AQA A-Level Design & Technology (7552) – Exam Technique & Answer Guide

🧾 **Paper 1: Technical principles**

📅 **Duration: 2 hours 30 mins**
🧠 **Weighting: 30% of A-Level**
📝 **Format: Mixture of short answer and extended response questions**

🧾 **Paper 2: Designing and making principles**

📅 **Duration: 1 hours 30 mins**
🧠 **Weighting: 20% of A-Level**
📝 **Format: Mixture of short answer and extended response questions**

💡 **High-Scoring Student Habits**

- ✅ Link every decision back to user needs or specification
- ✅ Use technical terminology
- ✅ Use intuition when they know nothing
- ✅ Include justified trade-offs
- ✅ Evaluate honestly — flaws and improvements

Disclaimer:
This guide is based on my personal understanding, experience, and interpretation of the AQA A-Level Design & Technology specification. It is not affiliated with or endorsed by AQA. Students should always refer to the official specification, mark schemes, and guidance provided by their teachers or exam board for the most accurate and up-to-date information.

General Exam Strategies

1. Time Management

- Allocate time based on marks. E.g., 1 mark ≈ 1 minute.

2. Command Word Awareness

Understanding command words is key to answering questions correctly. These words tell you exactly what the examiner expects.

Understand what examiners want (I've picked a few here but not all!):

Command Word	Meaning	What To Do in the Exam	Example Question	Answer Tip
Evaluate	Judge from available evidence (AO3)	Weigh up pros and cons, give a final judgement or conclusion	*"Evaluate the use of carbon fibre in bike frame design."*	Use a balanced structure: advantages, disadvantages, then a conclusion linked to the context
Describe	Set out characteristics (AO4)	Say what something is or what it looks like – no explanation needed	*"Describe how injection moulding is used in mass production."*	Use clear, technical language. Don't explain or justify – just describe steps or features
Discuss	Present key points, different views, or strengths/weaknesses (AO3)	Explore different sides of an issue or idea – often requires a mini debate	*"Discuss the impact of planned obsolescence on consumers."*	Cover multiple perspectives and end with a summary or viewpoint
State	Express clearly and briefly (AO4)	Give a fact or direct answer – usually one sentence	*"State one property of ABS plastic."*	Be precise and concise – no need for extra detail or explanation

3. Use Keywords from the Specification

Use technical terms (e.g. "thermoplastic", "ergonomics", "tensile strength") – this shows understanding to examiners.

Paper 1: Technical Principles

Question) Compare and evaluate the suitability of Acrylonitrile Butadiene Styrene (ABS) and Polylactic Acid (PLA) for the manufacture of a 3D printed component. **[6 marks]**

- Very typically 6 marker common to Paper 1 – Technical principles
- Both command words are AO3 (Compare, analyse, justify, and make judgements)
- Use phrases like:
  - *"ABS is more/less..."*
  - *"On the other hand, PLA..."*
  - *"This means that..."*
  - *"Therefore, for components that require..."*
- Avoid listing facts – **link your points back to the function or context** of the component.
- Be balanced and concise – the mark scheme rewards clear, structured reasoning.

Exemplar Answer

ABS and PLA are both commonly used in 3D printing. ABS is a strong, impact-resistant plastic, which makes it good for components that need to handle stress. PLA, **on the other hand**, is more brittle, so it might snap or crack if the component is dropped or put under pressure.

PLA is easier to print with **because** it has a lower melting point and doesn't need a heated bed. ABS needs higher temperatures, more energy, and proper ventilation **because** it gives off harmful fumes. This makes PLA a better option for quick or simple prints, especially in schools or home setups.

PLA is made from renewable sources and will eventually biodegrade. ABS comes from oil and usually ends up in landfill, even though it's recyclable. **However**, PLA's lower heat resistance means it's not suitable for parts exposed to heat or friction, where ABS would perform better.

Whilst both can be easily pigmented, **overall**, I'd say PLA is more suitable if you're making a low-stress, short-term part or a prototype. But if the component needs to be tough or heat-resistant, ABS is the better choice, even though it's worse for the environment.

Question) Explain why teak is an appropriate material for the manufacture of the sun lounger shown in Figure 7. **[6 marks]**

Figure 7

- Another very standard 6 maker in paper 1 – Technical principles
- Command word is AO4 (Apply knowledge in a recognised context)
- Avoid listing teak's properties – always link back to the **function and environment** of the sun lounger shown in the image
- Focus on **weather resistance**, **durability**, **aesthetic appeal**, and **comfort for the user**
- There are many **clues in the photo** about what's on the mark scheme (e.g. can those curved shaped be achieved naturally or through steam bending?)

Exemplar Answer

Teak is an appropriate material for the sun lounger because it contains natural oils that help it resist weathering. This makes it suitable for outdoor use, as it can withstand exposure to sunlight, moisture, and general outdoor conditions without rotting or degrading.

It also has a good level of hardness, meaning it can resist scratches and surface damage from being used, dragged, or stored — which helps the product stay looking good and functioning well over time.

Teak can also be successfully steam bent, which is useful for shaping the gentle curves visible in the lounger. This allows for a more comfortable and ergonomic design without compromising the strength of the timber.

In addition, teak has an attractive natural appearance and doesn't need extra finishes, reducing both manufacturing effort and maintenance for the user.

Overall, its weather resistance, strength, formability, and low maintenance make teak a highly suitable choice for the sun lounger in Figure 7.

Question) Describe the main stages in the process of soft soldering. **[6 marks]**

- "Describe" means you must give a detailed account of each stage in the process.
- Use clear, logical points to list and explain what happens step-by-step.
- Stick to process order – write the stages in the sequence they happen.
- Be specific – don't just say "clean it", say what you're cleaning and why.
- Use technical terms – e.g., "flux", "tin the tip", "molten solder".
- Don't explain why – this isn't an "explain" or "evaluate" question.
- Aim for 6 solid stages – 1 mark per correct, relevant point.

Clean the metal surfaces to remove dirt, grease, and oxidation for good adhesion.

Apply flux to the joint area to prevent oxidation during heating and improve solder flow.

Secure the components in place using a jig or helping hands.

Heat the joint with a soldering iron until it's hot enough to melt solder.

Feed solder into the joint (not onto the iron tip) until it flows around the connection.

The heat source should be removed and the component or join allowed to cool in order for the solder to return to a solid state.

Question) Explain how rapid prototyping has impacted on traditional manufacture. **[9 marks]**

- "Explain" means you must give reasons and justifications — not just what happened, but why it matters and what the effect is.
- Give a balanced argument – cover positives and negatives of rapid prototyping.
- Link to traditional manufacturing – always compare or show the effect.
- Structure your answer – split into advantages, disadvantages, and a mini conclusion.
- Use examples – e.g., 3D printing replacing CNC or model-making in early design stages.
- Go beyond surface points – explain how it affects costs, lead times, materials, and skills.

Rapid prototyping has significantly changed the way products are developed and manufactured compared to traditional methods. (Intro – no marks) One major impact is the ability for companies to produce fully functioning prototypes without the high financial cost of creating moulds or tooling. This has led to greater innovation and experimentation in the early stages of design, especially for complex components that would have been too expensive or difficult to manufacture traditionally.

It has also reduced the reliance on highly skilled toolmakers and traditional craftspeople, as designs can now be produced directly from CAD models using automated machines like 3D printers. These machines can run for long periods without supervision, increasing efficiency and eliminating issues like fatigue or error that come with manual labour. As a result, traditional labour-intensive processes have declined in favour of automated digital workflows.

The role of the manufacturer has shifted from being hands-on with physical materials to having strong skills in digital tools like CAD/CAM. Lead times have also been drastically reduced as designs can be quickly created, tested, and modified without having to wait for outsourced parts or slow tooling processes. Manufacturers now often keep production in-house, removing the need to subcontract components, which also saves time and cost.

Furthermore, rapid prototyping reduces the need for large industrial facilities and heavy machinery, since many prototyping machines are compact and use fewer materials. It also allows designers to break away from standard stock forms and sizes, as custom shapes can be printed directly from a digital file. With a wide and ever-growing range of printable materials available, this flexibility continues to increase.

In summary, rapid prototyping has enabled faster, cheaper, and more flexible manufacturing processes, but it has also shifted the required skill sets and made some traditional practices and roles less essential in modern production.

Question) Figure 8 and Figure 9 show two bicycle frames.

Figure 8

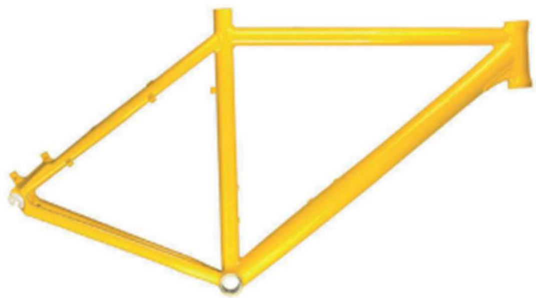

Figure 9

Aluminium TIG welded bicycle frame CFRP lay-up bicycle frame Evaluate the suitability of the materials and manufacturing methods used for each of the bicycle frames shown. **[12 marks]**

- Give a balanced argument – cover positives and negatives of *both* frames and materials.
- Link to performance and use – explain why the material/method suits the frame's purpose (e.g. commuting vs. racing).
- Structure your answer – Paragraph 1: Aluminium, Paragraph 2: CFRP, Paragraph 3: TIG welding, Paragraph 4: Lay-up method, Paragraph 5: Conclusion.
- Use examples from the images – shape, form, style → tell you what the bike might be used for.
- Go beyond surface points – talk about repairability, production scale, weight, strength, and user context.

Paragraph 1: Aluminium (Figure 8)
Aluminium is a lightweight material, making it easier for the rider to pedal and carry the bike, which improves usability in everyday cycling. Its excellent resistance to corrosion increases the overall lifespan of the frame, especially in outdoor or wet conditions. The ductility of aluminium means it can be shaped, bent, or formed into simple frame designs like the one shown in Figure 8. It's also easy to powder coat for protection or aesthetics, and the low melting point makes it easy to recycle at the end of its life, contributing to sustainability. These properties make aluminium highly suitable for affordable, mass-produced bikes used by commuters or casual riders.

Paragraph 2: Carbon Fibre Reinforced Polymer (Figure 9)
CFRP is an extremely stiff and lightweight composite, making it ideal for high-performance cycling. The reduced weight helps minimise effort from the rider, while the stiffness ensures efficient power transfer when pedalling. It also absorbs shock and vibration effectively, which makes rides more comfortable, especially important for racing or long-distance use. The material has decent resistance to chips and stones, although it is harder to recycle and more difficult to repair if damaged. As seen in Figure

9, the design looks more aggressive and aerodynamic, suiting CFRP's ability to perform well in competitive environments.

Paragraph 3: TIG Welding (Aluminium Frame)
TIG welding is ideal for aluminium frames as it creates a strong, clean joint using a filler rod and inert gas shielding (argon or helium), preventing oxidation. This process works well even with thin-walled aluminium tubes, like those in Figure 8. TIG welding provides the accuracy needed to join complex cylindrical sections, and the frame can also be tempered afterwards to increase strength. The method is also widely used in industry, supporting consistent, scalable production. Its reliability and ability to join aluminium effectively make it a highly suitable method for mass-manufactured frames.

Paragraph 4: Lay-Up Method (CFRP Frame)
The lay-up method used for CFRP allows complex, organic shapes to be created, as seen in Figure 9’s smooth, aerodynamic lines. Layers can be reinforced in high-stress areas, and cable routing or inserts can be integrated directly into the mould. This also allows for hollow monocoque structures, which reduce weight while maintaining strength. The frame can be finished with paint or decals under a protective lacquer. Although the process is labour-intensive and costly, it allows for advanced frame designs tailored to professional cyclists.

Paragraph 5:
Overall, both frames use materials and manufacturing methods that are highly suited to their intended purpose. Aluminium and TIG welding are ideal for general use bikes where durability, cost, and recyclability matter. CFRP and lay-up methods offer high performance, reduced weight, and custom geometry, making them best for professional or sport cyclists. The choice is ultimately about performance vs. practicality.

Paper 2: Designing and Making Principles

Question) Figures 1 and 2 show two screwdrivers.

	Figure 1	Figure 2
Handle material(s)	Aluminium	Thermoplastic and elastomer
Handle formed by	Casting	Injection moulding
Screwdriver tip	Fixed tip	Interchangeable magnetic attachment

Compare the two screwdrivers shown. In your answer you should refer to:

- ergonomics
- material suitability
- product function.

[12 marks]

- Compare directly – don't just describe; say how they're different or similar.
- One paragraph per bullet point and a short conclusion needed.
- Ergonomics – discuss comfort, grip, shape. Figure 2's rubber grip = better comfort than Figure 1's metal handle.
- Material suitability – aluminium = strong but cold/slippery; elastic/elastomer = cheaper, grippy, easier to shape.
- Product function – fixed tip (Figure 1) is limited; magnetic interchangeable tip (Figure 2) is more versatile.
- Use the images + table – they show key clues like hand position, tip design, material.
- Include a conclusion – judge which is more suitable and for what type of user (e.g. casual vs. professional).

Ergonomics

Figure 1 is designed for precision use and features a slim, pencil-like shape, making it suitable for detailed tasks that don’t require much force. This slender profile allows for accurate control during delicate adjustments. In contrast, Figure 2 has a wide plastic and elastomer handle that provides greater comfort and grip. The TPE gives it slight elasticity, allowing the user to apply significant pressure without discomfort, which is essential for tasks requiring more torque.

Material Suitability

The handle in Figure 1 is made from aluminium, which is lightweight, corrosion-resistant, and strong, offering durability and rigidity ideal for fine adjustment tools. The casting process allows textured flutes to be integrated for grip. Figure 2 uses thermoplastics and elastomers, which are electrical insulators and safer for use near circuitry. Injection moulding makes it easier to add ergonomic shaping and texture. However, in terms of end-of-life recycling, aluminium is easier to recycle if kept pure, whereas the mixed materials in Figure 2 require separation.

Product Function

Figure 1 has a fixed tip, which is suitable for repetitive, precise tasks like jewellery or electronics repair, and its long, narrow design allows access to recessed screws. Figure 2 offers more flexibility with interchangeable magnetic tips, making it a multipurpose tool. This design reduces the need for multiple screwdrivers, and the magnetism helps prevent small screws from being lost. If the tip becomes damaged, it can be replaced without discarding the entire tool, increasing sustainability and value.

Conclusion

Overall, Figure 1 is better suited for precision tasks with minimal force, offering durability and ease of control. Figure 2 is more ergonomic, versatile, and practical for general use or professional settings where various screw types and higher torque are needed. Both are well-suited to their intended functions but cater to different user needs.

Question) Explain how developments in manufacturing techniques affected the work of Bauhaus designers. **[6 marks]**

- Explain = give reasons + effects – not just facts.
- Link manufacturing to Bauhaus design – show how new methods (like tubular steel or mass production) changed what designers could do.
- Structure – Point → Effect → Bauhaus link (e.g. "This meant that...").
- Use examples – e.g. tubular steel → lighter, modern furniture; machine processes → simple, functional forms.
- Always tie back to Bauhaus values – function, simplicity, affordability, honest materials.

The development of tubular steel allowed Bauhaus designers to create lightweight, single-piece furniture like the B3 Wassily chair. This material supported their aim of designing minimal, functional products without unnecessary decoration, following the "form follows function" principle.

The use of chrome-plated tubular steel also gave furniture a consistent, monochromatic appearance that matched the Bauhaus ideal of embracing the machine aesthetic. These materials and processes made mass production possible, helping standardise products for wider accessibility.

Additionally, laminated veneers allowed designers to produce complex, curved shapes efficiently, without waste. Using moulds and formers meant identical pieces could be made repeatedly, reducing costs and making products more affordable to the public, which aligned with the Bauhaus goal of accessible, functional design for all.

Mark schemes

Question – 3D printed components

ABS

- ABS is a crude oil-based polymer which comes from a finite resource.
- ABS is a tough material that can be used to create a 3D printed component with good resistance to impact.
- ABS can be pigmented to produce a filament with a wide range of bright and bold colour options.
- 3D printing often creates waste material in the form of rafts and supports. Although ABS can be recycled, it would more than likely be disposed of and contribute to landfill.

PLA

- PLA is a bio polymer that is engineered from natural and renewable resources.
- PLA is a brittle material so may create a component with poor impact resistance.
- PLA is becoming increasingly available in a wider range of colour options in line with ABS.
- Rafts and support material in PLA will eventually biodegrade and have a reduced environmental impact when disposed of.

General

- ABS has a higher melting point than PLA which means it requires more energy to print in ABS than PLA.
- ABS can give off toxic fumes when heated and can often require extraction and filtration.
- ABS requires a 3D printer to have a heated bed to improve adhesion when printing whereas PLA is generally an easier material to work with.
- The lower melting point of PLA makes it unsuitable for the manufacture of a component that may be exposed to friction or higher working temperatures.

Question – Teak sun lounger

- Teak has a **naturally occurring oil** that makes it **resist damage and degradation** associated with the sun lounger being used and left outside.
- Teak has a **good level of hardness** meaning it will **resist the scratching and abrasion** associated with it being used, moved and stored.
- The **natural oils in the timber** provide a **good level of chemical resistance** preventing the accelerated degradation of the sun lounger that may be caused by bird droppings or cleaning products.
- Teak is a **naturally attractive aesthetic** material that requires **no additional surface finish** for the sun lounger.
- Teak has a **close grain pattern** making the sections and profile of timber used in the chair **strong enough to be suitable for accommodating the weight** of the user.
- The **natural oils in the teak remove the need for additional preservatives** at point of manufacture to be added to the timber, **reducing both production and ongoing maintenance costs**.
- Teak can be **successfully steam bent** to create the **shallow radiused sections** of the sun lounger.
- Teak is **less prone to splinter or crack** over time in the same way that alternative timbers might.

Question – Soft soldering

- The components should be clean and free from grease or impurities.
- Flux may be used to help the solder flow and prevent oxidisation when heating. The flux can be added separately or may be present in the core of the solder itself.
- The components should be held in place while being heated to approximately 200°
- Heating can be undertaken with a soldering iron, small gas blow torch or hot air gun depending on the application.
- The solder should be added to the joint.
- The heat source should be removed and the component or join allowed to cool in order for the solder to return to a solid state.
- Any excess flux should be removed to prevent corrosion.
- An electrical circuit may be tested after soldering as part of effective quality control.
- A solder bath may be used to solder several components to a complete circuit board at one time.

Question – Rapid prototyping

- Rapid prototyping has allowed companies the ability to develop and produce fully functioning prototypes without a huge financial investment in the manufacture of moulds or ancillary components.
- It has allowed for the design and manufacture of complex components that would have been prohibitive to manufacture traditionally.
- Rapid prototyping has removed the need for highly skilled manufacturers and tool makers as complex designs can be easily achieved without tooling.
- Traditional labour intensive manufacturing processes have been replaced by 3D printing that can run without supervision for extended periods of time without breaks or loss of concentration.
- A change in focus of manufacturers primary ability to work with physical materials to being competent to work in the field of CAD/CAM.
- A huge reduction in the lead time taken to design, produce, develop and test a physical product.
- The ability of a manufacturer to now perform many different techniques without the need to subcontract individual component parts out to specialist manufacturers.
- A reduction in the need for large industrial spaces and the investment in materials and machinery.
- The ability to create components from an ever-developing catalogue of material substrates.
- Rapid prototyping can be undertaken using a variety of substrates or materials.
- The move away from manufacturers designing components around stock forms and sizes of material.

Question – Bicycle frame

Aluminium

- Lightweight material making the bike easy to pedal or carry
- Aluminium has good resistance to corrosion, increasing the lifespan of the frame.
- Ductile material that allows for tubes to be shaped, bent or fluid formed
- Easily powder coated
- Low melting point making it easy to recycle at the end of its life

TIG welded

- TIG welding provides a reliable joint with the use of a filler rod, producing a strong frame
- Argon or helium gas shield protect the joint from oxidising
- Aluminium with a thin wall thickness can be successfully joined
- TIG welding allows the accuracy needed to weld complex cylindrical shapes
- Frames can be tempered after welding

Carbon Fibre Reinforced Polymer

- Creates a stiff rigid structure allowing the cyclist to transfer power effectively
- Lightweight material reducing the effort needed from the cyclist
- Excellent absorption of shock and vibration
- Has a reasonable level of impact resistance to resist chips from stones etc
- Composite material that is hard to recycle if damaged or when it has reached the end of its life

Lay up

- Organic shapes can be easily achieved
- Areas of high stress can be reinforced
- Inserts such as threads or internal cable routing can be incorporated in to the frame
- Hollow monocoque designs can be achieved
- Can be painted or have company decals applied under the protective lacquer

Question – Screwdrivers

Material suitability

- **Figure 2** has a thermal and electrical insulator for the handle.
- Aluminium can be textured using the die casting process.
- Texture can be applied within the injection moulding process.
- **Figure 1** requires fine adjustment and has flutes suitable for this.
- Use of aluminium for the handle gives rigidity not possible from polymer of the same thickness.
- Aluminium is a non-ferrous metal and will not corrode/rust.
- The rotating top of the jeweller's screwdriver has been attached by bolt which may be possible using polymer but would not last as long.
- Material recyclability: aluminium kept pure, TPE and Thermoplastic require separation

Ergonomics

- TPE gives a degree of elasticity required for increased grip when using **Figure 2**.
- **Figure 1** is for precision and doesn't generally require a lot of force to be applied, leading to the slender pencil like grip.
- **Figure 2** may require significant force and therefore has a wide handle allowing pressure to be applied without harming the palm of the hand.

Function

- The interchangeable ends for **Figure 2** means fewer tools are required.
- If a tip was damaged then the whole product does not need to be replaced.
- The use of standardised hexagonal tips allows for a wide range of functions to be achieved with one tool.
- **Figure 1** the long narrow body means recessed screws can be reached easily.
- **Figure 2** the magnetic tip means that removed screws are less likely to be lost when removed as they may remain attached to the tip upon removal.

Question – Bauhaus

Tubular steel

- **The development of tubular steel allowed the production of single piece furniture**, a key feature of Bauhaus designs.
- **The use of tubular steel lent itself to minimal designs without ornamentation** as favoured by the 'form follows function' mission statement.
- **Chrome plated tubular steel gave a monochromatic minimal look without variation** to standardise the appearance of products for the masses.
- **The Bauhaus wished to embrace the machine aesthetic** created during production.

Laminated veneers

- **Laminated veneers allowed the production of complex curved forms** without the need for wastage processes.
- **Identical forms could be reproduced using moulds and formers allowing large scale production** that would reduce costs to the customer and make products accessible to all.

Specific examples:

B3 Wassily chair

- Production of a lightweight frame armchair with elasticity associated with tubular steel.
- Monochromatic colour scheme which was easily adjustable with a variety of leather components.

Cesca Chair

- Cantilever chair design striving towards 'fried air' concept associated with the design school.