



UKMT Team Maths Challenge 2012

## 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 2012

### HEAD-TO-HEAD (MINI RELAY) ANSWERS AND SCORE SHEET

School number:

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

<b>A1</b>	<b>3</b>
<b>A2</b>	<b>1.8</b>
<b>A3</b>	<b>35</b>
<b>A4</b>	<b>27</b>

<b>B1</b>	<b>25</b>
<b>B2</b>	<b>25</b>
<b>B3</b>	<b>35</b>
<b>B4</b>	<b>7 : 2</b>

<b>C1</b>	<b>6/5</b>
<b>C2</b>	<b>3</b>
<b>C3</b>	<b>9</b>
<b>C4</b>	<b>5</b>

<b>D1</b>	<b>5</b>
<b>D2</b>	<b>1,800,000</b>
<b>D3</b>	<b>13</b>
<b>D4</b>	<b>65</b>

#### 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 (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 style="width: 100%; height: 20px;" type="text"/>		Total	<input style="width: 100%; height: 20px;" 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 style="width: 100%; height: 20px;" type="text"/>		Total	<input style="width: 100%; height: 20px;" type="text"/>	

Grand Total:



## UKMT Team Maths Challenge 2012

### HEAD-TO-HEAD (MINI RELAY) EXAMPLE OF MARKING

*Only mark when all questions have been answered, or the time is up.*

*Handed in first time*

<b>Question A1</b>		<i>Right on first attempt</i>
24	✓	<b>3</b> marks – circle ‘3’ against A1 on score sheet
<b>Question A2</b>		<i>Wrong, so stop marking and return to team</i>
17	✗	3 marks no longer available - cross out ‘3’ against A2 on score sheet
<b>Question A3</b>		<i>(Ignore answers to questions 3 and 4)</i>
8		
<b>Question A4</b>		
5		



*Handed in second time*

<b>Question A1</b>		<i>Right on first attempt</i>
24	✓	<b>3</b> marks ( <i>already awarded</i> )
<b>Question A2</b>		<i>Right on second attempt</i>
<del>17</del> 16	✓	<b>1</b> mark – circle ‘1’ against A2 on score sheet
<b>Question A3</b>		<i>Right on first attempt</i>
8 7	✓	<b>3</b> marks – circle ‘3’ against A3 on score sheet
<b>Question A4</b>		<i>Wrong, so return to team</i>
<del>5</del> 6	✗	3 marks no longer available - cross out ‘3’ against A4 on score sheet

*and so on, until all answers are right or the time is up*

**All questions right (at first or subsequent attempts) before the team you are paired with**

**= Bonus 3**

**(circle ‘3’ against Bonus on score sheet)**



# UKMT Team Maths Challenge 2012

## 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

- 2 The largest prime factor of 2564 (3)
- 4 The size, in degrees, of the interior angle of a regular polygon which has more than 23 Down sides (3)
- 6 The mean of 3 Down, 10 Across, 10 Down and 23 Across (3)
- 7 The difference between 10 Down and a power of 3 (3)
- 10 The highest common factor of 6664 and 9333 (2)
- 11 A palindromic number (4)
- 12 A square number (2)
- 13 A number with twelve factors (2)
- 15 1 Down as a percentage of 25 Across (2)
- 16 The sum of the first six positive whole numbers (2)
- 17 The sum of 15 Across and a multiple of 21 Across (4)
- 18 The sum of two cube numbers (2)
- 21 A number, the product of whose digits is zero (3)
- 23 A Fibonacci number and also one less than a triangular number (3)
- 24 The size of the bearing, in degrees, of  $Y$  from  $X$  when the bearing of  $X$  from  $Y$ , in degrees, is 4 Across (3)
- 25 A multiple of 73 (3)

### Down

- 1 Half of 20 Down (3)
- 2 A square number (2)
- 3 The difference between two cube numbers (2)
- 4 The size, in degrees, of the exterior angle of a regular polygon which has more than 23 Down sides (2)
- 5 One thousand less than a Fibonacci number (3)
- 8 A factor of 23 Across (2)
- 9 23 Down percent of 25 Across (3)
- 10 The largest prime factor of 4652 (4)
- 11 A multiple of 16 Across; the sum of its digits is 21 Down (4)
- 14 The highest common factor of 20 Down and 25 Across (3)
- 18 The perimeter of an isosceles triangle, two of whose sides are 4 Across and 6 Across (3)
- 19 The sum of the prime factors of 18 Across (2)
- 20 The sum of the squares of 2, 14 and 26 (3)
- 21 A triangular number (2)
- 22 The sum of all six digits in the central column (2)
- 23 The sum of the smallest prime number and the seventh triangular number (2)



## UKMT Team Maths Challenge 2012

### CROSSNUMBER

Completed Grid

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

### 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 2012

### RELAY score sheet

Team number ..... School name .....

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

<b>A1</b>	2 / 0	20%	<b>B8</b>	2 / 0	169
<b>B1</b>	2 / 0	84%	<b>A9</b>	2 / 0	12
<b>A2</b>	2 / 0	13	<b>B9</b>	2 / 0	(1, 3)
<b>B2</b>	2 / 0	40°, 70°, 100° (in any order)	<b>A10</b>	2 / 0	15
<b>A3</b>	2 / 0	$\frac{1}{36}$	<b>B10</b>	2 / 0	$\frac{1}{6}$
<b>B3</b>	2 / 0	11 p	<b>A11</b>	2 / 0	8.5 km
<b>A4</b>	2 / 0	150%	<b>B11</b>	2 / 0	6
<b>B4</b>	2 / 0	10	<b>A12</b>	2 / 0	(5, 7)
<b>A5</b>	2 / 0	(1, 2)	<b>B12</b>	2 / 0	2 years
<b>B5</b>	2 / 0	50 p	<b>A13</b>	2 / 0	117
<b>A6</b>	2 / 0	3	<b>B13</b>	2 / 0	77
<b>B6</b>	2 / 0	$U=4, K=7, M=2, T=5$	<b>A14</b>	2 / 0	171 seconds
<b>A7</b>	2 / 0	$\frac{1}{3}$	<b>B14</b>	2 / 0	£8600
<b>B7</b>	2 / 0	6 yrs	<b>A15</b>	2 / 0	30 years
<b>A8</b>	2 / 0	2, 3, 5, 13, 17	<b>B15</b>	2 / 0	20 seconds

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



## UKMT Team Maths Challenge 2012

### GROUP ANSWERS

<p>1. 900</p> <p style="text-align: right;"><b>6 or 0</b></p>	<p>2.</p> <table border="1" data-bbox="919 568 1334 725"><thead><tr><th><i>Tick</i></th><th></th><th><i>Amount</i></th></tr></thead><tbody><tr><td></td><td>Broke even</td><td></td></tr><tr><td></td><td>Profit</td><td>£</td></tr><tr><td>✓</td><td>Loss</td><td>£40</td></tr></tbody></table> <p>Both ✓ and 40 needed for 6 marks.</p> <p style="text-align: right;"><b>6 or 0</b></p>	<i>Tick</i>		<i>Amount</i>		Broke even			Profit	£	✓	Loss	£40
<i>Tick</i>		<i>Amount</i>											
	Broke even												
	Profit	£											
✓	Loss	£40											
<p>3. 1110</p> <p style="text-align: right;"><b>6 or 0</b></p>	<p>4. 717</p> <p style="text-align: right;"><b>6 or 0</b></p>												
<p>5. 170 metres</p> <p style="text-align: right;"><b>6 or 0</b></p>	<p>6. 5</p> <p style="text-align: right;"><b>6 or 0</b></p>												
<p>7. 20 sides</p> <p style="text-align: right;"><b>6 or 0</b></p>	<p>8. 1 : 13</p> <p style="text-align: right;"><b>6 or 0</b></p>												
<p>9. 7 ways</p> <p style="text-align: right;"><b>6 or 0</b></p>	<p>10. <math>T = 1, M = 9, C = 8</math></p> <p style="text-align: right;"><b>6 or 0</b></p>												

Award 6 points for each correct answer on Team Answer Sheet.



**UKMT Team Maths Challenge 2012**

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