Maths Workshop

October 2020

Problems

1. How many sequences of 0s and 1s can be made of length 10?

2. A point P is chosen at random inside an equilateral triangle of side length 6. Find the average value of the sum of the (perpendicular) distances from P to the three sides of the triangle.

3. Amy, Ben and Cat are three siblings. Interestingly their current ages are prime. What's more interesting that differences between their ages are also prime. How old are they?

4. The numbers x, y and z are given by:

$$x = \sqrt{12 - 3\sqrt{7}} - \sqrt{12 + 3\sqrt{7}}$$
$$y = \sqrt{7 - 4\sqrt{3}} - \sqrt{7 + 4\sqrt{3}}$$
$$z = \sqrt{2 + \sqrt{3}} - \sqrt{2 - \sqrt{3}}.$$

What is the value of xyz?

5. If the numbers 2^n and 5^n (where n is a positive integer) start with the same digit, what is this digit?

6. The sum of five real numbers is 7; the sum of their squares is 10. Find the minimum and maximum possible values of any one of the numbers.