

Scarborough Teams Math Olympics 2014

Maria grows several varieties of plants in a rectangular-shaped garden. She uses fencing to divide the garden into 16 squares that are each 1 m by 1 m. She also puts fencing around the perimeter of the garden. What is the smallest amount of fencing that Maria needs?



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Each of the numbers 1,2,3,4,5,6 is painted, one to a face, on the faces of a cube. The cube is placed on a table so that from each of three positions a person can see the top and two other faces. The sums of the numbers showing on the visible faces from the three positions are 9, 14, and 15. What is the number on the bottom face?



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# **INDIVIDUAL EVENT**

Scarborough Teams Math Olympics 2014

- Write your information in the boxes provided on the ANSWER SHEET.
- You have a maximum of 30 minutes to complete as many questions as you can. Please wait for the Olympic Official's instruction to begin.
- Questions are worth 3, 4, or 6 points as indicated.
- Questions can be done in any order.
- Calculators, rulers and graph paper are allowed.
- Record your answers on the ANSWER SHEET. Indicate your choices using capital letters: A, B, C, D or E.
- Hand in the QUESTIONS booklet and the ANSWER SHEET.



**INDIVIDUAL EVENT** 

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#### Part A: Each correct answer is worth 3 points.

- 1. All angles in the figure are right angles. The perimeter of the figure is
  - A 23 B 16 C 69 D 46
  - E None of the above



- In a cabinet, six drawers contain blue pens, five drawers contain red pens, four drawers contain green pens and one drawer is empty. There are at most two colours of pens in any drawer. The minimum number of drawers in the cabinet is
   A 10
   B 9
   C 16
   D 8
   E 15
- A straight road goes through four towns, A, B, C and D, as shown. The distance between A and C is 58 km. The distance from B to D is 80 km. Town C is half-way between B and D. Find the distance between A and B.
   A 17
   B 18
   C 29
   D 11
   E 22



- 4. The decimal expansion of the fraction  $\frac{2}{13}$  is the repeating decimal  $0.\overline{153846}$ . What digit occurs in the 2014<sup>th</sup> place after the decimal point? A 8 B 6 C 5 D 3 E 4
- 5. The addition of 2 three-digit numbers is shown. The letters x and y represent different digits. Find the value of y - x. A 3 B -5 C 7 D -7 E 2  $\frac{y}{1 - x - 1}$

#### Part B: Each correct answer is worth 4 points.

6. In the diagram, the object is made up of seven 1 × 1 × 3 blocks. What is the total surface area of the object? A 28 B 56 C 21 D 14 E 42
7. Find the value of x if x+2014/3 C -3 D -2015 E -670







**INDIVIDUAL EVENT** 

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#### Part C: Each correct answer is worth 6 points.

16. All the edges in this solid are 1 cm long and the distance between the top and the bottom face is 2 cm. The volume of the solid is

17. In a magic square the sums of numbers in any column, any row and the main diagonals are the same. In the magic square shown, what value of X + Y + Z?

18. The product of three different positive integers is 72. What is the smallest possible sum of these integers?

19. Fifty Cards are numbered 1, 2, 3, ...., 50. Some cards are placed in a hat. No two cards in the hat have a sum of 51. What is the greatest number of cards that could have been placed in the hat?

20. In ABC, D divides AB in the ratio 1:2, and E divides BC in the ratio 3:4. If the area of BDE is 6, find the area of ABC.









# COMPETITION ANSWER SHEET Scarborough Individual Math Olympics 2014

First Name:			
Last Name:			
School:			
Circle:	Grade: 7	8	Gender: F M

#### Circle your choice for each question:

1.	А	В	С	D	Е	6.	А	В	С	D	Е	11.	А	В	С	D	Е
2.	А	В	С	D	Е	7.	А	В	С	D	Е	12.	А	В	С	D	Е
3.	А	В	С	D	Е	8.	А	В	С	D	Е	13.	А	В	С	D	Е
4.	А	В	С	D	Е	9.	А	В	С	D	Е	14.	А	В	С	D	Е
5.	А	В	С	D	Е	10.	А	В	С	D	Е	15.	А	В	С	D	Е
	x 3	3 =					x 4	1 =					<b>x</b> 4	l =			

Write your answer for each question:

16.		
17.		
18.		
19.		
20.		
x 6 =	Total =	/ 85 points



Scarborough Teams Math Olympics 2014

Team:		
	1.	ID#
Team Members' Names:	2.	ID#
Score:	DJ Songs	/6
	Clock Hands	/4
	Train Passengers	/8
	Magic Triangles	/9
	Total	/27

- Make sure that you have entered your team name and your names in the box provided above.
- You have a maximum of 30 minutes to complete this event. Please wait for the Olympic Official's instruction to begin.
- Calculators, rulers and graph paper are allowed.
- Be sure to hand in all sheets.



Scarborough Teams Math Olympics 2014

#### Part A – DJ Song Sets (6 points)

Your mobile DJ business has 6 Rap songs, 10 Rock songs, 6 Alternative songs, 8 "Oldies" songs and 5 Country songs.

How many different 10-song sets can the DJ play at a party if she plays exactly 3 Rap songs and exactly 4 Rock songs in each set? Briefly explain your thinking.

Answer:

## Part B - Clock Hands (4 points)

A day has 24 hours from 12:00 Midnight to 12:00 Midnight. How many times a 24-hr day would the minute and hour hands of a 12-hour clock form a right angle?

Briefly explain your thinking.

hight to 12.00 Midnight. How many times a

Answer:

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#### Part C - Train Passengers (8 points)

A train goes one way to twenty stations and, at each station, picks up a group of passengers, one of which will get off at each of the remaining stations. For example, at station 5, the train picks up a group of passengers. One passenger of that group will get off at station 6, another at station 7, and so on. At station 20, the last passenger of that group gets off.

Briefly explain your thinking.

i) What is the total number of passengers that get on the train?

Answer:

ii) From which station did the train leave with the most passengers?



iii) How many passengers were on that train when it left the station in (ii)?

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## Part D - Magic Triangles (9 points)

Place the digits 1-9 in the circles on the "Magic Triangle" in the diagram using each digit only once. For each side of the triangle, the sum of the two "inside numbers" subtracted from the sum of the two "end numbers" must be the same "magic number'.

Find an arrangement for each of the Magic Numbers 0, 3, and 9.





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## Part A - RECTANGLE (5 points)

Use a rectangular piece of paper provided for this problem.

1.	Clearly explain how to cut and fold the piece of paper to form the 3-D shape shown in the diagram. <b>Tape and glue may NOT be used to hold</b> <b>pieces of paper together.</b>	- - -		

2. Execute your plan and glue the paper in the space below.



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### Part B - SQUARE (4 x 5 points)

A piece of paper is the size of 5 congruent squares arranged as shown. Use the pieces of paper provided for this problem.

#### Task:

Cut the paper so that resulting pieces can be rearranged and glued to form the one large rectangle.

- There cannot be any parts of the original paper that are leftover or unused in the square.
- Folding is allowed.
- Can this task be done using exactly 4 cuts? Clearly explain how to do it and glue your results to this page OR explain why it cannot be done.



 Can this task be done using exactly 3 cuts? Clearly explain how to do it and glue your results to this page OR explain why it cannot be done.



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3. Can this task be done using **exactly 2 cuts**? Clearly explain how to do it and glue your results to this page OR explain why it cannot be done.

4. Can this task be done using **exactly 1 cut**? Clearly explain how to do it and glue your results to this page OR explain why it cannot be done.

Part A			FairA			Part A	
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Part B			Part B				
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		Part B					
Part B				Pa	rt B		



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## Part A - Dominoes (6 points)

Tile the grid below (using 2 × 1 dominoes) so that no four dominoes touch at a point. Extra grids provided - Circle your answer.







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## Part C - Ken Ken (14 points)

Fill in the numbers 1 through 6 in each row and each column. The value in each block represents the answer when the operation is applied to the numbers in that block. Extra grid provided - Circle your answer.

Teamwork Puzzle +								
54×		4—		60×	2 <del>:</del>			
	24×							
7+	15 <del>+</del>			7+	6 <del>+</del>			
		11+						
7+				5—	2 <del>:</del>			
		2—						

www.kenken.com

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+ = × ÷

54×		4—	60×	2 <del>÷</del>
	24×			
7+	15+		7+	6+
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							Part B	
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7+				5—	2 <del>:</del>		
		2—					

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