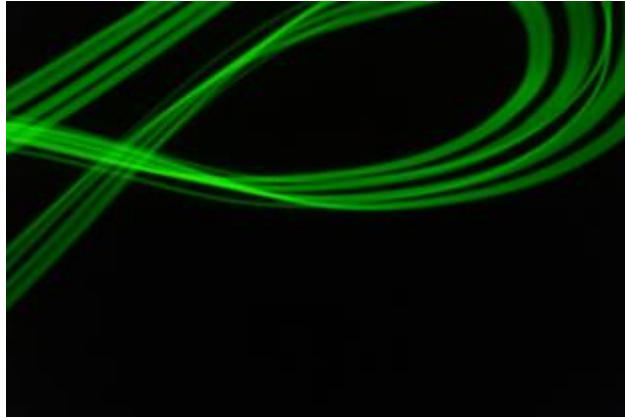


# Photomath17



1 - For those of us blessed with sight, it is difficult not to take it for granted. Every waking minute we depend upon our vision. We live in a three-dimensional world of great complexity and immense proportion. Light reflects off of that world and strikes the retina. We see a rich three-dimensional world and it all comes from that tiny patch of light-sensitive cells. We humans are capable enough create a machine to capture these moments and sometimes we can even manipulate them. By taking a picture in a dark room with an alarm clock set at the time 11:11, then by creating aleatory movements, I was able to make a large variety of abstract shapes like the one depicted underneath. Like the Perception Personality Images shown to the general public they can be interpreted in numerus ways. It's fascinating how some wavelengths of electromagnetic radiation can allow us to experience something as magnificent as the world that surrounds us.



2 - Esta foto representa un fondo oscuro, parecido al de un abismo. Aquí se puede apreciar la perspectiva y la lejanía, fijándonos en las líneas rectas que se dirigen a la línea del horizonte. También se puede apreciar una espiral formada por círculos del mismo radio que recorren la misma trayectoria.



3 - The mathematical theme used here is symmetry, as the trees are aligned.



4 - For me, this photo does not only represent the beauty of nature, but all the mathematical aspects beyond the big picture. At first glance, this photo may appear like a normal picture, but the fact is that everything that surrounds us has to do with maths. The parallelity of the bridge, the infinity effect of the tiles... and many more things that we, as human beings, do not take notice of.



5 - Broken shadow, I took this picture with my phone. I set my chair up against the wall and pointed a light at it, this created the bigger shadow effect. I think it turned out really well.



6 - The mathematical theme in this image is the structure of the different buildings of Frankfurt am Main, and their shapes



7 - This is my work of photographic art. I call it "Circles of liquid".



8 - The mathematical theme in this picture are the circles that are inside each other



9 - It is a photo of a water bottle, which represents the circumference of a circle.



10 - Cette photo prise sur un temple d'Ayutthaya renferme de nombreux éléments mathématiques qui semblent protéger Bouddha : colonnes de tailles différentes et placées symétriquement qui nous guident vers le Bouddha, éléments de construction horizontaux, le damier qui peut être visualisé au sol nous montre l'évolution de la couleur des pierres dans le temps.

*Une statue de dos de Bouddha se devine au fond de la photo et apporte un élément symétrique supplémentaire. Cette photo semble être comme une opposi-tion entre deux élém-ents, éléments mathé-matiques de la const-ruction du temple et le concept plus spi-rituel de Bouddha.*



*11 - En esta foto, intento comparar la relación antagónica de los números opuestos, con la del Sol y la Luna, aumentando así, el contraste entre ellos. De esta forma, se puede apreciar las matemáticas desde otro punto de vista.*



*12 - El efecto que produce este cristal cóncavo es perfecto para observar mejor este paisaje de Inglaterra.*





13 - La geometría mas destacada de esta foto, es la forma tan peculiar de las rampas que constituyen la cuesta. Se podría decir que son trozos de tarta, ordenados perspectivicamente. Al observar la parte amarilla podemos destacar un triángulo que cumple las leyes pitagóricas. En cambio, los trozos azules son mas complejos ya que habría que fragmentarlos para aplicar la ley pitagórica. Al mismo tiempo podemos ver las barandillas como forman rectas que interseccionan entre si. Este conjunto de propiedades matemáticas, ha creado una imagen compleja y fabulosa.



14 - Winter isn't about snow but about ice. Snowflakes are very beautiful and unique as well but they're very hard to catch on a picture and it almost didn't snow this winter. Ice only needs low temperature to exist and snow only falls in humid, cold days. To walk on ice is truly fascinating and exciting because you realise that these cristal stuctures are actually frozen water. The light made a good contrast and it was easier to see the different shapes that the ice had. It was too thin to walk on it but even i fit would have been secure, we wouldn't want to walk on it and to destroy it. It also is interesting to know that the ice will melt and freeze again. So, it creates new structures and gets unique from one day to asnother. I chose this picture because i think it shows, that there also is beautiful mathematical shapes everywere. I would even call it art.



15 - El ecuador celeste es un gran círculo en la imaginaria esfera celeste. Esta esfera, es una esfera ideal, sin radio definido, concéntrica con el globo terrestre, en la cual aparentemente se mueven los astros. Permite representar las direcciones en que se hallan los objetos celestes. La fotografía está tomada en el pueblo viejo de Belchite, que fue bombardeado durante la Guerra Civil Española.



16 - Durante mi viaje a Praga visité su reloj astronómico. Mi imagen pretende demostrar el ingenio del constructor al crear una estructura combinando elementos metálicos, con formas geométricas, que asemejan espirales sobre cruzadas que se elevan, dando soporte al ascensor que lleva a la cima de la torre.





17 - This photo is a symmetrical image of a spherical dome. The hemisphere is architecturally designed in a way that it's a reflection, so if you rotate it by  $90^\circ$ ,  $180^\circ$  or  $270^\circ$  it would still look the same. The dome is made up of different geometrical shapes, such as spheres and quadrilaterals. The edges of the square are parallel and perpendicular to one another, meaning the vertices are presumably made using Pythagoras' Theorem.



18 - It's strange how this simple photo of a few children's blocks made me think so much about myself and the people I'm sorrowed by. Consider that these stacked blocks are the average person. We're all constantly trying to fit in even if we stand out like a sour thump. Especially in adolescence, when what others think about you becomes more important than your happiness or staying true to yourself. Teenagers are constantly in the urge to grow up and they do so by spending time with people of a considerably higher age or by partaking in commonly adult activities just like the blocks (representing teens) trying to sorrowed itself with the older, worn out wood (representing people of a higher age). Geometry is all around us and it can be interpreted in a million different ways. Every shape can be associated to your personal memories. This simple photograph made me think about the people I know and about myself. There are so many other similarities I could point out and I find that to be pretty odd.



19 - Après un séjour à Athènes (capitale de Grèce), j'ai remarqué que la plupart des lettres grecques sont utilisés dans le langage mathématique. Je me suis alors amusé à photographier ce magasin de souvenirs vendant des T-shirt où l'on remarque la lettre Pi (2ème en haut en partant de la droite). J'ai alors remarqué que les mathématiques étaient présentes même là où on ne pense pas qu'on puisse les trouver !!



20 - "This photograph aims to emphasize the use of geometry in the world around us. I tried to capture the essence of Tadao Ando's architecture and design, as his manipulation of area and form is beautifully simple yet complex, and created with perfect mathematical precision. The use of space, shape, colour, lines and light in this photo strikes me as harmonious and makes me feel serene, and it is a feeling I would like to share. I aimed to explore the connection between mathematics and architecture that I find so incredibly fascinating. (Taken in Tadao Ando's Conference Pavillion)"



21 - "The mathematical reasoning behind this image is the zero. The zero between negative and positive numbers; the absolute zero, the lowest point of internal energy, where Bose-Einstein condensate possible; An arabic number presumably invented by babylonians 400 BC, Used back then as a place holder for numbers like 100 and 10; Brought to europe by Fibonacci; It allowed the creation of negative numbers."



22 - The mathematical reasoning behind this image is that the frost spreads out in different angles and creates a unique pattern illustrating the idea of fractals. Every area of frost is the same shape no matter which scale it is. This image is also an example of symmetry since the frost spreads out on both sides and mirrors each side.



23 - Cette photo représente bien les maths pour moi. Je peux les tourner dans tous les sens, elles resteront logiques, impressionnantes mais quand même déroutantes. Les escaliers, cercles, carrés, lignes et symétries représentent pour moi le côté ordonné, logique des mathématiques. L'escalier central flanqué par deux plus petits, comme par deux gardes, m'impressionne. Ils sont imposants et gris, mais c'est pas pour ça qu'ils ne sont pas jolis. Comme quand je regarde un exercice pour la première fois, et que je me sens un peu perdue, ces escaliers, montants, descendants, uniformes mais différents, m'embrouillent un peu.



24 - The mathematical concept behind this picture is geometry. The almost perfectly circular shape of these bubbles and ball, along with the light, give a very spherical effect to them (as well as fish eye and depth for the ball).



25 - Esta foto, representa como las matemáticas, es la base de todo, esta diariamente presente en nuestras vidas, en este caso, el sol, es lo que nos mantiene vivos, podemos ver un infinito limitado dibujado en nuestro cielo y segmentos en las ramas de los árboles.

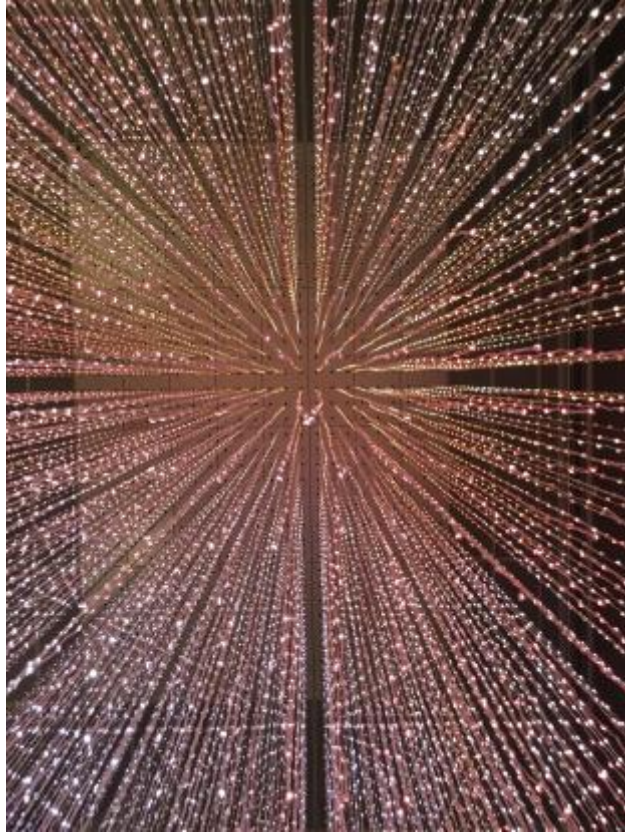


26 - Esta foto muestra una estrella de cinco puntas, rodeada por una circunferencia con los bordes ondulados, que simplemente es el resto de sacarle punta a un lápiz de color rosa.





27 - En la fotografía se observa uno de los muchos ejemplos de esferas presentes en la naturaleza. Al observar el erizo de mar, vemos que tiene una forma discoidal, formando una esfera casi perfecta.



28 - A veces mirar hacia arriba es sinónimo de descubrir. En esta fotografía tomada en una estación, una lluvia de destellos dan forma a una coordenada cartesiana.



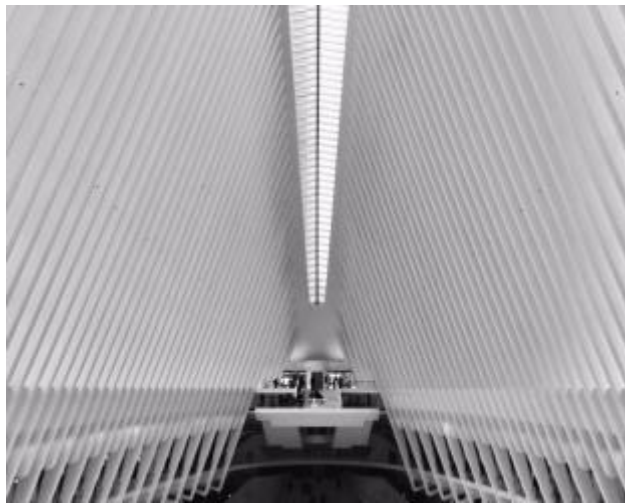
29 - The bricks in the photo are from a game in which you have to make a tower with all the bricks and then take them one by one and put them back on top without the tower falling. The fact that all the bricks are rectangles of the same size allows a perfect stability to the tower. When the tower falls it ends up like the image. We can see that horizontally, the bricks form parallel lines and vertically they form perpendicular lines. The bricks are 3D so we could calculate height, width and length but also volume. This picture shows that even a really simple game has its maths behind it and how we can find maths everywhere.



30 - There is something mathematical about the natural world, the more we look, the more math we can find! Math is about numbers! You can see the numbers of trees in nature. Symmetry is one of the fundamental concept in math! You can see the symmetry in nature.., Infinity in math is endless, without bond! You can see infinity in nature..There is more math in my photo, please look more to see what math YOU can find in my photo!



31 - Here is my mathematical picture which was not taken here in Strasbourg, but was taken in India



32 - Math: The white props of each side of the building are symmetrical to each other. Reason: I chose this picture because it reminds us of the Twin Towers, the original World Trade Center and the old mall which was destroyed on September 11, 2001 by the terrorist attack.



33 - The main mathematical object in this picture is represented by a superb caustic curve at the surface of the milk. This curve is more precisely called a cardioïd. It creates itself with reflection of the light rays on the circular wall of the mug.





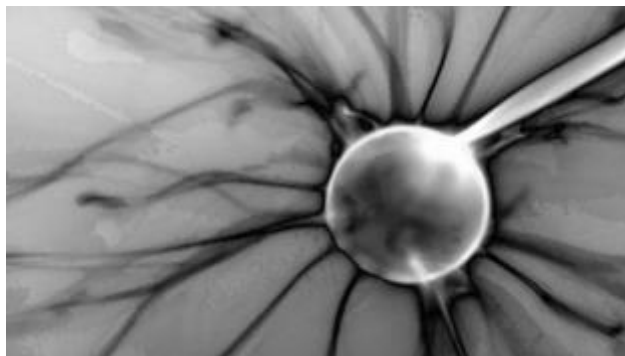
34 - I chose this picture because the wood fence makes an x (multiplication). In the background there are parallel wooden planks separating the salt.



35 - In this picture we can see nature in the background—a mountain covered in snow. In the foreground we see metal bars, which are parallel. Since the bars are parallel, this photo is mathematical.



36 - Irracionalidad con sus infinitas cifras decimales y infinitas historias que guardan estos libros. Un mundo de imaginación muy amplio.



37 - Al observar los rayos de una bola de plasma podemos ver su similitud con las neuronas del sistema nervioso de los humanos. Esta neurona estaría en fase de reposo, lo que significa que no se está transmitiendo ningún tipo de información en forma de impulsos eléctricos. Se pueden identificar varias partes de la neurona, como por ejemplo el cuerpo neuronal y varias ramificaciones que se unirán a otras neuronas.



38 - Aquí aparece una parábola hecha por la luminiscencia de las farolas de la calle, y tienen un difuminado dado al día lluvioso



39 - The mathematical theme in this image is the relation between maths and poker, how money and numbers control the world how we know it. The bull is an international sign for money and power.



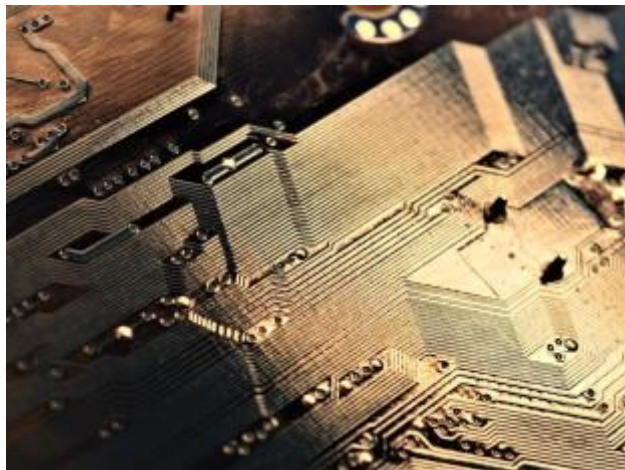
40 - The mathematical theme shown here are parallel lines.



41 - In this picture, you can see 3.14 pies. You get this amount of pies by solving the equation " $\pi \times \text{pie}$ ", thus the the name "Pi times PIE".



42 - The mathematical theme seen here is the symmetry of the plasma ball, and its rays

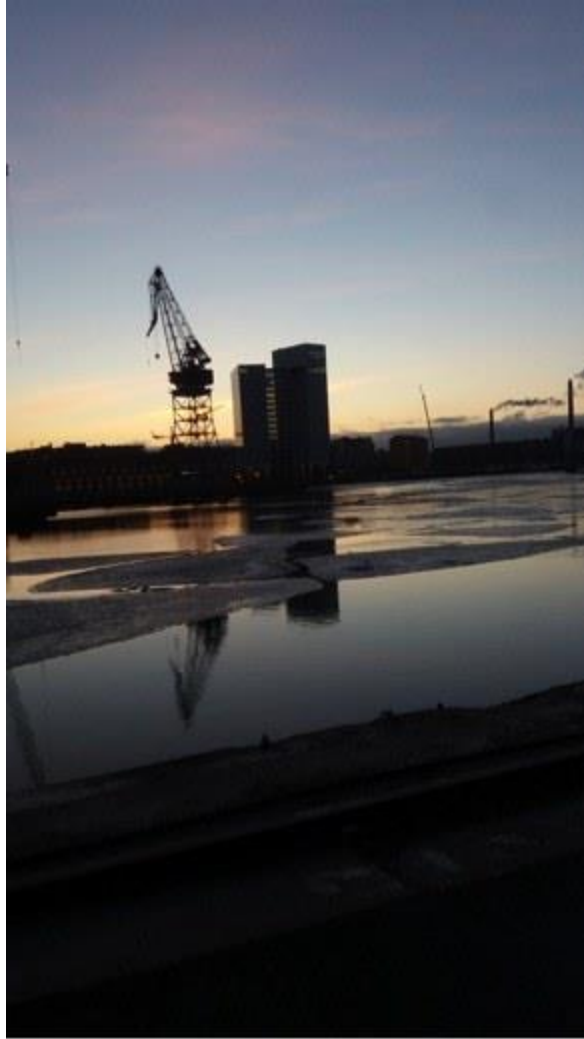


43 - This is a picture of the underside of a computer's main Printed Circuit Board (Motherboard). This motherboard has very interesting refractive properties where under certain light conditions and angles, the PCB traces (the lines going across the picture) will reflect light in different directions, sometimes giving the illusion of cuboids or apartment block-like structures popping out of the board.





44 - In Cairo, mathematics was used in the Egyptian times to build one of the greatest wonders in history- the pyramids. Back then, the pharaoh's used the Pythagorean theorem, trigonometry, simple algebra, and physics to design a smooth-faced constructed pyramid. Many large blocks of stones were cut and brought from quarries that were nearby. To move the blocks, the Egyptians had used the idea of physics; they wetted the Egyptian desert sand to reduce the friction so that their sledges could carry the rocks and be pushed by the workers easier. When the stones had arrived at the pyramids, a system of ramps were used to haul the stones up. The Egyptians had also measured the angle of each direction so that each side of a pyramid was facing North, South, East and West. And they had also used the  $\pi$ ,  $\phi$  (the golden ratio) and the Pythagorean theorem to construct the length and height of the pyramid. Thus in this photo, it expresses the idea on how the Egyptians had used mathematical techniques before to create the pyramid.



45 - In this image the mathematical approach of this picture is mirrored image. The way we see the blurred reflection of the crane and building on the sea gives it a cool as well as mathematical effect. We can see that the reflection is the opposite complete opposite image of the original.



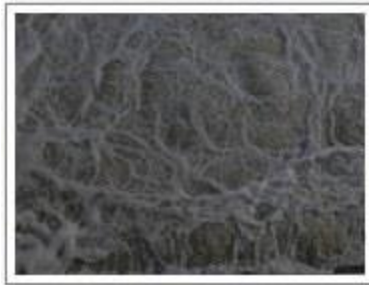
46 - Ce Rubik's cube reflète son image par rapport au miroir, plan de symétrie. D'autre part, ce casse-tête géométrique contenant 26 éléments cubiques qui remplissent ses 6 faces sont placés de manière parallèles et perpendiculaires.



47 - "The relationships between this photo and Math are the following: · Each leaf is an enlargement of the shapes in front of and around it. · Within each ring there is a mirrored image in the leaves next to each other, as they are all the same shape, and in the same general position. This provides symmetry throughout the image. · These shapes are also repeated while getting smaller and smaller. If one imagines that the shapes continue decreasing in size within the center of the plant, forever, this image could also be considered a fractal. This is actually an image of a miniature plastic plant."



*48 - The mathematical theme shown here is the pattern of the ripples in the water.*



*49 - Abstract Shapes have to do with math*



50 - La foto es una imagen del cielo de una tarde de otoño. Casualmente, encontramos cuatro estelas de condensación dejadas por aviones. Es curioso que todas las rectas son secantes pues cortan o cortarán entre ellas en algún punto. Al cortar, las rectas forman diferentes ángulos, pero en ningún caso ángulos rectos. Se observan fácilmente ángulos suplementarios y opuestos por el vértice. Es interesante también mencionar el hecho de que las estelas son de diferente grosor dependiendo de la distancia a la que se encuentra el avión.



51 - This beautiful shell is one of the many examples where nature arranges in patterns that follow the Fibonacci numbers (flowers, seeds, leaves). The Fibonacci series which are formed by adding the latest two numbers to get the next one starting. The starting point can be any two positive numbers. The corresponding beauty of this series is that the ratio of successive terms ( $F(i+1)/F(i)$ ) will always tend to the value Phi (1.618...), which is also called the golden ratio. I do not have the technical means to verify the pattern on my shell but its regularity and balance are outstanding.





*52 - Simetría con falta de proporción o de regularidad en la forma.*



*53 - Esta foto fue tomada en los preciosos paisajes de Canada. Refleja la naturaleza de una manera muy matemática, la simetría. Se puede observar como en el tranquilo lago se reflejan los árboles y el cielo azul con nubes.*



*54 - Una silla que encontré en la salina de Torrevieja nos deja esta perfecta reflexión sobre el agua de la misma.*



55 - Just as in a triangle drawn in paper we can create similar triangles using a ruler and a compass (triangles with the same angles and proportional sides), we can also create them with a light source and a piece of paper, the projection of the piece of paper against the wall creates a shadow that gets bigger the closer the triangle of paper is to the light source and, at a certain distance, the shadow of the original triangle will create a perfectly similar triangle, demonstrating how geometry is everywhere.



56 - El juego de luces y reflejos que proporciona una cortina de ducha con dibujos cuadrados, transforma las líneas rectas de la cuadratura geométrica en un dibujo que fluye y adquiere movimientos.



57 - This is a photo of a hotel composed of nine stacked floors with an illuminated core that goes from top to bottom. The floors have irregularities in their length with at the top some miscellaneous antennas. This represents the differences in the people in our society which differ from the norm.



58 - This image is related to mathematics since the multiple objects composing it have a geometrical, or numerical origin. For instance, in this image of a staircase we can distinguish parallel lines, and a larger line perpendicular to all the others. We Can also relate this pattern to a cobweb sequence since the staircase's pattern has a similar shape to it. Finally, the stairs themselves are mathematical because the precision put into every step, the calculation of every rise and run during the process of the construction of a set of stairs confirms the mathematical relation of this staircase picture to mathematics.

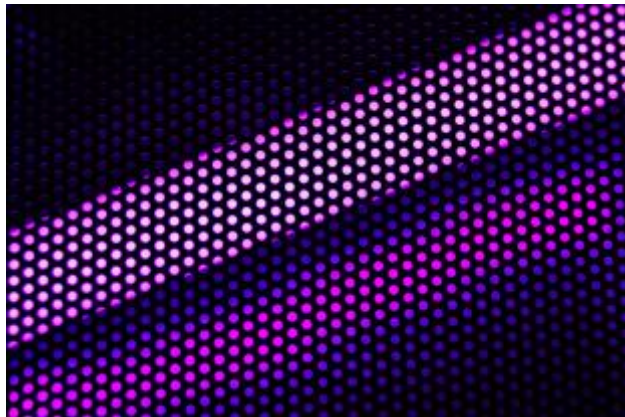


59 - The photo was taken at my grandparents house. The web has a perfect geometric forms and lines, which, covered by dew drops, gives an effect of reflection and illusion.

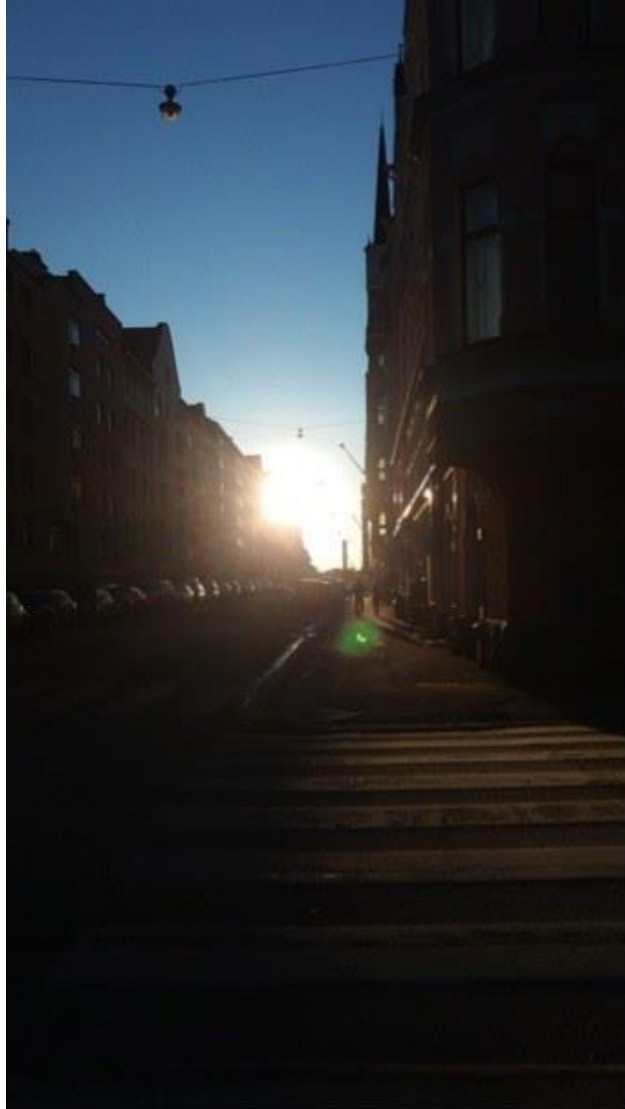




60 - With this image you will need your mathematical intelligence and your imagination. This image is a 69 and a 96, these numbers are called Strobogrammatic Numbers; for the ones that don't know what they are: it's a written number that is turned 180 degrees to form another number (Example: 69 and 96).



61 - Las circunferencias están sucesivamente colocadas. Se puede ver en la foto que hay dos líneas paralelas diseñadas por la luz malva del fondo. El conjunto está difuminado y hay zonas más enfocadas y otras menos. La imagen es un efecto que no se puede observar diariamente.



62 - The mathematical concept related to this picture is perspective and depth of vision. When we look at the picture, our eyes are almost instantly directed to the depth of the image, and we can see that everything around (the street, the buildings, the cars...) are all directed to a single point.



63 - This picture is an upward-angle shot of a cross-section between a flight of stairs and a car ramp, taken in an indoor parking complex. A right angle is formed in the centre of the frame by harsh white light falling onto the inner edges of the quadrant highlighted by light on the ceiling and the space between the stairs and the car-ramp. This motive becomes larger and larger with every floor of the complex getting nearer to the ground, an effect slightly distorted by various lights and contrasts shining faintly on differently shaped surfaces. This makes the whole structure look like some sort of light tunnel.



64 - A Cube balancing on one of its vertices. The whole construction is under an arch



65 - The Black-Scholes formula is one of the most important formulas in economics, used to give an estimate for the price of 'Call and Put' options, and its creators (Myron Scholes and Robert Merton) have been awarded a Nobel Prize in economics for their creation (1997)



66 - There are simple squares representing organized thinking in the picture who thinks outside the box in math and are ready to become engineers. However, there is a curve of people thinking that they can fix everything with tape and thinking inside the box.



67 - The mathematical concept behind this picture is geometry. The almost perfectly circular shape of these bubbles and ball, along with the light, give a very spherical effect to them (as well as fish eye and depth for the ball).



68 - A circle on top of two vertically parallel lines. The whole structure is one the face of the Cathedral of Saint Minas in my home town of Heraklion.

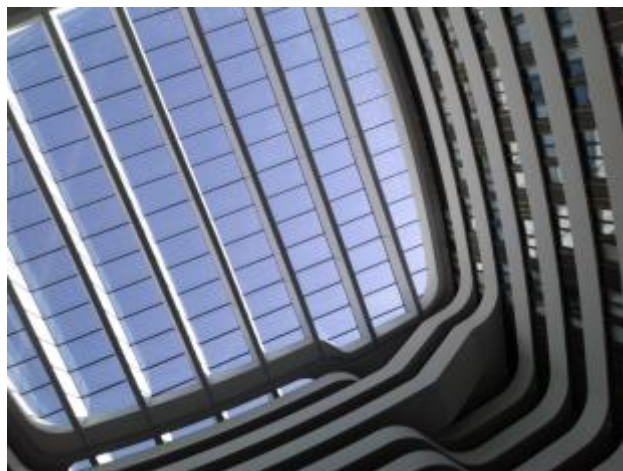




69 - Took the photo at the Louis Vuitton foundation in Paris, the building looked nice and the water was smooth which allowed me to do a long exposure



70 - The mathematical concept behind this picture is geometry. The almost perfectly circular shape of these bubbles and ball, along with the light, give a very spherical effect to them (as well as fish eye and depth for the ball).



71 - This is a photo of a skylight and its surrounding balconies located in the Hilton hotel at Amsterdam Airport Schiphol. I think it captures not only the precise, straight cut lines of the grid on the skylight and the even spacing of the windows, but also the small irregularities of its architecture, such as the jutting out of specific balconies (most likely staircases), and the shape of the skylight. By doing so it shows us that small inconsistencies can come together and create something beautiful and visually

*stunning, and that nothing has to be perfect. Though some may find its uniqueness to be a flaw, I choose to see the beauty in asymmetry.*



72 - This photo was taken in Lisbon. The movement of the dolphin can be modeled by a quadratic function.



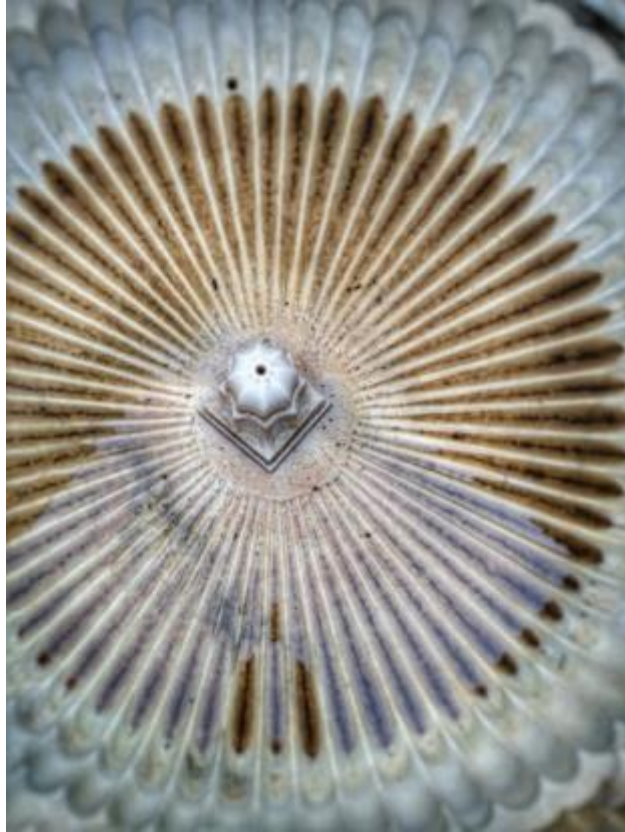
73 - Todo el mundo conoce la historia del timo del ajedrez, la cual dicta que el inventor del ajedrez, una vez le enseñó el asombroso juego a su rey, y este le ofreció cualquier recompensa como regalo, gracias al crecimiento exponencial se le ocurrió proponerle que le otorgase un grano de arroz por la primera casilla, y a continuación doblara la cantidad para la próxima casilla, y así sucesivamente. A primera vista, como parece poco, el rey accedió, pero no se dio cuenta de que ni con todo el arroz del reino podría pagar al astuto inventor, pues la suma ascendía hasta más de mil ochocientos trillones. Como me pareció graciosa la historia, decidí viajar un poco atrás en el tiempo e inmortalizar el momento.



74 - 1) The music in the image is for two pianos and is called 'Piano Phase' by the minimalist composer Steve Reich. 2) Each of pianist plays the exact same 12 note melody continuously in unison. 3) After a while, one pianist begins to play his part slightly faster until they are playing the second note of the score at the same time as the other pianist is playing the first note. 4) This is repeated until, once more, both pianists are once again playing the same piece in exact unison. 5) This is an example of translations of a periodic function. 6) The second pianist translates the music of the first pianist along the x axis by accelerating. 7) Eventually their music will have been translated to a point where its period has been reached and the two functions are now equal to each other once more



75 - J'ai choisi de présenter cette photo, prise à Barcelone sur une façade de la Sagrada Família. Il s'agit du Cryptogramme de Subirach, un carré magique dont la somme de toute ligne, colonne et diagonale est égale à 33, l'âge du Christ lors de sa mort.



76 - This is a bird's eye view photo of a fountain. This may be considered as a 'mathematical photo' as it shows symmetry and it is a circle. We can see it contains 60 radiuses. As it is a circle every line from the center going out to the circumference is of equal length. We can also see that the fountain is symmetrical. If you were to cut it in half both sides would perfectly mirror each other. This also looks like a rose or rhodonea curve.

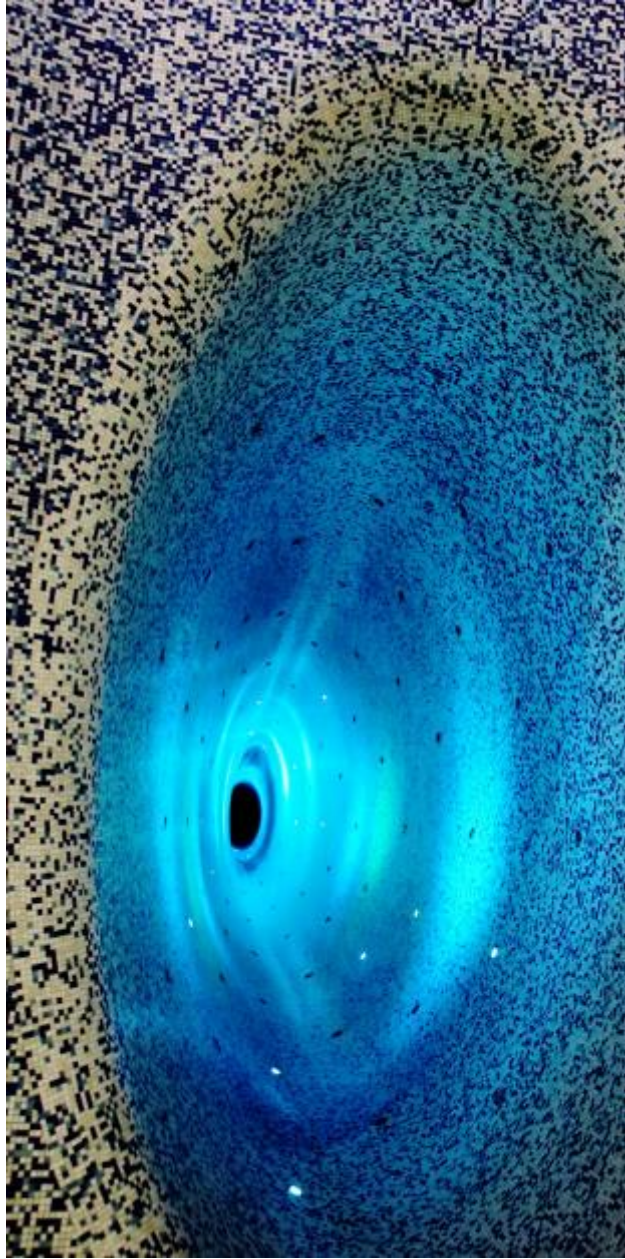


77 - If you don't pay attention to this picture you maybe only see a building with disc liked shapes stacked on each other but if you take a closer look at this picture you might see that the discs actually have a parabola like shape. With math its the same if you just look at the main points and just skip the other details you will get the answer wrong you have to really think about math (unless its a really easy question like  $2+2$ ). Math is a exact science if you skip or miss a small detail your answer might make no sense.





78 - This picture is of the inside of a lamp which is turned on. What I was thinking about when I took this picture was the shape and circle it made and how perfectly round the shape is and all the math related details the lamp provides, electricity, heat, the distance, but also that it looks like a planet (Saturn) and its rings which is also simply math. I named the picture "UNIVERSAL EQUATION" because of the math related to the lamp and the math related to everything else (space and the universe in this case). Universal equation could also symbolize the math that is hidden in everything and our daily lives. It's all about how you look at the world and what your definition of math is. To me math is not simply numbers on a page it's a visual way of looking at small things in the world, composed of shapes and structure.



*79 - Hice esta foto en el metro de Napoles, en un viaje con mi familia. Este túnel me recuerda al universo con las luces y pequeñas baldosas, podrían confundirse con una imagen de un agujero negro o galaxia*



80 - The mathematical theme in this image is the shape of the wet feather, housing water droplets.