









# Night Light Buddy Knowledge Organiser

## Specification areas that assist with the Evaluation

 <p><b>1. PURPOSE:</b> What should the product be able to do?</p>	 <p><b>7. PERFORMANCE:</b> How is the product going to perform over its lifespan?</p>
 <p><b>2. FUNCTION:</b> How is the product going to do what it's meant to do?</p>	 <p><b>8. QUALITY CONTROL:</b> What BSI Standards must it conform to?</p>
 <p><b>3. AESTHETICS:</b> What is the product going to look like?</p>	 <p><b>9. WEIGHT &amp; SIZE:</b> What weight and size restrictions are needed?</p>
 <p><b>4. ERGONOMICS:</b> Ensuring a good fit between people and the things they interact with.</p>	 <p><b>10. COST:</b> What will it cost to make the product? Selling price?</p>
 <p><b>5. USER NEEDS:</b> How might the user interact with the product?</p>	 <p><b>11. SAFETY:</b> How safe must the product be? Who will be using it?</p>
 <p><b>6. MATERIALS:</b> What is the product going to be made from?</p>	 <p><b>12. SUSTAINABILITY:</b> Will materials be recycled? What will happen at the end of its life?</p>

**Key Words**  
Sensing, Microcontroller, CAD, Electronic Component, Electronic Symbol, Circuit wizard, Investigate, Design Brief, System.

## Microcontrollers

A microcontroller is like a mini computer in a single chip that is used inside some household products that allow them to do a number of tasks depending on the input you choose.

### Timepieces / Consumer

- Watch, Clock
- Sports watch
- Bike computer
- Remote controller
- White goods
- Label writer



### FA, Household

- Time Switch
- Metering
- Thermostat
- Heat cost allocator
- Electronic shelf label
- Multi-meter



### Healthcare / Medical

- Pedometer
- Activity monitor
- Insulin pen
- Blood pressure
- Body temp. measurement

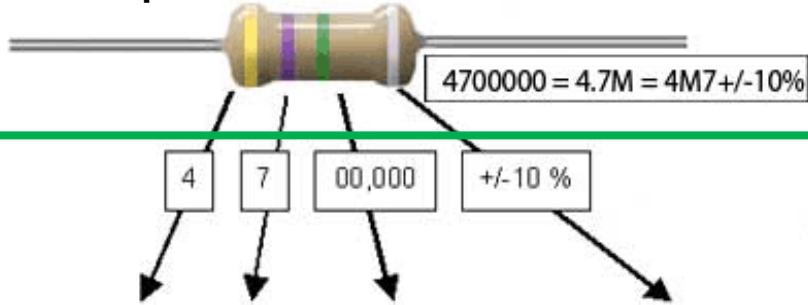
### Security products

- Smart card
- E-token
- Card reader
- Logistics tag

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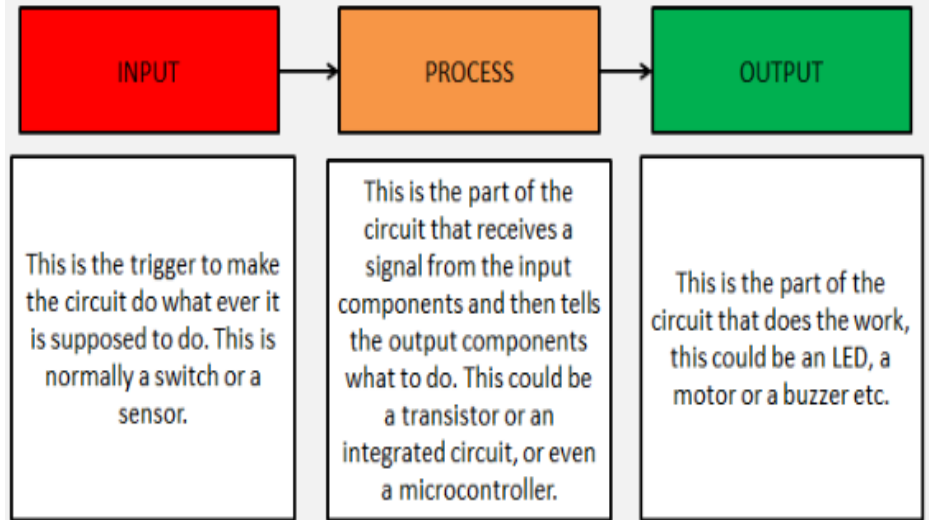
## Resistor colour chart

This component is a Resistor.



Band	1	2	3	4
Meaning	1 <sup>st</sup> Digit	2 <sup>nd</sup> Digit	(No. of zeros)	Tolerance % (No band +/- 20%)
Silver			.00 (divide by 100)	+/- 10%
Gold			.0 (divide by 10)	+/- 5%
Black	0	0	No Zeros	
Brown	1	1	0	+/- 1%
Red	2	2	00	+/- 2%
Orange	3	3	,000	
Yellow	4	4	0,000	
Green	5	5	00,000	+/- 0.5%
Blue	6	6	,000,000	+/- 0.25%
Violet	7	7	0,000,000	+/- 0.1%
Grey	8	8		+/- 0.05%
White	9	9		

## Systems



## Electronic Component Symbols

<b>Polyester Capacitor</b> 	<b>Electrolytic Capacitor</b> 	<b>Microphone</b> 	<b>SPDT Switch</b> 
<b>Photodiode</b> 	<b>Field Effect Transistor (FET)</b> 	<b>Light Emitting Diode (LED)</b> 	<b>Lamp</b> 
<b>NPN Transistor</b> 	<b>Diode</b> 		<b>Light Dependent Resistor (LDR)</b> 
<b>Bridge Rectifier</b> 	<b>Thyristor (SCR)</b> 	<b>Speaker</b> 	<b>Motor</b> 
<b>Optoisolator (slotted)</b> 	<b>Relay</b> 	<b>Piezoelectric Transducer</b> 	<b>Thermistor</b> 
<b>Cell</b> 	<b>Battery</b> 	<b>Buzzer</b> 	<b>Bell</b> 

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## The Design Process

### Situation



What is the problem you are going to solve?

### Brief



How do you propose to solve the problem?

### Analysis & Considerations



Analyse the problem.  
*Who, what, why, where, when?*  
Are there any constraints you will need to consider?  
*For example materials, cost or size?*

### Research



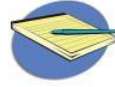
Investigate the problem  
Existing products, disassembly, target audience, materials.  
Use different sources.  
Internet, libraries, interviews.

### Specification



Use your research to create a **specific** list of criteria that the design **must** meet.

### Evaluation



Evaluate your design against the specification.  
*How successful is the design?*  
*Ask the opinion of others.*  
*Suggest modifications and areas for improvement.*

### Prototype



Model all or part of the design.  
*This will allow you to check whether the design actually works!*

### Final Design



A detailed presentation of your solution including.....  
*Working drawings, CAD / CAM, Plan for making*

### Development



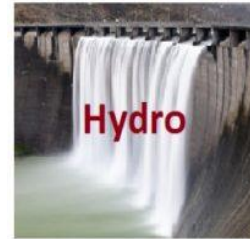
Develop your best idea.  
*Consider size, materials, aesthetics, ergonomics, safety, environmental impact, and construction details.*

### Design Ideas

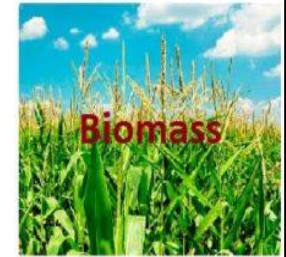


Use your specification to sketch initial ideas.  
*Be creative and innovative.*

## Sources of Electricity



### Renewable Energy



←



←








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### Non-Renewable Energy

Symbol	Name	Function
	Start/end	An oval represents a start or end point
	Arrows	A line is a connector that shows relationships between the representative shapes
	Input/Output	A parallelogram represents input or output
	Process	A rectangle represents a process
	Decision	A diamond indicates a decision

The **CAD – COMPUTER AIDED DESIGN** package we will use to program the microcontroller is called **CIRCUIT WIZARD**. We can then convert the flowchart to the programming language called **BASIC**.

## Program Control



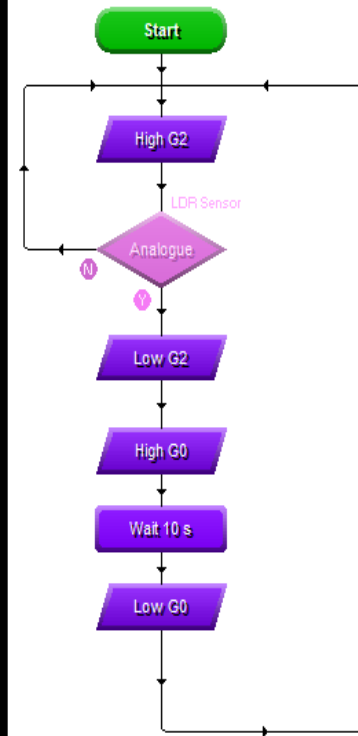
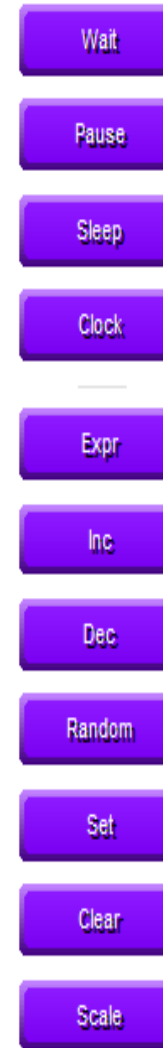
## Flow Control



## Input and Output



## Processing



Here is an example of the commands used in a working flowchart. This flowchart can be downloaded to the microcontroller and used in a product that is required to detect changes in light levels.