Pearson
Edexcel

Mark Scheme (Results)

Summer 2025

Pearson Edexcel GCSE
Design Technology
Paper 1D: Systems

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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	Additional guidance	Mark
1 (a) (i)	Any **one** property from: • Soft (1) • Insulator of heat (1) • Flexible/flexibility (1) • Warm (1)	Do not accept 'Insulator' on its own	(1)

Question number	Answer	Additional guidance	Mark
1 (a) (ii)	Any **one** property from: • Stiff / rigid / hard (1) • Waterproof / water resistant / stain resistant / non-absorbent (1) • Food safe / non-toxic (1) • Good heat resistance (1) • Good UV resistance (1) • Lightweight (1)	Do not accept the following on their own: 'Can be recycled' 'Durable' 'Light' 'Strong'	(1)

Question number	Answer	Additional guidance	Mark
1 (a) (iii)	Any **one** property from: • Good insulator of heat (1) • Good impact resistance (1) • Printability / takes colour well (1) • Food safe / non-toxic (1)	Do not accept the following on their own: 'Insulator' 'Recyclable'	(1)

Question number	Answer	Additional guidance	Mark
1 (a) (iv)	Any **one** property from: • Corrosion resistance / will not rust (1) • Good fluidity / casts well (1) • Malleability (1)	Do not accept: 'Durable	(1)

Question number	Answer	Mark
1 (b) (i)	Any **one** other property of oak that makes it a suitable choice of material for the floorboards (1) and a linked justification of that property (1) • Oak is hard (1) therefore it will withstand abrasive wear from being walked over / on / furniture placed / moved on it (1) • Oak is durable / hardwearing (1) therefore it will be able to withstand abrasive wear / damage from being walked on (1)	(2)

Question number	Answer	Additional guidance	Mark
1 (b) (ii)	A calculation that includes: • correct working out of cost 57.6 / 1.44 (1) • correct answer £40 or £40.00 (1) ECF Award 1 mark if candidates show 1.44 / 57.6 = 0.025 or Award 1 mark if candidates show $57.6 / 1.44^2$ = 27.70 to 27.80	Award full marks for correct numerical answer without working. Allow ECF if candidate gets part of calculation wrong.	(2)

Question number	Answer	Additional guidance	Mark
2 (a)	Any **one** property of copier paper that makes it an appropriate choice of material for the origami rabbit from: • Flexibility (1) • Bendability / easy to bend (1) • Easily creased / holds shape when folded (1) • Biodegradability (1) • Foldability / easy to fold / easily folded / easily foldable (1)	Do not accept 'Foldable' or 'Folded' on their own	(1)

Question number	Answer	Additional guidance	Mark
2 (b)	Any **one** advantage explained of using recycled copier paper to manufacture the origami rabbit (1) and a linked justification of that advantage (1) • Using recycled paper will reduce the need to make new paper / reduce environmental damage / is more sustainable / lowers carbon footprint (1) which reduces the need for cutting down trees to make the pulp required for paper production / reduces deforestation / reduces energy consumption / emissions (1) • Recycling paper stops it going to landfill / being thrown away / reduces waste (1) which keeps the space in landfill available for materials that cannot be recycled (1)	Do not accept 'Recycled' on its own	(2)

Question number	Answer	Additional guidance	Mark
2 (c)	Any **one** feature explained of how SMAs can be used to animate the origami rabbit (1) and a linked justification for that feature (1) • SMAs can be added / connected to the ears / nose / head / tail (1) which can be made to twitch / spring / straighten / fold when activated / heated / cooled / deformed (1) • SMAs can be added / connected to the legs / front paws / arms (1) which can create the impression of the rabbit hopping when activated / heated / cooled / deformed (1) Marking points can be accepted in reverse	Do not accept any reference to 'Move' on its own	(2)

Question number	Answer	Additional guidance	Mark
2 (d)	A calculation that includes: • correct calculation for the area of the standard sheet of A4 paper (Step 1) 29.7 x 21.0 = 623.7 cm^2 (1) • correct calculation for area of the square sheet (Step 2) 21.0 x 21.0 = 441 cm^2 (1) • correct calculation of waste percentage (Step 3) ((623.7 – 441) / 623.7) x 100 = 29.29(2929)% (1) • Correct answer rounded to 29% (Step 4) (1) Alternative method for Steps 2 and 3: • correct calculation for waste area cut off (Step 2) (29.7 - 21.0) x 21 = 182.7 cm^2 (1) • correct calculation of waste percentage (Step 3) (182.7 / 623.7) x 100 = 29.29% (1)	Award full marks for correct numerical answer without working. Allow ECF if candidate gets part of calculation wrong. Award one mark for the correct rounding of an ECF calculation.	(4)

Question number	Answer	Mark
3 (a)	Award **one** mark from: • Resistor (1) • Fixed resistor (1) Do not accept: • Variable resistor • Preset resistor • Surface mount resistor	(1)

Question number	Answer	Mark
3 (b)	Any **one** advantage for the manufacturer of making the electronic circuit in batches of 1,000 (1) and a linked justification for the advantage (1) • A batch of circuit boards will take a set amount of time to manufacture (1) therefore the manufacturer can plan how to make best / efficient use of their time / machines / staffing (1) • Any changes in component / material prices can be reflected when a new batch is ordered / manufactured (1) therefore the manufacturer does not have to bear / stand any price increases (1) • If faults are found in a batch of completed / assembled circuit boards modifications can be made / products do not sell (1) therefore material / components wastage / financial loss is kept to a minimum (1) • The manufacturer does not need to buy lots of stock (1) therefore they do not have to invest / tie up money in stock / storage space (1) • The manufacturer can bulk buy components / get discounts (1) therefore being able to take advantage of economies of scale / pass on savings to the customer (1)	(2)

Question number	Answer	Additional guidance	Mark
3 (c)	A calculation that includes: • Correct calculation of number of circuit boards that can be cut from the larger sheet (32 / 4) x (16 / 4) = 8 x 4 = 32 (1) • Correct calculation of cost of one circuit board £3.20 / 32 = £0.10 or 0.1 (1)	Award full marks for correct numerical answer without working. Allow ECF if candidate gets part of calculation wrong.	(2)

Question number	Answer	Mark
3 (d)	Any **one** advantage of using batteries (1) and a linked justification of the advantage (1) • They do not need to be plugged into a mains power source / require a cable (1) which means the device is free to be used anywhere / fully mobile / portable (1) • The batteries are a small / discrete component (1) which means they do not take up too much space within the circuit / product (1) • You can use rechargeable batteries (1) which means one set can be used again and again (1) • You can use the voice recorder in remote areas / campsites / beach / power cuts (1) because it does not need to be plugged into the mains power supply (1) • The batteries can simply be replaced with new ones (1) which means no time is wasted having to wait to charge it / can be used straightaway (1)	(2)

Question number	Answer	Mark
3 (e)	Any **two** benefits of using HIPS for the case of the Sing Along Box (1) and a linked justification of that benefit (1) • HIPS is lightweight / has a low density (1) therefore it will be easier for young children to carry / move it around / it is portable (1) • HIPS has good / excellent impact resistance / tough (1) therefore if the box is dropped the contents inside will be protected from damage / the box is unlikely to break (1) • HIPS does not absorb water / is waterproof (1) therefore it can be easily cleaned / wiped down without any risk of damaging the materials / moving / working parts / electronic circuit (1) • As a thermoplastic / thermoforming polymer HIPS can be formed / moulded (1) therefore it is capable of being used to form complex shapes / forms / intricate details (1)	(4)

Question number	Answer	Mark
4 (a)	Any **two** explanations of a working characteristic of stainless steel (1) and a linked justification of that characteristic (1) • Stainless steel is corrosion resistant / rust proof / non-toxic (1) therefore it will not be affected by the corrosive salt / react with / contaminate the contents / surface will not become blemished / food safe (1) • Stainless steel has good torsional resistance (1) therefore it will not distort / twist when the grinder is rotated (1) • Stainless steel is hard (1) which means it will withstand the abrasive wear / scratching from grinding the salt / will not wear / will extend life span of product (1)	(4)

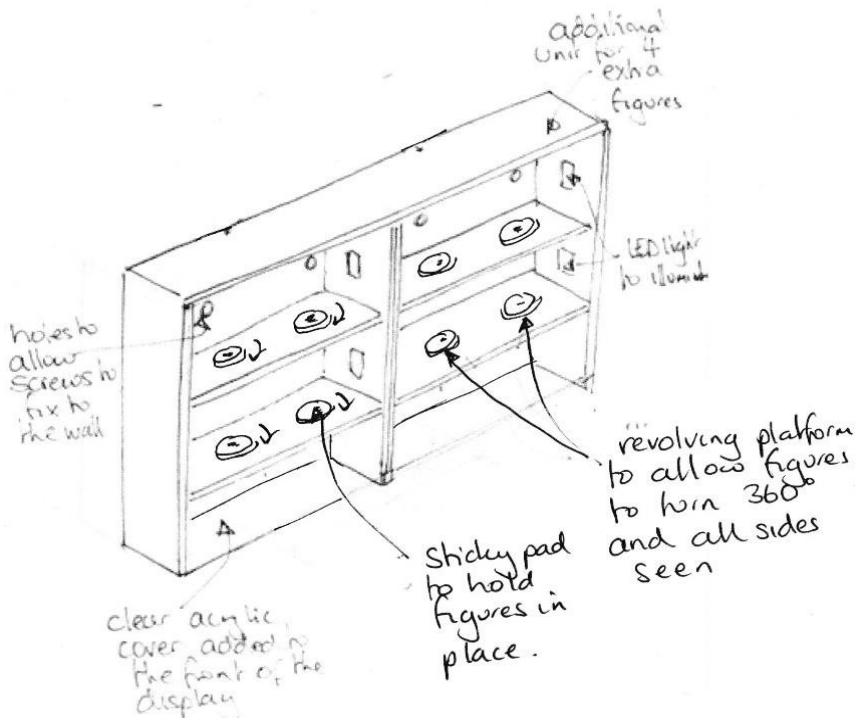
Question number	Answer	Additional guidance	Mark
4 (b)	A calculation that includes: • Correct calculation of the percentage of material that CANNOT be recycled 100 – 80 = 20 % (1) • Correct calculation of the weight of material that CANNOT be recycled (20 / 100) x 270 = 54 grams (1) ECF Award 1 mark for an answer of 216 grams which is what 80% represents	Award full marks for correct numerical answer without working. Allow ECF if candidate gets part of calculation wrong. 216 alone with no working out is zero marks.	(2)

Question number	Indicative content	Mark
4 (c)	• Designers can see / get a better idea of how products work when they are taken apart • Designers can see / draw each individual part that they may be able to improve / refine / combine / design them out / combine them into one individual part • Designers may be able to introduce standardised components into their new designs • Designers can look at ways of trying to reduce material usage / wastage when designing a new product • Designers can take measurements of existing products • Designers can look at how they might improve the assembly / manufacture of a new product to reduce time • Designers take inspiration that they can use in their own work • Designers can analyse / evaluate the materials that have been used • Designers can get to see the intricate workings of the product • Designers are able to evaluate products in terms of working out / discovering what is wrong with them / identify flaws • Designers can work out how they can be improved / made more reliable / energy efficient	(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.

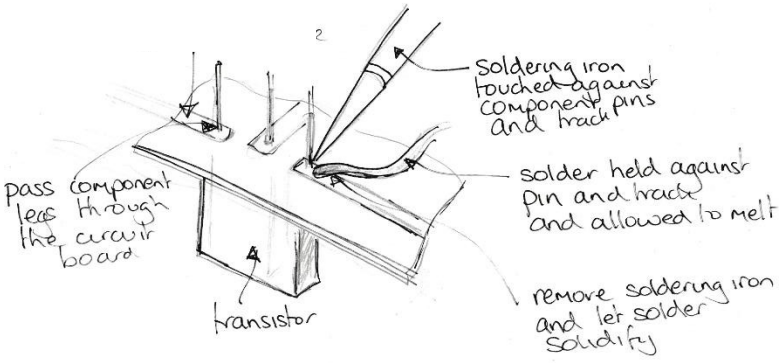
Section B – Systems

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 display an additional four collectable figures (1) and include a method to stop them falling off the shelves (1) e.g. unit is made taller / wider to show extra four spaces and sticky pads / glue dots / velcro / lipped front edge ('door' will also attract credit for stopping the figures falling off the shelf) • be able to automatically rotate the collectable figures (1) and include a method to stop them from being stolen (1) e.g. motor / turntable / lazy susan / hinged / sliding doors & lock / lockable / padlock / hasp and staple and clear acrylic / glass screen [do not credit responses that reference an 'alarm' or 'sensor'] • be capable of being fixed to a wall (1) and include a lighting system (1) e.g. screws / bolts / wall / flat plates / hooks and LEDs / neo pixels / bulbs used / strip lights (reference to 'lights' generically without any subsequent graphical indication or reference to wiring does not attract a mark)	(6)

	Example of candidate response:  Notes: • Additional unit for 4 extra figures • Sticky pads to hold figures in place • Automatic revolving platforms to allow figures to turn 360° and all sides seen • Clear acrylic cover added to the front of the display • Holes to allow screws to fix to the wall • LED lights to illuminate	

Question number	Answer	Mark
5(b)	Any **two** explanations that include a way the number play toy meets or fails to meet the requirement (1) and a linked justification of that way (1) • There is a full set / lots of numbers between 1 and 20 / in 10s up to 100 (1) therefore the child will be able to make up lots of different sums / equations (1) • The numbers are all very clear / easy to read (1) therefore there can be no confusion as to what the number is given they are in the correct order (1) • Helps teach them about how the numbers look / differentiate numbers / symbols (1) without the need of having to be able to write (1) • Images above the numbers show the same number of items (1) therefore allowing the child to make connections / associations between the image and number / shape (1) • Coloured lights / speaker will provide a form of reward (1) therefore providing feedback / reward for correct / incorrect responses to questions (1) • There are not enough operations to make up some questions / answers (e.g. multiplication and division) (1) therefore the toy will not be very useful as it will not allow children to practice these types of calculations (1) • Some of the numbers / symbols might get broken / stuck if pressed too hard (1) therefore you will not be able to carry out a full range of sums / equations / the toy cannot be used (1) • The images between the rows of numbers might be confusing (1) therefore the child might not understand their relevance when learning how to do calculations (1) • There are buttons with a question mark and undo symbol which the child might not be able to identify (1) therefore they may not understand how to use these when carrying out calculations / developing their maths skills (1)	(4)

Question number	Answer	Additional guidance	Mark
6 (a)	Any **two** explanations for using a loudspeaker in the alarm unit (1) and a linked justification (1) • Loudspeakers can produce sounds / noises at a range of different volume levels (1) therefore the output can be adjusted so that when it sounds it will be heard over other noises / serve as a deterrent / disturb intruders / alert multiple people (1) • The volume of a loudspeaker can be controlled / adjusted (1) therefore the level of the alarm can be turned down if it is being used at night (1) • Loudspeakers can produce a wide range of sounds / noises / play speech (1) therefore the alarm can be customised to make different noises in different situations (1)	Do not credit 'They are 'loud' as a response	(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: • Transistor need to be orientated correctly (1) • The legs / pins of the transistor are passed through the holes in the tracks in the circuit board (1) • The soldering iron is placed against a leg and track to apply heat (1) • Solder is applied to the joint and melts (1) • Soldering iron removed and the solder allowed to solidify (1) Example of candidate response:  Notes: • Pass component legs through the circuit board • Soldering iron touched against component leg and track • Solder held against leg and track and allowed to melt • Remove soldering iron and let solder solidify	Cap at 3 marks if no sketches or all sketches and no notes	(4)

Question number	Answer	Additional guidance	Mark
6 (c)	Any **one** explanation of a property of copper (1) and a linked justification of the property (1) • Copper is an electrical conductor (1) therefore it will allow an electrical current to flow between the circuit board components (1) • Copper has good thermal conductivity (1) therefore heat generated by the flow of electricity can be easily dissipated (1)	References to 'conductor' on its own should not be awarded credit	(2)

Question number	Answer	Mark
6 (d)	Any **two** explanations that include a manufacturing method (1), plus two linked justifications of that method (1) + (1) 3D printer / 3D printing (1) • The stand can be produced as a single part (1) as the stand is created by layers of polymer being built up to form the shape of the stand (1) Injection moulding machine / injection moulding (1) • All features can be produced in a single manufacturing operation / removes need for secondary operations (1) as a mould is produced which includes all of the details of the stand (1) Wastage / milling / milling machine (1) • The stand can be manufactured from a solid block of material (1) with material removed from the solid block by a cutting tool to leave the back, sides and base of the stand (1)	(6)

Question number	Answer	Additional guidance	Mark
7 (a)	Award **one** mark from: • Wire cutters (1) • Side cutters (1) • Cable cutters (1) • Wire snips (1) • Cable snips (1) Award different / phonetic spellings of cutters or snips, including (there are other variations): • Wire cuters (1) • Side cotters (1) • Cabl cutters (1) • Wire snipps (1) • Cable sniips (1)	Do not credit any responses related to 'Pliers' Do not credit 'Cutters' or 'Snips' on their own	(1)

Question number	Answer	Mark
7 (b)	Any **two** benefits for the manufacturer of using stock materials (1) plus a linked justification of the benefit (1) • It means the materials will be widely / readily available / can be bulk purchased / do not have to be machined to a specific non-standard size (1) therefore the materials will be cheaper / reducing overall costs / improve profit margin (1) • The manufacturer does not need to have / hold lots of different sized materials (1) which reduces the need for cutting / machining / reducing waste / machining time / processes (1) • Machines do not have to be reset each time a different sized material is used (1) therefore it helps to reduce the manufacturing time / speed up manufacturing / reduce potential errors that might be introduced (1)	(4)

Question number	Answer	Additional guidance	Mark
7 (c)	A calculation that includes: • Conversion of units at any stage (1) • Calculation of the cost of Part number 1 and 2 (1) 2 at 100 mm = 200 mm or 0.2 m x 2.80 = £0.56 • Calculation of the cost of Part number 3 (1) 1 at 75 mm = 75 mm or 0.075 m x 2.80 = £0.21 • Calculation of the cost of Part number 4 (1) 3 at 100 mm = 300 mm or 0.3 m x 3.30 = £0.99 • Total cost of the material (1) 0.56 + 0.21 + 0.99 = £1.76 Any response of £1760 or £17.60 or equivalent without any working out shown must be awarded 0 marks	Award full marks for correct numerical answer without working. Allow ECF if candidate gets part of calculation wrong. £1760 or £17.60 are partially correct answers given some incorrect no conversion units has taken place but can be awarded 4 marks	(5)

Question number	Answer	Mark
7 (d)	Any **two** explanations that include a benefit of using an insulated coating (1), plus two linked justifications of that benefit (1) + (1) • The insulated coating will prevent the wire/s touching each other (1) which means that there will be no short circuits (1) therefore the lamp unit will not become damaged (1) • The insulated coating will provide a durable surface finish (1) which will prevent the wires from touching the metal bracket / lampshade (1) therefore protecting the user from potential electric shock (1) • The insulated coating will allow individual wires to be colour coded (1) which allows easier identification of the purpose of each wire (1) therefore wires will be connected to the correct terminals / components (1)	(6)

Question number	Answer	Mark
8 (a)	Any **one** explanation of a working property of ABS (1) and a linked justification of that working property (1) • ABS is tough (1) therefore will not become damaged / will withstanding knocks from repeated use / movement of the printer (1) • ABS is hard (1) therefore will not become scratched when buttons are pressed / labels removed from the printer (1)	(2)

Question number	Answer	Mark
8 (b)	Any **one** explanation of an issue associated with the ecological footprint of using gold (1) plus two linked justifications of that explanation (1) + (1) • The demand for gold results in mining (1) which results in loss of natural habitats (1) therefore local ecosystems are damaged / potential loss of species (1) • The mining of gold requires large amounts of energy (1) which results in the emission of lots of pollution due to the burning of fuels (1) therefore contributing to climate change (1) • Gold is difficult to separate from the other materials used in the cables (1) which means gold that could be reclaimed often goes to landfill / is incinerated (1) therefore further gold needs to be extracted to meet demand (1)	(3)

Question number	Answer	Mark
8 (c)	Any **two** reasons for manufacturing the casing of the desktop label printer to a tolerance (1) and a linked justification (1) • The slot for the printed labels / printer needs to be of a certain width / size (1) otherwise it will not be long enough to allow the printed labels to pass through / will get jammed (1) • The shape / size of the holes / buttons must be cut / manufactured to a certain size (1) otherwise the buttons will not move in and out freely (1) • The buttons must be positioned within a certain set of dimensions (1) otherwise they will be difficult to access when changing the roll of labels (1) • The top and bottom parts of the casing must be manufactured to the correct size (1) so that the separate pieces can fit into each other correctly / neatly (1)	(4)

Question number	Indicative content	Mark
8 (d)	• ABS tends to have good dimensional stability once it is formed meaning that it will retain the shape of the casing of the printer when it has been moulded • There will be limited manufacturing processing needed for the casing of the printer as it is likely to be injection moulded which will result in a high quality surface finish which needs minimal additional processing • Electronic components will be supplied to a required tolerance value which should ensure that the printer functions as intended • Products of this nature tend to be produced on production lines with parts assembled at different workstations so that demand can be met • The circuit boards will need to be designed and cut out correctly so that they can fit into their required spaces in the body of the printer • The circuit board will need to be assembled correctly with components soldered in place so that they are able to function as intended • All wiring connections will need to be made correctly so that the circuits function as intended • Some of the parts such as the buttons are small and care will be needed when assembling these so that they can move as intended • Due to batch production stages / steps should be planned so as to maximise machine processes / times / set up • The printer will need to be designed so that it can be recycled in order to meet the requirements of WEEE which means that it should be easily dismantled • The printer must be designed so that materials used for the casing and switches can be recovered at the end of its working life so that the environmental footprint is reduced • The manufacturer needs to put systems in place to collect and recycle printers at the end of their lives as part of the WEEE Directive	(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.