Success in the examination

You will take one written paper that is worth 50 per cent of your total marks. The paper is divided into three sections:

- Section A: Core technical principles (20 marks)
- Section B: Specialist technical principles (30 marks)
- Section C: Designing and making principles (50 marks)

When will the exam be completed?

REVISED

There is one opportunity to take the exam – in the summer term of your final year.

How long will I have to complete the exam?

REVISED

- The exam is two hours long and each question has a guide time to help you complete the paper.
- You should practise working past papers and sample questions within the allotted time.

What type of questions will appear in the exam paper?

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Section A consists of 20 multiple-choice questions that test your knowledge of the core technical principles.

Here is a typical Section A multiple-choice question.

Example

1 Which of the following is a composite material:

a) Iron ☐
b) Teak ☐
c) Kevlar ☐
d) Cartridge paper ☐

The correct answer is c) Kevlar and for one mark you should indicate it as:

Example

1 Which of the following is a composite material:

a) Iron ☐
b) Teak ☐
c) Kevlar ■
d) Cartridge paper ☐

Don't answer a multiple-choice question like this:

Example

1 Which of the following is a composite material:
- a) Iron
- b) Teak
- c) Kevlar
- d) Cartridge paper

If you mark any more than one box, your answer will not be awarded a mark even if one of your answers is correct.

Exam tip

Never leave a multiple-choice question blank. See if you can eliminate some of the answers you believe to be definitely wrong and then make an educated guess from among the remaining options.

Section B consists of a mixture of short answer and long answer questions. This section will test your knowledge of specialist technical principles.

This is a typical Section B question:

Example

1 Many products are given a finish to enhance their appearance and give protection. For a material of your choice, name a suitable finish and explain how this finish would be applied. [4 marks]

Section C consists of a number of short and long answer questions. This section will test your knowledge of design and making principles.

This is a typical Section C question:

Example

Baby's high chair

3 Study the picture of the baby's high chair. Discuss the suitability of the product in terms of its:
- suitability for the user
- aesthetics
- environmental impact.

Tips on preparing for the exam

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- If you did not understand a topic when it was covered in class, you are unlikely to understand it when revising. Make sure you ask at the end of a lesson if you're unsure of any of the material covered.
- Being absent from school can leave a big hole in your knowledge. Make sure that you catch up any missed work.
- Don't leave revision till the end of the course. Test yourself at the end of each topic.
- Use past papers, online materials and revision guides to help you practise exam-type questions.
- Plan your revision time in the weeks leading up to the exam.
- Make revision cards to help you compartmentalise your understanding.
- Work with other students to test each other.

Approaching the paper

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- Make sure you know the date, time and location of your exam.
- Get a good night's sleep. Make sure you have eaten and that you are hydrated.
- Arrive early and make sure you have all your equipment with you.
- Read the instructions on the front cover of the question paper. This will tell you what you have to do.
- Read each question carefully at least twice. This will help you to understand exactly what information you need to give.
- The question will tell you how many marks are available for this question. Use this to gauge how much detail you need to put into your answer.
- The question will tell you how long you should take to answer the question. Use this to help you pace yourself during the exam.
- If you finish early, go back and reread the questions and your answers. You will usually find that you have remembered more detail. You may also be able to spot any mistakes that you may have made.

Exam practice answers at **www.hoddereducation.co.uk/6 myrevisionnotesdownloads**

Sample examination questions

Section A

Example

Which of the following is a modern material?

a) Foam board
b) Metal foam
c) Plywood
d) Stainless steel

Assessment comment

Only one answer should be selected in a multiple-choice question. If more than one response is chosen then the response will automatically be marked as incorrect.

'b) – Metal foam' is the only correct response. A modern material is one that has been recently developed and has properties that are useful when designing and manufacturing.

Section B

In the exam you will be able to answer Section B questions in relation to **one** chosen material category or system. The sample questions included here each focus on a different material category or system.

Sample question 1: Paper and boards

Example

Explain the benefits of applying a surface treatment to paper/board products. Give examples of treatments/finishes in your answer. [6 marks]

Candidate response

By adding a finish to paper and board materials their lifespan and that of the product they are manufactured into, can be extended.

A finish such as lamination adds a layer of polymer over the surface of the paper/board, adding a waterproof layer which makes the material ideal for restaurant menus. Making paper or board waterproof means its properties have been improved and that it can be used for the packaging of liquids. Without the surface finish, it could not be used for that application.

Varnish or spot varnish not only adds a high gloss (or matt) effect, improving the aesthetics of the product but also adds a layer of protection too as it can be waterproof to an extent.

Foil blocking and embossing are finishes which improve the aesthetic of a product by either adding a metallic effect or raised lettering. These make a product feel more luxurious and ensure a product is noticed by the target market. It also means that high-end products have packaging that reflects their contents.

Assessment comment

This response would be credited in the 5–6-mark bracket as the candidate shows a good understanding of the material area and the finishes that can be applied. The benefits that have been highlighted are linked to clear examples and benefits are explained.

Mark scheme

The assessment for a 6-mark question like this would usually use descriptors like those shown below:

Band	Descriptor
5–6	Several benefits of finishes explained with reasoning given. Finishes are appropriate to the materials and a range of examples are used to assist the explanation.
3–4	Some benefits of finishes have been given with some explanation. Finishes are suitable for the materials and more than one has been used to assist the explanation.
1–2	A simple or obvious benefit of applying a generic finish has been highlighted. An example has been given which may not be fully explained.
0	No response

Sample question 2: Timber-based materials

Example

Use notes and sketches to describe how you would produce a curve in wood using the industrial process of lamination. [9 marks]

Candidate response

Before you can begin laminating, you need a former that is the same shape as the finished curved piece of wood.

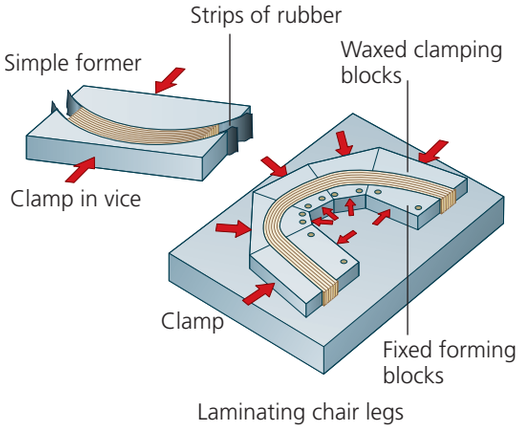
First you need to cut several laminates of wood. These must be thin enough to bend around the former.

A layer of PVA glue is then spread over both sides of the laminates.

Each laminate is then placed into the former.

The former is then clamped together for 24 hours until the glue is dry.

The laminated wood can then be removed and finished by planning and sanding.



The process of laminating

Assessment comment

This is a complete answer and would be awarded 9 marks. The candidate has provided accurate, labelled sketches that show their understanding of what a former looks like. They have gone on to describe the process of lamination in correctly sequenced, detailed stages using the correct technical terminology.

Mark scheme

Band	Descriptor
7–9	Notes and sketches have been provided to comprehensively describe the process of laminating wood. The stages are correctly sequenced and use the correct technical terminology.
4–6	Notes and sketches have been provided to describe most of the process of laminating wood. The stages are correctly sequenced and some technical terminology has been used.
1–3	Simple notes and/or sketches have been provided to describe some of the process of laminating wood.
0	No response

Sample question 3: Metal-based materials

Example

Explain what is meant by the term alloy. Give an example, properties and uses of an alloy to illustrate your answer. [6 marks]

Candidate response

An alloy is a combination of two or more metals mixed together to improve their physical and mechanical properties.

Brass is an example of a metal alloy. It is a combination of copper and zinc that produces a strong, ductile metal that is corrosion-resistant and is a good conductor of heat and electricity.

It is used for making water taps and wood screws.

Assessment comment

This is a complete answer that would be awarded 6 marks. A full and correct description of the term alloy has been given, an example of a metal alloy has been provided together with a detail description of its properties and uses.

Mark scheme

Band	Descriptor
5–6	A detailed explanation of the term alloy has been given with a suitable correct example linking its properties to its uses.
3–4	An explanation of the term alloy has been given with a correct example and a suitable use.
1–2	A simple description of the term alloy has been given with a correct example or a correct use.
0	No response

Sample question 4: Polymers

Example

Describe how polymers such as polyethylene (PE) are changed from their primary source into stock form. [6 marks]

Candidate response

Polyethylene (PE) comes from crude oil that is found underground. It has to be drilled, pumped to the surface and then transported to the refinery by pipe or by tanker.

At the refinery, it is turned into the monomer ethylene by the process of fractional distillation and cracking.

The ethylene monomer is then converted into polyethylene (PE) by a process known as polymerisation.

Polyethylene (PE) is then processed into its stock form by extruding it into a variety of cross sectional shapes.

Assessment comment

This is a complete answer that would be awarded 6 marks. A full explanation of the processing of crude oil into polyethylene (PE) has been given with all the main areas covered.

Mark scheme

Band	Descriptor
5–6	A detailed explanation of the processing of crude oil into polyethylene (PE) has been given with all of the main areas covered.
3–4	An explanation of the processing of crude oil into polyethylene (PE) has been given with most of the main areas covered.
1–2	A brief explanation of the processing of crude oil into polyethylene (PE) given with some areas missing.
0	No response

Sample question 5: Textile-based materials

Example

Explain how the sourcing, processing and disposal of textile materials can impact on the environment.
Give examples in your answer. [9 marks]

Candidate response

Cotton is a natural fibre but is not good for the environment because it needs to have lots of chemical pesticides and fertilisers sprayed on to the crops to make them grow. The chemicals can poison the ground and any rivers and lakes nearby. This means that other crops may not grow and fish will be poisoned. Cotton is a very thirsty plant and needs a lot of water, which can cause rivers and lakes to dry up. The Aral Sea disaster was caused when farmers diverted the water for their cotton crops. The water may be needed by people who do not have enough water to drink. Organic cotton is better for the environment as it is grown without chemicals.

Polyester comes from oil that is non-renewable and supplies are running out, but it can be made from recycled plastic bottles. Polyester takes many years to break down when it is sent to landfill.

When fibres are turned into yarns and fabrics, a lot of energy is needed to power the machines' work and this also has a bad effect on the environment.

Dyeing fabrics uses a lot of chemicals and water and if these are not disposed of properly this can pollute the land and rivers. Applying finishes such as flame retardant and stain repellent can mean that the chemicals used pollute land. Even when textiles are sent to landfill, the dyes and chemicals can still pollute the land.

When textile products wear out or people do not want them anymore they are often sent to landfill and this is a problem because we are running out of space for landfill sites. Reusing the textile materials to make new products is better, or giving them to charity shops means that other people can use them if they are not worn out.

Mark scheme

The assessment for a 9-mark question like this would usually use performance descriptors like those shown below:

Band	Descriptor
7–9 marks	Several points relating to different ways in which textiles impact on the environment with explanation of the issues. A range of appropriate examples is given to illustrate the issues.
4–6 marks	Some points relating to the ways in which textiles impact on the environment with some explanation of the issues. More than one appropriate example is given to illustrate the issues.
1–3 marks	A limited number of simple or obvious ways that textiles impact on the environment with little explanation of the issues. An example has been given which may not be fully explained.
0 marks	No response

Sample question 6: Electrical and mechanical systems

Example

Describe the process of producing a printed circuit board (PCB) using a photo-resist board. [6 marks]

Candidate response

The first stage in producing a printed circuit board (PCB) is to produce a circuit design mask using a software program. The software will even check your circuit to make sure it works and it will also make it as compact as possible.

The light-resistant backing is then removed from the photo-resist board and the acetate mask placed over it.

The board is then subjected to UV light in the light box and then placed into the developing solution to remove the unwanted backing.

After cleaning the board, it is then placed into the etching solution where unwanted copper is removed leaving just the copper track and pads.

The board is the cleaned, drilled and is now ready for the components to be soldered in.

Assessment comment

This response would be credited in the 7–9-mark bracket as the candidate shows a good understanding of a number of ways in which textiles can impact on the environment and gives some good explanation of the issues. A range of clear and relevant examples is given to illustrate the points made.

The answer could be improved by explaining:

- how energy use affects the environment,
- how chemicals leech out of textile materials buried in landfill and pollute waterways and land.

Assessment comment

The candidate has produced a full and detailed description of how to produce a printed circuit board using a photo-resist board. It follows a logical sequence and would enable a competent third party to manufacture the board.

Mark scheme

Band	Descriptor
5–6	A detailed description of how to produce a PCB using a photo-resist board has been given. The process follows a logical, complete sequence that could be used by a third party to manufacture the board.
3–4	A description of how to produce a PCB using a photo-resist board has been given. The process follows a logical sequence that covers most of the process. This could partially be used by a third party to manufacture the board.
1–2	A simple description of how to produce a PCB using a photo-resist board has been given. The process is incomplete and could not be used by a third party to manufacture the board.
0	No response

Section C

Example

Explain how the following are used when designing a product.

- Focus groups
- Ergonomics
- Anthropometric data [3 x 3 marks]

Candidate response 1

- Focus groups:

Large companies use these to test out their ideas as it involves a group of people giving their opinion through a discussion. This feedback allows for useful primary research to be collected at the initial investigation stages of the design process. It also helps a designer make useful modifications as prototypes can be tested with the focus group too.

- Ergonomics:

Ergonomics is the consideration of how a person interacts with a product. A designer would need to consider this to ensure that the product they design is comfortable and easy to use. Considering aspects such as size, shape, weight and colour make the product more efficient to use.

- Anthropometrics:

Anthropometrics is the size of humans, for example their height, hand span or leg length. This data is used by a designer to ensure that the product they design fits the intended audience. It is common for the 5th to 95th percentile of data to be used, ignoring the extreme sizes. Using anthropometrics ensures that the product is ergonomically designed.

Candidate response 2

- Focus groups:

A type of research where lots of people try out a product

- Ergonomics:

How easy a product is to use

- Anthropometrics:

The size of humans

Mark scheme

For a 3-mark answer the following style of assessment might be used.

Band	Descriptor
3	Three points well made or two points made and justified or two points made and an example given.
2	Two simple points made or a point made and justified or exemplified.
1	A simple point made
0	Nothing worthy of credit

Assessment comment

Candidate One would score 3 marks each time as they give a full explanation of each term and link it back to how a designer might use it to design a product. Detailed statements showing a good understanding.

Candidate Two would score 1 mark for their answers to both ergonomics and anthropometrics as they recall only a simple statement which is a definition of the term. Their answer for focus group may score 2 marks as there is slightly more to their response.