Pearson Edexcel

Mark Scheme (Results)

Summer 2024

Pearson Edexcel GCSE
In Design & Technology (1DT0)
1F: Timbers

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

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Component 1 mark scheme

Section A – Core content

Question number	Answer	Mark
1 (a) (i)	Any **one** property from: • Soft / softness (1) • Absorbent / absorbs water (1) • Insulator of heat / thermal insulator (1)	**(1)**

Question number	Answer	Mark
1 (a) (ii)	Any **one** property from: • Sets rigid / rigid (1) • Hard / scratch resistant (1) • Transparent (1) • Non-toxic / skin safe (1)	**(1)**

Question number	Answer	Mark
1 (a) (iii)	Any **one** property from: • Smooth surface (1) • Printability / takes colour / ink / toner well (1) • Absorbent (1) • Opaque (1) • Flexible / flexibility (1)	**(1)**

Question number	Answer	Mark
1 (a) (iv)	Any **one** property from: • Hard (1) • Tough (1) • Fine grain / close grain / even texture (1) • Non-toxic / food safe (1) • Good heat resistance / thermal insulator / low thermal conductor (1)	**(1)**

Question number	Answer	Additional guidance	Mark
1 (b) (i)	Any **one** advantage of using cast iron for the frying pan (1) and a linked justification of that advantage (1) • It is a good conductor of heat (1) therefore the pan surface gets hot quickly / will transfer heat to the food to cook it (1) • It is dense / heavy (1) therefore it will be quite stable on the oven top / unlikely to get knocked over easily (1) • It has good dimensional stability when heated (1) therefore the pan will not distort / buckle (1) • It holds the heat well (1) therefore meaning it stays hot for some time / longer (1) • It has a high melting point (1) therefore it can withstand the temperatures involved in cooking (1)	Do not accept anything related to melting	**(2)**

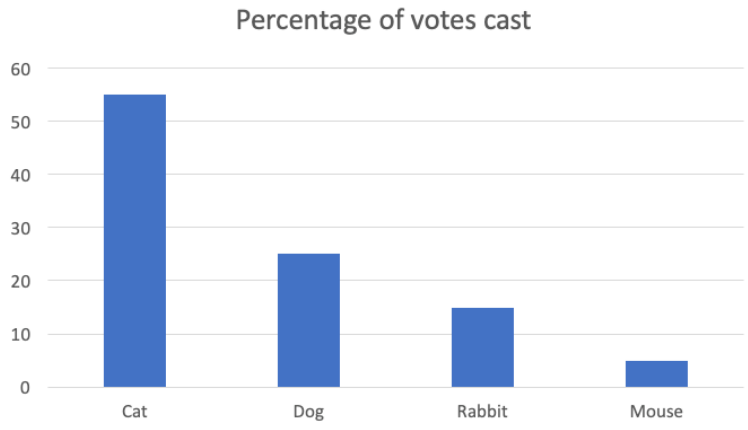
Question number	Answer	Additional guidance	Mark
1 (b) (ii)	A calculation that includes: • correct conversion of units 3 kg = 3000 grams (1) • correct answer 3000 x 2/100 = 60 grams (1) If no conversion of units: 3 x 2/100 = 0.06 grams (worth 1 mark)	Award full marks for correct numerical answer / correct numerical answer without working. Conversion of units could be done after the percentage calculation. Allow for ECF if candidate gets part of transposition wrong.	**(2)**

Question number	Answer	Additional guidance	Mark
2 (a)	Any **one** specific animal fibre from: • Wool (1) • Silk (1) • Mohair (1) • Horsehair (1) • Cashmere (1) • Angora (1) • Alpaca (1)	Do not accept plant fibres, e.g. cotton / cotton wool	**(1)**

Question number	Answer	Mark
2 (b)	Any **one** advantage of using biofuels (1) and a linked justification of that advantage (1) • Biofuels are a renewable / sustainable source of energy (1) which means there will always be a supply / not run out / reduce the rate at which conventional fuels are being used (1) • Less carbon emitted when burnt as fuel (1) which reduces pollution levels / emissions by the delivery vehicles (1) • Biofuels are relatively carbon neutral / smaller carbon footprint (1) which means the absorption of CO^2 during growth is almost equal to the emissions produced when being burnt (1)	**(2)**

Question number	Answer	Mark
2 (c)	Any **one** advantage of using CAD (1) and a linked justification of that advantage (1) • Colour / texture / grain / render can be added to the design (1) which means a realistic image is produced / able to see what it looks like / accurate visual representation (1) • Changes can be easily made (1) which means client feedback can be considered / design modified (1) • Files / part files can be output direct to CNC machines (1) which means prototypes can be produced quickly / reduce lead times to full production runs (1) • Files can be saved electronically (1) which means they can be sent to client / manufacturer as an email attachment (1) • Designs can be sent via email (1) which means stakeholders can provide immediate feedback (1) • Images / views can be manipulated / rotated / zoomed-in (1) which means the ideas can be seen from any angle / intricate details seen up close (1) • Design can be seen in 3D (1) which means thickness / proportions can be accurately represented / seen (1)	**(2)**

Question number	Answer	Additional guidance	Mark
2 (d) (i)	A calculation that includes: • correct calculation for the number of votes cast for the Rabbit (165 / 55) * 15 = 45 (1) • correct calculation for the number of votes cast for the Mouse • (165 / 55) * 5 = 15 (1) • Alternative method for second mark 300 – 165 – 75 – 45 = 15	Correct numerical answers only for full marks. Award full marks for correct numerical answers without working.	**(2)**

Question number	Answer	Mark
2 (d) (ii)	A completed bar chart that shows the two correct bars for the Rabbit at 15% and the Mouse at 5%: 	**(2)**

Question number	Answer	Mark
3 (a)	Award **one** mark from: • V-belt (1) • Vee belt (1) • V-shaped (1) • Vee shaped (1)	**(1)**

Question number	Answer	Mark
3 (b)	Any **one** reason for using aluminium rather than mild steel for the pulley (1) and a linked reason for the use (1) • Aluminium is a non-ferrous metal (1) therefore it will not rust if it comes into contact with water (1) • Mild steel is a ferrous metal / contains iron (1) therefore it is likely to rust / corrode (1) • Aluminium is lighter / less dense than mild steel (1) therefore it will have less of an impact on the weight of the boat / quicker to get up to speed (1) • Aluminium has a lower melting point than mild steel (1) which makes it easier / cheaper to cast (1) • Aluminium is softer than mild steel (1) which means it is easier to machine / turn on a lathe (1)	**(2)**

Question number	Answer	Mark
3 (c)	A calculation that includes: • Correct transposition of the formula Output speed = input speed / velocity ratio (1) • Correct calculation of output speed in rpm 2000 / (5/1) = 400 rpm (1)	**(2)**

Question number	Answer	Mark
3 (d)	Any **one** disadvantage of using the solar cell to power the motor (1) and a linked justification of the disadvantage (1) • The sun might not be bright enough / blocked by clouds (1) which means the boat could stop / get stranded in the middle of a lake / pond (1) • The solar cell might not be capable of providing the power required (1) which means the motor will not turn / turn fast enough to make the boat move (1) • A battery / storage system may be required to store electrical charge (1) which means an increase in weight in the boat hull / make the boat heavier / slower to move through the water (1) • Will not work in low light / dark (1) which means limited use in winter / late at night (1)	**(2)**

Question number	Answer	Mark
3 (e)	Any **two** benefits of using balsa wood to manufacture the frame for the model boat (1) and a linked justification of that benefit (1) • It is lightweight (1) making it easier to power with the solar cell (1) • It is soft (1) which means it is easy to cut with a sharp knife / sand to a smooth curve shape / form / work with (1) • It has a low density / buoyant material (1) which means it will float on the water / not sink (1)	**(4)**

Question number	Answer	Mark
4 (a)	Any **two** explanations that reference the way in which conductive inks can be used in products (1) and a linked justification of each way (1) • They can be used to draw / repair electronic circuits (1) which reduces the need for wires / soldering / expensive / dangerous chemicals to be used to make circuits / PCBs / can be drawn on flexible materials (1) • They can be used as antenna / wireless aerials in car windscreens (1) which means cars can have uninterrupted Wi-Fi connectivity / connected to internet for live traffic data / electric charging points (1) • They can be used to create interactive wall / visual displays / products (1) which means when parts of the wall / products are touched / connected electronic outputs are made to work / light up / move / sound (1) • They can be applied using a pen / printer / silk screen printed (1) which means circuits can be produced to decorate fashion / textiles garments / embed electrical components (1) • They reduce the need for dedicated circuit boards (1) which reduces product weight / useful in restricted spaces (1) • Conductive inks will bend / flex (1) therefore they will move without breaking / cracking (1)	**(4)**

Question number	Answer	Additional guidance	Mark
4 (b)	A calculation that includes: • correct working out of weight (40/100) x 9 or 9 x 0.4 (40 x 9) /100 (1) • correct answer 3.6 grams (1)	Award full marks for correct numerical answer without working. Allow for ECF if candidate gets part of calculation wrong.	**(2)**

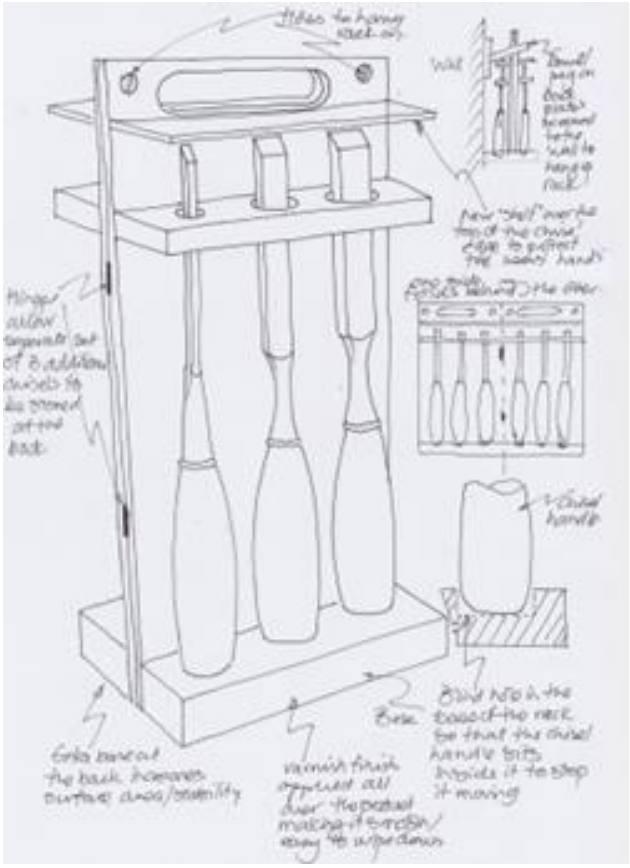
Question number	Indicative content	Mark
4 (c)	• Designers should consider / try to use fewer materials when designing new products / developing new technology so as to minimise the impact on the natural resources available • Designers should try to use as many recyclable materials as possible to reduce the need for new / virgin grade materials • Products / technology should be lighter therefore costing less to transport / distribute post manufacture • Fewer toxic materials / processes should be used therefore causing less damage to the environment during / post use / less to be taken into account when disposing of the item / recycling • The carbon footprint of the product / technology should be considered so that minimal impact on the environment can be made / use locally available materials / less transportation • LCA should be carried out during the design process to make sure that the product / technology can be assessed in terms of its carbon footprint • Consideration should be given to the origin of the raw materials in terms of mining for minerals / oil exploration / cutting down of trees / mining for ore • Designers should try to use biodegradable materials if possible / appropriate • Carry out research into new / emerging materials to assess environmental impact / carbon footprint • Designers could make use of standardised parts / modular components • Designers create products that are easily dismantled / disassembled / repaired allowing materials / parts to be recycled / reused	**(6)**

Level	Mark	Descriptor
	0	
Level 1	1 - 2	• Attempts to interrogate and deconstruct information but connections and logical chains of reasoning are flawed. • An unbalanced appraisal of the information/issues, containing judgements that show a limited awareness of the interrelationships between factors or competing arguments.
Level 2	3 – 4	• Interrogates and deconstructs information and provides some connections and logical chains of reasoning. • A balanced appraisal of the information/issues, containing judgements that show an awareness of the interrelationships between factors or competing arguments.
Level 3	5 - 6	• Interrogates and deconstructs information and provides sustained connections and logical chains of reasoning.

		• A well-balanced appraisal of the information/issues, containing judgements that show a thorough awareness of the interrelationships between factors or competing arguments.

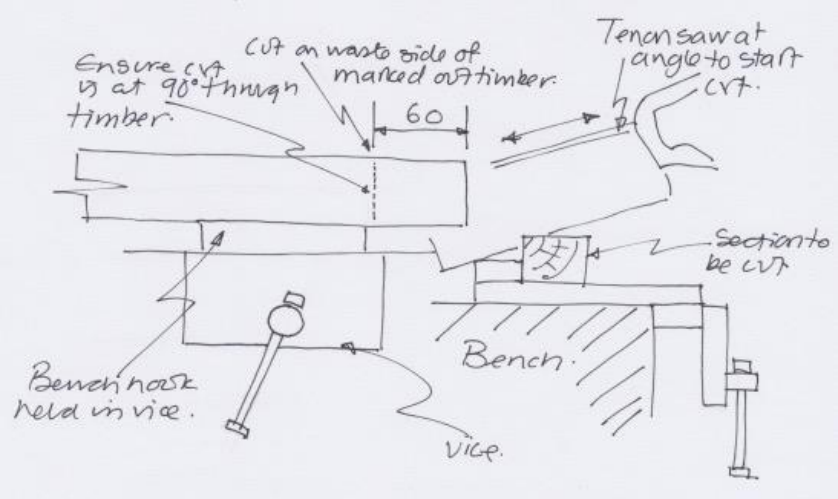
Section B – Timbers

Question number	Answer	Mark
5 (a)	**Marks will be awarded for understanding of design and technology, not graphical skills.** Notes and sketches that include: • be able to hold an additional three chisels (1) and to stop the handles of the chisels from moving as the rack is carried around a workshop (1) e.g. extra three holes / slots alongside / longer / double sided (but not at the expense of being able to hang it up on a wall) / blind hole for butt of chisel / frame around it to hold it in place • protect the user from potential cuts when carrying the rack (1) and have a surface finish that is easy to clean (1) e.g. shelf over the top edge of the chisels / chisel edge covers / enclosed in a box / hinged flap / varnish / waxed / painted • be more stable when placed on a bench (1) and be capable of being hung up on a wall (1) e.g. wider base / triangular back supports / holes to hang it up on / nails / screws / pegs in the wall **See next page**	**(6)**

	Example of candidate response:  Notes: Holes to hang rack Dowel peg on back plate screwed to the wall to hang up rack New 'shelf' over top of chisel edge to protect the user's hand One side folds behind the other Hinges allow separate set of 3 additional chisels to be stored at the back Extra base at the back increases surface area / stability Varnish finish applied all over the product to make it smooth / easy to wipe down Blind hole in the base of the rack so that the chisel handle sits inside it to stop it moving	

Question number	Answer	Mark
5(b)	Any **two** explanations that include a way the wooden food play set meets or fails to meet the requirement (1) and a linked justification of that way (1) • You can cut the fruit in half with the toy knife (1) therefore the child is able to see what the fruit looks like on the inside / simulates preparing a healthy meal (1) • There are several different fruits (1) therefore there is quite a lot to be able to discuss with parents about the types of fruits / some have to be peeled to be eaten / others just eaten / benefits of eating fruit (1) • There are only fruits shown / featured in the set (1) therefore it only provides a narrow range of healthy foods / discussion points (1)	**(4)**

Question number	Answer	Mark
6 (a)	Any **two** explanations for finishing the house with shellac (1) and a linked justification (1) • Shellac dries clear (1) which means that the grain of the timber is left natural to see / show off the natural colour / see the contrast in colours between the main body and roof / increase aesthetic appeal (1) • Shellac can be rubbed down in between coats once dry before another layer is applied (1) which means a harder / smoother surface finish can be achieved (1) • Shellac is capable of being buffed up to achieve a glossy lustre / shiny surface (1) which means that the light from the candle will shine / reflect from the surface (1) • Shellac does not darken / yellow with age (1) which means the product will keep its natural colour (1)	**(4)**

Question number	Answer	Additional Guidance	Mark
6 (b)	**Marks will be awarded for understanding of design and technology, not graphical skills.** Notes and sketches that include: • Place bench hook in the vice / clamp wood to the bench (1) • Clamp / hold wood against the bench hook / use of sacrificial timber to protect the wood being cut (1) • Small cuts at the start on the waste side to get the cut going (1) • Check / ensure cut is being made vertical / straight down the marked line (1) • Progress the cut all the way down / slowing down at the end (1) Example of candidate response:  Notes: Cut on waste side of the marked-out timber Ensure cut is 90^0 through timber Bench hook held in vice Tenon saw at angle to start cut Section to be cut	Cap at 3 marks if no sketches or all sketches and no notes	**(4)**

Question number	Answer	Mark
6 (c)	Any **one** explanation of a physical characteristic of birch (1) and a linked justification for that reason (1) • Birch is a creamy white / pale colour / attractive grain (1) which means that it will contrast well in colour / to the grain of the mahogany roof (1) • Birch has an even / regular / close / tight / stiff / straight grain (1) which means it can be sanded to a fine finish / less likely to tear when being machined (1)	**(2)**

Question number	Answer	Mark
6 (d)	Any **two** explanations that include a method (1), plus **two** linked justifications of that method (1) + (1) Cutting / sawing / use of saw (1) • A tenon saw can be used to cut along the lines whilst the work is held in a vice (1) which means the triangular sections would be removed as whole pieces (1) Planing (1) • A plane could be used at an angle to remove small shavings whilst the work is held in a vice (1) which results in a smooth surface finish (1) Machine sanding / sanding / abrading (1) • The work could be held against a band facer / sanding machine to remove the waste (1) leaving a very smooth surface finish (1) Routing (1) • A chamfer bit is held in a router (1) which means the waste would be removed by a fast turning bit / made with several passes to leave a smooth edge (1)	**(6)**

Question number	Answer	Mark
7 (a)	Award **one** mark from: • Lamination (1) • Laminating (1) • Vacuum lamination (1) • Vacuum laminating (1) • Steam bending (1)	**(1)**

Question number	Answer	Mark
7 (b)	Any **two** working properties of plywood explained (1) plus a linked justification of the property (1) • Plywood is flexible / has elasticity (1) which means that it is capable of being bent / flexed to form over the former / mould required to make the seat shape (1) • Plywood has good compressive / bidirectional strength (1) which means that it can take / hold the weight of a small child / will not break when formed into the curved shape (1) • Plywood has good resistance to splitting (1) which means there is little risk of the shape / edges causing harm through splinters / de-lamination (1)	**(4)**

Question number	Answer	Additional guidance	Mark
7 (c)	A calculation that includes: • Calculation of the length of the semi-circle (1) $\pi D/2 = \pi$ (2 x 9) / 2 = 28.278 cm • Calculation of the total length of the part required (1) 28.278 cm + (2 x 16) = 60.278 cm • Calculation of how many whole strips can be cut from long length of the sheet (1) 244 / 30 = 8 • Calculation of how many whole strips can be cut from width of the sheet (1) 122 / 60.278 = 2 • Calculation of the number of whole pieces that can be cut from a single sheet (1) 8 x 2 = 16 pieces Alternative method from Step 3 (Step 1 and 2 same as above) • Calculation of small sheet area 60.278 x 30 = 1808.34 cm^2 (1) • Calculation of total sheet area 244 x 122 = 29768 cm^2 (1) • Calculation of number of sheets 29768 / 1808.34 = 16.46 rounded to 16 (1)	Award full marks for correct numerical answer without working. Allow ecf if candidate gets part of calculation wrong.	**(5)**

Question number	Answer	Additional guidance	Mark
7 (d)	Any **two** explanations that include a benefit of using a mortise and tenon joint (1), plus **two** linked justifications of that benefit (1) + (1) • There will be a large gluing / surface area (1) which means there will more contact area (1) therefore resulting in a stronger joint (1) • There is a physical connection between the two parts (1) which means that as the upright is turned via the handlebars the axle will turn (1) therefore ensuring that the buggy turns as well (1) • A minimum amount of material needs to be removed from the axle (1) which means there is less chance of the axle bending (1) therefore reducing the risk of any breakage to the axle / snapping / harm to the young child (1)	Do not accept 'won't break easily' on its own	**(6)**

Question number	Answer	Mark
8 (a)	Any **one** explanation that includes a benefit of using MDF (1) and a linked justification of that benefit (1) • MDF is available in large flat sheets (1) which means the inserted panel can be as a single piece rather than being made up from smaller bits being joined together (1) • MDF has a very smooth / flat surface (1) which means it can have a range of surface finishes applied / veneered (1) • MDF is a manufactured board (1) which means it is more sustainable / environmentally friendly when compared to timber (1)	**(2)**

Question number	Answer	Mark
8 (b)	Any explanation of using a regular section sized material for the frames (1) plus **two** linked justifications of that advantage (1) + (1) • Fewer different sizes of materials have to be bought (1) which means less money tied up in stock / more readily available (1) therefore providing better cash flow for the company (1) • Frames can be pre-made / machined (1) which means stock levels can be maintained (1) therefore ensuring there are always sufficient number of parts ready to respond to consumer demand (1) • Frames of different sizes can be quickly / readily manufactured from the standard stock sizes (1) which means response times are quicker (1) therefore allowing the company to meet consumer demand (1)	**(3)**

Question number	Answer	Mark
8 (c)	Any **two** explanations that includes a way that a jig can be used to aid the manufacture of the kitchen cupboard doors (1) and a linked justification (1) • A jig can be used to hold the door frame whilst holes for the hinges / handles are being drilled (1) which means that the holes for the hinges / handles will always be in the same place / reduces need for marking out / speeds up the process (1) • A jig can be used to hold the frame when it is being glued / assembled (1) which means that the frame will be square (1) • A jig can be used to hold the frame when it is being machined (1) which means any profiles will all be in the correct place / to the same size / depth / identical (1)	**(4)**

Question number	Indicative content	Mark
8 (d)	Impact on **cost factors** in relation to: • MDF does not warp / twist and so will stay flat / true when used for the doors • MDF has a smooth surface which makes it ideal for the doors and it can be machined / have a routed edge profile cut on it • MDF is an easy material to cut but it blunts the tools quickly • MDF gives off a lot of small dust / fibre particles when being machined and so the correct extraction systems need to be in place • MDF is not a good material for cutting traditional wood joints to make the frames however biscuit joints are an ideal alternative and are very quick and effective to use • The cut edges of MDF are not as smooth as the main surface and so appropriate edge surface finishing must be used to sand / finish the cut edges • MDF is a very absorbent material therefore a primer / undercoat must be used before any final surface finish / paint can be used / applied • MDF will soak up water and is therefore not an ideal material to use in a kitchen environment around sinks without an appropriate surface finish / treatment to improve its resistance to water **See next page**	**(9)**

Level	Mark	Descriptor
	0	
Level 1	1 - 3	• Attempts to interrogate and deconstruct information but connections and logical chains of reasoning are flawed. • An unbalanced appraisal of the information/issues, containing judgements that show a limited awareness of the interrelationships between factors or competing arguments. • A conclusion may be presented but it is likely to be generic assertions rather than supported by relevant judgements.
Level 2	4 – 6	• Interrogates and deconstructs information and provides some connections and logical chains of reasoning. • A balanced appraisal of the information/issues, containing judgements that show an awareness of the interrelationships between factors or competing arguments. • A conclusion is presented that is partially supported by relevant judgements.
Level 3	7 - 9	• Interrogates and deconstructs information and provides sustained connections and logical chains of reasoning. • A well-balanced appraisal of the information/issues, containing judgements that show a thorough awareness of the interrelationships between factors or competing arguments. • A conclusion is presented that is fully supported by relevant judgements.