 7 \end{array}$ [with evidence of the 7 tens]

- $\begin{array}{c|cc} & 20 & 8 \\ \hline 9 & 180 & 72 \end{array}$ so 72 + 180

- $10 \times 28 = 280$, $280 - 28$
- $9 \times 30 - 18$
- $2 \times 28 = 56$,
  $4 \times 28 = 112$,
  $8 \times 28 = 224$, so $224 + 28$
- $\begin{array}{r} 28 \\ 9\overline{)25\,^7 2} \end{array}$ [with evidence of the 7 tens]

Additional guidance:

✓ *Minimally acceptable indication*
  eg
  - 72 + 180
  - 280 − 28
  - 270 − 18

! *Method uses repeated addition*
Accept provided there is evidence of how the addition has been carried out
  eg, accept
  - $\begin{array}{r} 28 \\ 28 \\ \vdots \\ \underline{28} \\ 252 \\ \scriptstyle 7 \end{array}$

  - 28, 56, 84, 112, 140, 168, 196, 224, 252

✗ *Final answer incorrect*
  eg
  - $\begin{array}{r} 28 \\ \times\ \underline{9} \\ 152 \\ \scriptstyle 7 \end{array}$

---

b b b **2m**

756

or
1m

Shows or implies a complete correct method with not more than one computational error

The most common correct methods:

Use the relationship between 27×28 and 9×28
eg
- 3×252 (or their incorrect value from (a))
- $252 + 252 + 252$

Calculate 27×28 directly
eg
- $10 \times 27 = 270$, $270 \times 3 = 810$,
  $810 - 54$

- $\begin{array}{c|cc} & 20 & 7 \\ \hline 20 & 400 & 140 \\ 8 & 160 & 56 \end{array}$

  so $400 + 160 + 140 + 56$

- $\begin{array}{r} 28 \\ \times\ \underline{27} \\ 460\ (error) \\ \underline{196} \\ 656 \end{array}$

Additional guidance:

✓ *For 1m, method uses repeated addition*

✗ *Conceptual error*
  eg
  - $\begin{array}{r} 28 \\ \times\ \underline{27} \\ 56 \\ \underline{196} \\ 252 \end{array}$
  - $20 \times 20 = 400$, $7 \times 8 = 56$
    $400 + 56 = 456$

Tier & Question					**Matching expressions**	
3-5	**4-6**	**5-7**	**6-8**			
14	**8**	**3**			**Correct response**	**Additional guidance**

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 $500 - 5m$	

5k

5m

5 − 5m

500 − 5m

5k + m

5(k + m)

5m − 5k

5k − 5m

Tier & Question						
3-5	4-6	5-7	6-8			**Paper**
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**	Indicates that the perimeter is greater than 24cm and gives a correct explanation	✓ *Minimally acceptable 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.
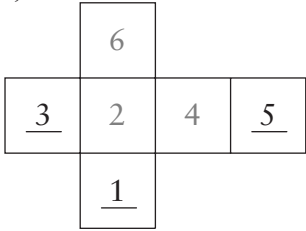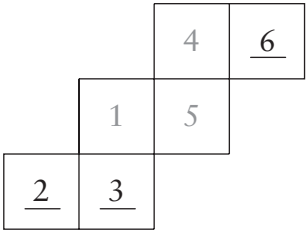
(U1)

CD player

Tier & Question					Correct response	Additional guidance
3-5	4-6	5-7	6-8			
16	**10**	**4**				

a	a	a		**2m**	Gives all three correct values, ie	**!** *Units given*
						Ignore

$$\boxed{8.4}$$
$$\boxed{4.2}$$
$$\boxed{2.1} \quad \text{or equivalent}$$

or
1m Gives two correct values

! *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

- $\boxed{0.84}$ *(error)*
  $\boxed{0.42}$
  $\boxed{0.21}$

- $\boxed{8.4}$
  $\boxed{4.3}$ *(error)*
  $\boxed{2.15}$

b	b	b		**2m**	£ 98.70	**!** *Follow through from part (a)*

or
1m 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
- $84 + \dfrac{17.5}{100} \times 84$

! *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 • $k = \times 4$ Penalise only the first occurrence
				1m	−7		! *Incomplete processing* eg, as an answer for the first mark • $k = \dfrac{8}{2}$ Penalise only the first occurrence

Odd or even?

Tier & Question					Correct response	Additional guidance
3-5	4-6	5-7	6-8			
18	12	6				

| a | a | a | | **1m** | 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 × even = even,
          and even × odd = 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 × 2 × 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 × an even number is even
  ◆ Any multiple of an even number is even
  ◆ Even + even = even

✓ *Minimally acceptable explanation*
eg
  ◆ It's 2 × 2 × 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 × even = even
  ◆ 3 × 4 = 12 which is even
  ◆ 4, 8, 12, 16, 20 …
  ◆ They all end in even numbers
  ◆ They end in 2, 4, 6 or 8 |

(U1)

| b | b | b | | **1m** | 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 × 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) |

(U1)

Hexagon patterns

Tier & Question						
3-5	4-6	5-7	6-8		**Correct response**	**Additional guidance**
19	13	7				

	Correct response	Additional guidance
2m	61	✖ *For 2m or 1m, incorrect notation* eg, for 2m ◆ 61n

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 + 1, 20 × 2
	  ■ 20 × 3 + 1
	
	or
	
	Shows a correct expression for the total number of hexagons, in which the terms in n have been collected together eg
	  ■ 3n + 1
	  ■ n × 3 + 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

	6		
<u>3</u>	2	4	<u>5</u>
	<u>1</u>		

1m Gives all three numbers correctly for the second net, ie

		4	<u>6</u>
	1	5	
<u>2</u>	<u>3</u>		

Tier & Question				Correct response	Additional guidance
3-5	4-6	5-7	6-8		
	15	**9**	**2**	**Sizing**	

| | 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

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 × 100 = 312 500,
    312 500 ÷ 4
■ 3125 × 5 = 15 625
    15 625 × 5

■   3125
    ×   25
    15525 *(error)*
    62500
    78025

■   3125 × 10 ÷ 2 = *15 125 (error)*
    15 125 × 10 ÷ 2 = 75 625 | ✖ *Follow through using their value for 5^2 from part (a)*

✖ *Conceptual error*
eg
◆   3125
  ×   25
  15625
   6250
  21875

◆ 5^5 = 3125, 5^2 = 25,
  3125 + 25 = 3150
◆ 5^2 = 10, 3125 × 10 = 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 − ÷ + ×	
				or **1m**	Gives any two correct operations	
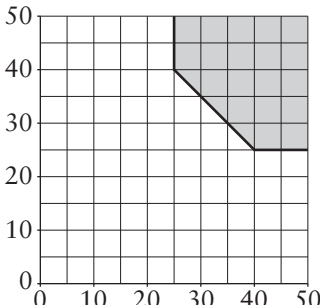
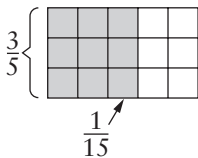| Tier & Question					**Finding** y	
3-5	4-6	5-7	6-8			
	17	11	4		**Correct response**	**Additional guidance**
				2m	$6\frac{1}{2}$ or equivalent	
				or **1m**	Shows or implies a correct first step of algebraic manipulation that either reduces the number of terms or collects unknowns on one side of the equation and numbers on the other eg ▪ $14 = 2y + 1$ ▪ $3y + 13 = 5y$ ▪ $14 − 1 = 5y − 3y$ ▪ $13 = 2y$ ▪ $13 ÷ 2$	

Favourite sport

Tier & Question				Correct response	Additional guidance
3-5	4-6	5-7	6-8		
	18	12	5		

| | a | a | a | 1m | 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

(U1) | ✓ *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 |

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

Consideration

	19	13	6		Correct response	Additional guidance

	a	a	a	**1m**	Gives a correct counter example, using a value that is less than or equal to one eg ■ $-4 \times 2 = -8$ which is not greater than 2 ■ $0.1 \times 2 = 0.2$, $0.2 < 2$ ■ $2 \times 1 = 2$ 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 (U1)	**!** *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 ◆ $-4 \times 2 = -8$ ◆ $-4 \times 2 < 2$ However, penalise only the first occurrence of both aspects omitted eg, for part (a) ◆ -4×2 **!** *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…
	b	b	b	**1m**	Gives a correct counter example, using a value that is less than or equal to zero eg ■ $2 - (-3) = 5$, $5 > 2$ ■ $2 - 0 = 2$ which is not less than 2 or Gives a correct general explanation eg ■ Two minus a negative number is greater than 2 (U1)	**!** *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
		c	c	**1m**	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 ■ $0 \times 0 = 0$, so it stays the same ■ $\left(\frac{1}{2}\right)^2 = \frac{1}{4}$ but $\frac{1}{4} < \frac{1}{2}$ ■ $0.1 \times 0.1 = 0.01$, 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 (U1)	**✓** *For part (c), minimally acceptable counter example* eg ◆ $1^2 = 1$ ◆ 0×0 is not greater than 0 ◆ $\left(\frac{1}{2}\right)^2 < \frac{1}{2}$ **✗** *For part (c), incorrect response* eg ◆ $(-2)^2 = -4$ which is less than -2 ◆ 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

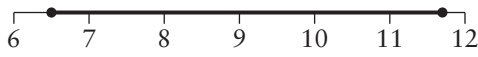| Tier & Question					**Test**
3-5	4-6	5-7	6-8		
	21	**14**	**7**	**Correct response**	**Additional guidance**
	a	a	a	**1m** N	**!** *N identified only on scatter graph* Accept provided unambiguous **!** *Highest total mark given* Ignore if given with N If N is not given, accept a value between 82 and 83 inclusive

	b	b	b	**1m** 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 − 40
					     Coursework 10 − 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

(U1)

Test (cont)

Tier & Question				Correct response	Additional guidance
3-5	4-6	5-7	6-8		
	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**	Indicates the correct region, ie
					
					or
					1m
					
					Indicates both the lines $x = 25$ and $y = 25$, even if there are other errors
					
					or
					
					Indicates the line $x + y = 65$, 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 −5
						eg, for $x + y = 65$ accept
						  ◆ Line parallel to $x + y = 65$ and closer to $x + y = 65$ than to $x + y = 60$
						
						! *For 1m, line(s) not full length*
						Accept provided each line spans at least 10 marks

Fractions

Tier & Question						
3-5	**4-6**	**5-7**	**6-8**		**Correct response**	**Additional guidance**
	20	**15**	**8**			

1m	$\frac{7}{12}$ or equivalent	✘ *For the first and third marks, incorrect notation or incorrect further working* eg, for the first mark
		◆ $\frac{3\frac{1}{2}}{6}$
1m	For either calculation shows, or implies by a correct answer or otherwise, a correct method that would enable addition or subtraction of fractions	! *Throughout the question, decimal or percentage values rounded or truncated*
	The most common correct methods:	For $\frac{7}{12}$, accept 0.583 or better, or percentage equivalents
	Show or imply correct fractions with common denominators eg, for the first calculation	For $\frac{8}{15}$, accept 0.53 or better, or percentage equivalents
	▪ $\frac{3}{12}$, $\frac{4}{12}$ seen	For $\frac{1}{3}$, accept 0.33 or better, or percentage equivalents
	▪ $\frac{1}{4} = \frac{15}{60}$, $\frac{1}{3} = \frac{20}{60}$	For $\frac{1}{15}$, accept 0.066 or 0.067 or better, or percentage equivalents
	▪ $\frac{3\frac{1}{2}}{6}$	
	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	

Tier & Question						
3-5	4-6	5-7	6-8			**Triangle**
		16	**9**		**Correct response**	**Additional guidance**

				3m	15, with no evidence of an incorrect method
				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**	Shows or implies at least one correct deduction about *b* or about *a* and *b* eg
					■ $b = 2 \times a$
					■ $b = 30$
					■ $(180 - 90) \div 3 = 30$
					■ $2b + 2a = 180 - 90$

Additional guidance:

✘ *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. $a + b = 45$

✓ *b = 2a implied by values shown*
eg
  ◆ *a* as 22.5° and *b* as 45°

(U1)

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

Multiplication grids

Correct response	Additional guidance

3m Completes both multiplication grids correctly, ie

×	8	−5
9	72	−45
−6	−48	30

×	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

! *For 2m or 1m, follow through*
For the first grid, accept follow through only from their −5 but note that their −5 must be negative
eg

×	8	−6 *(error but negative)*
9	72	−54 ← follow through
−6	−48	30

or
1m Completes one of the grids correctly

or

Makes not more than one error or omission in each grid

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

×	0.2	0.4
3	0.6	1.2
10 *(error)*	2	6

follow through

Building

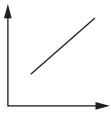| Tier & Question					Correct response	Additional guidance
3-5	4-6	5-7	6-8			
		18	**11**			
		a	a	**1m**	Gives a correct explanation eg ■ The highest was 11.7, the smallest was 6.5 $11.7 - 6.5 = 5.2$ ■ $11.7 - 6.5$ ■ Count up from 6 to 11, that's 5, then count up from 5 to 7 for the 0.2	✓ *Minimally acceptable explanation* eg ♦ 6.5 to 11.7 ♦ 6 7 8 9 10 11 12 ! *Ambiguous notation* eg ♦ $6.5 - 11.7$ 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 – 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

Quiz

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

	Correct response	Additional guidance
2m	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	✓ *For 2m, minimally acceptable explanation* eg ♦ 54, 45 45 + 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

■
	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 + 10 = 55
■ A = 54, B = 45, 54 − 45 = 9, but there are still 10 questions left
■ 10% of 90 is 9, so A is only 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 + 10 = 55
   A is at 56 *(error)* so B cannot win or draw
■ A is 60 *(error)*, B is 45, 60 − 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
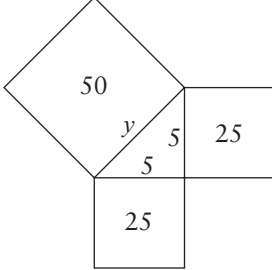
(U1)

Tier & Question						
3-5	4-6	5-7	6-8			***x* and *y***
		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 $x = -3$
	 • $\quad 3(5 - 2y) + 7y = 18$
	   $15 - 5y$ *(error)* $+ 7y = 18$
	   $\quad 2y = 3$
	   $\quad y = 1.5$, so $x = 2$
	 • $18 - 7y = 15 - 6y$
	   $-y = 3$ *(error)*
	   so $y = -3$ and $x = 5 - (2 \times -3)$
	   $\quad = 11$
		✓ *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
	 • $18 - 7y = 15 - 6y$
	 • $3(5 - 2y) + 7y = 18$	

Tier & Question					
3-5	4-6	5-7	6-8		**Line of best fit**
		21	**14**		

Line of best fit

					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

✓ *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

[1m category continued on next page]

Tier & Question					
3-5	4-6	5-7	6-8		
		21	**14**		

Line of best fit (cont)

			Correct response	Additional guidance
	b	b	**1m** cont	

Correct response

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

Use a point or points on the line of best fit, or the meaning of its coordinates

eg

- When x is 10, $y = 10 + 40 = 50$, but on the graph it is 30
- When y is 0, $0 = x + 40$ so $x = -40$, but the line of best fit goes to (40, 0)
- Someone studying for 20 hours would watch TV for about 20 hours, not 60
- $y = x + 40$ means that $y > x$, but this is not true for some of the points on the line

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 $x + y = 40$
- It should be $y = -x + 40$

Additional guidance

✓ *Minimally acceptable explanation*

eg

- The vertical scale only goes up to 40
- All the ys are below 40 [condone that this is not true at (0, 40)]
- $10 + 40 = 50$, 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

✓ *Minimally acceptable explanation*

eg

- When $x = 10$, $y = 30$ so $y \neq x + 40$
- Line goes through (40, 0) but $y = 40 + 40$ $y = 80$
- $20 \neq 20 + 40$
- The equation shows that $y > x$, but this is not always true for the line

✗ *Incomplete or incorrect explanation*

eg

- $5 \neq 30 + 40$ [indicating use of the cross at (30, 5) rather than a value on the line of best fit]

✓ *Minimally acceptable explanation*

eg

- $x + y = 40$
- $y = -x + 40$

✗ *For part (b), incorrect statement alongside a correct explanation*

eg

- It should be $x + y = 40$, $y = x + 40$ would be a vertical line
- That would be positive correlation, the equation should be $y = x - 40$

Thinking diagonally

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

			Correct response	**Additional guidance**

| | a | 1m | Gives a correct explanation that shows the correct application of Pythagoras' theorem | ✓ *Minimally acceptable explanation* |

Correct response:

eg
- $\sqrt{(5^2 + 5^2)} = \sqrt{(25 + 25)}$
- $5 \times 5 + 5 \times 5 = 50$, so $y = \sqrt{50}$
- $y^2 = 5^2 + 5^2$
  $y^2 = 50$
  $y = \sqrt{50}$
-

so $y^2 = 50$
and $y = \sqrt{50}$

- It's an enlargement of a 1, 1, $\sqrt{2}$ triangle, so it's $5\sqrt{2}$ and $5\sqrt{2} = \sqrt{50}$

Additional guidance:

✓ *Minimally acceptable explanation*
eg
- $\sqrt{(5^2 + 5^2)}$
- $5^2 + 5^2$
- $\sqrt{(25 + 25)}$
- $\sqrt{(2 \times 25)}$
- $2 \times 25 = 50$ [with no evidence of a misconception, eg about area]
- $5\sqrt{2} = \sqrt{(5^2 \times 2)}$

! *Throughout the question, incorrect notation or incorrect further working alongside a correct explanation*
Condone
eg, for part (a) accept
- $y^2 = 5^2 + 5^2$
  $y^2 = 50$
  y^2 *(error)* $= \sqrt{50}$
- $5 \times 5 + 5 \times 5 = 50$,
  so length is $\sqrt{50} = 7.5$ *(error)*

✗ *Incomplete or incorrect explanation*
eg
- $y^2 = 50$
- Use Pythagoras
- $\sqrt{25} + \sqrt{25}$
- It's $2 \times \sqrt{25}$
- $5 \times 10 = 50$ and $y = \sqrt{50}$
- Area $= 5 \times 5 \times 2$
       $= 50$
- $5 \times 5 = 25$ which is half the square, so $25 \times 2 = 50$

| | b | 1m | Indicates $\sqrt{200}$ and gives a correct explanation | ✓ *Minimally acceptable explanation* |

Correct response:

eg
- $2\sqrt{50} = \sqrt{4} \times \sqrt{50} = \sqrt{200}$
- The sides would be 10cm
  $\sqrt{(10^2 + 10^2)} = \sqrt{200}$
- $10\sqrt{2} = \sqrt{100} \times \sqrt{2} = \sqrt{200}$
- $\sqrt{100}$ is 10, $10 \div 2 = 5$ but the length of the diagonal of the small square is > 5
- $\sqrt{100} = 10$, but $\sqrt{50} \neq 5$

Additional guidance:

✓ *Minimally acceptable explanation*
eg
- $2\sqrt{50} = \sqrt{4} \times \sqrt{50}$
- $\sqrt{(10^2 + 10^2)}$
- $10^2 + 10^2$
- $10 \times 10 = 100$, 100×2

✗ *Incomplete or incorrect explanation*
eg
- $\sqrt{200} = 2\sqrt{50}$
- $10\sqrt{2}$
- $\sqrt{100} = 10$
- 50×2 then $\times 2$ again
- Area $= 10 \times 10 \times 2$
         $= 200$

Tier & Question					
3-5	4-6	5-7	6-8		**Rounding**
			16	**Correct response**	**Additional guidance**

a	**2m**	8.7×10^4
	or **1m**	Shows the value 86 790, not expressed in any kind of index form or Shows the digits 87

Additional guidance (for part a):

! *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**	1×10^{-3}

	or **1m**	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}

Tier & Question					**Factorising**

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 ◆ $2x$ and 4, $2x$ then 10 Mark as 0, 1
				1m	Gives x then 10 or -10 then $-x$	**!** *Throughout the question, unconventional notation* eg, for the first mark of part (a) ◆ $1 \times x$ and 4 eg, for the first 2 marks of part (b) ◆ $(x - 2) \times (x + 9)$ 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 ◆ $(x - 2)(x + 9) = 0$ so $x = 2$ or $x = 9$ *(error)*
			b	2m	Factorises the expression correctly and fully eg ▪ $(x - 2)(x + 9)$ *or* 1m Shows one correct factor or Identifies the digits 2 and 9 eg ▪ $9 - 2 = 7$, $9 \times -2 = -18$ ▪ The numbers must be 2 and 9 ▪ $-2, -9$ ▪ $(x - 9)(x + 2)$	
				1m	Factorises the expression correctly and fully eg ▪ $(x + 7)(x - 7)$	

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
☐	✓	☐
✓	☐	☐
☐	✓	☐

or

1m Makes two correct decisions

(U1)

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

Equation

				Correct response	Additional guidance

| | | | a | **1m** | (+)20 and −20, 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 = infinity
◆ $\frac{60}{0} = \infty$

✗ *Incomplete or incorrect explanation*
eg
◆ It's $\frac{60}{\sqrt{0}}$ and that's impossible
◆ Because 10 − 10 = 0
◆ You cannot divide by zero and you cannot find the square root of zero
◆ The denominator would be zero but $\frac{60}{0} = 60$
◆ $\frac{60}{0} = 0$ |

| | | | c | **1m** | Gives a value less than 10 | ✓ *Correct set of values described*
eg
◆ $x < 10$
◆ Less than 10 |

Tier & Question						
3-5	4-6	5-7	6-8		*Marking overlay available*	**Journeys**
			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)

Tangent

Tier & Question						
3-5	4-6	5-7	6-8			
			21		**Correct response**	**Additional guidance**

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]
	   ■
	
	 $b = \dfrac{180 - 2a}{2}$ so $b = 90 - a$
	
	 therefore $a + b = 90$ [1 + 2 implied]
	 and PC is a radius of the small circle
		✓ *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]

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)

Index to mark schemes