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KEY STAGE

B

ALL TIERS

2004

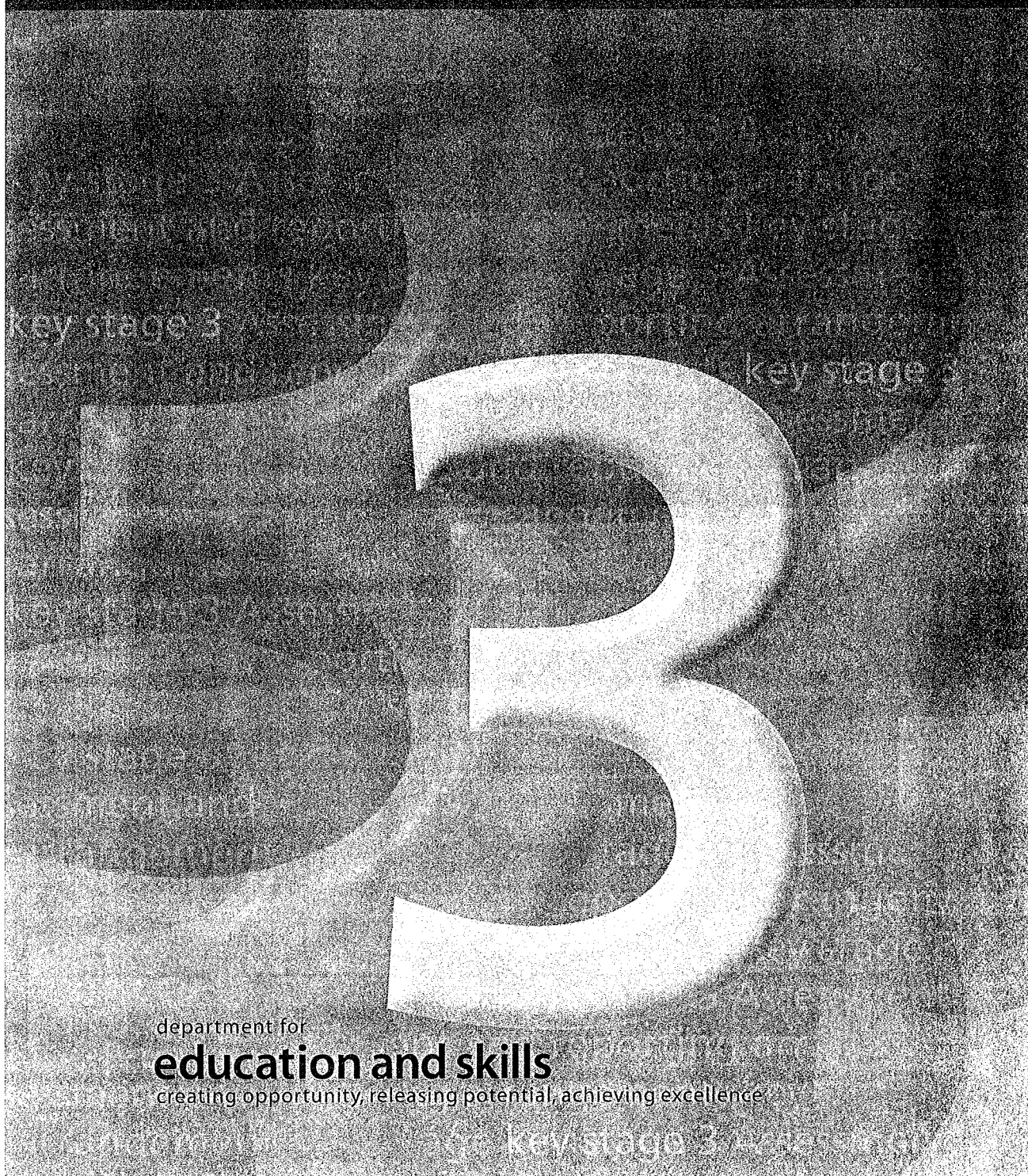
2004



Mathematics tests

# Mark scheme for Paper 1

Tiers 3–5, 4–6, 5–7 and 6–8

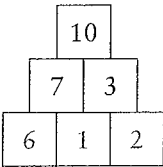
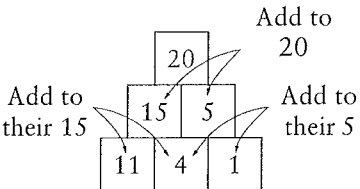
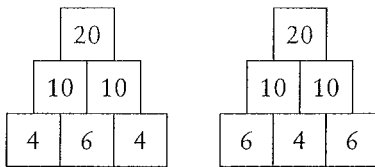
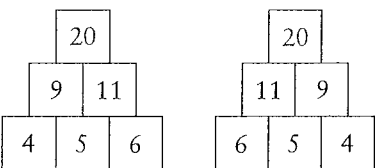


department for  
**education and skills**  
creating opportunity, releasing potential, achieving excellence

key stage 3/4/5/6/7/8

Tier & Question					Answer of 100	
3-5	4-6	5-7	6-8			
1					Correct response	Additional guidance
				1m	32	
				1m	5	
				1m	3	
				1m	30	

Tier & Question					Pupils	
3-5	4-6	5-7	6-8			
2					Correct response	Additional guidance
a				1m	3	<i>✓ Pupils identified</i> eg <ul style="list-style-type: none"> <li>♦ A, M, S</li> <li>♦ Mike and two others</li> </ul>
b				1m	Drama	
c				1m	Paul	<i>✗ Pupil not identified</i> eg <ul style="list-style-type: none"> <li>♦ 6</li> </ul>
d				1m	Sule	

Tier & Question					Number pyramids	
3	4-6	5-7	6-8			
3					Correct response	Additional guidance
a				1m	<p>Completes the pyramid correctly, ie</p> 	
b				1m	<p>Completes the first pyramid correctly eg</p> 	<p>✓ Numbers used are decimals, fractions, negatives or zero</p> <p>✗ Zeros omitted</p>
				1m	<p>Completes the second pyramid correctly, in a different way from one credited for the first pyramid</p>	<p>! Numbers credited for the first pyramid but shown in a different order</p> <p>Accept if the centre numbers of the bottom rows are different eg, accept</p>  <p>eg, do not accept</p> 

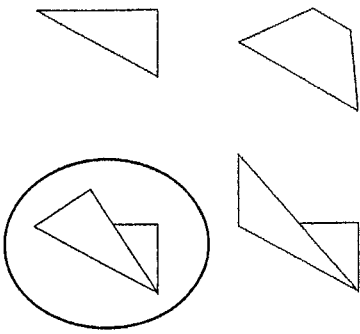
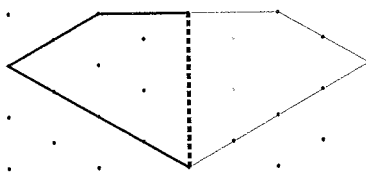
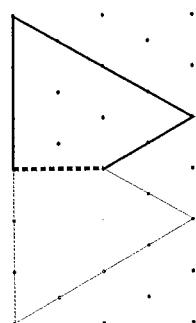
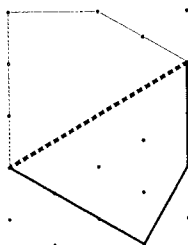
U1

Tier & Question					Stacking	
3-5	4-6	5-7	6-8			
4					Correct response	Additional guidance
a				1m	Gives all three correct and in the correct order ie 9, 18 and 27	<b>! In both parts (a) and (b), bottom layer not included</b> ie ♦ 0, 9 and 18 [for part (a)] 24 [for part (b)] Mark as 0; 1
b				1m	30	
c				1m	6	

Tier & Question					Calculations	
3-5	4-6	5-7	6-8			
5					Correct response	Additional guidance
a				1m	523	
b				1m	182	
c				1m	147	
d				1m	40	

Tier & Question						Coins	
3-5	4-6	5-7	6-8				
6	1					Correct response	Additional guidance
				3m		Shows all five correct ways, with none incorrect or duplicated eg ▪ 0      2      4 0      3      2 0      4      0 1      0      3 1      1      1	✓ <i>Zeros omitted</i>  ! <i>Values of coins given</i> eg ▪ 0      4      4 0      6      2 0      8      0 5      0      3 5      2      1 Provided this is the only error, mark as 1, 0, 0
				or 2m		Shows at least four correct ways, with not more than one incorrect or duplicated	
				or 1m		Shows at least three correct ways, with not more than two incorrect or duplicated	

Tier & Question						Matchboxes	
3-5	4-6	5-7	6-8				
7	2					Correct response	Additional guidance
				1m	10.6		✓ <i>Equivalent fractions or decimals</i>
				1m	7.2		
				1m	3(.0)		
				1m	8		! <i>Answer of 4</i> Accept only if it is clearly stated that another 4 boxes are needed eg, accept ▪ 4 more eg, do not accept ▪ 4

Tier & Question						Folding shapes	
3	4	5	6	5-7	6-8	Correct response	Additional guidance
8	3						
1	1					<p>1m Indicates the correct diagram, ie</p> 	
1b	1b					<p>1m Completes the diagram correctly, ie</p>  <p>1m Completes the diagram correctly, ie</p>  <p>1m Completes the diagram correctly, ie</p> 	<p>! <i>Lines not ruled or accurate</i> Accept provided the pupil's intention is clear</p>

Tier & Question						Television	
3-5	4-6	5-7	6-8			Correct response	Additional guidance
9	4						
				2m	£ 130		
				or 1m	Shows or implies both $- 900$ and $\div 3$ , and carries out at least one of these calculations correctly eg <ul style="list-style-type: none"> <li>■ <math>1290 - 900 = 330</math> (error)</li> <li>■ <math>330 \div 3 = 110</math></li> <li>■ <math>390 \div 3</math></li> <li>■ Digits 13(0) seen</li> </ul>		

Tier & Question						Measuring	
3-5	4-6	5-7	6-8			Correct response	Additional guidance
10	5						
				1m	Gives a correct explanation that shows the relationship between the volume of the jug and one litre eg <ul style="list-style-type: none"> <li>■ It's 2 jugs</li> <li>■ Fill the jug once, pour it in the bucket and fill it again</li> <li>■ He uses <math>500 + 500</math></li> <li>■ A jug is half a litre</li> <li>■ Empty into the bucket twice</li> </ul>		✓ <i>Minimally acceptable explanation</i> eg <ul style="list-style-type: none"> <li>♦ Fill it twice</li> <li>♦ <math>500\text{ml} \times 2</math></li> </ul> ✓ <i>Jug assumed to be calibrated</i> eg <ul style="list-style-type: none"> <li>♦ Put 200ml in the jug, then repeat to give a total of 5 times</li> </ul>
				(U1)			

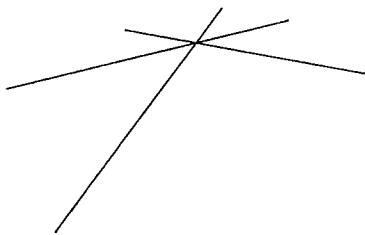



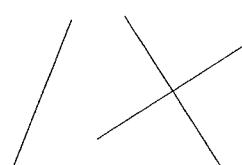
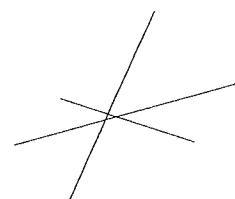
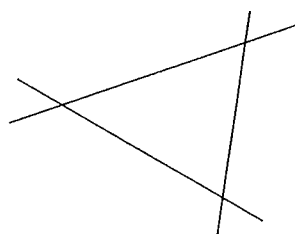
Tier & Question						Grid shapes	
3-5	4-6	5-7	6-8			Correct response	Additional guidance
11	6						
				1m	B and E in either order		✓ <i>Shape A given alongside a correct response</i>  ! <i>Responses for parts (a) and (b) transposed but otherwise correct</i> Mark as 0; 1
				1m	D and E in either order		
				1m	30		✓ <i>The given shape C excluded</i> eg <ul style="list-style-type: none"> <li>♦ 29 more</li> <li>♦ 29</li> </ul>

Tier & Question						Club	
3	5	4	6	5-7	6-8		
12	7					Correct response	Additional guidance
						<p>1m</p> <p>Indicates False and gives a correct explanation</p> <p>The most common correct explanations:</p> <p>Identify the statement is incorrect for week 2 eg</p> <ul style="list-style-type: none"> <li>True for the first and last weeks only</li> </ul> <p>Identify the statement is incorrect for one of the Wednesdays eg</p> <ul style="list-style-type: none"> <li>The most popular day was a Wednesday</li> <li>The highest ever bar was Wednesday</li> <li>One Wednesday there were 27</li> </ul> <p>(U1)</p>	<p>✓ <i>Minimally acceptable explanation</i> eg</p> <ul style="list-style-type: none"> <li>Not true for one of the weeks</li> <li>Wed was higher</li> </ul> <p>! <i>Explanation unclear as to whether it refers to one week or all three weeks</i> Condone eg, accept</p> <ul style="list-style-type: none"> <li>Wed was the most popular day</li> </ul> <p>Do not accept incorrect explanations eg</p> <ul style="list-style-type: none"> <li>Each week Wed was most popular</li> </ul> <p>! <i>Number of pupils identified</i> Where the value is a multiple of 5, do not accept incorrect values. Otherwise, within a correct response, accept integer values between the relevant multiples of 5, eg for Monday of week 3 accept 26, 27, 28 or 29</p> <p>✗ <i>Incomplete explanation</i> eg</p> <ul style="list-style-type: none"> <li>Not always true</li> </ul>
						<p>1m</p> <p>Indicates True and gives a correct explanation</p> <p>The most common correct explanations:</p> <p>Identify that for each week 20 pupils attended eg</p> <ul style="list-style-type: none"> <li>20 pupils went each Friday</li> </ul> <p>Identify the relevant feature of the charts eg</p> <ul style="list-style-type: none"> <li>The bars are all the same height</li> </ul> <p>(U1)</p>	<p>✓ <i>Minimally acceptable explanation</i> eg</p> <ul style="list-style-type: none"> <li>20</li> <li>The bars are the same</li> </ul> <p>✗ <i>Incorrect explanation, or incomplete explanation that simply restates the information given</i> eg</p> <ul style="list-style-type: none"> <li>They are all 25 (error)</li> <li>Same amount went</li> <li>It's the same number each week</li> </ul>



Tier & Question						Club (cont)	
3	5	4	6	5-7	6-8		
12	7					Correct response	Additional guidance
				1m		<p>Indicates Not enough information and gives a correct explanation</p> <p>The most common correct explanations:</p> <p>State that names are not shown eg</p> <ul style="list-style-type: none"> <li>It doesn't give their names so we don't know who went each week</li> </ul> <p>State that the people could be different eg</p> <ul style="list-style-type: none"> <li>Same amount went each week but it could be different people</li> <li>Different pupils might have gone on different Fridays</li> </ul> <p>State that only the total is shown eg</p> <ul style="list-style-type: none"> <li>It doesn't say the same pupils went. It just says 20 pupils went on Friday</li> <li>It doesn't tell you about each pupil, it tells you about the total</li> </ul>	<p>✓ <i>Minimally acceptable explanation</i> eg</p> <ul style="list-style-type: none"> <li>No names</li> </ul> <p>✓ <i>Minimally acceptable explanation</i> eg</p> <ul style="list-style-type: none"> <li>It doesn't tell you which pupils</li> <li>Could be different each week</li> </ul> <p>✓ <i>Minimally acceptable explanation</i> eg</p> <ul style="list-style-type: none"> <li>It only gives the total</li> <li>It just says 20</li> <li>All it says is how many</li> </ul> <p>✗ <i>Incomplete explanation</i> eg</p> <ul style="list-style-type: none"> <li>You don't know</li> <li>The charts don't show it</li> <li>It doesn't give that much detail</li> </ul>

U1

Tier & Question						Points of intersection	
3-5	4-6	5-7	6-8			Correct response	Additional guidance
13	8	1					
				1m		<p>Draws three straight lines intersecting at one point</p> <p>eg</p> 	<p><b>! Ruler not used</b> Condone, provided the pupil's intention is clear</p> <p><b>✓ Lines meet rather than intersect</b> eg, for part (a)</p>  <p>•</p>  <p>eg, for part (b) in tiers 3-5 and 4-6</p>  <p><b>! Diagrams for parts (a) and (b) in tiers 3-5 and 4-6 transposed but otherwise correct</b> Mark as 0; 1</p> <p><b>! Other diagrams shown</b> Ignore, as these may be working for the last part of the question</p> <p><b>✗ Diagram is ambiguous</b> The drawing must clearly show the correct number of points of intersection eg, for part (b) in tiers 3-5 and 4-6 do not accept</p>  <p>•</p> 
				1m		<p>Draws three straight lines intersecting at three different points</p> <p>eg</p> 	

Tier & Question					Points of intersection (cont)		
3–5	4–6	5–7	6–8				
13	8	1			Correct response	Additional guidance	
				1m	Parallel	<p><b>!</b> <i>Words used to describe parallel</i></p> <p>Accept if applicable to all sets of parallel lines</p> <p>eg</p> <ul style="list-style-type: none"><li>• Never meeting</li><li>• At the same angle</li><li>• In the same direction</li><li>• Not touching each other</li></ul> <p>Do not accept if applicable to only some</p> <p>eg</p> <ul style="list-style-type: none"><li>• Vertical</li><li>• Horizontal</li></ul> <p><b>×</b> <i>Incomplete response describing parallel</i></p> <p>eg</p> <ul style="list-style-type: none"><li>• Like railway tracks</li><li>• Apart</li></ul>	
							U1

Tier & Question		Daylight hours	
3-5	4-6	5-7	6-8
14	9	2	
		Correct response	Additional guidance
	3m	<p>Gives a complete correct response with both months identified correctly and correct values given within the ranges as shown below, ie</p> <p>June 18.5 to 19.5 inclusive December 5 to 6 inclusive</p>	<p><b>! Months not written in full</b> Accept unambiguous indications eg, for December • D Do not accept ambiguous indication that could refer to other months eg, for June • J</p> <p><b>! Dates given</b> Ignore eg, for June accept • June 15th</p> <p><b>! Follow through</b> Note that follow through must be applied from incorrect months. Ranges for correct values are shown below</p> <p>Jan 6.5 to 7.5 inclusive Feb 9.5 to 10 inclusive Mar 12 to 12.5 inclusive Apr 15 to 16 inclusive May 17.75 to 18.25 inclusive (Jun 18.5 to 19.5 inclusive) Jul 17.5 to 18 inclusive Aug 15 to 15.5 inclusive Sep 12 to 12.5 inclusive Oct 9 to 9.5 inclusive Nov 6.5 to 7.5 inclusive (Dec 5 to 6 inclusive)</p> <p><b>! Months omitted or months identified ambiguously</b> Treat each omission or ambiguous response as one error eg, for 2m accept • J (ambiguous) 19 Dec 5.8 eg, for 1m accept • (omits) 19 (omits) 5.8</p>
	or 2m	<p>Makes not more than one error, but if the error is in identifying a month the pupil must follow through from that incorrect month eg</p> <ul style="list-style-type: none"> <li>■ Jun 20 (error) Dec 6</li> <li>■ June 19 February (error) 10</li> </ul>	
	or 1m	<p>Makes not more than two errors or omissions, but if the error is in identifying month(s) the pupil must follow through from that incorrect month(s) eg</p> <ul style="list-style-type: none"> <li>■ June 12 (error) Dec 7 (error)</li> <li>■ July (error) 18 Oct (error) 9</li> <li>■ June 12 (error) Jan (error) 7</li> </ul>	

Tier & Question					Plasters	
3	5	4	6	5	7	6-8
15	10	3				
					Correct response	Additional guidance
a	a	c			1m $\frac{1}{35}$	<b>!</b> <i>Answer given as a decimal or a percentage without a correct fraction shown</i> Accept decimals within the following ranges, or their percentage equivalents: part (a) 0.028 to 0.03 inclusive part (b) 0.45 to 0.46 inclusive part (c) 0.54 to 0.55 inclusive  <b>!</b> <i>Words given alongside a correct probability</i> Ignore eg, for part (a) accept • Unlikely, $\frac{1}{35}$
b	b	b			1m $\frac{16}{35}$	
c	c				1m $\frac{19}{35}$	

Tier & Question						Calculators
3-5	4-6	5-7	6-8			
16	11	4		Correct response		Additional guidance
				2m	£ 27.50	
				or 1m	Shows the digits 275 eg <ul style="list-style-type: none"> <li>■ 27.5</li> <li>■ 2750</li> <li>■ 2.75</li> </ul> or Shows a complete correct method for how to multiply 1.25 by 22, with not more than one computational error, but with the decimal point correctly positioned eg <ul style="list-style-type: none"> <li>■ <math>12.50 + 12.50 + 1.25 + 1.25</math></li> <li>■ <math>11 \times 2.50 = 10 \times 2.50 + 2.50</math></li> <li>■ <div style="margin-left: 20px;"> <math display="block">\begin{array}{r} 125 \\ \times 22 \\ \hline 2500 \\ 2740 \end{array}</math> </div> </li> </ul>	
						<p>✗ <i>Conceptual error</i>  eg  <ul style="list-style-type: none"> <li>• <div style="margin-left: 20px;"> <math display="block">\begin{array}{r} 125 \\ \times 22 \\ \hline 250 \\ 250 \\ \hline 500 \end{array}</math> </div> so 5.00 </li> </ul> </p> <p>! <i>Method is repeated addition</i>  For 1m, at least some multiplication must be shown or implied  eg, for 1m do not accept  <ul style="list-style-type: none"> <li>• <math>1.25 + 1.25 + \dots</math></li> </ul> </p>

Tier & Question				Delivery charges	
3-5	4-6	5-7	6-8		
17	12	5			
a	a	a			
b	b	b			
c	c	c			
d	d	d			

U1

Tier & Question		Magic square										
5-5	4-6	5-7	6-8									
18	13	6										
12	3	4										
2m	Gives all six correct values, ie		✗ <i>Incomplete processing</i>									
	<table><tr><td>13</td><td>12</td><td>5</td></tr><tr><td>2</td><td>10</td><td>18</td></tr><tr><td>15</td><td>8</td><td>7</td></tr></table>			13	12	5	2	10	18	15	8	7
13	12	5										
2	10	18										
15	8	7										
or 1m	Gives at least three correct values											
16	4	9										
2m	Gives all three correct values, ie $a = 16, b = 4, c = 9$											
or 1m	Gives the correct value for $b$ or the correct value for $c$											

Tier & Question					Fractions	
3-5	4-6	5-7	6-8		Correct response	Additional guidance
19	14	7				
				1m	$\frac{1}{3}$ or equivalent fraction	<b>! Decimals used</b> For $\frac{1}{3}$ , accept 0.33 or better For $\frac{7}{12}$ , accept 0.58, 0.583(...)
				1m	$\frac{7}{12}$ or equivalent fraction	For $\frac{1}{6}$ , accept 0.17, 0.16, 0.166(...)
				1m	$\frac{1}{6}$ or equivalent fraction	



Tier & Question		Functions																									
3-5	4 6 5 7 6-8																										
	15 8 1	Correct response	Additional guidance																								
	1m	<p>Gives both correct values, ie</p> <table><tr><td>4</td><td>→</td><td>6</td></tr><tr><td>18</td><td>→</td><td>20</td></tr></table>	4	→	6	18	→	20	<p>✓ <i>Incomplete processing</i> eg, for part (a)</p> <table><tr><td>4</td><td>→</td><td>4 + 2</td></tr><tr><td>20 – 2</td><td>→</td><td>20</td></tr></table> <p>eg, for part (b)</p> <table><tr><td>4</td><td>→</td><td>4 × 2</td></tr><tr><td>20 ÷ 2</td><td>→</td><td>20</td></tr></table> <p>✗ <i>Incorrect notation</i> eg, for part (a)</p> <table><tr><td>4</td><td>→</td><td>6n</td></tr><tr><td>18</td><td>→</td><td>20</td></tr></table>	4	→	4 + 2	20 – 2	→	20	4	→	4 × 2	20 ÷ 2	→	20	4	→	6n	18	→	20
4	→	6																									
18	→	20																									
4	→	4 + 2																									
20 – 2	→	20																									
4	→	4 × 2																									
20 ÷ 2	→	20																									
4	→	6n																									
18	→	20																									
	1m	<p>Gives both correct values, ie</p> <table><tr><td>4</td><td>→</td><td>8</td></tr><tr><td>10</td><td>→</td><td>20</td></tr></table>	4	→	8	10	→	20																			
4	→	8																									
10	→	20																									
	2m	<p>Gives two different correct functions Examples of correct functions are shown below eg</p> <ul style="list-style-type: none"><li>▪ <math>\frac{n}{5}</math></li><li>▪ <math>\sqrt{n}</math></li><li>▪ <math>n - 20</math></li><li>▪ <math>\frac{n - 10}{3}</math></li></ul>	<p>! <i>Unconventional notation for <math>\sqrt{n}</math></i> eg</p> <ul style="list-style-type: none"><li>▪ <math>n\sqrt{\quad}</math></li></ul> <p>Condone</p> <p>! <math>n \rightarrow 5</math> Accept as a correct function, provided nothing that could be an incorrect operation is shown eg, do not accept</p> <ul style="list-style-type: none"><li>▪ <math>n \rightarrow + 5</math></li></ul>																								
	or 1m	<p>Gives one correct function</p>	<p>✗ <i>For 2m, same functions written with different symbols or same functions but unsimplified</i> eg</p> <ul style="list-style-type: none"><li>▪ <math>\frac{n}{5}</math> and <math>n \div 5</math></li><li>▪ <math>\frac{n}{5}</math> and <math>n \times 0.2</math></li><li>▪ <math>n - 20</math> and <math>n - 10 + 30</math></li></ul>																								

U1

U1

Tier & Question					Cuboids	
3-5	4-6	5-7	6-8		Correct response	Additional guidance
16	9	2				
				1m	<p>Indicates Cuboid A and gives a correct explanation</p> <p>The most common correct explanations:</p> <p>Show the correct surface area for both A and D eg</p> <ul style="list-style-type: none"> <li>The surface area of A is 66, but D is 40</li> </ul> <p>Consider the number of cube faces that are not visible eg</p> <ul style="list-style-type: none"> <li>Each cube in D has 3 or 4 faces that cannot be seen but each cube in A has only 1 or 2</li> <li>Fewer faces of the cubes are touching each other in A</li> </ul> <p>Consider the number of cube faces that are visible eg</p> <ul style="list-style-type: none"> <li>In A the cubes show 4 or 5 faces, but in D it's 2 or 3</li> <li>There are more cube faces facing out on A than on D</li> </ul>	<p><b>! Units inserted</b> Ignore</p> <p><b>✓ Minimally acceptable explanation</b> eg, for the correct surface areas</p> <ul style="list-style-type: none"> <li>66 and 40 seen</li> <li><math>4 \times 16 + 2</math> is bigger than <math>4 \times 8 + 8</math></li> </ul> <p>eg, for cube faces that are not visible</p> <ul style="list-style-type: none"> <li>There are fewer hidden faces in A</li> <li>D is more compact</li> </ul> <p>eg, for cube faces that are visible</p> <ul style="list-style-type: none"> <li>Cubes in A show 4 or more faces, D shows less than 4</li> <li>A has more faces showing</li> <li>A is more spread out</li> </ul> <p><b>! Use of 'sides' for cube faces</b> Condone eg, accept</p> <ul style="list-style-type: none"> <li>More sides face out on A</li> </ul> <p><b>! Descriptors of cube faces</b> Note that pupils use a wide range of terms to describe the cube faces</p> <p>eg, for cube faces that are not visible</p> <ul style="list-style-type: none"> <li>Hidden faces</li> <li>Faces pointing inside</li> <li>Faces touching</li> </ul> <p>eg, for cube faces that are visible</p> <ul style="list-style-type: none"> <li>Faces facing out</li> <li>Faces showing</li> <li>Faces you can see</li> </ul> <p>Condone provided the pupil does not explicitly refer to the area of only one of the faces of each cuboid</p> <p>eg, do not accept</p> <ul style="list-style-type: none"> <li>You can see 8 faces on D and 16 faces on A</li> </ul> <p><b>✗ Use of 'square' for cube or cuboid</b> eg</p> <ul style="list-style-type: none"> <li>You can see more of each square's surface in A than in D</li> </ul> <p><b>✗ Explanation is simply a description of one or both of the cuboids</b> eg</p> <ul style="list-style-type: none"> <li>In A all 16 are in a line and not on top of each other</li> <li>D is two cubes high</li> </ul> <p><b>✗ Incorrect statement</b> eg</p> <ul style="list-style-type: none"> <li>Each cube in A shows 4 faces; D is 3</li> </ul>

U1

Tier & Question		Cuboids (cont)	
3-5	4 6 5 7 6 8		
	16 9 2	Correct response	Additional guidance
	5 5 5	1m Indicates All the same	
	6 6 6	1m 4	
	6 7 8	3m Shows, in any order, all four correct sets of dimensions eg ▪ 1 3 8 1 4 6 2 2 6 2 3 4  or 2m Shows three correct sets of dimensions  or 1m Shows two correct sets of dimensions	<b>!</b> <i>Repeated sets of dimensions</i> eg • 1 3 8 1 8 3 ( <i>repeated</i> ) 2 2 6 6 2 2 ( <i>repeated</i> ) Ignore the repeats and mark as 1, 0, 0  <b>×</b> <i>Negative or non-integer dimensions used</i>

Tier & Question		Shading	
3-5	4-6, 5-7, 6-8		
17	10	3	
		Correct response	Additional guidance
a	1m	<p>Indicates No and gives a correct explanation</p> <p>The most common correct explanations:</p> <p>State or imply that the sides are not all the same length</p> <p>eg</p> <ul style="list-style-type: none"> <li>■ The sides are not all the same length</li> <li>■ Only 2 sides are the same</li> </ul> <p>State or imply that the angles are not all the same</p> <p>eg</p> <ul style="list-style-type: none"> <li>■ The angles are not all equal</li> <li>■ The angles aren't <math>60^\circ</math></li> </ul> <p>State or imply that the order of rotation symmetry is not 3, or that the shape does not have 3 lines of symmetry</p>	<p>✓ <i>Minimally acceptable explanation</i></p> <p>eg</p> <ul style="list-style-type: none"> <li>♦ The lengths are different</li> <li>♦ An equilateral triangle has equal sides</li> <li>♦ It is isosceles</li> <li>♦ One side is 4, the others are 4.5</li> <li>♦ The angles are different</li> <li>♦ It has rotation symmetry of order 1</li> <li>♦ It doesn't have rotation symmetry</li> <li>♦ There is only one line of symmetry</li> </ul> <p>✗ <i>Incorrect explanation</i></p> <p>eg</p> <ul style="list-style-type: none"> <li>♦ No sides are equal</li> <li>♦ No equal angles</li> </ul>
		<p>Indicates Yes and gives a correct explanation, even if the fact that the shape is a quadrilateral is not stated explicitly</p> <p>The most common correct explanations:</p> <p>State or imply there are two pairs of adjacent equal length sides</p> <p>eg</p> <ul style="list-style-type: none"> <li>■ The long sides are next to each other and they are the same length. So are the short</li> <li>■ Two isosceles triangles on either side of the same base</li> <li>■ Two pairs of equal length sides, but opposite sides are not parallel</li> </ul> <p>State or imply that the quadrilateral has exactly one line of symmetry through opposite vertices</p> <p>eg</p> <ul style="list-style-type: none"> <li>■ The only line of symmetry is a diagonal</li> </ul> <p>State or imply that one diagonal bisects the other at right angles</p> <p>eg</p> <ul style="list-style-type: none"> <li>■ One diagonal is the perpendicular bisector of the other</li> </ul>	<p>! <i>Minimally acceptable explanation (sides)</i></p> <p>Note the explanation must make it explicit that the sides are both equal and adjacent</p> <p>eg, accept</p> <ul style="list-style-type: none"> <li>♦ The top two sides are the same and the bottom two sides are the same</li> <li>♦ Two joining sides equal, other two also equal</li> <li>♦ It's two isosceles triangles</li> </ul> <p>eg, do not accept</p> <ul style="list-style-type: none"> <li>♦ Two pairs of equal length sides</li> <li>♦ It has a big triangle and a little triangle</li> <li>♦ Opposite sides are equal in length</li> </ul> <p>✗ <i>Incomplete explanation</i></p> <p>eg</p> <ul style="list-style-type: none"> <li>♦ There are two equal opposite angles</li> </ul> <p>✓ <i>Minimally acceptable explanation (symmetry)</i></p> <p>eg</p> <ul style="list-style-type: none"> <li>♦ Relevant line of symmetry identified on diagram</li> </ul> <p>✗ <i>Incomplete explanation (symmetry)</i></p> <p>eg</p> <ul style="list-style-type: none"> <li>♦ It has one line of symmetry [no line or incorrect line of symmetry shown on diagram]</li> </ul>

Tier & Question					Shading (cont)	
3-5	4-6	5-7	6-8			
	17	10	3		Correct response	Additional guidance
				1m	<p>Indicates Yes and gives a correct explanation</p> <p>The most common correct explanations:</p> <p>State or imply both that the sides are equal and the angles are equal</p> <p>eg</p> <ul style="list-style-type: none"> <li>■ 4 equal sides and 4 right angles</li> <li>■ It has 4 sides the same length and a right angle</li> </ul> <p>State or imply that the order of rotation symmetry is 4</p> <p>State or imply that the shape has 4 lines of symmetry</p>	<p>✓ <i>Minimally acceptable explanation</i></p> <p>eg</p> <ul style="list-style-type: none"> <li>♦ Same sides, same angles</li> </ul> <p>✗ <i>Incomplete explanation</i></p> <p>eg</p> <ul style="list-style-type: none"> <li>♦ 4 sides that are the same length</li> <li>♦ 4 right angles</li> <li>♦ Sides are the same length and if you rotate it it's a square</li> <li>♦ Same sides and it has rotation symmetry</li> </ul>

U1

Tier & Question					Sums and products	
3-5	4-6	5-7	6-8			
	18	11	4		Correct response	Additional guidance
				1m	<p>Both correct, ie</p> <div style="display: flex; align-items: center; gap: 10px;"> <div style="border: 1px solid black; padding: 2px 5px;">5</div> <div style="border: 1px solid black; padding: 2px 5px;">-3</div> <div style="border: 1px solid black; padding: 2px 5px;">2</div> <div style="border: 1px solid black; padding: 2px 5px;">-15</div> </div>	
				1m	<p>Both correct, ie</p> <div style="display: flex; align-items: center; gap: 10px;"> <div style="border: 1px solid black; padding: 2px 5px;">-8</div> <div style="border: 1px solid black; padding: 2px 5px;">3</div> <div style="border: 1px solid black; padding: 2px 5px;">-5</div> <div style="border: 1px solid black; padding: 2px 5px;">-24</div> </div>	

! *Second and third columns completely correct, fourth column incorrect or omitted*  
Mark as 0, 1


Tier & Question					Thinking fractions	
3-5	4-6	5-7	6-8			
19	12	5			Correct response	Additional guidance
				2m	$\frac{1}{2}$	✓ For 2m, decimal fraction of 0.5
				or 1m	Shows the fraction $\frac{15}{30}$ or other unsimplified but correct fraction eg ▪ $\frac{450}{900}$ or Shows correct cancelling to $\frac{1}{2} \times \frac{1}{1}$ , even if there are subsequent conceptual errors eg ▪ $\frac{\overset{1}{\cancel{8}}}{\underset{2}{\cancel{6}}} \times \frac{\overset{1}{\cancel{3}}}{\underset{1}{\cancel{6}}} = \frac{2}{3}$ or Shows or implies a correct method using fractions with not more than one computational error, and with their fraction given in its simplest form eg ▪ $\frac{5}{6} \times \frac{3}{5} = \frac{18}{30} \text{ (error)} = \frac{3}{5}$ or Shows or implies a correct method using decimals eg ▪ $\frac{2.5}{5}$ ▪ 0.83 recurring $\times$ 0.6	✗ <i>Conceptual error</i> eg • $\frac{5}{6} \times \frac{3}{5} = \frac{8}{30} = \frac{4}{15}$ (numerators added) • $\frac{5}{6} \times \frac{3}{5} = \frac{15}{11}$ (denominators added)  ✗ <i>Decimal rounded</i> eg • $0.83 \times 0.6$

Tier & Question				Thinking fractions (cont)	
3-5	4-6	5-7	6-8	Correct response	Additional guidance
	19	12	5		
	6	15		2m	
				or 1m	
				<p><math>\frac{3}{5}</math> or equivalent fraction or decimal</p> <p>Shows or implies that the fractions should be multiplied, even if there are subsequent conceptual or computational errors</p> <p>eg</p> <ul style="list-style-type: none"> <li>▪ <math>\frac{3}{4} \times \frac{4}{5}</math></li> <li>▪ <math>\frac{1}{4}</math> of <math>\frac{4}{5}</math> is <math>\frac{1}{5}</math>, then times 3</li> <li>▪ <math>\frac{16}{20} \times \frac{15}{20}</math></li> <li>▪ <math>0.8 \times 0.75</math></li> <li>▪ 60%</li> </ul> <p>or</p> <p>Shows a complete correct method involving finding fractions of an arbitrary amount, with not more than one computational error</p> <p>eg</p> <ul style="list-style-type: none"> <li>▪ <math>\frac{4}{5}</math> of 100 = 80, <math>\frac{3}{4}</math> of 80 = 60, so it is 60 out of 100</li> <li>▪ <math>\frac{3}{4} \times 20 = 15</math>, <math>\frac{4}{5} \times 15 = 3</math> (error) so it's <math>\frac{3}{20}</math></li> </ul>	<p><b>✗ The use of 'of' to imply multiplication</b></p> <p>eg</p> <ul style="list-style-type: none"> <li>♦ <math>\frac{3}{4}</math> of <math>\frac{4}{5}</math></li> </ul> <p>As the phrase is suggested by the question, do not accept as the only evidence</p> <p><b>✗ Incomplete method</b></p> <p>To be complete, their final answer must show the connection between the arbitrary amount and the calculated value</p> <p>eg, do not accept</p> <ul style="list-style-type: none"> <li>♦ <math>\frac{4}{5}</math> of 100 = 80, <math>\frac{3}{4}</math> of 80 = 60 without subsequent expression of 60 out of 100 or equivalent</li> </ul>
				(U1)	

Tier & Question					Rearrange		
3-5	4-6	5-7	6-8				
20	13	6			Correct response	Additional guidance	
	a	a		1m	$a - 4$	$\checkmark c \div 4$	
				1m	$\frac{c}{4}$		
				1m	$4k + 3$		
	b	b		2m	Rearranges correctly eg <ul style="list-style-type: none"> <li>▪ <math>\frac{w}{5} - 2</math></li> <li>▪ <math>\frac{w - 10}{5}</math></li> </ul>	$\checkmark$ For 2m, negative denominator eg <ul style="list-style-type: none"> <li>♦ <math>\frac{10 - w}{-5}</math></li> </ul>	
				or 1m	Shows or implies a correct first step of algebraic manipulation eg <ul style="list-style-type: none"> <li>▪ <math>2 + t = \frac{w}{5}</math></li> <li>▪ <math>10 + 5t = w</math></li> <li>▪ <math>5t = w - 10</math></li> <li>▪ <math>w - 10 \div 5</math></li> </ul>	! For 2m, use of division sign Accept provided there is no ambiguity eg, accept <ul style="list-style-type: none"> <li>♦ <math>w \div 5 - 2</math></li> <li>♦ <math>(w - 10) \div 5</math></li> </ul> eg, do not accept <ul style="list-style-type: none"> <li>♦ <math>w - 10 \div 5</math></li> </ul>	



Tier & Question					Journey	
3-5	4-6	5-7	6-8			
		14	7		Correct response	Additional guidance
				2m	24	
				or		
				1m	Shows the journey time is $2\frac{1}{2}$ (hours)	
					or	
					Shows a complete correct method	
					eg	
					<ul style="list-style-type: none"> <li>■ <math>60 \div 2.5</math></li> <li>■ <math>60 \div (100 \div 40)</math></li> <li>■ <math>60 \times 2 \div 5</math></li> <li>■ <math>40 \times 0.6</math></li> <li>■ <math>60 = \frac{3}{5}</math> of 100, so <math>\frac{3}{5}</math> of 40</li> </ul>	
					or	
					The only error is to misread A for B, giving an answer of $66\frac{2}{3}$	<p>! Answer given as a decimal</p> <p>Accept 66.7 or 66.6 or 66.6(...)</p> <p>Do not accept 67 unless a correct method or a more accurate value is seen</p>

Tier & Question					Factors again	
3-5	4-6	5-7	6-8			
		15	8		Correct response	Additional guidance
		a	a	1m	Indicates $(y + 2)(y + 6)$ , ie 	
		b	b	2m	<p>Gives a correct simplified expression</p> <p>eg</p> <ul style="list-style-type: none"> <li>■ <math>y^2 + 11y + 18</math></li> <li>■ <math>11y + 18 + y^2</math></li> </ul>	<p>! Use of multiplication sign in simplified expression</p> <p>Accept either <math>y \times y</math> or <math>11 \times y</math>, but not both</p>
				or		
				1m	<p>Multiplies out the brackets correctly, even if there is incorrect or no further simplification</p> <p>eg</p> <ul style="list-style-type: none"> <li>■ <math>y^2 + 9y + 2y + 18</math></li> </ul> <p>or</p> <p>The only error is in the constant term but the pupil simplifies correctly to give an expression of the form <math>ay^2 + by + c</math></p> <p>eg</p> <ul style="list-style-type: none"> <li>■ <math>y^2 + 9y + 2y + 11</math> (error) = <math>y^2 + 11y + 11</math></li> </ul>	<p>✗ a, b or c as zero</p>

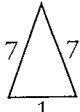

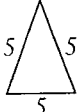
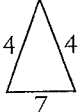
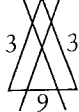
34

Tier & Question					Rodents (cont)	
3-5	4-6	5-7	6-8			
		16	9		Correct response	Additional guidance
		d	d	1m	<p>Indicates No and gives a correct explanation</p> <p>The most common correct explanations:</p> <p>Refer to the point being too far removed from the others</p> <p>eg</p> <ul style="list-style-type: none"> <li>It would be an outlier</li> <li>It would be a long way from the other points</li> <li>It would be too far from the line of best fit</li> </ul> <p>Refer to the general relationship between foot length and body length for these species</p> <p>eg</p> <ul style="list-style-type: none"> <li>A rodent as long as this would have much longer feet</li> <li>For such a small foot, the body would be smaller</li> </ul> <p>Use, implicitly or explicitly, the values 228 and 22</p> <p>eg</p> <ul style="list-style-type: none"> <li>Ratio of foot to body is too different from the others</li> <li>228 is over ten times 22, which is too much</li> </ul>	<p>✓ <i>Minimally acceptable explanation</i></p> <p>eg</p> <ul style="list-style-type: none"> <li>It's on its own on the graph</li> <li>It doesn't fit the correlation</li> <li>The body to foot ratio doesn't fit with the others</li> </ul> <p>✗ <i>Incomplete explanation</i></p> <p>eg</p> <ul style="list-style-type: none"> <li>It's on its own</li> <li>It doesn't fit with the others</li> </ul> <p>✗ <i>Conceptual misunderstanding</i></p> <p>eg</p> <ul style="list-style-type: none"> <li>The point isn't on the line of best fit</li> </ul> <p>✓ <i>Minimally acceptable explanation</i></p> <p>eg</p> <ul style="list-style-type: none"> <li>Foot too small</li> <li>Body too long</li> <li>This one is long but it has small feet</li> <li>Rodents with small feet are small in length too</li> </ul> <p>✗ <i>Incomplete explanation</i></p> <p>eg</p> <ul style="list-style-type: none"> <li>It doesn't fit the graph</li> </ul> <p>! <i>Their line of best fit used to estimate the foot length or the body length if the animal were one of these species of rodents</i></p> <p>Accept provided the value is correct according to their line (even if their line is incorrect) within the following ranges:  Foot length <math>\pm 2</math>, or a range of 5 that includes their value  Body length <math>\pm 15</math></p> <p>! <i>Relationship quantified</i></p> <p>Accept provided the approximate nature of the relationship is recognised, and body length is shown as between 4 and 6 (inclusive) times foot length, or foot length as between 16% and 25% (inclusive) of body length</p> <p>eg, accept</p> <ul style="list-style-type: none"> <li>22 is not about a fifth of 228</li> <li>45.6 is a fifth of 228 and 22 is not close to this</li> <li>228 is much more than about 6 times 22</li> </ul>

U1

Tier & Question										Two dice																																																	
3-5		4-6		5-7		6-8																																																					
				17		10																																																					
										Correct response										Additional guidance																																							
2m										Gives the value $\frac{1}{2}$ or equivalent probability, and gives a correct justification																																																	
										The most common correct justifications:																																																	
										Use a systematic approach to illustrate all outcomes, either numerically or as even or odd eg										✓ <i>Minimally acceptable justification</i> eg • $\frac{8}{16}$ • $3 + 2, 3 + 4, 3 + 6, 3 + 8$ $5 + 2, 5 + 4, 5 + 6, 5 + 8$ (odd outcomes only) • $2, 2 \quad 2, 4 \quad 2, 6 \quad 2, 8$ $4, 2 \quad 4, 4 \quad 4, 6 \quad 4, 8$ (even outcomes only implied)																																							
										<div>■<table><tr><td></td><td>2</td><td>4</td><td>6</td><td>8</td></tr><tr><td>2</td><td>4</td><td>6</td><td>8</td><td>10</td></tr><tr><td>3</td><td>5</td><td>7</td><td>9</td><td>11</td></tr><tr><td>4</td><td>6</td><td>8</td><td>10</td><td>12</td></tr><tr><td>5</td><td>7</td><td>9</td><td>11</td><td>13</td></tr></table></div> <div>■<table><tr><td></td><td>2</td><td>4</td><td>6</td><td>8</td></tr><tr><td>2</td><td>e</td><td>e</td><td>e</td><td>e</td></tr><tr><td>3</td><td>o</td><td>o</td><td>o</td><td>o</td></tr><tr><td>4</td><td>e</td><td>e</td><td>e</td><td>e</td></tr><tr><td>5</td><td>o</td><td>o</td><td>o</td><td>o</td></tr></table></div>																					2	4	6	8	2	4	6	8	10	3	5	7	9	11	4	6	8	10	12	5	7	9	11	13		2	4	6	8
	2	4	6	8																																																							
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3	o	o	o	o																																																							
4	e	e	e	e																																																							
5	o	o	o	o																																																							
										Use separate probabilities for each dice which are then multiplied eg										! <i>Reversals included to give 32 outcomes</i> Accept as a correct method																																							
										<div>■ <math>\frac{4}{4} \times \frac{2}{4}</math></div> <div>■ 1<sup>st</sup> dice all even so probability is 1, 2<sup>nd</sup> dice two even so probability is 0.5, <math>1 \times 0.5</math></div>																																																	
or 1m										Reason generally eg										✓ <i>Minimally acceptable justification</i> eg • Using the 3 gives 4 odd numbers Using the 5 gives 4 odd numbers, and the other 8 must be even • Even + even = even, even + odd = odd same amount of each																																							
										<div>■ You are always adding an even from one dice. Half the time you add to another even which gives an even, half the time you add to an odd which gives an odd</div>																																																	
										Gives a correct probability without sufficient justification or with a non-systematic approach										✗ <i>Incorrect, spurious or no justification</i> eg • $2 + 2 = 4, 4 + 3 = 7,$ $6 + 4 = 10, 8 + 5 = 13$  so answer $\frac{1}{2}$ • $\frac{2}{4} = \frac{1}{2}$ with no further working																																							
										or																																																	
										Uses a systematic approach to show at least 12 correct outcomes with not more than one incorrect, even if an incorrect or no probability is given																																																	

Tier & Question					Juice	
3-5	4-6	5-7	6-8			
		18	11		Correct response	Additional guidance
				2m	Indicates all three correct values, ie	✓ <i>Equivalent fractions or decimals</i>
					Orange $\frac{3}{4}$	
					Cranberry $\frac{1}{2}$	
					Grape $\frac{1}{4}$	
				or 1m	Gives a correct value for cranberry or grape, with no evidence, seen or implied, of an incorrect method for this value	✗ <i>Incorrect method shown or implied</i>
					or	eg • Answer of $\frac{1}{2}$ , $\frac{1}{2}$ , $\frac{1}{2}$
					Gives the correct value for orange and shows working indicating that one of the other amounts should be multiplied by 1.5	• Answer of $\frac{2}{3}$ , $\frac{1}{2}$ , $\frac{1}{3}$ ( $\frac{1}{6}$ added to each)
					eg	• Answer of $\frac{4}{6}$ , $\frac{3}{6}$ , $\frac{2}{6}$ ( $\frac{1}{6}$ added to each)
					▪ $\frac{1}{6} \times \frac{3}{2}$	! <i>Unconventional notation</i>
					▪ $\frac{1}{3} \times 1.5$	For 1m, condone
					▪ $\frac{1}{3} \div 2 = \frac{2}{3}$ (error), $\frac{2}{3} + \frac{1}{3}$	eg, for $\frac{1}{4}$ accept
					▪ $\frac{2}{12} \times 1\frac{1}{2}$	• $\frac{1.5}{6}$
				or		! <i>Decimals rounded within working</i>
					For each type of juice, shows the correct amount to be added	For 1m, accept $\frac{1}{3}$ rounded to 0.33 or better
					eg	and $\frac{1}{6}$ rounded to 0.17 or 0.166 or better
					▪ $\frac{1}{4}$ , $\frac{1}{6}$ , $\frac{1}{12}$	

Tier & Question						Triangles															
3-5	4-6	5-7	6-8			Correct response	Additional guidance														
		19	12																		
				3m		<p>Gives a complete justification that identifies the four possible triangles as</p> <p>4, 4, 7 5, 5, 5 6, 6, 3 7, 7, 1</p> <p>and makes a correct deduction that allows them to reject other possibilities</p> <p>The most common correct deductions:</p> <p>State that the length of the two equal sides must sum to more than the length of the third</p> <p>eg</p> <ul style="list-style-type: none"><li>Call the sides <math>a</math>, <math>a</math> and <math>b</math>, then <math>2a &gt; b</math>, so</li></ul> <table><tr><td>1, 1, 13</td><td>✗ <math>1 + 1 &lt; 13</math></td></tr><tr><td>2, 2, 11</td><td>✗ <math>2 + 2 &lt; 11</math></td></tr><tr><td>3, 3, 9</td><td>✗ <math>3 + 3 &lt; 9</math></td></tr><tr><td>4, 4, 7</td><td>✓</td></tr><tr><td>5, 5, 5</td><td>✓</td></tr><tr><td>6, 6, 3</td><td>✓</td></tr><tr><td>7, 7, 1</td><td>✓</td></tr></table> <ul style="list-style-type: none"><li>It is not possible to make the base 9 or more as each side must be less than the sum of the other two</li></ul> <div><div><p>7 7 1</p></div><div><p>6 6 3</p></div><div><p>5 5 5</p></div><div><p>4 4 7</p></div><div><p>3 3 <del>9</del></p></div></div> <p>State that the length of the 'non-equal' side must be less than 8 (or 7.5)</p> <p>eg</p> <ul style="list-style-type: none"><li><math>2x + y = 15</math>, <math>2x &gt; y</math> so <math>0 &lt; y &lt; 7.5</math> when <math>y = 7</math>, <math>x = 4</math> when <math>y = 5</math>, <math>x = 5</math> when <math>y = 3</math>, <math>x = 6</math> when <math>y = 1</math>, <math>x = 7</math></li></ul>	1, 1, 13	✗ $1 + 1 < 13$	2, 2, 11	✗ $2 + 2 < 11$	3, 3, 9	✗ $3 + 3 < 9$	4, 4, 7	✓	5, 5, 5	✓	6, 6, 3	✓	7, 7, 1	✓	<p>✓ <i>Minimally acceptable deduction</i></p> <p>eg</p> <ul style="list-style-type: none"><li>There are no more because the combined total of the equal sides must be more than the other side or it wouldn't meet [with four possible triangles identified]</li><li>All sides must be <math>&lt; 8</math> or the other two sides would not reach, only possible solutions are <math>5 + 5 + 5</math> <math>7 + 7 + 1</math> <math>6 + 6 + 3</math> <math>4 + 4 + 7</math></li></ul> <p>! <i>Deduction is that 'the sides won't meet'</i></p> <p>For 3m, pupils must consider explicitly the 3, 3, 9 triangle</p> <p>eg, for 3m accept</p> <ul style="list-style-type: none"><li>7, 7, 1 6, 6, 3 5, 5, 5 4, 4, 7 3, 3, 9 is not possible because the sides won't touch</li></ul>
1, 1, 13	✗ $1 + 1 < 13$																				
2, 2, 11	✗ $2 + 2 < 11$																				
3, 3, 9	✗ $3 + 3 < 9$																				
4, 4, 7	✓																				
5, 5, 5	✓																				
6, 6, 3	✓																				
7, 7, 1	✓																				

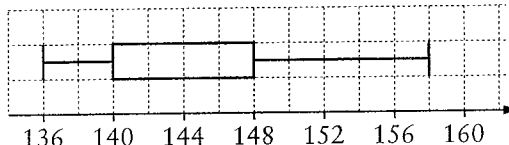
Tier & Question					Triangles (cont)	
3-5	4-6	5-7	6-8		Correct response	Additional guidance
		19	12			
				<p>or 2m</p> <p>Makes a correct deduction that <math>2a &gt; b</math> or that <math>b &lt; 8</math>, even if the four possible triangles are not identified</p> <p>or</p> <p>Identifies the four possible triangles and states that the 3, 3, 9 triangle will not work, but gives an incomplete or no explanation as to why</p> <p>or</p> <p>Identifies the four possible triangles and gives an explanation that the sides on others won't meet, without explicitly considering the 3, 3, 9 triangle</p> <p>eg</p> <ul style="list-style-type: none"> <li>There are no more as the sides wouldn't meet [with four possible triangles identified]</li> <li>2, 2, 11 and 1, 1, 13 won't work as the sides are too short to reach to make a triangle [with four possible triangles identified]</li> </ul> <p>or 1m</p> <p>Identifies the four possible triangles, with no impossible triangles identified as possible</p> <p>or</p> <p>Makes a correct statement about the sides of the triangles</p> <p>eg</p> <ul style="list-style-type: none"> <li>The sum of the sides that are equal must be even</li> <li>One side must be odd</li> </ul> <p>U3</p>		<p>✗ <i>Triangles identified only through unlabelled scale drawings</i></p>

Tier & Question						Births	
3-5	4-6	5-7	6-8			Correct response	Additional guidance
			13				
			a	1m	1920		✓ <i>Unambiguous indication</i> eg ♦ $1.13 \times 10^6$
			b	2m	$4.5 \times 10^4$		
				or 1m	Shows or implies the value 45 000 eg <ul style="list-style-type: none"> <li>■ 45 000</li> <li>■ <math>45 \times 10^3</math></li> <li>■ <math>0.45 \times 10^5</math></li> </ul>		✗ <i>Incorrect value</i> eg ♦ $45 \times 10^4$ ♦ $4.5^4$

Tier & Question						Factors	
3-5	4-6	5-7	6-8			Correct response	Additional guidance
			14				
			a	1m	$a = 4$ and $b = 3$		! <i>For parts (a) and (b), values embedded</i> Accept embedded values but do not accept incorrect statements eg, for part (a) accept ♦ $2^4$ and $2^3$ seen eg, for part (a) do not accept ♦ $a = 2^4$ or $b = 2^3$
			b	1m	7		✓ <i>For part (b), follow through from part (a) as the sum of their values for a and b</i>



Tier & Question					Population	
3-5	4-6	5-7	6-8			
			15		Correct response	Additional guidance
				1m	<p>Indicates False and gives a correct explanation eg</p> <ul style="list-style-type: none"> <li>Although the number of under 20s is constant, the population size has changed</li> <li>It's a smaller proportion of the whole population</li> <li>The overall number of people has increased so the percentage will drop</li> <li><math>\frac{2.3}{6} \neq \frac{2.3}{9}</math></li> <li>It's out of more people</li> </ul>	<p>✓ <i>Minimally acceptable explanation</i> eg</p> <ul style="list-style-type: none"> <li>There are more people (in 2050)</li> </ul> <p>! <i>Values evaluated or approximated</i> Accept within the following inclusive ranges: 1998 No. of people &lt; 20: 2 or 2.2 to 2.4 (billion) Total no. of people: 5.9 to 6.1 (billion) Proportion of people &lt; 20 33% to 45% 2050 No. of people &lt; 20: 2 or 2.2 to 2.4 (billion) Total no. of people: 8.8 to 9.2 (billion) Proportion of people &lt; 20 20% to 30% 1998 to 2050 Proportional increase needed 45% to 55% eg, accept</p> <ul style="list-style-type: none"> <li>To keep the number of under 20s about the same it would need to be about 50% more</li> </ul>
				1m	Gives a value between 45 and 55 inclusive	
				1m	Gives a value between 250 and 350 inclusive	
				1m	<p>Makes a correct statement that refers both to the increase in the population as a whole and to the increase in the proportion of the population who are aged 60 or over, or, minimally, 40 or over eg</p> <ul style="list-style-type: none"> <li>By 2050 the world's population is expected to have risen by 50%. Much of this increase will be from people aged 60 or over</li> <li>The whole population will be bigger but the proportion of young people will be less</li> </ul>	<p>! <i>Use of 'old' or 'young'</i> Accept old for people over 60, or, minimally, over 40 Accept young for people under 20, or, minimally, under 40</p> <p>✓ <i>Implicit reference to the increase in the population as a whole</i> eg</p> <ul style="list-style-type: none"> <li>Number of young people stays the same but old people increases</li> </ul> <p>! <i>Follow through</i> Accept provided this does not invalidate the correct conclusion</p> <p>✗ <i>Incomplete interpretation</i> eg</p> <ul style="list-style-type: none"> <li>More people in 2050, more over 60</li> <li>The world population will be bigger and people are expected to live longer</li> <li>Proportion of young people will be less</li> </ul> <p>✗ <i>No interpretation</i> eg</p> <ul style="list-style-type: none"> <li>The world population will increase by 50% and the number of people over 60 will increase by 300%</li> </ul>

Tier & Question					Box plots																																
3-5	4-6	5-7	6-8																																		
			16																																		
				Correct response	Additional guidance																																
			a	2m Draws a correct box plot, in which shortest = 136 tallest > 156 IQR < 10  eg 	! Value for median shown, or other labels given Ignore, even if incorrect  ! All four points of location shown correctly but box plot not drawn Mark as 1, 0																																
				or 1m Their box plot has shortest = 136, and tallest > 156  or Their box plot has IQR < 10																																	
			b	Up to 3m are available from the categories shown on the opposite page, all of which compare year 9 with year 7 girls  Note that a maximum of 2m can be awarded from the minimally acceptable interpretations for the categories, ie for all 3m at least some valid comparison must be made	! Year group(s) not specified Accept provided the statement is correct for year 9 eg, accept • The range of heights is greater  ! Incorrect statement or interpretation Within each category, do not accept contradictory statements or incorrect data eg, do not accept • In year 9 the IQR was 8, that's higher (error) than for year 7 • The year 9 range was bigger and it was 40 (error)  Markers may find the following helpful: <table><tr><td></td><td colspan="2">year 9</td><td>year 7</td></tr><tr><td>shortest</td><td>136</td><td>± 1</td><td>136</td></tr><tr><td>tallest</td><td>172</td><td>± 1</td><td>156</td></tr><tr><td>range</td><td>36</td><td>± 2</td><td>20</td></tr><tr><td>LQ</td><td>149.5</td><td>± 1</td><td>140</td></tr><tr><td>median</td><td>153</td><td>± 1</td><td>144</td></tr><tr><td>UQ</td><td>157</td><td>± 1</td><td>150</td></tr><tr><td>IQR</td><td>7.5</td><td>± 2</td><td>10</td></tr></table>		year 9		year 7	shortest	136	± 1	136	tallest	172	± 1	156	range	36	± 2	20	LQ	149.5	± 1	140	median	153	± 1	144	UQ	157	± 1	150	IQR	7.5	± 2	10
	year 9		year 7																																		
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UQ	157	± 1	150																																		
IQR	7.5	± 2	10																																		

Tier & Question					Box plots (cont)
3-5	4-6	5-7	6-8		
			16		

U2

Tier & Question					Graphs	
3-5	4-6	5-7	6-8			
			17		Correct response	Additional guidance
			2m	Gives all five correct letters in the correct order, ie D C B A E		
			or 1m	Gives at least three correct letters		

Tier & Question					Proving	
3-5	4-6	5-7	6-8			
			18		Correct response	Additional guidance
			3m	<p>Gives a correct proof</p> <p>The most common correct proofs:</p> <p>Use algebra to manipulate expressions representing two consecutive numbers, interpreting the results</p> <p>eg</p> <ul style="list-style-type: none"> <li><math>n</math> and <math>n + 1</math> are consecutive numbers  <math>n^2, (n + 1)^2 = n^2 + 2n + 1</math>  <math>n^2 + n^2 + 2n + 1 = 2n^2 + 2n + 1</math>  <math>= 2(n^2 + n) + 1</math>, which is odd</li> <li><math>(2x)^2 = 4x^2</math>  <math>(2x - 1)^2 = 4x^2 - 2x - 2x + 1</math>,  <math>4x^2 + 4x^2 - 2x - 2x + 1</math> is  even + even – even – even = even,  then + 1 makes it odd</li> </ul> <p>Reason generally about odd and even numbers, showing explicitly the following four steps</p> <ol style="list-style-type: none"> <li>Of the two numbers, one must be odd (or one must be even)</li> <li>Odd<sup>2</sup> is odd</li> <li>Even<sup>2</sup> is even</li> <li>Odd + even is odd</li> </ol> <p>eg</p> <ul style="list-style-type: none"> <li>Out of the two you pick, one will be even and so have an even square. One will be odd and so have an odd square. An odd number added to an even number gives you an odd number</li> </ul>	<p><b>! Numbers used</b>  Ignore if used to illustrate but do not accept explanations that lack generality  eg, do not accept  • <math>3^2 = 9, 4^2 = 16</math>  <math>9 + 16 = 25</math>, which is odd</p> <p><b>✓ Minimally acceptable proof</b>  eg, using algebra  • <math>n^2 + (n + 1)^2 = 2n^2 + 2n + 1</math>  <math>= 2(n^2 + n) + 1</math>  • <math>n^2 + (n + 1)^2 = 2n^2 + 2n + 1</math>  <math>= \text{even} + \text{even} + 1</math>  • <math>(2x)^2 + (2x - 1)^2 = 4(2x^2 - x) + 1</math>  eg, reasoning generally  • One is odd,  odd × odd = odd  even × even = even  odd + even = odd  • Consecutive numbers are odd and even, and consecutive square numbers alternate between being odd and even.  Odd + even = odd</p> <p><b>✗ For 3m, incomplete mathematical communication</b>  eg  • One is odd, one is even  Square them both and you have one odd number, and  odd + even is odd</p>	

Tier & Question					Proving (cont)	
3-5	4-6	5-7	6-8			
			18		Correct response	Additional guidance
				or 2m	<p>Uses algebraic expressions to represent the squares of any two consecutive numbers, then expands the brackets correctly, even if expressions are not simplified</p> <p>eg</p> <ul style="list-style-type: none"> <li>■ <math>n^2, (n + 1)^2</math></li> <li>■ <math>n^2, n^2 + 2n + 1</math></li> <li>■ <math>(2x)^2 = 4x^2</math></li> <li>■ <math>(2x - 1)^2 = 4x^2 - 2x - 2x + 1</math></li> </ul> <p>or</p> <p>Reasons generally about odd and even numbers but omits one of the four steps shown above</p> <p>eg</p> <ul style="list-style-type: none"> <li>■ <math>\text{Odd}^2 = \text{odd}, \text{even}^2 = \text{even},</math>  <math>\text{Odd} + \text{even} = \text{odd}</math> [step 1 not explicit]</li> <li>■ Consecutive square numbers alternate between being odd and even, <math>\text{odd}^2 = \text{odd},</math>  an odd number added to an even number is always odd [step 3 not explicit]</li> <li>■ If the integers are consecutive, one of them will be even, the square of an odd number is always odd, and the square of an even number is always even [step 4 not explicit]</li> </ul>	<p>✓ For 2m, minimally acceptable response</p> <p>eg</p> <ul style="list-style-type: none"> <li>• One is odd, one is even.  Square them both and you have one odd number.  Odd + even is odd</li> </ul>
				or 1m	<p>Uses algebraic expressions to represent any two consecutive numbers</p> <p>eg</p> <ul style="list-style-type: none"> <li>■ <math>n, n + 1</math></li> <li>■ <math>2x - 1, 2x</math></li> </ul> <p>or</p> <p>Attempts to reason generally, showing at least one of the four steps</p> <p>eg</p> <ul style="list-style-type: none"> <li>■ Of two consecutive numbers, one is odd and one is even</li> <li>■ <math>\text{Odd}^2 = \text{odd}</math></li> <li>■ <math>\text{Even} \times \text{even} = \text{even}</math></li> <li>■ One in every two consecutive squares is odd</li> <li>■ <math>\text{Odd} + \text{even} = \text{odd}</math></li> </ul>	<p>✓ For 1m, minimally acceptable response</p> <p>eg</p> <ul style="list-style-type: none"> <li>• One is odd</li> </ul>
				U1		