

CLIL WRITTEN TEST

1) Fill in the gaps with the words listed below: (pay attention: not all the words are necessary!)

Number - Georg Cantor - David Hilbert - Kurt Godel - rooms - last - Set Theory - guests - math - cardinality - $\mathbb{R}$ - $\mathbb{N}$ - $\mathbb{Q}$ - $\mathbb{Z}$ - empty - mathematician - seats - sets - guests - hotel - bigger - unprovable - kind - mathematical - paired up - move- guest - room - cardinality - hypothesis - Continuum Hypothesis - concept

Infinity represents a very difficult _____ concept.

To explain its properties in a simple way, the mathematician _____ used a hotel with infinitely many _____ on a never-ending corridor: a new guest arrive asking for a room but the hotel is full. The hotel asks all the _____ to move up into the next room and the first _____ becomes available. This trick is possible because this strange hotel doesn't have a _____ room!

This idea can be applied also if any finite _____ of new guests arrives or, even if it's more difficult, if infinitely many new guests arrive: every _____ will get a new room! If we want to develop and deepen the concept of infinity we have to use the mathematical _____: trying to build a bijection between two different _____ it's possible to understand if they have the same cardinality.

Using this method we can show that $\mathbb{N}$, _____ and $\mathbb{Q}$ all have the same _____, while the real numbers $\mathbb{R}$ have a _____ size.

_____, the mathematician who founded the Set Theory and developed the concept of cardinality, invented the _____ asking whether the _____ of $\mathbb{R}$ is the next bigger cardinality after the cardinality of $\mathbb{N}$. Later the mathematician _____ discovered that this hypothesis is _____: this means that it can be true or not without generating conflict with other mathematical concepts in any case!

2) Answer the following questions.

2a) What is a set in math? _____

2b) What does it mean that a set is "countable"? _____

2c) Explain the concept of cardinality and compare the cardinality of $\mathbb{N}$, $\mathbb{Z}$, $\mathbb{Q}$ and $\mathbb{R}$

SURNAME _____ NAME _____

2d) Explain Cantor's Diagonal. _____

3) Match the words on the right with the correct definitions on the left.

A	HYPOTHESIS	1	A "number" which indicates a quantity, size, or magnitude that is larger than any real number.
B	DAVID HILBERT	2	The part of a conditional after If and before Then.
C	SYMBOL	3	The German mathematician who tried to explain some of the properties of infinity using a hotel with infinitely many rooms.
D	INFINITY	4	The first mathematician to realize that there are different kinds, different sizes of infinity.
E	KURT GODEL	5	An integer that is not a multiple of 2.
F	CONTRADICTION	6	The mathematician who discovered the existence of unprovable statements like the continuum hypothesis.
G	GEORG CANTOR	7	An integer that is a multiple of 2.
H	ODD	8	A function between the elements of two sets, where every element of one set is paired with exactly one element of the other set, and every element of the other set is paired with exactly one element of the first set. There are no unpaired elements.
I	EVEN	9	A convincing demonstration that some mathematical statement is necessarily true.
J	BIJECTION	10	A logical incompatibility between two or more propositions.
K	PROOF	11	A seemingly absurd or contradictory statement or proposition which when investigated may prove to be well founded or true.
L	PARADOX	12	A mark or character used as a conventional representation of an object, function, or process, e.g. the letter or letters standing for a chemical element or a character in musical notation.