**FMA Team Mathematics Competition - Finals**

**YEAR 13 – 2016**

Y13/1 Find argument of the complex number ,

Y13/2 Find the coefficient of x-1  in the expansion of

Y13/3 Evaluate 

Y13/4 If is one of the solutions of the equation, what is the other solution?

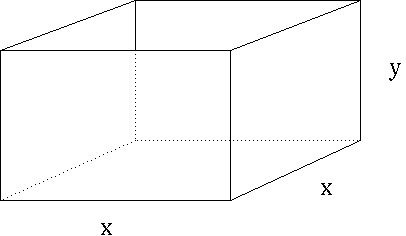
Y13/5 A classroom has a rectangular array of desks. A student notices that there are three desks to her right, two to her left, ﬁve desks in front of her and two behind her. How many desks are in the room?

Y13/6 Compute the area of the region enclosed by the graphs of   and 

Y13/7 A pet shop has 1500 pets that are either: cats, dogs or birds. Of this total, 55% are cats and 20% are dogs. A group of cat lovers bought cats only, until just 40% of the remaining pets were cats. How many cats were bought by the cat lovers?

Y13/8 If and, and if and are real numbers, then what is the value of?

Y13/9  An open rectangular box with square base is to be made from 48 ft.2 of material. What dimensions (values of x and y) will result in a box with the largest possible volume?



Y13/10 Study the pattern shown below. What is the product of the numbers?



Y13/11 Suppose and are the roots of .Find the Value of .

Y13/12 In a psychology experiment, an image of a cat or an image of a dog is flashed briefly onto a screen and then Anna is asked to guess whether the image showed a cat or a dog. This process is repeated a large number of times with an equal number of images of cats and images of dogs shown. If Anna is correct 95% of the time when she guesses “dog” and 90% of the time when she guesses “cat”, determine the ratio of the number of times she guessed “dog” to the number of times she guessed “cat”.

Y13/13 Determine all values of x for which

Y13/14 Consider all triangles formed by lines passing through the point and both the and axes. What is the exact size of the hypotenuse of the triangle with the shortest hypotenuse?

Y13/15 Determine the value of the following sum:

Y13/16 Determine all angles with and .

Y13/17 At a certain intersection, the light for eastbound traffic is red for 15 seconds, yellow for 5 seconds, and green for 30 seconds.  Find the probability that out of the next eight eastbound cars that arrive randomly at the light, exactly three will be stopped by a red light. Give answer to 3 decimal place.

Y13/18 Two buoys, A and B, lie 33 metres apart on the sea surface. There is a crab "C" on the seabed. The angle of depression of C from A is 60° and the distance AC is 40 metres.Calculate the distance BC.

Y13/19 Simplify

Y13/20 How many different numbers can be formed by rearranging 2212562?

TIE BREAKER

Y13/21 Compute the sum of the first 120 numbers in the following list: 3, 7, 11, 15, 19, 23, 27, ...

Y13/22 Find the point on the graph of  nearest the point (4, 0).

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