

# Night light

Year 9

## Task 1 - Questionnaire

Students need to form a questionnaire to find out what people want from a Night Light.

The Questions need to be laid out to give people options to choose from.

Example:

What colour should the night light make use of?

- Red
- Yellow
- Blue
- Purple

Once you have completed your questionnaire ask people to fill it in.

## Ideas for questions

- Size
- Shape
- Colours
- Materials
- Characters
- Theme
- Light colour
- Construction method
- Finish

## Task 2 – Questionnaire result graphs and Analysis

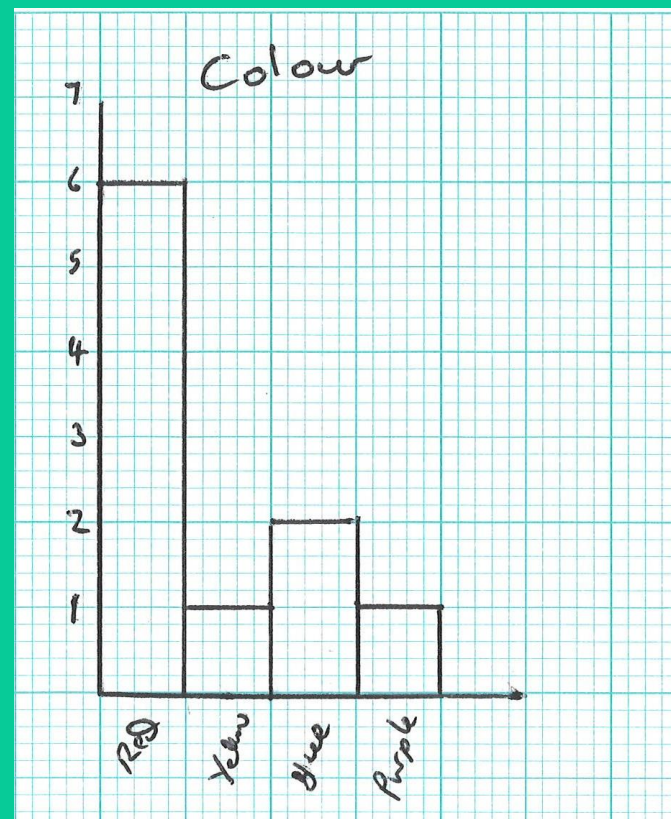
Students need to use the results from your questionnaire and form graphs to show the results.

The graphs can be simple bar charts completed on paper or completed in Excel using the screen shots below to help you complete it.

The graphs need to be analysed to identify what they tell you about what people want from your night light.

### Graphs on paper

Collect from graph paper from Technology and lay out like below.



### Graphs in Excel

Type in the question and options

Count up how many people said what

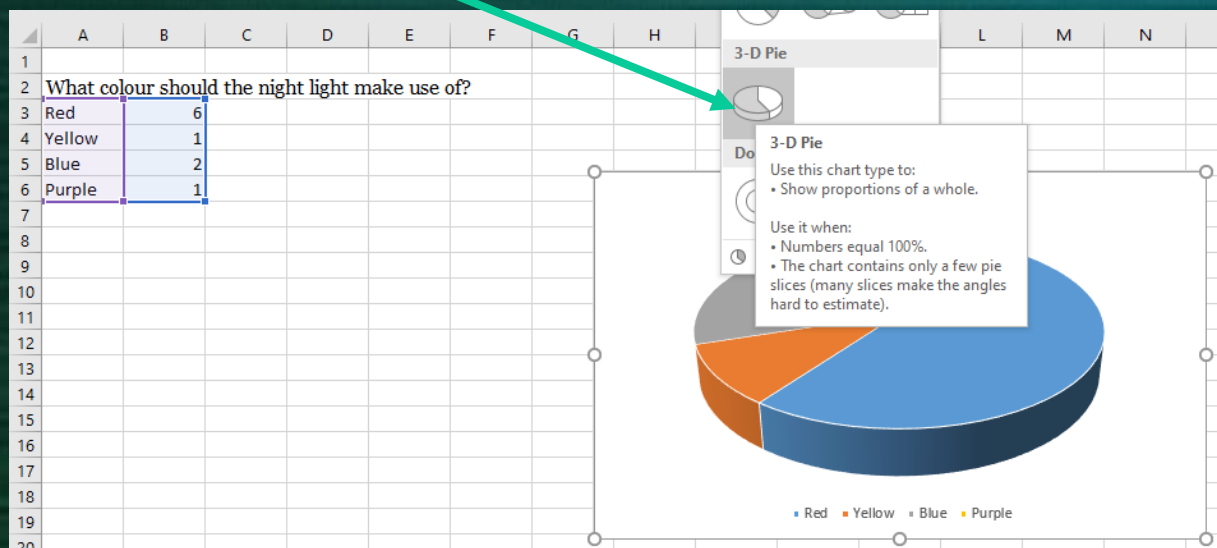
Highlight the options and numbers only

Click on insert and select one of the Chart options

	A	B	C	D	E
1					
2					
3					
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7					
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9					

	A	B	C	D	E
1					
2					
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7					
8					

	A	B	C	D	E
1					
2					
3					
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5					
6					
7					





## Task 3 - Analysis

Next you need to look at your results and explain what they show you and how they can help you when you start designing.

Sentence starter:

From the first question in my questionnaire I have found out that...

This will help me when designing by...

## Analysis Example

From the first question in my questionnaire I have found out that people wanted the colour Red to be used in mood light.

This information will help me because I will be able to use the colour red somewhere in design of night light which will make people want to buy it.

## Task 4 – 2<sup>nd</sup> Design idea

In class we have come up with one design for your night light.

This weeks homework is to come up with another idea for a night light, you need to use the isometric paper to draw your idea up neatly and in 3D.

The idea will also need to be rendered (coloured) to show what different colour combinations you would be using.

On this knowledge organiser I have placed some different examples of a night light for you to get inspiration from.



## Task 5 – CAD/CAM

In class we have started to put together your base and character for your night light we are making.

Thinking about the CAD/CAM tools we are using in lesson to complete your night light and the information on the knowledge organiser answer the following questions:

What does CAD stand for?  
What does CAM stand for?

What are the advantages of using CAD and CAM when making a product?

Explain how we are using CAD to make your night light  
How is this helping you when making?



### Computer aided design

C.A.D. involves products being designed on a computer, using specialist software. Designs can be saved, edited, and copied many times. The design can be 2D or 3D, and some software can even simulate how a product will work in real life.

Advantages of C.A.D.	Disadvantages of C.A.D.
Can be more accurate than hand-drawn designs - it reduces human error.	<b>Requires a computer.</b>
Ideas can be tested on screen, to see if they would work in real life. This would save time and money for the company.	<b>Staff need to be trained how to use the software, which also adds to costs.</b>
You can save and edit design ideas, which makes it easier and cheaper to modify your design as you go along, which saves time.	<b>The software itself can be expensive so initial costs are high. (There are free software packages though).</b>
Many copies can be made in one go, consistently and accurately, because computer-aided machines will understand the instructions from the software.	



### Computer aided manufacture

C.A.M. uses computer numerical control (CNC) to create CAD designs. CAD software creates the 3D coordinates of the design. The CAM machine can then make the product.

Advantages of C.A.M.	Disadvantages of C.A.M.
Computer Aided Manufacture (CAM) has meant that products and components can be made repeatedly to the same high standard.	<b>Expensive equipment</b>
Accuracy of machining is consistently high, and machining through CAM is much faster than machining by human control / by hand	<b>Needs maintenance</b>
Large quantities can be produced 24 hours a day, reducing the final cost/price.	<b>Replaces humans, so they could lose their jobs.</b>
Products can be made directly from CAD files	<b>Staff need training</b>

## Task 6 – Production plan

In class we have been making your night light and the base piece could have been finished by now.

In Engineering GCSE and Food and nutrition you have to form what is called a production plan, which basically is a record of what you have done to make a part of a product.

Your 6<sup>th</sup> homework is to write a production plan for the Base piece you have been making in lesson. Use the help sheet below to help you write it.

Production plan					
Stage of production	Time	Quality control	Health and safety	Explanation of process	Alternative processes
<b>In these areas you need to:</b>  State the stage of production - Base State the time you think it will take to make State what quality control checks you are doing to make sure it is correct State health and safety steps you are taking			<b>In this area you need to explain the process you are completing and why this process has been chosen</b>		<b>In this area you need to state what alternative processes could have been used.</b>



## Task 7 – Jointing methods

In class we have made the Base and have screwed the bottom piece onto the Base piece.

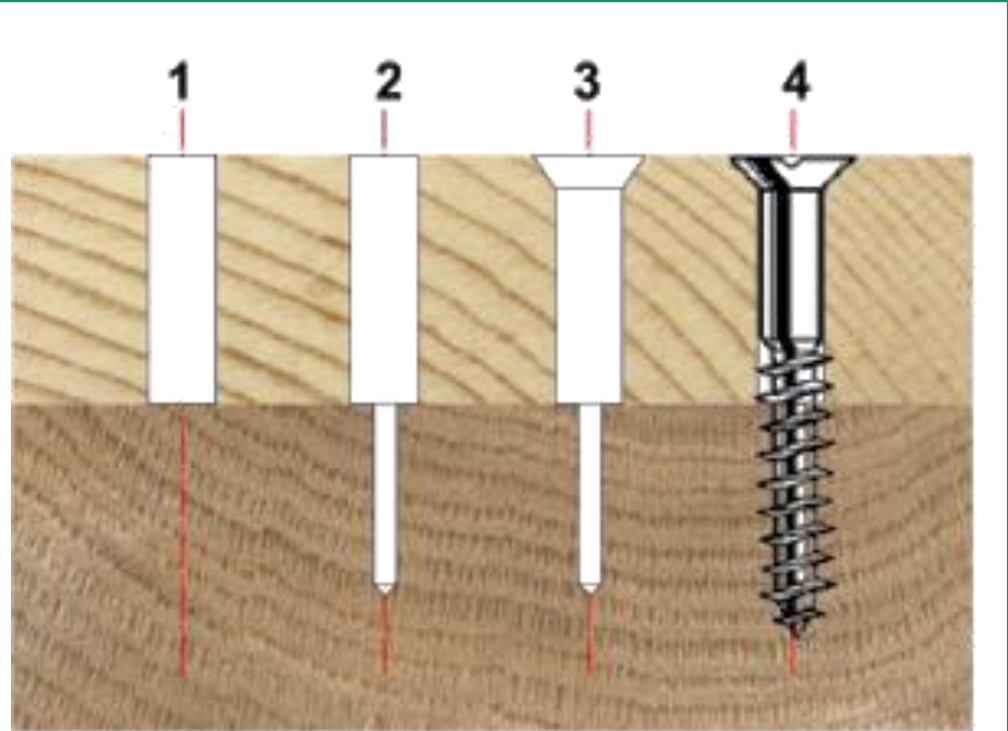
See image to the right which shows the process of drilling various sized holes so the screw can hold pieces together.

The first hole is a pilot hole that is drilled through all pieces  
The second hole is a clearance hole that is only drilled through the Bottom piece.

The third hole is a counter sink hole which allows the screw to fit flush / flat with the Bottom piece.

## Task 7

- 1, What are the different holes called that you have to drill to attach two pieces together with a screw?
- 2, What piece of equipment did you use to drill the holes out?
- 3, How was the counter sunk hole cut to hide the top of the screw?
- 4, What quality control checks did you have to do to ensure the screws were in correctly?
- 5, What other way could you have attached the Bottom piece to the base?



Stages in drilling for a woodscrew:

1. Drill a hole slightly smaller than the diameter of the shank
2. In hardwoods, drill a pilot hole less than the diameter of
3. Countersink the hole to a diameter equal to the diameter  
(4a and 4b show the options of 'Counterboring' and insert)

## Task 8 – Finishes

The Base and bottom piece have been painted to add colour and interest to the night light.

## Task 8

- 1, Why is it necessary to sand smooth the material before painting?
- 2, What is the purpose of priming the material first before painting
- 3, What type of paint have we used to paint your base? Why this type of paint?
- 4, Why is it necessary to sand the paint after each layer?
- 5, What is the point of watering the paint down for the last layer?
- 6, What other finishes could we have used on the Base and bottom piece?



## Painting process



Step 1 – Sand smooth using P120 and P240 sand paper

Step 2 – Prime with a layer of white paint

Step 3 – Sand back to make smooth using P240.

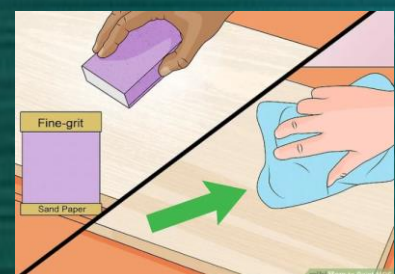
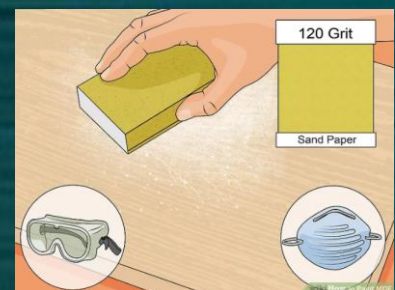
Step 4 – Apply layer of the coloured acrylic paint you want.

Step 5 – Sand using P240 until smooth

Step 6 – Apply another lay of paint

Step 7 – Sand smooth using P240

Step 8 – Paint for the final time using a slightly watered down paint.





# Night light

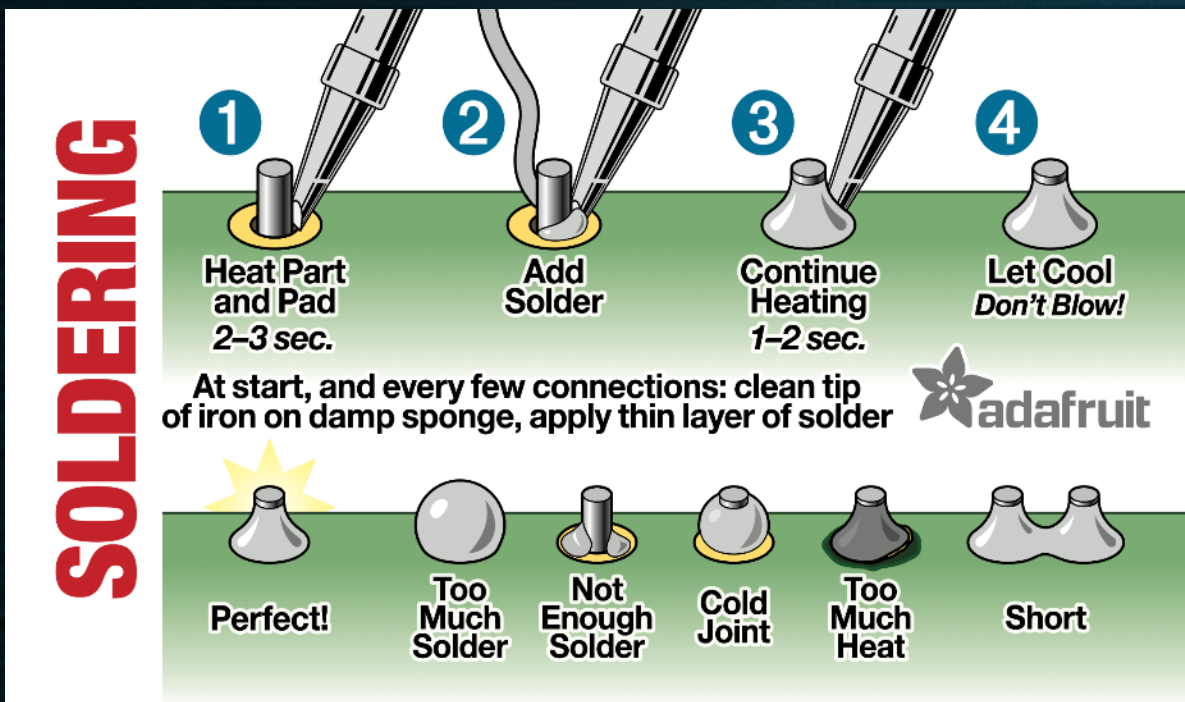
Year 9

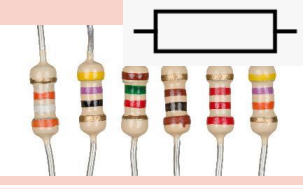
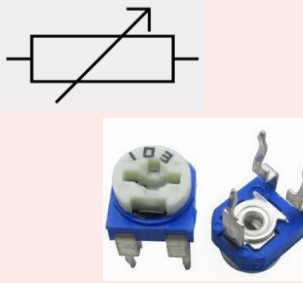
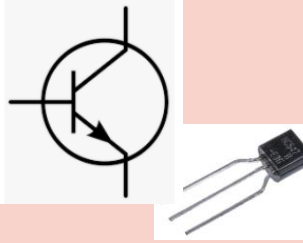
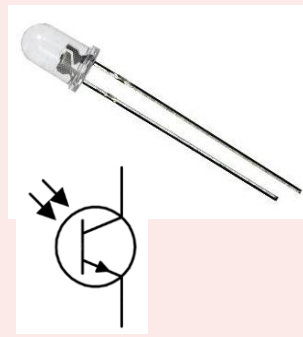
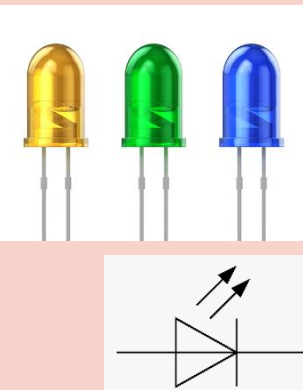

## Task 9 – Electronics soldering

In class we have working on our circuits to make the night work and produce light. This weeks homework is about the components we have used to make the circuit work and what each of the components do in the circuit.

We will also be looking at how we solder so the components can join onto the circuit board (PCB) and allow the current to flow around the circuit.

The homework task is to complete the Electronics booklet.



Component	Explanation
	<b>Resistor</b> – resistors are used to reduce current flow to protect components
	<b>Variable resistor</b> – Variable resistors are used to protect components but also to allow the resistance to vary / change, used in dimmer switches and volume knobs in stereos.
	<b>Transistor</b> – These are used as voltage amplifiers and as an electronic switch.
	<b>Photo transistor</b> – These are semiconductor devices that is able to sense light levels and alter the current flowing between emitter and collector according to the level of light it receives.
	<b>LED (light emitting diode)</b> – When current passes through them they light up. They can be sourced in many different colours and can be multi coloured. They also control the flow of current around a circuit.
	<b>Battery snap</b> – This provides power / voltage to the Circuit.  This allows a battery to be connected to the circuit.