

A-level Maths Summer Project

Due: First maths lesson in September 2019

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The Problem

1. Choose three integers (whole numbers) and call them a, b and c.
2. Replace the squares in the expression below with your numbers in any order

$$(\blacksquare x + \blacksquare)(x + \blacksquare)$$

3. Multiply the brackets out and simplify
4. Change the order in which you put a, b and c into the squares in the expression above and multiply out the brackets again and simplify.
5. Do the same for every possible order.
6. Add all of your results together
7. Can you factorise your answer?
8. Try the process again with different values of a, b and c. What do you notice? Can you prove it?

PLEASE BRING AT LEAST THREE EXAMPLES ON SEPARATE LINED/SQUARED PAPER TO YOUR FIRST MATHS LESSON IN SEPTEMBER 2019.

Example

I pick 2,3,4

All of the possibilities are:

$$(x + 2)(3x + 4) = 3x^2 + 10x + 8$$

$$(x + 2)(4x + 3) = 4x^2 + 11x + 6$$

$$(x + 3)(2x + 4) = 2x^2 + 10x + 12$$

$$(x + 3)(4x + 2) = 4x^2 + 14x + 6$$

$$(x + 4)(2x + 3) = 2x^2 + 11x + 12$$

$$(x + 4)(3x + 2) = 3x^2 + 14x + 8$$

Add them up:

$$18x^2 + 70x + 52$$

Factorise:

$$2(9x^2 + 35x + 26)$$

$$2(x + 1)(9x + 26)$$

Mathematics is a fascinating subject and there are many things outside of the classroom that I'm sure will intrigue you and get you thinking. Take a look at the suggestions below...

Reading/watch list:

- 3blue1brown maths videos on youtube
- Numberphile maths videos on youtube
- https://www.ted.com/talks/hannah_fry_the_mathematics_of_love?language=en
- How to solve a rubix cube <https://www.youtube.com/watch?v=7Ron6MN45LY>
- Book called 'Fermats Last Theorem' by Simon Singh
- Book called '17 Equations That Changed The World' by Ian Stewart