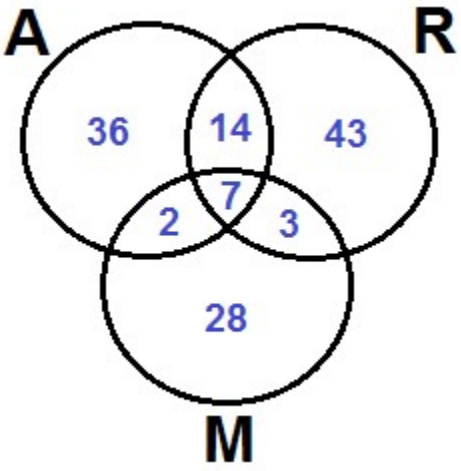
PIMS Elementary Grades Math Competition NAME: _____
11 May 2013
Target Round - Grade Seven Division SCHOOL: _____

1. The Canadian edition of the Times appears every day of the week. The paper costs the same every weekday (Monday through Friday). The Saturday paper costs $0.90 more than the paper costs on weekdays, and the Sunday paper costs twice as much as the Saturday paper. Alan buys a copy of the paper every day, and spends a total of $20.38 per week. What is the cost, in dollars, correct to 2 decimal places, of the Sunday edition of the Times? _____($) 1

2. How many different three-digit numbers can be made using any three of the following six digits: 2, 3, 4, 4, 5, and 5? _____ 2

3. The chart below represents all the medals that were given to participants in the "Art Math" competitions. From the chart you can easily find out that the total number of medals that were given is 133. You also know: a) **M** of the medals were made out of metal (the rest were plastic), b) the colour of **R** of the medals was red (the rest were blue), and c) **A** of the medals were given for outstanding art performance (the rest were for math). Note that no plastic blue medals were awarded for math. What is the ratio of the number of metal medals that are either for math or red to the number of metal medals that are neither blue nor for math?



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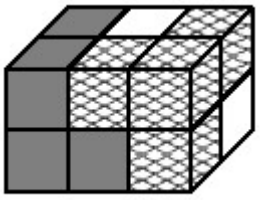
4. The box below is made up of 12 cubes (some of the cubes are not visible from this viewing angle). Each cube has one of three patterns all around (white, mesh, or dark). You are told that if you select a dark cube at random (of all the dark cubes including those that are not visible), the probability that exactly one of its faces touches a cube with mesh face is $\frac{2}{5}$. If you select a mesh cube at random, what is the probability that at least one of its faces meets a face of a white cube?



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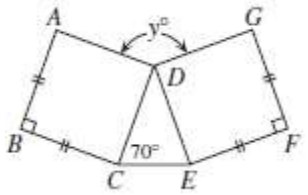
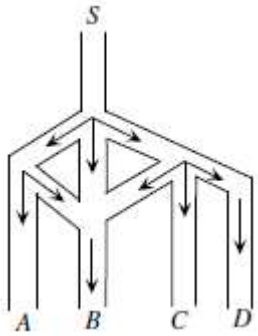
5. The 2 squares below have the same area.
What is the value of the angle (in degrees) marked by the letter y?



_____(°) 5

6. The first two terms of the Lucas sequence are 1 and 3, and after that any term of the Lucas sequence is the sum of the previous two terms.
What is the 7-th term of the Lucas sequence? _____ 6

7. The figure below describes the flow of water through a system of pipes (all the water flows as indicated by the arrows). In any 3-way split $\frac{1}{3}$ of the water continues in any of the 3 branches, and in any 2-way split $\frac{1}{2}$ of the water continues in any of the 2 branches.
What is the ratio of the flow at D to the flow at B?



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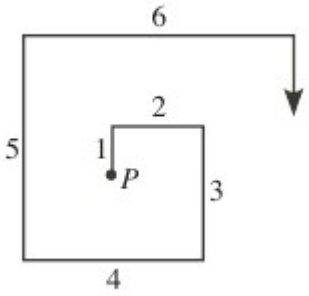
8. In the figure below, all segments meet at right angles.
The first segment is of length 1, the second is of length 2, and so on.
Note that all segments with odd length are vertical.
What is the (horizontal) distance between the segment of length 2013 and the segment with length 111?



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9. What is the largest integer n such that 7 divides $n!-1$?
(Note: $n!=1\times 2\times 3\times\cdots\times n$).

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10. If you fill the missing numbers in the magic square below, all horizontal, vertical and diagonal sums are the same. What is the value of x?

$2x$	3	2
		-3
0	x	

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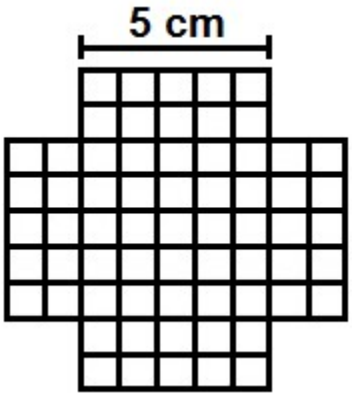
11. The figure below is a map of all the streets of the city of Squarina. The length of each block on the map (horizontal or vertical) is 1 cm and the scale of the map is 1:12000. What is the total length of all the streets (in km correct to 2 decimal places)?



_____(km) 11

12. 2013 cards are labeled 1 through 2013 (from top of the pile to its bottom). Alan removes cards from the pile as follows. He begins by removing every second card starting at the top (i.e. cards 2, 4, and so on up to and including card 2012) without changing the order of the remaining cards. He then removes every third card of the remaining cards starting again from the top of the pile (as some of the cards were removed already, he now removes cards 5, 11, 17, and so on). Then, every fourth card the same way. How many cards have been removed in total once he finished removing every fourth card?

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