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| TRIMESTRE | NOMBRE DEL RETO | META | INTEGRACIÓN CURRICULAR (APORTES DE LAS ASIGNATURAS PARTICIPANTES) – CONCEPTOS Y HABILIDADES | IMPLEMENTACIÓN /  DESCRIPCIÓN METODOLÓGICA  (SECUENCIA DIDÁCTICA) | PRODUCTO |
| 1 | Interactive Scratch presentation | Students will built an interactive presentation using scratch, in this presentation, they will simulate the process of photosynthesis, moreover they will use games and other kind of activities to attract the attention of the user. | **Biology**   * Photosynthesis * Plant’s needs * Phases of the photosynthesis * Related vocabulary * Parts of the plant.   **Computer Science.**   * Programming * If-else.   **Social Skills**   * Group work | Photosynthesis is a biological process. Explore how plants need carbon dioxide, water and light for photosynthesis in order to make biomass and oxygen. - How could you explain this process by making an animation in scratch?,  - What about a game so people can have some and a quiz at the end to check understanding?  -How can you program a videogame or a kind of interactive presentation using programming commands?   * QUESTION * IMAGINE * PLAN * CREATE * TEST * IMPROVE | * Scratch Interactive presentation   https://stem7.weebly.com/ |
| 2 | Electronics Circuit Challenge | Students will build electronic circuits in order to simulate different experiments, while they review physics laws, example alarms, digital traffic light, proximity sensor simulations, etc | Physics   * Circuits * Electronic laws.   Computer Science   * Arduino * Programming in blocks * If/else * Variables. | -How can they solve a real life problem using a micro controller and simulator?  -How can they explain the process of electronics by building a circuit and a simulation | * Arduino simulation circuits.   Projet Arduino | Tinkercad   1. Practice electronics 2. Learn how to make a video 3. Solve a real life problem 4. Work in groups |
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| Challenge | Explananation | Maths |
| Digital Thermometer | Utilizando el sensor de temperatura y 6 leds hacer un termómetro digital que vaya encendiendo más leds a medida que aumenta la temperatura. | Temperature is proportional to the number of led bulbs that turn on. Depending on the mechanism of the thermometer, more proportional relationships can be stated. Plot the graph of proportional relationship and determine the equation of this proportion. Explain the meaning of the constant of proportionality in context. |
| Electronic Dice | Construir un dado electrónico que funcione presionando un botón y muestre el resultado en un 7 segmentos. | Determine the probability of compound events with mutually exclusive events. Perform the experiment to show the difference between theoretical and experimental probability. Use the standard deviation to find the error in the measurements. |
| Intruder Alarm Detection | Construir un circuito que dispare una alarma cuando el sensor detecte movimiento de personas u animales dentro de un almacén. | Determine the precision of the circuit by collecting enough data to state the percentage of error using standard deviation and average. |
| 0 to 100 Centigrade Experiment | A partir de un servo motor y un sensor de temperatura, implementar un cartel automático que indique en que estado (sólido, líquido o gaseoso) se encuentra el agua según la temperatura ambiente. | Tempertature is proportional to the average kinetic energy of the particles. The latent heat of fusion and fision is proportional to the mass of water. Plot different graphs to explain the relationship between the variables. Explain the meaning of the constant of proportionality in the context of the problem. |
| Proximity Alarm | Un sensor de distancia ubicado en la parte trasera de un auto, advierte al conductor al momento de estacionar, si está demasiado cerca de otro auto. Lo hace a través de una señal sonora que aumenta la velocidad a medida que la distancia se disminuye | Inverse relationship between speed and distance. Plot the graph of an inverse proportion and writing the equation of proportionality. Explain the meaning of the constant in the context of the problem. |
| Display 7 segments | El visualizador de siete segmentos es una forma de representar caracteres en equipos electrónicos. Está compuesto de siete segmentos que se pueden encender o apagar individualmente. Cada segmento tiene la forma de una pequeña línea. Se podría comparar a escribir números con cerillas o fósforos de madera. | The electric potential is proportional to the resistance. The constant of proportionality is the electric current. Perform different measurements varying the resistance or the electric potential to determine the electric current flowing through the display using the ohm´s law and compare this with the luminosity. Plot the graph of proportionality. |
| Traffic light simple and traffic light for intersection | Programar la secuencia rojo-amarillo-verde de un semáforo, teniendo en cuenta que rojo y verde tienen una duración de 3 seg. Mientras que amarillo dura 1 seg.  Similar al ejercicio anterior, vamos a plantear un cruce con dos semáforos. | The electric potential is proportional to the resistance. The constant of proportionality is the electric current. Perform different measurements varying the resistance or the electric potential to determine the electric current flowing through the light bulbs using the ohm´s law and compare this with the luminosity. Plot the graph of proportionality |
| Sequence Selection and speed variation | *Conectar y programar 6 leds para que enciendan y apaguen de derecha a izquierda si el interruptor 1 esta activado; y en sentido contrario cuando se active el interruptor 2.*  *uno.*  *Utilizar un potenciómetro para variar la velocidad de una secuencia de leds que encienden y apagan, uno a uno.* | The electric potential is proportional to the resistance. The constant of proportionality is the electric current. Perform different measurements varying the resistance or the electric potential to determine the electric current flowing through the light bulbs using the ohm´s law and compare this with the luminosity. Plot the graph of proportionality |
| Mixer of Lights and Music | *Determinar el color de un led RGB a partir de tres potenciómetros.*  *Controlar las notas de un piezo o buzzer con un potenciómetro.* | The electric potential is proportional to the resistance. The constant of proportionality is the electric current. Perform different measurements varying the resistance or the electric potential to determine the electric current flowing through the light bulbs using the ohm´s law and compare this with the luminosity. Plot the graph of proportionality |
| Roulette Game | La mecánica del juego es que al presionar un botón se genera de forma aleatoria un numero del 1 al 7. Cada numero enciende un led diferente. | Determine the probability of compound events with mutually exclusive events. Perform the experiment to show the difference between theoretical and experimental probability. Use the standard deviation to find the error in the measurements. |
| Digital binary Converter | El binario es un sistema de numeración en base 2. Esto quiere decir que cada dígito puede variar entre 0 y 1. En computación, estos valores representan apagado o encendido respectivamente. Para construir un conversor binario a decimal, necesitamos de 4 interruptores que activen 4 leds individualmente. Cada led representa un dígito. Si este se encuentra encendido entonces su valor decimal será igual a 2 elevado a la potencia que corresponda según su posición. Contando siempre, de derecha a izquierda. | Explain how exponents are used to transform from decimal to binary and vice versa.  Answer: What are the benefits of using both systems? Are there other systems and in which contexts are they used? |