

1496 Double Award Manufacturing Unit 3 - 4880

Training Support Materials

Candidate Revision Guide

This material is issued as support for candidates in the above examination for Unit 3, the written paper specifically for the OCR Manufacturing Specification.

As with the previous revision guides provided by OCR it is written for the candidates and uses the language which appears in the specification and also the written paper.

It is partly based on 8.2 WHAT YOU NEED TO LEARN of the specification and written with the insight gained from OCR's marking experiences of the five papers, June 2004, January 2005, June 2005, January 2006 and June 2006 for this specification.

It is important for centres to note that from January 2007 Unit 3 will also include specific questions based on other areas of the specification i.e. questions will not solely be based on 8.2 WHAT YOU NEED TO LEARN.

It is not a fully comprehensive document nor is it intended to be nor is the intention that it is the sole teaching material for Unit 3. It has been written as a support for teachers and candidates for preparation for the written paper.

Its design is also to encourage centres to comprehensively address all the areas of specification. Some exercises follow the format of examination questions whilst others are meant to stimulate and provoke appropriate thought and activity for class and homework activities. The Unitised format of the revision guide allows disassembly by centres for this type of approach.

The material should be used throughout the course and is designed to supplement, focus and reinforce the teaching of the full content of the specification.

Preparation of candidates for this Unit should not be left until the end of the course and taught as a final theory preparation for the written paper. It should form the core of candidate activity throughout their GCSE study.

The contents are easily re-orientated to suit individual centres and/or teachers' needs but remain a guide only and relate solely to the OCR specification.

GCSE Manufacturing Revision Guide

Unit 3 Application of Technology

- 1 It is a 1½ hours written examination
- 2 You will sit the examination on
- 3 You will have the opportunity to re-sit the examination either next January or June but there could be a cost for doing this.
- 4 You will need to take the following to the exam:
 - ✓ Black or blue pens (you need a spare)
 - ✓ Pencil
 - ✓ Pencil sharpener
 - ✓ Ruler
 - ✓ Eraser
 - ✓ A black fine line pen might also be useful
 - ✗ **BUT** you must not write in red ink
- 5 When you start the examination:
 - ✓ Relax as much as you can
 - ✓ Read the instructions on the front of the paper
 - ✓ Read the question paper all the way through
- 6 You have to answer **all** the questions.
- 7 Check the marks in brackets for each question. e.g. [4].
- 8 If you find a question difficult, move on and ***return*** to it later.
- 9 Never leave a question blank. Give a common sense answer if you are not sure.
- 10 If you make a mistake cross it out with a single line so that the examiner can still read what you first wrote.
- 11 Try to use sentences if you can.
- 12 Write as neatly as you can—the examiner has to be able to read it.
- 13 Use as many ***technical*** words as you can (It is better to use technical words even if you spell them incorrectly – you will **not** lose marks for incorrect spelling!)
- 14 For **some** questions it might be useful if you mention your industrial visits or work experience. This can help you with your thinking.
- 15 Towards the end of the examination read the **all** the questions again and **then** read your answers. You can change anything you have written if you feel you need to. Just cross through and write your changes.
- 16 Relax and wait for the examination results.

State - Give - Explain - Describe - Discuss - Plus 1, 2, 3, 4, 5, 6, 7, & 8!

There some things you should know about the Examination Paper you are going to sit.

All questions have a “command word” in them which triggers **you** into action.

For example a question might say “Give **two** examples of.....”

Or “State **one** use of.....”

Another might say describe or “*Explain* the use of.....”

More challenging questions might ask you to “*Discuss* the use of.....”

Also something you should think about is that each question in the paper gets a little bit more difficult as it goes through the Examination Paper **AND** each question gets a little more difficult through the question.

This means that question 1 is the easiest, question 2 a little more difficult, question 3 is a little more difficult and so on.

This also means the first part of a question (a) will be the easiest part the next part (b) will be a little harder and (c) will be a little harder again.

And before we move on lets us look at a specific issue in some questions.

Let us look at this one first. The question says “Give **two** examples of...”
So how many examples should you give? **Two** is pretty obvious isn't it?
But you would be surprised at how many candidates give just **one**. Also a lot of candidates give three or four! That is **not** what you should do and is **not** to your advantage to do.

So....one means **one**, **two** means **two** and **three** means.....You've got it!

Command words are the triggers which ask you to do things. Watch out for the following:

Complete the table using 1 or 2 words	Use the spaces in the table to guide your answers.
State	One word answers. Possible a short phrase.
Give	Again, one word or short phrase answers
Complete the table using short sentences	Slightly longer written answers, perhaps with two parts to them. An answer and a reason for it.
Use notes and sketches	Please use Notes and Sketches to explain things. You really do need to practice your drawing skills!
Describe	Much fuller explanations are required. Give several points and reasons why you think the points are important.
Explain	An even fuller answer with reasoning and justifications.
Discuss	An argument <i>explaining both</i> sides of a situation and why things are important. An example is also required.

You'll find out more as you work through this revision guide.

A question at the beginning of the paper will be on the Manufacturing SECTORS.

Use the WWW to find out what each sector produces. Some are very obvious such as “Computer”. But what other products are made in this sector in addition to computers? Try Google as a search engine. They try a different search engine of your own.

<p>Find out as much as you can about the sectors and put your findings in “note” form in the column on the right. Try using bullets to “sort” your information.</p>	
biological and chemical	
engineering fabrication	
food and drink	
paper and board	
printing and publishing	
textiles and clothing	

Choose 3 or 4 of the sectors from the list above and learn all you can about them.
In the examination you will have to:

- answer about the Manufacturing sectors and **not** the Engineering sectors (**BUT remember that “Engineering Fabrication” is a Manufacturing sector**)
- understand and talk about different **products** from the sectors;
- write about of **new technologies** used **in their production** and also technologies used **by** the products.

Biological and chemical sector...

Washing Powder...

A powder which when mixed with water cleans and freshens fabrics. Usually used in a washing machine.

Cleaning enzymes with bleach and brightening agents. Pre-treatment no longer needed.

In the box below identify **three** Manufacturing sectors and give **two different** examples of a product from each sector and **two different** technologies, **one** technology used in the production of the product and **one** used by the product.

Sector	Product	Technologies

You will be asked to “use sketches and notes” to show how technology is used in the design and manufacture of **one** product.

You will need to think about:

- the technologies used;
- materials and components used; and
- the structure and form of the product.

You will choose your own product.

It is **NOT** advisable to try to use the example below as your product.

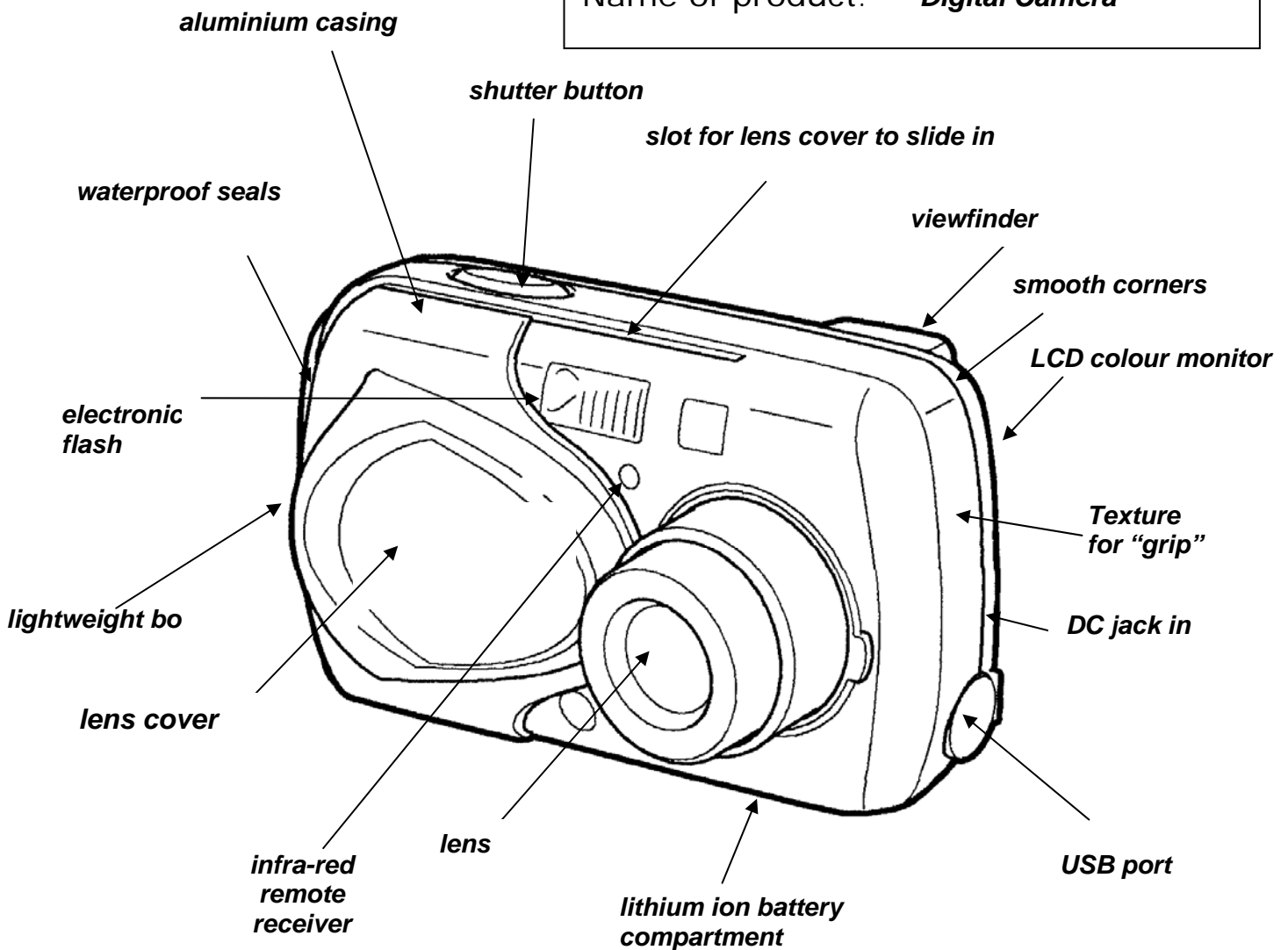
You should have prepared at least **two different** products for the examination

What you choose should:

- be a product that you have investigated in detail;
- be complicated enough so you can “show off what you know”;
- but not be too complicated so that you confuse yourself.

Below is an example of what you are going to be asked to do.

Name of product: **Digital Camera**



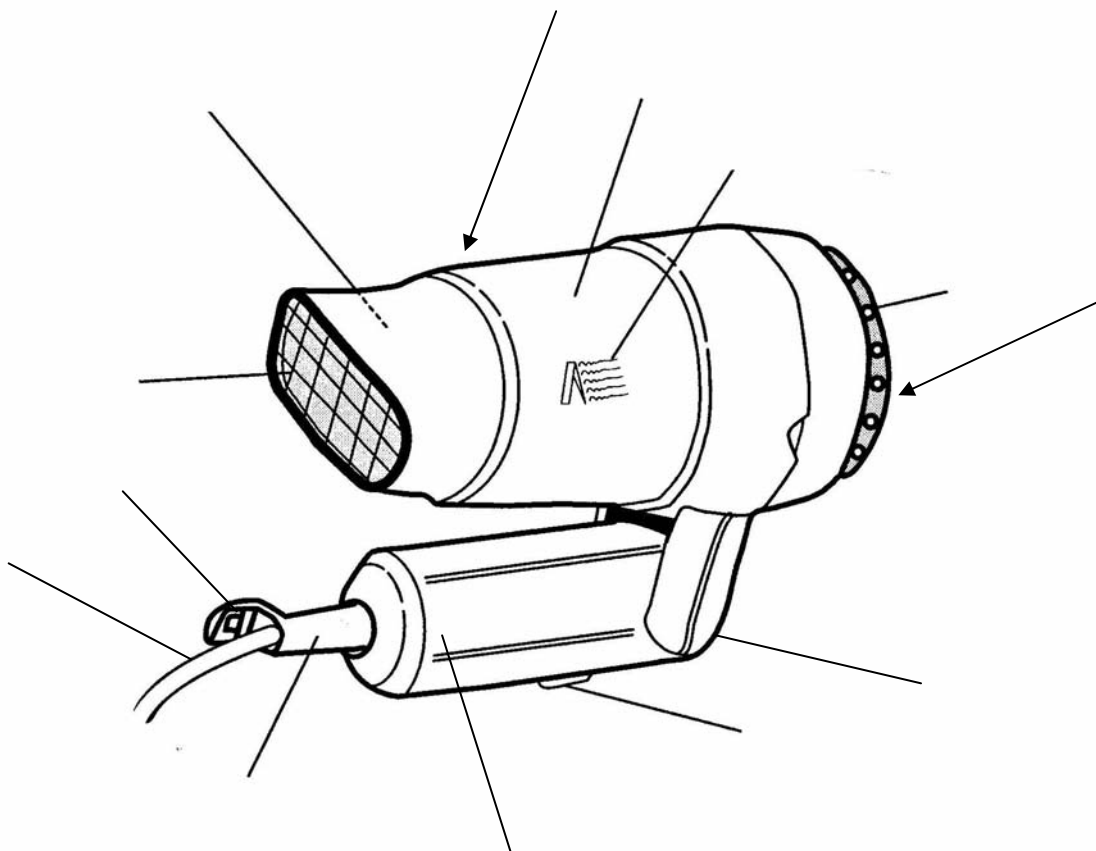
You will probably use previous examination papers to practice before your actual examination. You may even have one of them as your “mock” or “trial” examination.

Have a go at this example from the June 2005 paper.

Use sketches and notes to explain how technology and materials are used in the design and manufacture of a hairdryer.

Your answer must include:

- The technology used; [4]
- How materials/components are used; and [4]
- The structure and form of the product. [4]



The sketch has been done for in this exercise but YOU will have to draw your own in the actual examination.

Warning!! Do not try to use this example in the examination paper

Did you remember to look for the bracketed marks?

Think about the products in the table below and decide if they are good examples or poor examples of products to choose for this question:

	Example	Good or Bad	Reasons for your choice of good or bad
A	A motor cruiser		
B	A paper clip		
C	A mobile telephone		
D	A loaf of bread		
E	A pop-up Christmas card		
F	A coat button		

Choose a product of your own and have a practice in the space below.

Remember you will need to think about:

- the technologies used;
- materials and components used; and
- the structure and form of the product

- Remember neat sketches **and** notes.
- **Notes NOT JUST labels**

Name of product:

There will be questions on the use of various aspects of ICT (Digital Technology) in industry.

ICT (Digital Technology) is a very important part of **your course** and also all of our **daily lives**. Your visits to factories, visiting speakers and videos etc will have helped you have a clear understanding of how it **is** used and **can be** used in industry.

An example of selling things on “eBay” is a very good use of the Internet but it is not really an industrial application of the use of the WWW. So be careful when you answer.

<p>You must know about:</p> <ul style="list-style-type: none"> • spreadsheets • data bases • the internet 	<p>Think about them and for each of them write out an explanation of:</p> <ol style="list-style-type: none"> 1 what they are; 2 what they do; 3 advantages of using them; 4 disadvantages using them; 5 give at least one example of their use in industry.
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1	A spreadsheet is	----- ----- ----- -----
2	A spreadsheet is used to	----- ----- -----
3	The advantages of using a spreadsheet are	----- ----- ----- -----
4	The dis advantages of a spreadsheet are	----- ----- ----- -----
5	One example of the use of a spreadsheet is	----- -----

A DATABASE		
1	A database is	----- ----- ----- -----
2	A database is used to	----- ----- ----- -----

3	The advantages of a database are _____ _____ _____ _____
4	The disadvantages of a database are _____ _____ _____ _____
5	One example of the use of a database is _____ _____

The INTERNET	
1	The internet is _____ _____ _____ _____
2	The internet is used to _____ _____ _____ _____
3	The advantages of using the WWW are _____ _____ _____ _____
4	The disadvantages of using the WWW are _____ _____ _____ _____
5	One example of the use of the WWW is _____ _____

Important!

You **must** read the question carefully to understand what is being asked. Quite often candidates give **advantages** when the question asks for **disadvantages**;

- If the question is about Databases do not answer about Spreadsheets
- Remember your Industrial Visits and what you found out
- Remember the things you put in your portfolios about how things would be undertaken in industry for the things you designed and made
- If all else fails use information about your own designing and making activities
- **BUT NOT ABOUT YOU SURFING THE NET!**

During your course you will have undertaken a number of different investigations using products from different Manufacturing sectors.

In the table below identify **four** different products from each of the sectors you have investigated which you know something about. Then try to explain *exactly* **how you found out** information on the products.

Tip

You cannot just say "I went on the internet". It needs to be specific and more detailed. e.g. I used the internet to go to the manufactures web site and searched for details of the materials used in the manufacture.

Product	Sector	Method of investigation used

Now complete the table below for three different products you have investigated. This is similar to the exercise you did on page 5 but your answers should now be much more detailed.

Product	Sector	Technologies used in their production

Can you do a **fourth** product?

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Also as a regular part of your course you should have undertaken some simple assessment of the properties of products (and materials) such as:

- **structure;**
- **heaviness;**
- **colour;**
- **feel of surfaces;**
- **scratch resistance;**
- **wear resistance;**
- **any areas likely to be damaged.**

Complete the boxes below with details of products you have **actually tested**.
An example has been **started** for you.

Product	Method of investigation	Information that you found out
<i>Mobile phone</i>	<i>Testing the weight by weighing it</i>	<i>It weighed 135 grams, which is 22 grams lighter than the average mobile phone in my class. <u>Why might this be the case?</u></i>

*For a moment pretend you are an examiner for this examination paper.
How many marks would you give these examples?*

Product	Method of investigation	Information that you found out
<i>Space rocket</i>	<i>My mum flew the rocket to Mars</i> [1]	<i>It went very fast indeed - faster than I can go on my bike</i> [2]
<i>Wrist watch</i>	<i>I compared the accuracy of the watch with three different clocks</i> [1]	<i>Over a period of a week the wrist watch gained a total of four and a half minutes. All of the other watches were accurate to within six seconds</i> [2]
<i>Mobile phone</i>	<i>Testing the case by scratching the inside surface</i> [1]	<i>It did scratch but only with a lot of pressure. The sharper the object I used the deeper the scratches were but surprisingly they did not show up very much even then</i> [2]
<i>Digital Camera</i>	<i>I set fire to it</i> [1]	<i>It burned well and smelt a lot.</i> [2]

Abbreviations and Digital Technology (ICT)

You must get used to certain abbreviations, what they stand for **and** understand what they are all about.

Complete this table from memory.		
C	Aided	D
Computer	A	M
Computer	I	M
I	C	Technology
P	L	Controllers

Check if you had them correct if not change them now. That was the easy bit now the harder bit.

For each of them write out an explanation of:

- 1 what they are;
- 2 what they do;
- 3 advantages of using them;
- 4 disadvantages using them;
- 5 give at least one example of their use in industry.

C A D	
1	CAD is _____ _____ _____ _____
2	CAD is used to _____ _____ _____ _____
3	The advantages of CAD are _____ _____ _____ _____
4	The dis advantages of CAD are _____ _____ _____ _____
5	One example of the use of CAD is _____ _____ Can you give a 2 nd one? _____ _____ _____

C A M	
1	CAM is _____ _____ _____
2	CAM is used to _____ _____ _____
3	The advantages of CAM are _____ _____ _____
4	The dis advantages of CAM are _____ _____ _____
5	One example of the use of CAM is _____ _____
C I M	
1	CIM is _____ _____ _____
2	CIM is used to _____ _____ _____
3	The advantages of CIM are _____ _____ _____
4	The dis advantages of CIM are _____ _____ _____
5	One example of the use of CIM is _____ _____

Digital Technology (I C T)	
1	ICT is _____ _____ _____ _____
2	ICT is used to _____ _____ _____ _____
3	The advantages of ICT are _____ _____ _____ _____
4	The dis advantages of ICT are _____ _____ _____ _____
5	One example of the use of ICT is _____ _____
P L C	
1	PLC's are _____ _____ _____ _____
2	PLC's are used to _____ _____ _____ _____
3	The advantages of PLC's are _____ _____ _____ _____
4	The dis advantages of PLC's are _____ _____ _____ _____
5	One example of the use of PLC's is _____ _____

Modern and Smart Materials and Components.

Modern is very difficult to define accurately. However, if you give an answer, which is “*appropriate to the question*”, such things as “**aluminium alloy**” would be accepted as modern.

This is a very diverse subject and you will not be able to learn everything. But you will gain knowledge in the following ways:

- your teachers;
- in every day life – products you may own;
- during your Industrial Visits;
- from any videos you may watch;
- T.V. adverts;
- T.V. documentaries;
- newspaper articles;
- newspaper adverts; and *even...*
- some from text books.

However there are *some* specific modern materials which you could be asked direct questions on.

Important!

You **must** have knowledge of:

- Polymers, including plastics, adhesives and coatings
- Metals and composites, including shape memory alloys
- Biological, chemical and food products, modified ingredients and methods of preparation and production
- Computer technology including microprocessors and memory devices
- Micro-electric components and parts, including integrated circuits and display devices;
- Textile technology, including liquid crystal coated fabrics and thermocromic dyes

A lot of the information will come from your teachers. It is all important not just for your course but for everyday life. Here are some questions to get you interested and on the trail of knowledge.

- Have you ever wondered how the drawer of your CD player slides out so slowly? Smart Grease (motion Control Gel) is the answer but what is it and how does it work?
- Have you ever thought about how the colour of some display lights change from one colour to another?
- What about things which change colour when they get hot – the strip on an electric kettle for example?
- What does a microchip do and how does it work?
- What is polymorph and how might it be used?
- What is Nitinol and what can it do? How could it be used?
- What is the difference between an alloy and a composite?

There will have been good coverage of these things during your GCSE course by your teachers but **you should take every opportunity to ask questions and read about *anything*, which is mentioned, in the box above.**

Discuss

The last question on the examination paper is a “**Discuss**” question.

There will be help at the top of the page giving you instructions of how to answer this question and it will read as follows:

- identify **three** relevant issues/points raised by the question;
- explain why you consider **two** of these issues to be relevant; and
- use **one** specific example or piece of evidence to support your answer.

Of course you can always give **more** than three issues or **more** than one example. You will never lose marks for doing this and could easily gain some!



You **must** read the question carefully to understand what is being asked. Read the question at least **twice** – you could always use a highlighter pen to help you focus on the important words in the question

Try this little exercise.

With a friend, or your brother or sister sit down and talk about something for just 5 minutes.

Talk about anything you know something about. For example:

- Leeds Football Club chances in the FA cup;
- Your mobile phone and the new features;
- Your next holiday;
- The London bid and the Olympic games;
- Your hobby;
- The latest single from Will Young.
- Your Mum and Dad's car.

Keep focused on the topic you are talking about and try to:

- identify **three** relevant issues/points raised by the question;
- explain why you consider **two** of these issues to be relevant; and
- use **one** specific example or piece of evidence to support your answer.

In actual fact you probably do this all the time with your family and friends.

So for example:

Question: Why **didn't** your family enjoy your last holiday?

Our last holiday was to Florida but it was a very long flight and we were all very tired by the time we got there. Also, because we had to travel during school holidays, it was expensive, as the holiday's prices are more expensive then, and also very busy both at the airport and the resort where we stayed. On the aeroplane the seats were very close together and both my father and I had bad cramp in our legs. It was so crowded in the hotel and the restaurant it upset my mother because she really like peace and quite to eat her meals. It was very bad at breakfast on our first day; we were still very tired, when somebody accidentally spilt orange juice over my mother's shorts whilst she was at the buffet.

The stains would not come out and my mother had to buy new clothes.

[6]

The parts underlined are **facts** and will gain marks. In fact it is a pretty good response to the question set.

Can you see how easy it is to do? But **you must stay focused** and **not repeat yourself**. Did you spot how many marks were available for this question? Well done if you did – you remembered this from page 2 of this revision guide.

Have a look at these other examples. Can you see that they do not really stick to the point and hardly answers the actual question at all? How many marks would you give this one?

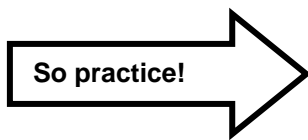
Our last holiday was to Florida and it was a very long flight but I managed to sleep most of the way. It very busy both at the airport and the resort where we stayed but I don't know why. On the aeroplane the seats were very close together and my dad got cramp, which made me laugh, but I didn't tell him I had it too. It was really sunny in Florida and the pool was smashing. We had all of our meals paid for and because it was busy I kept getting lost on purpose which upset my mum but was great fun.

[6]

How many marks do you think this answer is worth is worth?

My next holiday is going to be to Florida – we have been there before and it was great. The sunshine was super and the pool was excellent. It was ever so busy and I kept getting lost on purpose just to wind my mum up. Food was good too and I met some others kids who were a good laugh.

[6]

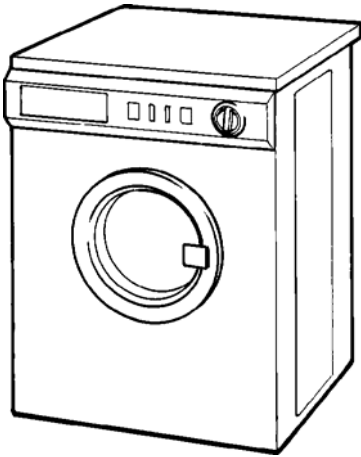


If you practice “discussing” things you will find this question quite easy. But always remember:

- Use the instruction given on the paper;
- Stick to the point of the question – don't get side tracked!

We are going to Discuss:	The new features of my mobile phone and how the improvements have come about. What they mean to me and the advantages, disadvantages, materials and how things are made. Also what life was like before mobile phones? How does their production effect the environmment?
We are going to Discuss:	
We are going to Discuss:	
We are going to Discuss:	

With reference to the product shown here try answering the following questions.



Explain the use of an embedded system in a washing machine.

State the sector that produces washing machines.

Explain how CAD might be used in the design of the washing machine?

State one modern material which might be used in the production of a washing machine?

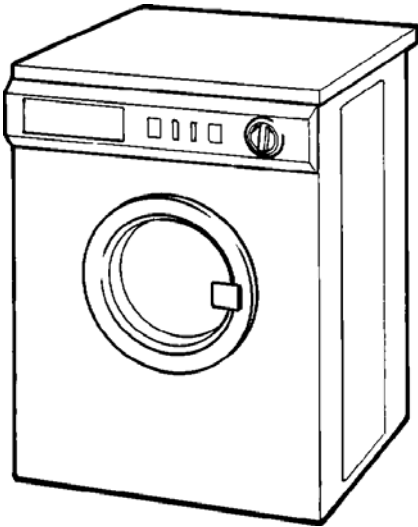
Explain how it is used in the washing machine

Name one technology which might be used in the production of a washing machine?

Explain how it is used in the production of washing machine

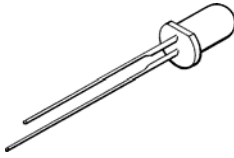
Describe how Digital Technology (ICT) could be used in the marketing of washing machines.

With reference to the product shown try answering the following questions.



Explain how CIM could have been used in the production of the washing machine.

Describe the function of this component when used in a washing machine and give **one** example of when it might operate.



Name the material used for the body panels and describe structure of the washing machine.

Material: -----

Structure: -----

State **four** environmental issues related to the production of a washing machine.

1 -----

2 -----

3 -----

4 -----

State **four** environmental issues related to the use of a washing machine.

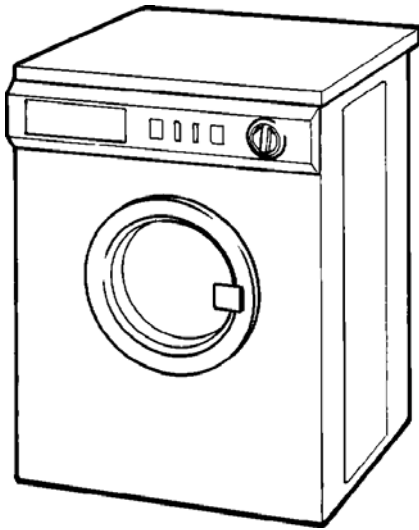
1 -----

2 -----

3 -----

4 -----

With reference to the product shown try answering the following questions.



Discuss the implications of using modern materials in relation to the final disposal of the washing machine.

[6]

Describe how Digital Technology (ICT) is used in the packaging and dispatch of washing machines.

State **four** simple tests you might carry out on a washing machine.

1 -----

Draw a clear sketch of the washing machine and label the visible components.

Robotics.

Complete the table below to identify **three** different products which are made using robotics **and** the processes which use them. The first one had been done for you.

Tip → You cannot just say "sprays" or "paints" the shell. Your answer needs to give details to show you understand the use of the robotics.

Product	Sector	Processes Involved
Archive Boxes	Paper and Board	The "net" of the boxes is stamped out using a conveyer system. Boxes are cut from larger sheets of card which have been rolled into huge Rolls of cardboard weighing many tonnes. These are moved and lifted into position using robotic arms which can lift heavy weights and place them accurately in position in the conveyer system.

Tip → Don't "**guess**". Think carefully about how products are made because there are **LOTS** of things which **do not** use robotics.

Now complete the table below with **two** different products which **do not** use robotics during their manufacture.

Product	Sector	Suggest why robotics are not used

Robotics

Robotics have many advantages when used during manufacture.

Explain **four** different advantages when using robotics during manufacture.

Tip

VERY IMPORTANT INFORMATION! When a question says "Explain" you must try to make at least **two** points for each of the 2 advantages. The first one has been done for you to show you what to do and explains **3** different points.

Advantage	
Can work 24/7	Because the robots are machines they do not need to take comfort breaks or stop for food and so lose production time ^① . They do not get sick and so can work all of the time and will not require sick pay ^② Also can work day and night, day after day without getting tired so do not lose production time ^③ . [3]
	[3]
	[3]
	[3]

Tip

If you get stuck because you only know, let us say one point of the three asked for, don't panic.
 Answer what you can and move on to the next part of the question.
But you must remember to go back later and have a guess then if needs be.

Complete the table below to identify which products use robotics during their production.

Product	✓ or ✗	Product	✓ or ✗
A motor car engine		An aeroplane engine	
Copper plumbing pipes		A plastic water bottle	
Plastic plumbing pipes		A jet engine	
A printed circuit board		Electrical wires	
A computer		A metal filing cabinet	

Embedded Systems.

Embedded systems have many advantages when used in modern products.

Explain **three** different advantages of embedded systems.

Tip → When a question says “Explain” you must try to make at least **two** points for each of the 2 advantages. The first one has been done for you to show you what to do and explains **2** different points.

Advantage	Reasons
Size	Because most embedded systems are very small “micro chips” they allow smaller products to be designed ^① . This can also mean that products are not as heavy and so could be more portable ^② . [2]

Tip → If you get stuck because you only know, let us say one point of the three asked for, don't panic. Answer what you can and move on to the next part of the question. But you must remember to go back later and even have a guess then if needs be.

Complete the table below to identify which products use embedded systems.

Product	✓ or ✗	Product	✓ or ✗
A motor car engine		A aeroplane engine	
A fridge		A digital camera	
A SLR reflex camera		A hearing aid	
A washing machine		A mobile	
A modern sewing machine		Electrical plugs	
A printed circuit board		A domestic oven	
A mobile phone		A food mixer	

Embedded Systems.

Embedded systems have some disadvantages when used in modern products.

Explain **two** different disadvantages of embedded systems.

Tip → When a question says “Explain” you must try to make at least **two** points for each of the **two** advantages. If you can “Explain” use any technical word you know which are relevant to the question. One has been done with ③

Disadvantage	
They are delicate and sometimes very small.	Because most embedded systems are very small and delicate “micro chips” they can be difficult to replace without specialist tools①. This means that any repairs might need to be undertaken by a specialist technician② and so cost of repair will be higher③. [3]
	[3]
	[3]

Tip → **Question:** If you move on from a question and need to come back to it later how do you remember which part of the question to go to?
Answer: Make a note on the front of the examination paper (in pencil and very small writing) to remind you. So at the end of the examination when you close the paper you can easily see it.

Complete the table below to identify which products use embedded systems.

Product	✓ or ✗	Product	✓ or ✗
A video camera		A handheld food blender	
A domestic steam iron		A dishwasher	
A wind up musical box		A digital video camera	
A paper shredder		A digital scanner	

For **two** of the products you have ticked above “describe” how the embedded system affects the products.
Product 1.

Product 2.

A TIMED EXERCISE

Remember the sectors?

2 minutes only to complete this table.

Product	Sector	Product	Sector
A pork pie		An industrial food blender	
A plastic drinks container		Orange juice	
A wind up musical box		A baseball cap	
A paper bag		A orange juice carton	

Remember the technologies?

2 minutes only to complete this table.

Product	Technology used in the production	Product	Technology used in the production
A pork pie		A industrial food blender	
A plastic drinks container		Orange juice	
A wind up musical box		A baseball cap	
A paper bag		A orange juice carton	

And another 2 minutes only to complete this table.

Product	Technology used by the product	Product	Technology used by the product
A pork pie		A industrial food blender	
A plastic drinks container		Orange juice	
A wind up musical box		A baseball cap	
A paper bag		A orange juice carton	

Thermochromatic inks and dyes. (Thermo = Heat + Chromatic = Colour)

Thermochromatic inks and dyes are now commonly used in many products.
Complete the table below to show **three** different products which use thermochromatic inks and dyes and explain how each of them works.

Tip 1

It is good to be wrong! Nobody knows everything so.....
When you hand in your homework sheets to get them marked do you always ask for an explanation for any answers which you got wrong?

Remember the ①, ②, ③.

Tip 2

Product	How it works in this product

Tip

Question: If you cannot remember the technical word to answer the question what can you do?
Answer: Use your own words to try to explain and/or do a little drawing to help the marker know what you mean.

For **two** of the products you have identified above “state” **two** different possible problems with the application of the thermochromatic inks and dyes on to the product.

Product 1.

Product 2.

Explain what the term “consumer” means.

A consumer is...

Explain what is meant by the term “local environment”

Local environment is...

Explain what is meant by the term “the environment”

The environment is...

Explain what is meant by the term “re-use”.

Re-use is...

Explain what is meant by the term “recycling”

Recycling...

Explain what “marketing” means.

Marketing is...

Explain what a risk assessment is

A risk assessment is...

Alloys, Composites and Shape Memory Alloys

State what an “alloy” is.

An alloy is.....[1]

Explain what an “alloy” is.

An alloy is.....
.....
.....[2]

These are **two** different questions. The topic is exactly the same but they require a different type of response from you.

There are two clear clues as to how much information you are expected to give for your answer. Can you spot them?

Clue 1.

Clue 2.

So..... State what a “composite” is.

A composite is[1]

Explain what a “composite” is.

A composite is
.....
.....
.....[3]

The **[3]** means that you need to give **more** information to gain **all** of the marks.

Think of it like this: **one** point or piece of information for **one** mark. So this question needs 3 pieces of information OR two pieces of information **and** an example to emphasise your points. This could be worth full marks if you explain it well.

Shape Memory Alloys

Now we are clear in our minds what “alloys” and “composites” are let us move on a little.

Nitinol is a shape memory alloy. Think about the words “shape memory alloy”.

Even without too much technical knowledge you can make quite a good guess at what “Nitinol” is and possibly does.

Lets try by breaking down the phrase “shape memory alloy”.

Shape means _____
Memory means _____ _____
An alloy is _____ _____

Think what the examiner is likely to ask you about a “shape memory alloy”?

The information which you **might** not know is that when an electrical current passes through “Nitinol” it **shrinks**.

And so when the electrical current is switched off it _____

So: Explain what “Nitinol” is and how it works.

_____ [4]

Now you are almost an expert in shape memory alloys.
When it shrinks Nitinol exerts considerable force.

Suggest one application (use) for Nitinol

_____ [3]

Microprocessors and Memory devices.

Your own personal knowledge might well be of use to you in this section.

BUT you must remember that the examination paper (unit 3) is called “**The Application of Technology**” and is really about the things you have seen and found out about during your course and your visits into **Industry**.

So: Take care to always try to think in terms of **Industry**. How and why the technologies are **used** in **industry**.

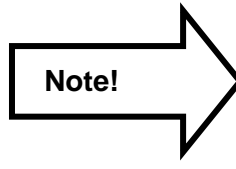
State what a Microprocessor is[1]

Explain what a Microprocessor is
.....
.....[3]

In terms of Digital Technology (ICT) state what memory is
.....[1]

In terms of Digital Technology (ICT) explain what memory is.
.....
.....[3]

Explain **one** way in which Digital Technology (ICT) memory could affect the speed of production.
.....
.....[3]



You always need to be careful! On page 32 we were talking about “memory” and also on this page we are talking about “memory”. The meanings are basically the same but it is the **application** which differs slightly.

So far this is pretty easy stuff!

Production Plans and Schedule for Manufacture

You must be able to create, understand, interpret and modify production plans and Schedules of Manufacture. In the examination you will not for example be asked to write a schedule for making a Christmas cake or a spice rack. But you may be given part of a production plan or schedule and be asked to complete them or spot problems with them.

Additionally you will have to produce and fully understand the details of and importance of production plans, schedules of manufacture including critical control points in Unit 2 “Manufactured Products” of your coursework.

So the next few pages will help you with both the written examination and your coursework.

Production plans provide information about the type and quantity of product to be manufactured.

The quantity might be a single unit (one off), batch produced items or items produced in volume.

Complete the table below to identify **three** products which are produced in each of the three given production types.

One example has been done for you in each production type.

Production Type	Products
Single unit	A bespoke Taylor made suit
Single unit	
Single unit	
Single unit	
Batch production	1,000 Loaves of wholemeal bread
Batch production	
Batch production	
Batch production	
Volume Production	Wire paper clips
Volume Production	
Volume Production	
Volume Production	

For each of these products you have identify the type of production used.

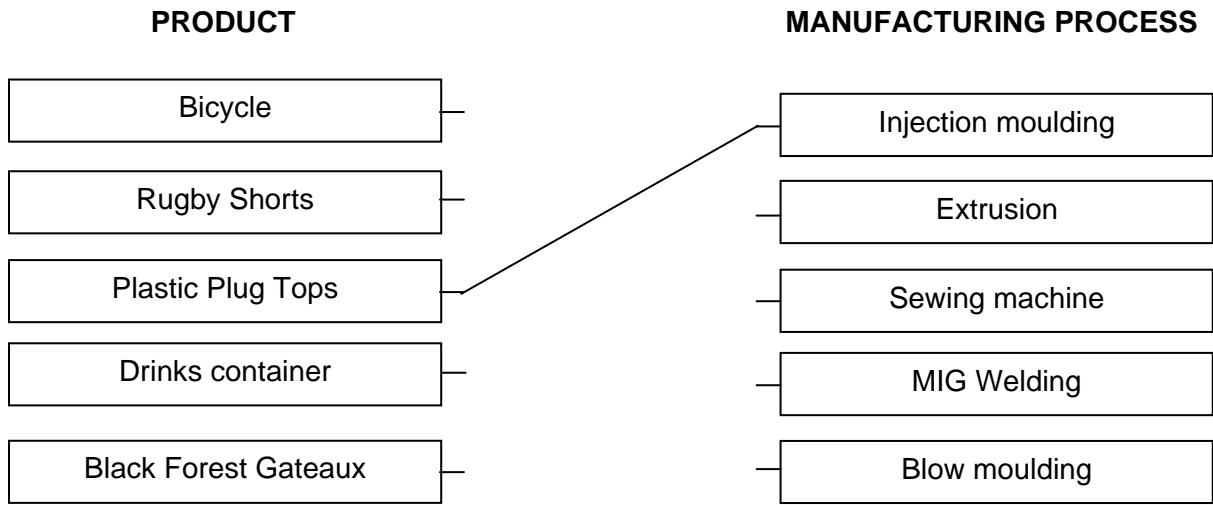
Products	Production Type
Wellington Boots	
Pasta Shells	
A 90 th Birthday Cake	
A 21 st Birthday Card	
Chocolate Bars	
A Daily newspaper	
A "Girls" annual	

Complete the table below to identify **three** different manufacturing processes which are used in each of the three production types together with products which are manufactured using the process.

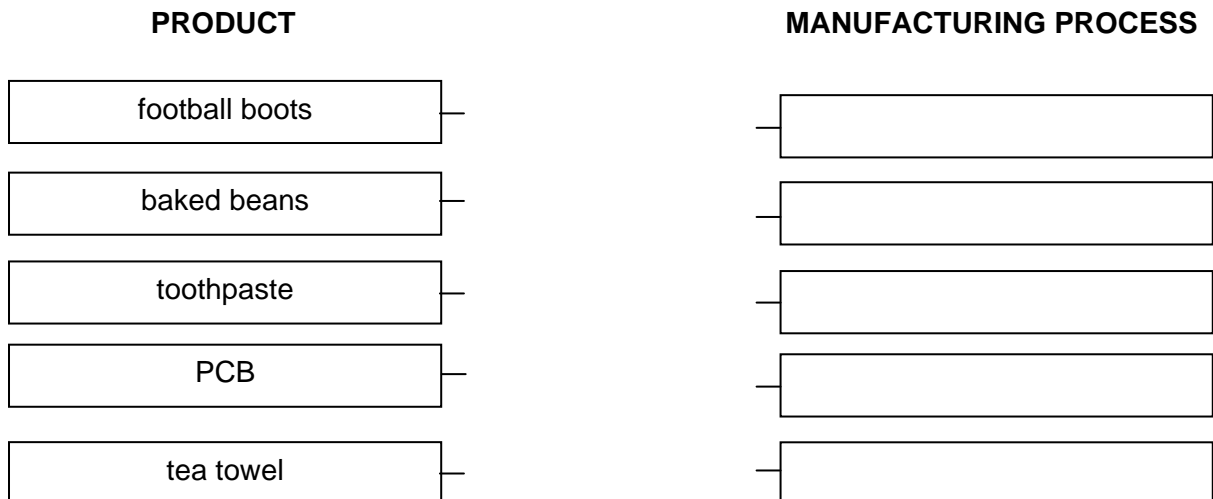
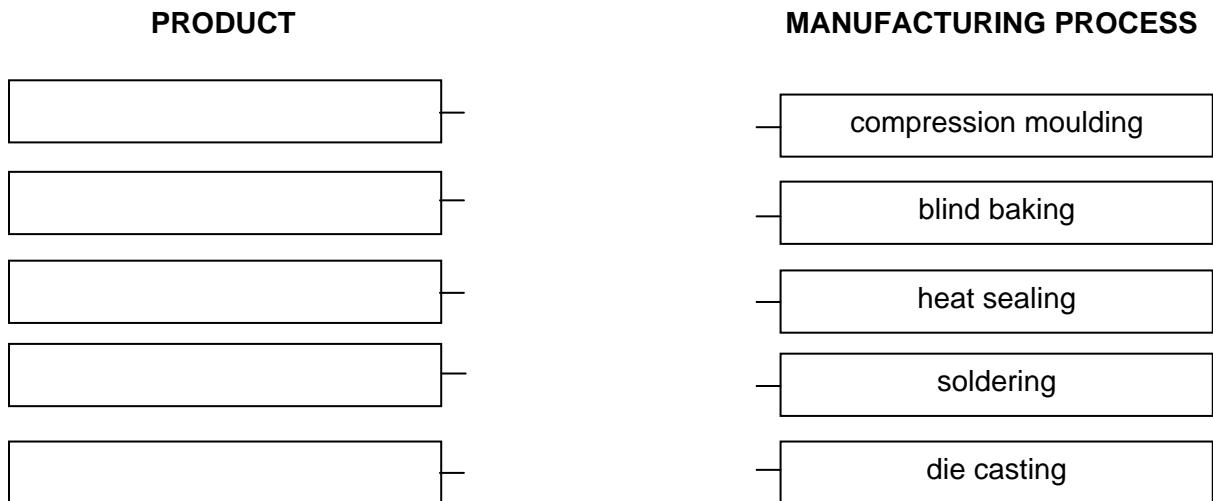
One example has been done for you for each production type

Production Type	Manufacturing Processes	Example of Product
Single unit	Steam bending	wooden instruments
Single unit		
Single unit		
Single unit		
Batch Production	Button sewer	Hockey shirts
Batch Production		
Batch Production		
Batch Production		
Volume Production	Injection moulding	Ball point pens
Volume Production		
Volume Production		
Volume Production		

Complete the links below to identify the manufacturing process which would be used to produce the given products.
The first one has been done for you.



Use the boxes below to create your own questions and then try them out on other students in your teaching group.



Using Production Plans to develop a Schedule for Manufacture

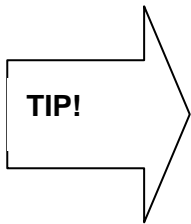
A schedule for Manufacture should include the following information:

- details of **all** preparation, processing and assembly stages;
- the sequence and timings of **all** the stages;
- critical production and quality control points;
- production and control procedures; and
- allocation of roles and responsibilities.

The schedule of Manufacture can be presented in many ways.

Charts, lists, bullet points are all ways to produce them.

A grid or table is probably a good way to start writing a production schedule.



You can experiment with different ways of presenting the information which is easiest for you to work with.

BUT remember the whole idea is that it has **all** the required information to manufacture the product **and** be quickly understood by other people.

Look at the schedule for making this well known example.

Making a Cup of Black Coffee

Timings	Stages	Required Materials / Ingredients Tools / Equipment	Sequence of Production & Control		Critical Control Points	Who is responsible
2 minutes	Preparation	Water (H ₂ O), coffee granules, kettle, spoon, cup (or mug)	1 2	Ensure sufficient amount of H ₂ O and correct coffee granules		Amanda
3–4 minutes dependent on amount of water and power rating of kettle used	Processes	Electrical supply, Flat surface to work on and sufficient space in which to operate	3 4 5 6	Use tea spoon to decant correct quantity of granules into cup Fill kettle with required amount of H ₂ O Switch kettle on Wait for H ₂ O to boil	1 One heaped tea spoon required 2 Automatic kettle	Amanda
20 seconds	Assembly	Flat surface, Sufficient space in which to operate, appropriate container for used spoon	7 8 9	Pouring boiling H ₂ O on to coffee in cup Pouring away from body and cup is stable and secure Stirring mixture whilst holding cup firmly by handle	3 H ₂ O must not be at boiling point when applied to granules. i.e. allow to cool slightly.	Amanda

Is any part of the manufacturing process missing?

The important thing is could somebody else make the black coffee from the details given in the schedule? If they could then it is a **good** schedule.

Now it is your turn. Complete the table below remembering to put **every single part** of the manufacturing process somewhere in the schedule.

Making a Pot of Tea for Two People both with Milk and Sugar

Timings	Stages	Required Materials / Ingredients Tools / Equipment	Sequence of Production & Control		Critical Control Points	Who is responsible
			1			Your name:

There are lots of simple examples to get you into the swing of understanding and writing schedules.

Try some of these:

Boiling an egg
Getting up, dressed and leaving home for school
Writing out a schedule
Making 24 fabric toys
Making 24 electronic bike alarms

Watering a flower pot
Preparing a sandwich
Wrapping up a Christmas present
Making 24 wooden DVD racks
Making 24 picnic lunches

Now for some fun.

Ask your teacher to divide your teaching group into pairs.

Working in your pairs, complete a schedule for clearing up and washing up from the point where the two cups of tea have been drunk.

Once again complete the table below remembering to put every single part of the process somewhere in the schedule.

Washing up after the 2 cups of tea have been drunk

Timings	Stages	Required Materials / Ingredients Tools / Equipment	Sequence of Production & Control		Critical Control Points	Who is responsible
			1			Your name:

Now read out your schedule to another pair in your teaching group.

They should see how many errors or gaps they can find in **your** schedule.

Repeat this again with a different task such as: **walking to the local shops to buy some sweets or washing and ironing a team's sports strip.**

Now it will be your turn to try to catch them out by spotting their gaps and errors.

Once you have mastered writing these simple schedules you will soon be able to both **write** and **understand** more **complex** ones which are used in Manufacturing and also produce your own for projects you undertake in school or college.

Design Briefs

The design brief tells you the client's requirements. This helps you understand the client's needs before design proposals are undertaken.

The client's brief will usually specify a product's:

- function – where and what the product will be used for;
- performance – how well the product has to perform;
- intended markets – who might use the product, competition with other similar products, client's own customer base;
- quantity – how many are required;
- styling/aesthetic appearance – the product's appearance and appeal;
- quality standards – client and/or sector standards;
- cost – factory gate, retail cost;
- timescales for design and manufacture.

The brief can be in written format, bullet pointed paragraphs, in a chart or table. Whichever way is used you must remember somebody else has to quickly and completely understand what is required.

Imagine you are **The Client**. Let us say that you want to have a new football or hockey boots designed and manufactured for your schools football or hockey team.

Using the above bullet points as a guide, write a **detailed** brief for the new boots. Use 100 as the total number of pairs of boots required.

Use this grid to help you. **Some information can be made up but you will need to find out about other information. What you will need to research is marked with an * .**

You can do this by talking to your P.E. teachers, visiting sports shops, using the WWW etc.

		Details
1	function	
2	performance *	
3	intended market	School A and B teams will be provided with a free pair of boots. These will be paid for by the sale of the same boots, various sizes, to other students at the same school. Initially 30 pairs will be earmarked for free issue leaving 70 pairs for sale. This number might need to be increased as time progresses.

4	quality *	
5	styling/aesthetic appearance	
6	quality standards *	BS 6366:1983 Footwear, Boots, Studs (footwear), Ball-games equipment, Sports equipment, Disposable, Shape, Dimensions, Wear resistance, Impact strength, Marking, Impact testing, Injuries, Damage, Test equipment, Test models, Skin (body), Wear tests, Specimen preparation
7	cost * (factory gate, retail cost)	
8	timescales	

Now do the same thing using the same headings for a different product.

Try some of these:

Refreshments for a sports event
A mountain bike
A computer
A portable hair drier
A quick chill meal for two people
A electronic door chime
Packaging for any of the above ideas

A mass produced DVD rack
A batch produced DVD rack
A single (one off) DVD rack
A range of "Get Well" cards
A Gortex rain hat
2000 fabric pencil cases
Advertising materials for any of the above

Product Design Specifications

Key features from the design brief are researched to obtain detailed information to enable the specification to include:

- product design details
- material details and constraints
- production details, constraints and quality standards.

Quite often the Design Brief might include details of some of the above in other word they will “overlap” in some ways. The example on page 41 the Football boots is a good example where the quality standards are given in the brief. However they may well need further exploration to ensure sufficient detail for trouble free designing and manufacture.

However they are different and must be presented separately but both must be easy to understand by a third party.

Let us take the example of **Refreshments for a sports event.**

Complete the Design Specification which has been started for you.

Use this grid to help you. **Some information can be made up but you will need to find out about other information.**

You can do this by talking to your teachers, visiting similar events, investigating cafes and food outlets and also using the WWW.

<ul style="list-style-type: none"> • product design details 	<p>The refreshments will need to be for the following groups of people:</p> <ul style="list-style-type: none"> • Athletes • Support staff (marshals, timekeepers, 1st aiders, etc.) • Spectators (young children, senior citizens and adults) <p>Food will need to be fresh and stay fresh for a period of 6 hours</p> <p>Drinks will need to be provided and will need to encompass:</p> <ul style="list-style-type: none"> • Hot drinks (in case the day is a chilly one) • Variety of cold drinks • •
<ul style="list-style-type: none"> • material details and constraints 	

<ul style="list-style-type: none"> • production details, constraints and quality standards. 	<p>HACCP:</p> <ul style="list-style-type: none"> • Refrigeration for sandwiches required • Washing ... •
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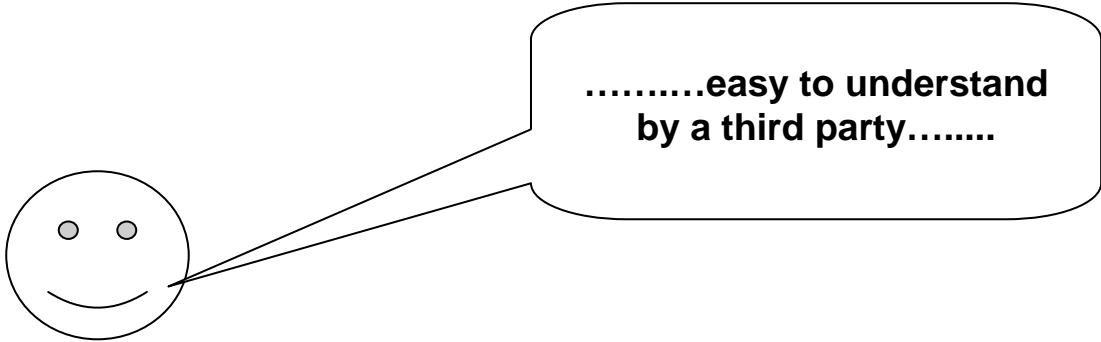
If you do this exercise well you will probably require extra space.

For **two** of the ones you selected from the list below extend the design Brief into a Design Specification.

A mountain bike
A computer
A portable hair drier
A quick chill meal for two people
A electronic door chime
Packaging for any of the above ideas

A mass produced DVD rack
A batch produced DVD rack
A single (one off) DVD rack
A range of "Get Well" cards
A Gortex rain hat
2000 fabric pencil cases
Advertising materials for any of the above

Try different ways of writing out the Design Specifications but remember:



Materials Details and Constraints

You will draw upon your knowledge, experience and understanding of materials, components and ingredients in order to decide which are most appropriate for your design and manufacturing proposals. When comparing materials, components and ingredients you will need to consider the following:

- their availability, form and supply;
- their properties, characteristics and performance;
- their cost;
- health, safety and hygiene requirements;
- handling and storage.

Below is an example of details of a commonly used material.

Material	Availability	Form	Supplier	Cost
30 mm block board	In stock: (checked by phone on 21 st November 2006 Tel: 0123 123 123)	Block board is sold in sheets of 2440 x 1220mm and are normally 30mm thick. Can be cut smaller by supplier at extra cost	Woodstock Suppliers Old Road Leeds LE2 2EL	£23.45 per sheet. £20.95 per sheet if 10 sheets purchased. Delivery £15.00 for any amount

Material	Properties, characteristics and performance	Health, safety and hygiene requirements	Handling and storage
30 mm block board	Block board is not suitable for outdoor use because the glues used are interior glues. The strips are placed edge to edge and sandwiched between veneers of hardwood. The sandwich is then glued under high pressure. Screws and nails may be used to attach block board but you have to ensure that you make contact with the strips of softwood and not the gaps between the softwood strips. The edges of block board are unattractive and cannot be cleaned up well. Fix softwood strips, veneers or fill and paint the edges.	Dust mask must be used because of: 1. wood dust inhalation 2. resin glues used in manufacture (sources of wooden strips would be unknown)	Do not handle sheets on your own! Heavy and needs two people. Store on edge as upright as possible

Choose **three** materials which you have used recently.

I have chosen :

Material	Where I used it

Now for each material you have identified complete the table similar to the one shown below:

Material	Availability	Form	Supplier	Cost

Material	Properties, characteristics and performance	Health, safety and hygiene requirements	Handling and storage

Teamwork

During your studies you must learn to fully understand what makes an effective team. You will find out that an effective team can be built through:

- allocating and agreeing roles and responsibilities, based on the strengths and weaknesses of team members;
- setting and agreeing individual and team targets;
- ensuring good communication between team members;
- ensuring that team members are motivated;
- creating an appropriate working environment.

You must be able to explain details about the demands of good team work and possibly relate it to your own experiences and experiences witnessed by you when you have been on visits to manufacturing companies.

Complete the table below by explaining the **importance** of each of effective team requirements. You can use your own experience to illustrate your example.

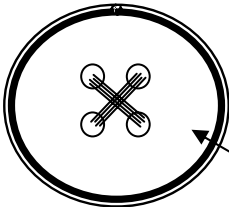
Requirements	Explanation of Importance
Allocating appropriate roles and responsibilities	
Setting and agreeing individual and team targets	
Good communication	
Motivation	
Creating an appropriate working environment	

Combining, Assembling and Finishing Materials and Components/Ingredients

During your course you will learn how to combine, assemble and finish materials, components and ingredients to a production plan and schedule for manufacture in order to meet client requirements and conform to quality standards.

You must be able to explain how you would accomplish this and **also** how they would be done in industry.

Look at the **two** examples shown below.

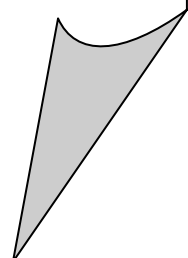
Material / Component / Ingredient Number 1	Material / Component / Ingredient Number 2	Method of combining / assembling
Block board cupboard door	50mm Brass Butt hinges x 2	<p>The hinges would need a recess cutting on the edge of the block board to house it.</p> <p>Sets of pilot holes (3 x 1.5 mm) would need drilling into the edge of the door.</p> <p>Countersunk brass \varnothing 3mm x 12mm long would then attaché each hinge to the door.</p>
Material / Component / Ingredient Number 1	Material / Component / Ingredient Number 2	Method of combining / assembling
80% cotton 20% polyester bespoke dress shirt	Four holed \varnothing 8mm white, plastic buttons x 10 	<p>Lengths of white polyester thread would be used to sew each button onto the shirt in the correct place by hand. Method of lining buttons up with button holes would be required.</p> <p>Stitching for these garments would need to be as shown –</p> <p>Client brief refers.</p>

Choose **four different** situations of Combining, Assembling and Finishing Materials and Components / Ingredients with which you have direct experience. Complete the table below with as much detail as possible.

Material / Component / Ingredient Number 1	Material / Component / Ingredient Number 2	Method of combining / assembling

Material / Component / Ingredient Number 3	Material / Component / Ingredient Number 4	Method of combining / assembling
Material / Component / Ingredient Number 5	Material / Component / Ingredient Number 6	Method of combining / assembling
Material / Component / Ingredient Number 7	Material / Component / Ingredient Number 8	Method of combining / assembling

Notes:



Notes: