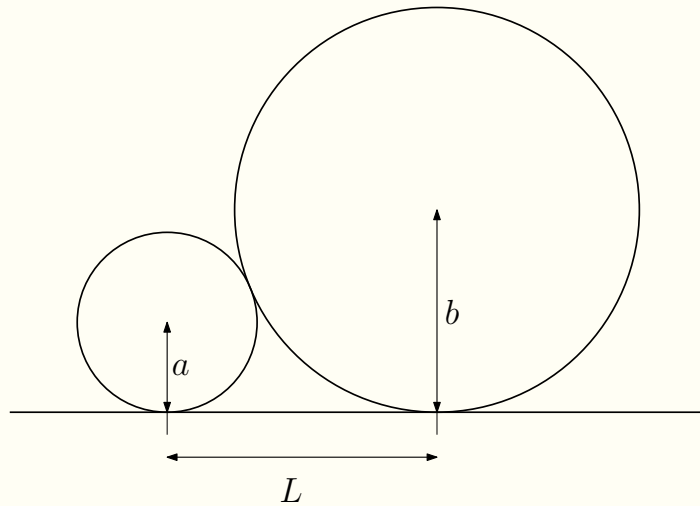


Question 1

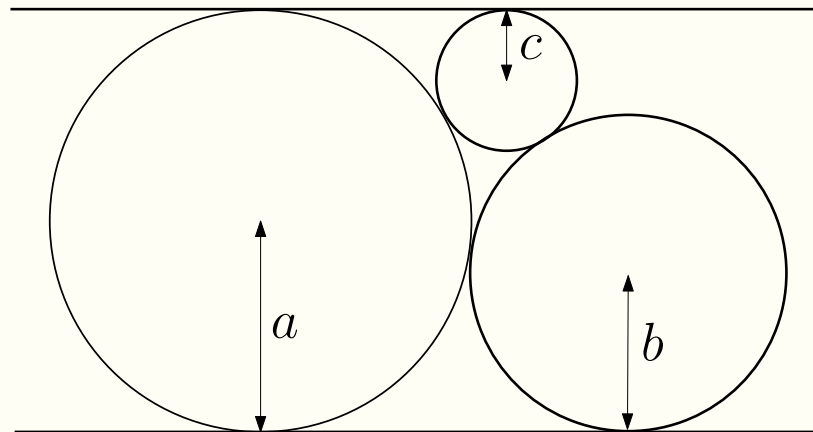


Show that $L^2 = 4ab$.

What mathematical results did you need to use to answer this question?

What is the most succinct answer you can give?

Question 2



Show that $a^2 = 4bc$.

You may assume $a > b > c$, as in the diagram.

Hint: you need to do Question 1 before trying this one!

Congratulations if you managed to answer this question.

If your answer involved a lot of algebra, can you see how to use your answer to Question 1 multiple times to give a more elegant, concise answer to this question?

Question 3

The integer 2019 is the product of two primes. What is the sum of these two primes?

Which numbers are prime numbers?

Is there an easy way to “spot” one of the factors of 2019?

What ways do you know of spotting the factors of an integer?

Question 4

What is the last digit of 9^{2019} ?

What is the last digit of 7^{2019} ?

What are the last two digits of 7^{2019} ?

What are the last two digits of 11^{2019} ?

What patterns can you spot in the last digit or digits of powers?

Question 5

Find an example of a triangle whose area is a rational number for which all of the side lengths are rational numbers.

Find an example of a triangle whose area is a rational number for which two of the side lengths are rational numbers (and the other is irrational).

Find an example of a triangle whose area is a rational number for which one of the side lengths is a rational number (and the others are irrational).

Find an example of a triangle whose area is a rational number for which all of the side lengths are irrational numbers.

A rational number is a number of the form p/q , where p and $q \neq 0$ are integers.

Is $\frac{1}{2}$ rational? Is 3 rational? Is $\sqrt{2}$ rational? Is $\sqrt{3}$ rational?