



UKMT Team Maths Challenge 2011

## Regional Finals

### *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.*



## UKMT Team Maths Challenge 2011

### Head-to-Head Score Sheet

School number:

School name: \_\_\_\_\_

#### MARKING REMINDERS:

Circle mark awarded (3 or 1) for each question:  
1<sup>st</sup> attempt = 3,  
any subsequent attempt = 1.

Cross out '3' if question answered incorrectly on first attempt (only 1 mark now possible) - subsequent questions can still get 3 marks.

Award bonus of 3 marks to first team in pair to present a complete set of correct answers (whether on their first attempt or not).

Round A			Round B		
A1	3	1	B1	3	1
A2	3	1	B2	3	1
A3	3	1	B3	3	1
A4	3	1	B4	3	1
Bonus	3		Bonus	3	
Total	<input type="text"/>		Total	<input type="text"/>	

Round C			Round D		
C1	3	1	D1	3	1
C2	3	1	D2	3	1
C3	3	1	D3	3	1
C4	3	1	D4	3	1
Bonus	3		Bonus	3	
Total	<input type="text"/>		Total	<input type="text"/>	

Grand Total:



## UKMT Team Maths Challenge 2011

### HEAD-TO-HEAD (MINI RELAY) ANSWERS

<b>A1</b>	<b>2011</b>
<b>A2</b>	<b>6000</b>
<b>A3</b>	<b>1000</b>
<b>A4</b>	<b>240 000</b>

<b>B1</b>	<b>16</b>
<b>B2</b>	<b>11</b>
<b>B3</b>	<b>4</b>
<b>B4</b>	<b>5</b>

<b>C1</b>	<b>25</b>
<b>C2</b>	<b>12</b>
<b>C3</b>	<b>29</b>
<b>C4</b>	<b>87</b>

<b>D1</b>	<b>11</b>
<b>D2</b>	<b>2</b>
<b>D3</b>	<b>88</b>
<b>D4</b>	<b>89</b>

### Guidelines for Teachers

- For Round 1, give Q1 and Q3 (and a blank Record Sheet) to Pair A, and Q2 and Q4 to Pair B. *Switch this for Round 2, i.e. give Q2 and Q4 to Pair A, and Q1 and Q3 to Pair B.*
  - Once Pair A has the answer to Q1, they write it on the Record Sheet and pass this (via you) to Pair B. This continues with Pair B passing the answer to Q2 to Pair A (via you) and so on.
  - *Pairs can work on either of their questions at any time and should be encouraged to do some preparatory work while waiting for the answer to the previous question.*
  - Once they have written down the answer to Q4, Pair B hands the Record Sheet to you.
  - Mark the answers, starting from Q1 (see 'Marking Reminders' on score sheet on previous page).
    - **If all answers are correct**, your team has successfully completed the round. If they beat the opposing team in doing so, they are also eligible for the bonus points for that round.
- OR:**
- **At the first incorrect answer stop marking**, circle the incorrect answer and pass the Record Sheet back to the relevant pair to reattempt. There is no limit on the number of reattempts.
  - If your team fails to complete the round in the time given, collect in their Record Sheet and mark those answers written on it. If the second pair has written the answer to Q4 on the sheet but failed to hand it to you in time, Q4 **should** still be marked; however, **bonus points are not available in that situation.**
  - **No communication is allowed between the two pairs.** Final answers (and nothing else) are written on the Record Sheet which is passed between the pairs **via you.**
  - *If a pair knows that the answer they have received must be wrong, they can circle it on the Record Sheet and pass this back to the other pair (via you) to reattempt.*
  - *If a pair realises they have passed on an incorrect answer, they can ask you to retrieve the Record Sheet from the other pair, **but only before Q4 is submitted to you for marking.***
  - The bonus points can be awarded to both teams in the case of a tie. In this rare situation, the decision of the two teachers is final.



# UKMT Team Maths Challenge 2011

## 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		

### Across:

- 1 A prime factor of 7997 (3)
- 4 A multiple of seven, whose digits add up to four (3)
- 6 A power of seventeen (4)
- 8 Less than twenty percent of 20 Down (2)
- 9 The mean of two consecutive Fibonacci numbers (2)
- 10 A multiple of three which is also half of a cube number (3)
- 11 The square root of 9 Down (2)
- 12 Half of 8 Down (2)
- 15 A number which can be expressed as the sum of a triangular number and a square number in three different ways (2)
- 17 The size, in degrees, of an angle in an isosceles triangle whose largest angle is (18 Across)<sup>o</sup> (2)
- 18 A number with exactly four factors (3)
- 19 The highest common factor of 8 Down and 22 Down (2)
- 21 The longest side of a right-angled triangle whose shorter sides are 7 Down and 12 Across (2)
- 22 A prime number whose digits are four of the factors of 19 Across and in decreasing order (4)
- 24 A factor of 6 Down (3)
- 25 A palindromic multiple of eleven (3)

### Down:

- 2 A prime factor of 7887 (3)
- 3 (One half of 15 Across) added to (two-sevenths of 8 Down) (2)
- 4 A palindromic multiple of three (2)
- 5 The size, in degrees, of the interior angle of a regular polygon with nine times as many sides as the regular polygon whose interior angle is (10 Across)<sup>o</sup> (3)
- 6 A multiple of eleven (4)
- 7 The shortest side of a right-angled triangle whose longer sides are 12 Across and 21 Across (2)
- 8 The mean of 2 Down, 4 Down and 18 Across (3)
- 9 The square of 11 Across (3)
- 13 More than ten percent greater than 4 Across (3)
- 14 A power of seventy-one (4)
- 16 Sixteen less than a multiple of sixty-one (3)
- 19 A cube number (3)
- 20 A multiple of four, whose digits add up to fifteen (2)
- 21 The lowest common multiple of the ninth and tenth prime numbers (3)
- 22 (9 Across) percent of 19 Down (2)
- 23 (One more than 22 Across) divided by 4 Across (2)



## UKMT Team Maths Challenge 2011

### CROSSNUMBER

Completed Grid

<sup>1</sup> 7	<sup>2</sup> 2	 7		<sup>3</sup> 5		<sup>4</sup> 3	 0	<sup>5</sup> 1
	 3		<sup>6</sup> 4	 9	<sup>7</sup> 1	 3		 7
<sup>8</sup> 1	 9		 4		 6		<sup>9</sup> 7	 2
 2		<sup>10</sup> 1	 0	 8		<sup>11</sup> 2	 8	
<sup>12</sup> 6	<sup>13</sup> 3		 0		<sup>14</sup> 5		<sup>15</sup> 4	<sup>16</sup> 6
	<sup>17</sup> 3	 7		<sup>18</sup> 1	 0	 6		 5
<sup>19</sup> 1	 8		<sup>20</sup> 9		 4		<sup>21</sup> 6	 5
 2		<sup>22</sup> 9	 6	<sup>23</sup> 3	 1		 6	
<sup>24</sup> 5	 5	 0		 2		<sup>25</sup> 9	 7	 9

### 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.



## UKMT Team Maths Challenge 2011

### RELAY score sheet

Team number .....

School name .....

Correct answers score 2 points – circle 2 or 0 for each question.

<b>A1</b>	2 / 0	12°	<b>B8</b>	2 / 0	42 minutes
<b>B1</b>	2 / 0	77	<b>A9</b>	2 / 0	75°
<b>A2</b>	2 / 0	2016, 2020 (can be written in either order)	<b>B9</b>	2 / 0	09:06
<b>B2</b>	2 / 0	(7, 4)	<b>A10</b>	2 / 0	20 minutes
<b>A3</b>	2 / 0	20	<b>B10</b>	2 / 0	35
<b>B3</b>	2 / 0	9	<b>A11</b>	2 / 0	Ann: 10, Beth: 5, Chris: 7
<b>A4</b>	2 / 0	TUKM and MTUK (can be written in either order)	<b>B11</b>	2 / 0	4 : 3
<b>B4</b>	2 / 0	2002, 2007 (can be written in either order)	<b>A12</b>	2 / 0	190 g
<b>A5</b>	2 / 0	5	<b>B12</b>	2 / 0	385
<b>B5</b>	2 / 0	3, 7, 7, 8, 10	<b>A13</b>	2 / 0	10
<b>A6</b>	2 / 0	15	<b>B13</b>	2 / 0	72°
<b>B6</b>	2 / 0	8, 9, 3, 1	<b>A14</b>	2 / 0	3 : 8
<b>A7</b>	2 / 0	16	<b>B14</b>	2 / 0	200 m
<b>B7</b>	2 / 0	15 cm	<b>A15</b>	2 / 0	5
<b>A8</b>	2 / 0	1/6 (or equivalent)	<b>B15</b>	2 / 0	91 litres

TOTAL SCORE = \_\_\_\_\_



## UKMT Team Maths Challenge 2011

### GROUP ANSWERS

<b>1.</b> 5	<b>2.</b> $36^\circ$
<b>3.</b> Product = 25344	<b>4.</b> Four-digit number = 8392
<b>5.</b> Ian £30, Barbara £12, Martin £8	<b>6.</b> 310 cubes
<b>7.</b> Time is 7:36 a.m. or 07:36 or 7.36	<b>8.</b> 50 students
<b>9.</b> Palindromic number = 141	<b>10.</b> $J = 5,$ $K = 1,$ $L = 3,$ $M = 2$

Award 6 points for each correct answer.

TOTAL SCORE = \_\_\_\_\_



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