



UKMT Team Maths Challenge 2013

National Final

Supervisor's Booklet

Please ensure that students do not have access to this booklet, and take care to hold it so that answers cannot be seen.

Please ensure that students use blue or black ink to write their answers; teachers are asked to use red ink for marking.



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MINI RELAY ANSWERS

A1	39
A2	10
A3	5
A4	34

B1	19
B2	50
B3	60
B4	460

C1	2013
C2	360
C3	240
C4	260

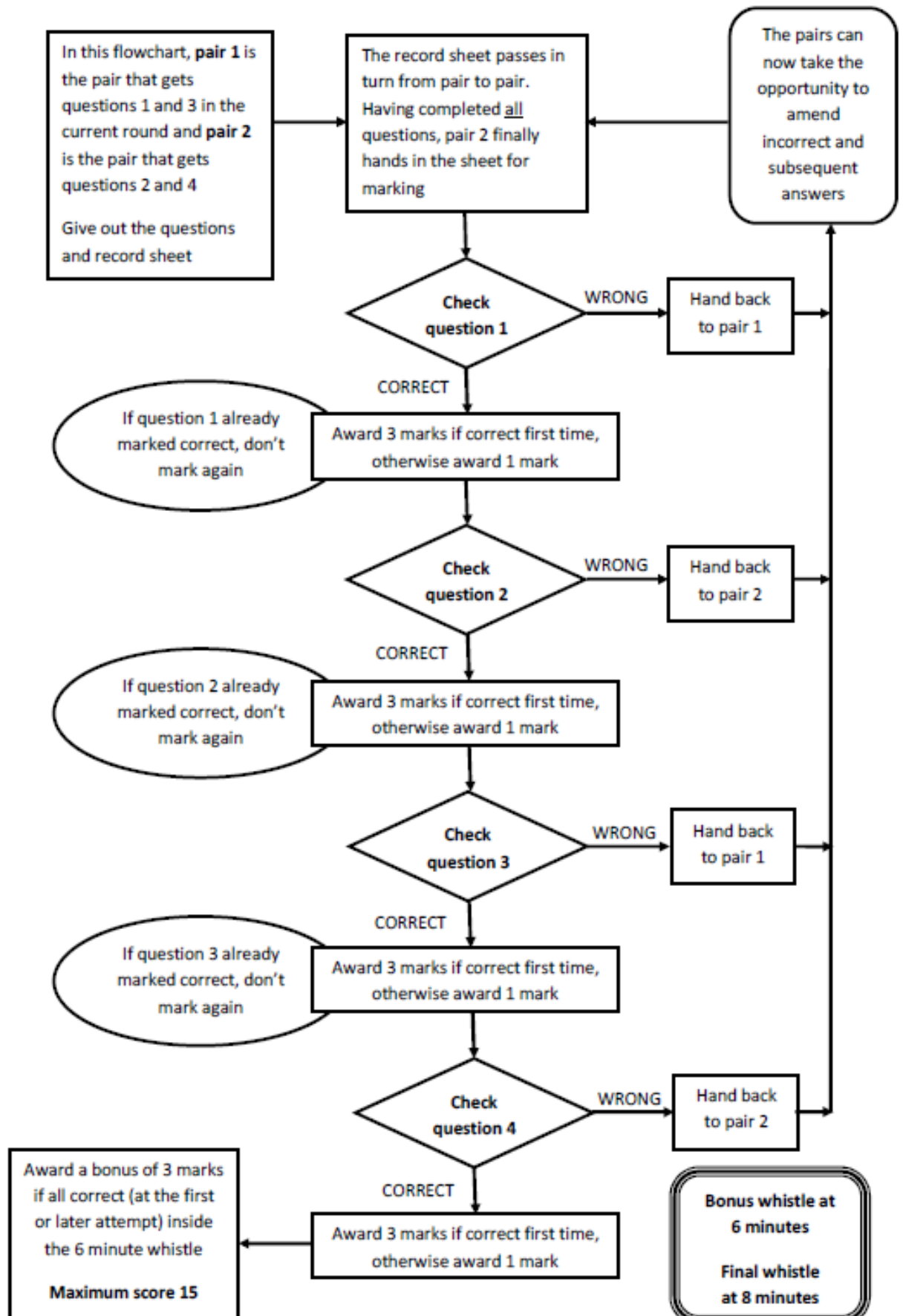
D1	7
D2	20
D3	41
D4	$\frac{21}{10}$

On the students' answer sheet please circle the mark awarded for each part of the question (either 3, 1 or 0)

The flowchart opposite explains the order in which questions should be marked.



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CROSSNUMBER

1			2		3		4	
			5	6			7	8
9	10							
			11		12		13	
14		15			16			
17			18	19			20	
						21		22
23	24		25		26			
	27				28			

Across

- 1 A multiple of 28 Across (4)
- 3 A palindromic square whose square root is not palindromic (3)
- 5 Twice 6 Down plus six (3)
- 7 Fourteen less than 4 Down (2)
- 9 A Fibonacci number (3)
- 11 The sum of 11 Down and 20 Down (3)
- 13 The cube root of 8 Down (2)
- 15 An angle of an isosceles triangle that has 76° as one of its angles (2)
- 16 The sum of the first six triangular numbers (2)
- 17 A square which is a multiple of the sum of its digits (2)
- 18 The number of different ways to arrange the letters in "MATHS" (3)
- 21 Product of two consecutive primes (3)
- 23 The hypotenuse of a triangle with two sides of 39 and 80 (2)
- 25 An even number (3)
- 27 A cube that is the sum of three cubes as well as being a square (3)
- 28 A twelfth power (4)

Down

- 1 The product of nine and the largest two digit prime (3)
- 2 The square root of 3 Across (2)
- 3 One more than 4 Down (2)
- 4 One side of a right-angled triangle with other sides 15 Across and 25 Down (2)
- 6 A multiple of the product of its digits (3)
- 8 The number of cubic inches in a cubic foot (4)
- 10 A number which is a multiple of the sum of the digits of 1 Down (2)
- 11 The sum of the divisors of 81 (3)
- 12 Ten times a Fibonacci number (3)
- 14 28 Across minus 8 Down (4)
- 19 A sixteenth of the difference between 28 Across and 1 Across (3)
- 20 The magic constant of a four by four magic square that uses the numbers from 1 to 16 (2)
- 22 The sum of the squares of its digits is the square of a prime (3)
- 24 One of a pair of consecutive primes that differ by eight (2)
- 25 A multiple of a factor of 21 Across (2)
- 26 The product of the square root of 11 Down and the sixth root of 28 Across (2)



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CROSSNUMBER

Completed Grid

1 8	1 1	9 9	2 2		3 6	7 7	4 6	
7			5 6	6 3	6		7 5	8 1
9 3	10 7	7		1				7
	2		11 1	5	12 5		13 1	2
14 2		15 5	2		16 5	6		8
17 3	6		18 1	19 2	0		20 3	
6				5		21 1	4	22 3
23 8	24 9		25 3	6	26 4			2
	27 7	2	9		28 4	0	9	6

Marking Instructions – a reminder

- Pairs may only communicate through the teacher, and only to request that the other pair work on a particular clue.
- When a pair enters an answer in the Answer Grid, the teacher checks each digit of the answer.
- If it is correct, tick it and award one mark; if it is wrong, cross it out and enter the correct digit. The correct answer is then shown to both pairs so that they are up-to-date.
- A pair may enter just one digit if they wish, rather than a complete answer.
- A pair may sacrifice a square, by guessing, if they wish.



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RELAY score sheet

Team number **School name**

Correct answers score 2 points – circle 2 or 0 for each question and cross out the other number. At the end of the round, draw a line under the last question attempted.

A1	2 / 0	23/01/2013	B8	2 / 0	$y = 3$
B1	2 / 0	210	A9	2 / 0	18
A2	2 / 0	2.5 cm	B9	2 / 0	7
B2	2 / 0	9 : 5	A10	2 / 0	47
A3	2 / 0	3	B10	2 / 0	9 inches
B3	2 / 0	5	A11	2 / 0	5 m
A4	2 / 0	7	B11	2 / 0	25 cm
B4	2 / 0	30/12/2013	A12	2 / 0	40 : 41
A5	2 / 0	91	B12	2 / 0	4
B5	2 / 0	North East (or NE)	A13	2 / 0	6.8 or $6\frac{4}{5}$
A6	2 / 0	13	B13	2 / 0	3.8 or $3\frac{4}{5}$ miles
B6	2 / 0	35	A14	2 / 0	(2, 7), (8, 9) & (8, 1) in any order
A7	2 / 0	Heptagon	B14	2 / 0	372
B7	2 / 0	24 litres	A15	2 / 0	18 mins
A8	2 / 0	100°	B15	2 / 0	23

TOTAL SCORE = _____



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GROUP CIRCUS ANSWERS

<p>1.</p> <p>Part A: 55 3 marks Part B: 12 3 marks</p> <p style="text-align: center;">6 or 3 or 0</p>	<p>2.</p> <p style="text-align: center;">246</p> <p style="text-align: right;">6 or 0</p>																																																	
<p>3.</p> <table border="1" data-bbox="153 860 778 1211"><tbody><tr><td>11</td><td>17</td><td>3</td><td></td><td>5</td><td>19</td><td>7</td></tr><tr><td>37</td><td style="background-color: black;"></td><td>43</td><td></td><td>37</td><td style="background-color: black;"></td><td>43</td></tr><tr><td>5</td><td>19</td><td>7</td><td></td><td>11</td><td>17</td><td>3</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>3</td><td>17</td><td>11</td><td></td><td>7</td><td>19</td><td>5</td></tr><tr><td>43</td><td style="background-color: black;"></td><td>37</td><td></td><td>43</td><td style="background-color: black;"></td><td>37</td></tr><tr><td>7</td><td>19</td><td>5</td><td></td><td>3</td><td>17</td><td>11</td></tr></tbody></table> <p>Any one of the 4 correct solutions shown – 6 marks</p> <p style="text-align: center;">6 or 0</p>	11	17	3		5	19	7	37		43		37		43	5	19	7		11	17	3								3	17	11		7	19	5	43		37		43		37	7	19	5		3	17	11	<p>4.</p> <p style="text-align: center;">18</p> <p style="text-align: right;">6 or 0</p>
11	17	3		5	19	7																																												
37		43		37		43																																												
5	19	7		11	17	3																																												
3	17	11		7	19	5																																												
43		37		43		37																																												
7	19	5		3	17	11																																												
<p>5.</p> <p>Correct arrangement as viewed</p> <p style="text-align: center;">6 or 0</p>	<p>6.</p> <p>Correct square as viewed</p> <p style="text-align: right;">6 or 0</p>																																																	
<p>7.</p> <p>Correct solution as viewed</p> <p style="text-align: center;">6 or 0</p>	<p>8.</p> <p style="text-align: center;">247</p> <p style="text-align: right;">6 or 0</p>																																																	

Award points as scored on the Team Answer Sheet.



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