**FMA TMC Finals**

**YEAR 12– 2016**

Y12/1 The numbers 4, 15,*x*, 21, 12,*y*, 7, have a mean of 14.5. What is the value of *x+ y*?

Y12/2 The first term of an arithmetic sequence is 10; the fifth term is 38. What is the second term?

Y12/3 There are exactly three different pairs of positive integers that add to make six.

1 + 5 = 6

2 + 4 = 6

3 + 3 = 6

How many different pairs of positive integers add to make one-thousand?

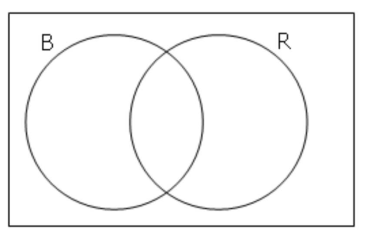
Y12/4 A sequence is arithmetic if the numbers increases by a fixed amount. For example, 2, 5, 8, are in an arithmetic sequence with a common difference of 3, and if these numbers represented the side lengths of a cuboid, the volume, V = 2 x 5 x 8 = 80 units3 . How many cuboids exist for which the volume is less than 100 units3 and the integer side lengths are in an arithmetic sequence?

Y12/5 For a set of five whole numbers, the mean is 4, the mode is 1, and the median is 5. What are the five numbers?

Y12/6 Mark takes 2 hours to clean 500 bottles,Flor takes 3 hours to clean 450 bottles. Starting at 8.15am and working together, when they are expected to finish cleaning 1,500 bottles?

Y12/7 Simplify

Y12/8 At a birthday party, one-half drank only lemonade, one-third drank only cola, fifteen people drank neither, and nobody drinks both. How many people were at the party?

Y12/9 Mr. Venn draws two large overlapping circles on the floor of the sports hall and labels them B and R. He asks all those students with brown hair to stand in the B circle andthose that are right handed to stand in the R circle; if they have both brown hair andare right handed, they need to stand in the region where the two circles overlap.

When they return to the classroom he asks his class of thirty two students how many have brown hair: twenty seven put their hands up. He then asks how many studentsare right handed: twenty four raise their hands.What is the minimum number of students that stood in the overlap?

Y12/10 When travelling by Fiji Airways, passengers have a maximum allowable weight for their luggage. They are then charged $10 for every kilogram overweight. If a passengercarrying 40 kg of luggage is charged $50, how much would a passenger carrying 80kg be charged?

Y12/11 Find the x-intercept of the rational function

Y12/12 Two painters paint a house in 3 days. The first painter can finish the house in 4 days if he works alone. If the second painter works alone how many days will he need to finish painting the house in his own?

Y12/13 A pile of oranges are arranged to make a square based pyramid by having one orange on the top layer, four oranges on the second layer, nine oranges on the thirdlayer, and so on. Such that consecutive layers will have a number of oranges equal toconsecutive square numbers: 1, 4, 9, 16, 25, ....If there were one-thousand oranges in the pile used to make the pyramid not all ofthem would be needed. How many oranges would be left over?

Y12/14 Determine all values of x for which

Y12/15The ninth and tenth terms of an arithmetic sequence are, 87 and 99 respectively. What is its first term?

Y12/16 Matilda wanted to transfer her favourite CD to tape.



The CD has six songs and the length of the tracks are 7:55, 9:40, 9:15, 12:45, 8:20 and 11:30; a total playing time of 59:25. After changing the order of the songs,Matilda was able to fit all the songs, without any breaks, on a sixty minute tape. Howdid she arrange the songs?

Y12/17 If you were 35 years old in the year 1225 it would be a very special time mathematically, because 352 = 1225. That is, the square of your age at that momentis equal to the year. This does not happen very often.Augustus de Morgan, a famous mathematician, was one of those lucky people and in 1864 he wrote:

***"At some point in my life the square of my age was the same as the year."***

If he died on 18/03/1871, when was he born?

Y12/18 A tortoise and a hare race against each other.A hare runs at a constant speed of 36 km per hour for exactly ten seconds and waitsfor the tortoise to catch up.If the tortoise takes two hours to move 1 km, how long will it take to catch up?

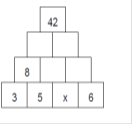
Y12/19 2 m³ of soil containing 35% sand was mixed into 6 m³ of soil containing 15% sand. What is the sand content of the mixture?

Y12/20 Ryan left the science museum and drove south. Gabriella left three hours later driving 42 km/h faster in an effort to catch up to him. After two hours Gabriella finally caught up. Find Ryan's average speed.

Tie Breaker

Y12/21 In the figure the number 8 is obtained by adding the two numbers directly below it. The

other numbers in the top three rows can be obtained in the same way. What is the value of x?

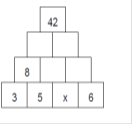


Y12/22 Sarah started school at the age of five. She spent one quarter of her life being educated, and went straight into work. After working for one half of her life, she livedfor fourteen happy years after retiring.

How old was she when she retired?

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