Government of **Western Australia**
School Curriculum and Standards Authority

MATERIALS DESIGN AND TECHNOLOGY

ATAR course examination 2020

Marking key

Marking keys are an explicit statement about what the examining panel expect of candidates when they respond to particular examination items. They help ensure a consistent interpretation of the criteria that guide the awarding of marks.

2020/65892

Section One: Short answer **15% (41 Marks)**

Question 1 **(16 marks)**

(a) State **four** design fundamentals that should be considered when evaluating the headphones. (4 marks)

Description	Marks
For each of four design fundamentals	
One mark for each correctly stated design fundamental	1–4
Total	**4**
Note: the design fundamentals must be cited as per the syllabus. No other answer accepted.	
Answers could include: • aesthetics, function, ergonomics, anthropometric data, cost, safety, environmental impact, sustainability.	

(b) Evaluate the headphones against **three** of the design fundamentals identified in part (a). (6 marks)

Description	Marks
For each of three evaluations	
Evaluation of the headphones against a design fundamental	2
Makes a general statement about a design fundamental	1
Subtotal	**2**
Total	**6**
Answers could include: Ergonomics: to be successful for the user the headphones need to fit comfortably on an adult head. They should have no hard edges or surfaces in contact with the skin, and be easy to put on and remove. The ear pieces need to fit snuggly to stay firmly in place for good sound and not fall off while the wearer is moving around during exercise. These features rely on accurate anthropometric data of head sizes and ear placement being used by the designer. The use of accurate data and measurements will create a product that is safe and functional for the user. The flexible band allows for a variety of head shapes. Anthropometric data: size of the headphone cushions and headband would need to take into consideration the average size and proportions of the target market, in this case middle aged adults. Anthropometric data sets could include dimensions of the external head curvature, head width, head height and size of ear. The headphones shown look to have a good size of headphone cushions and headband that would suit the target market, with some adjustability for a range of user sizes. Function: The function of the headphones is primarily listening to music whilst exercising. The design of the headphones seem to be ergonomically suited to fit comfortably on the head of a middle aged adult, with some adjustability for a range of sizes. The materials shown in the headband look to be cushioned for comfort, and sweat resistant. The headphones would need to fit comfortably and resist falling off when in motion during exercising. The absence of a cable indicates that the headphones may be Bluetooth enabled which would function well, as cables can swing and get snagged on an object whilst exercising. The ability for the cushions to rotate and fit in the bag provided, allows for greater portability and less physical space required in gym bag.	
Accept other relevant answers.	

Question 1 (continued)

(c) Redesign the headphones for use by 4 to 8 year-old children, ensuring they are suitable for a range of play-related activities. Identify and describe **three** design factors you will need to consider. (6 marks)

Description	Marks
For each of three design factors	
Identification and description of the design factor to consider	2
Identification and statement of the design factor	1
Subtotal	**2**
Total	**6**
Answers could include: • design factors to be considered for children's earphones • safety – no sharp edges, no small parts to be swallowed, robust cords and connections • ergonomics – correctly sized for children's heads and hands, adjustable for growth of child, light weight • water resistant, washable • aesthetically appealing to children, bright colours, interesting textures, fun shapes • functionally simple to use • anthropometrics/size.	
Accept other relevant answers.	

Question 2 **(16 marks)**

(a) Identify **three** techniques you have used in your design portfolio to communicate and document your design ideas. Justify why you have used each technique. (6 marks)

Description	Marks
One mark each for three communication and documentation techniques correctly identified	1–3
One mark each for appropriate justifications of techniques	1–3
Total	**6**
Answers could include: • rapid concept drawings • presentation 3D drawings • notes from client feedback • samples of features to show client and manufacturer • photography • drawings of revised designs to show client • annotating • prototype • evaluations • working drawings • justification.	
Accept other relevant answers.	

(b) Explain how design teams use technology to communicate their ideas to clients and manufacturers. (3 marks)

Description	Marks
Explains how design teams use technology to communicate their ideas to clients and manufacturers	3
Describes how design teams use technology to communicate their ideas to clients and manufacturers	2
Makes a general statement about how design teams use technology	1
Total	**3**
Answers could include: ● emailing design ideas, drawings, costings, clarifying questions to clients ● CAD software to create designs and drawings to show original ideas, and updated designs following client feedback • conferencing software used, e.g. Teams and Zoom ● 3D printers to create prototypes for client feedback ● mobile phones for brief communications e.g. confirming plans, details, specs, drawings, feedback .	
Accept other relevant answers.	

Question 2 (continued)

(c) State **four** features of working drawings required for the manufacture of a product. (4 marks)

Description	Marks
One mark for each correctly stated feature	1–4
Total	**4**
Answers could include: • dimensions/measurements/scale • accuracy • clear and detailed annotations • specifications of processes and features • 2D line drawings • hidden detail • materials • 2D line drawings • design title.	
Accept other relevant answers.	

(d) Identify **three** potential consequences of an error in a working drawing during the manufacture of a product. (3 marks)

Description	Marks
One mark for each correctly identified consequence	1–3
Total	**3**
Answers could include: • final product: may be inaccurate, have wrong dimensions, may not fit client, have incorrect and inefficient ergonomics, have wrong features, colours, be unsafe to use • end product may have to be remade, thereby increasing cost to the designer and manufacturer, reducing profitability • product users may be injured • workers may be injured • changes may have to be made during production, thereby wasting materials, time, energy and increasing impact on the environment • large quantities of faulty, incorrect products may be dumped • client may not give return business or recommendations to others • products may have to be recalled from consumers.	
Accept other relevant answers.	

Question 3 **(9 marks)**

In the box on page 9, produce a presentation drawing of your design idea. (4 marks)

Annotate your design to indicate the main features including:

- materials
- finishes
- joining methods
- client/end user needs
- design features/decoration. (5 marks)

Description	Marks
3D Drawing clearly communicates ideas, including features to meet all specifications	4
3D Drawing communicates ideas, including features to meet most specifications	3
2D Drawing communicates limited ideas, including any features to meet specifications	1–2
Subtotal	**4**
Annotations clearly justifies all specified features	5
Annotations justifies most specified features	4
Annotations are limited with some justification	3
Annotations are labelled	1–2
Subtotal	**5**
Total	**9**

Answers could include:

- drawing should include 3D features, rendering, features to accommodate smart phone and tablet, with chargers, cords and earphones, clear communication of ideas
- annotations should include all specified dot points.

Sample annotations:

- materials – stretchy neoprene slip cover, leather straps with brass buckles
- finishes – polyurethane lacquer for durability
- joining methods – laser cut finger joints, glued with PVA adhesive and sanded
- client/end user needs – handles on storage device to allow for portability as per client specification
- design features/decoration – integrated USB hub allows for easy charging of devices.

Accept other relevant answers.
Note: annotations need to be justified to receive full marks.

Section Two: Extended answer **25% (36 Marks)**

Question 4 **(7 marks)**

(a) Justify the choice of **one** of the materials used in the production of the chair. (2 marks)

Description	Marks
Justifies the choice of a material used in the production of the chair	2
Makes a general statement about a material used in the production of the chair	1
Total	**2**

Sample answer:
Stain repellent polyester microfiber:
An upholstered cushion and backrest will be softer and more comfortable than a hard surface. Microfiber is a pleasing contrast for aesthetic appeal. The stain repellent microfiber will reduce the wear and make the fabric easy to wipe clean, reducing the need for harsh washing products.

Tubular mild steel:
The mild steel tube has a high tensile strength, allowing it to be strong and support a range of users. It is relatively malleable and can be formed into complex curves through the use of tube benders. Can be welded together easily.

Durable and hard, will resist scratches and indentation. Parts can be made repeatably for manufacture through the use of jigs. Relatively inexpensive material that is easy to source in a range of sizes and wall thicknesses.

Plywood:
Plywood can be bent to form the shape of the seat. It has a uniform strength and is durable enough to withstand the load of an average person. Plywood has the aesthetic qualities of solid timber (grain, colour), but is not as expensive as solid wood.

Accept other relevant answers.

(b) Justify the choice of **one** of the finishes used in the production of the chair. (2 marks)

Description	Marks
Justifies the choice of one finish	2
Makes a general statement about one finish	1
Total	**2**

Answer:
Stain repellent finish:
A stain repellent finish will make the fabric easy to wipe clean, reducing the need for harsh washing products. It will be more durable and make the chair look better over time, prolonging its life. This makes the chair more environmentally friendly as it will not need to be replaced as frequently.

Powder coating:
Powder coating is a long lasting finish and corrosion resistant. Powder coated surfaces are more resistant to chipping, scratching, fading and wearing than other finishes. An economical process (for batch production or mass production). Irregular shaped pieces with tight bends can be easily powder coated. More environmentally friendly option than traditional liquid paint as it does not contain any harmful solvents. Powder coated surfaces can be washed with regular detergent and water.

Lacquer:
Lacquer is a durable finish that will withstand general use of the chair over time. Lacquer adds a smooth shiny finish that enhances the plywood grain making it more attractive to customers.

Accept other relevant answers.

(c) Outline **three** ways in which the manufacturer can ensure that mass-produced parts are accurately made. (3 marks)

Description	Marks
One mark for each of the three ways the manufacturer can ensure that mass-produced parts are accurately made.	1–3
Total	**3**

Answers could include:
- keep good records of specifications – journal
- production plan
- check against specification sheet
- use accurate and precise measurements
- make records available to workers
- test materials for reliability when repeated
- test techniques and processes for reliability when repeated
- train workers to standards required
- use of jigs
- use of patterns/templates.
- use prototypes to test before manufacture
- quality control
- using CAM to produce parts

Accept other relevant answers.

Question 5 **(9 marks)**

(a) At what stage of the design cycle is a prototype constructed? (1 mark)

Description	Marks
One mark for correct answer	1
Total	**1**
Answers could include: • design development stage, devising stage, after research and design work is done.	
Accept other relevant answers.	

(b) Identify **four** tools a designer will use to evaluate a prototype against the design brief. (4 marks)

Description	Marks
One mark for each of four tools correctly identified	1–4
Total	**4**
Answers could include: • statement of intent, design fundamentals, specification sheets, drawings, performance criteria, client and designer needs, values and beliefs, proposed costings, client feedback, measurements, CAD programs, paper, computer, environmental impact studies and research, ruler.	
Accept other relevant answers.	

(c) Outline **four** advantages of using prototypes during the design process. (4 marks)

Description	Marks
One mark each for four advantages outlined	1–4
Total	**4**
Answers could include to: • check the design fundamentals of the design: to work out, test and check ergonomics, function, safety, cost, environmental impact • evaluate aesthetics of design and materials • test materials properties for end use – strength, durability, absorbency, etc. • assess precise material quantities – for ordering and costing • check specifications of design • assess suitability for target market • test manufacturing techniques • refine design to fit purpose and target market.	
Accept other relevant answers.	

Question 6 **(14 marks)**

(a) Using **four** principles of design, describe the appeal of both coat racks from the consumer's viewpoint. (8 marks)

Description	Marks
One mark each for four principles of design correctly identified	1–4
Subtotal	**4**
For the description	
Describes in detail the appeal of both coat racks from the consumer's viewpoint	4
Describes the appeal of both coat racks from the consumer's viewpoint	3
Outlines the appeal of both coat racks from the consumer's viewpoint	2
Makes a statement about the coat rack/s	1
Subtotal	**4**
Total	**8**
Note: the principles of design must be cited as per the syllabus. No other answer accepted	
Principles of design: • balance, dominance, proportion, contrast, emphasis, rhythm, repetition, gradation, radiation, harmony, unity. Sample answer: Consumers will view coat rack A as bright, fun, youthful, happy and trendy. They will see this as fit for a dynamic or young room. This piece has a lack of unity created by the emphasis of the contrasting bright colours, the lack of balance of the colours and their proportional size to the frame. Coat rack B will be viewed as more conservative or traditional, designed to blend in and suited to a wider range of rooms. It has a harmonious look created by the use of a single colour, repetition of the hook style, lack of emphasis, and no contrasting features.	
Accept other relevant answers.	

(b) Explain, with reference to **rack B**, how by altering **three** elements of design it could be made to appeal to a different target audience. (6 marks)

Description	Marks
One mark each for three elements of design correctly identified	1–3
Subtotal	**3**
For the explanation	
Explains how by altering three elements of design of rack B could be made to appeal to a different target audience	3
Outlines how by altering three elements of design of rack B could be made to appeal to a different target audience	2
Makes a statements about the design of rack B	1
Subtotal	**3**
Total	**6**
Note: the elements of design must be cited as per the syllabus. No other answer accepted	
Elements of design: • colour, tone, line, form, shape, texture. Sample answer: Coat rack B could be altered to appeal to a young target market by changing the colour to bold, bright, contrasting colours, or to bold colours in a range of tones, such as reds or blues. The shape of the back board could be altered to an animal or curving shape, and texture added for fun.	
Accept other relevant answers.	

Question 7 **(6 marks)**

Discuss how designers consider environmental sustainability in the design and manufacture of new products. (6 marks)

Description	Marks
Discusses in detail how designers consider environmental sustainability in the design and manufacture of new products	6
Discusses how designers consider environmental sustainability in the design and manufacture of new products	5
Explains how designers consider environmental sustainability in the design and manufacture of new products	4
Describes how designers consider environmental sustainability in the design and manufacture of new products	3
Outlines how designers consider environmental sustainability in the design and manufacture of products	2
Makes a statement about how designers consider environmental sustainability	1
Total	**6**
Answers could include: • using recyclable materials • using materials from sustainable sources • source materials locally to decrease transportation emissions • using less materials in each product • use of recycled materials in the manufacture of the product where possible • labelling of plastic components to assist recycling • easily transported – lightweight/stackable/flatpack • minimise transport – manufacture close to the market • reduce number of processes used to make product • minimise waste during production • reduced packaging • use compostable packaging • improve energy efficiency of product • use of renewable energy for production • use of more durable materials to increase lifespan of product • consideration of how product will be disposed of/re-used/recycled.	
Accept other relevant answers.	

Section Three: Wood context **60% (72 Marks)**

Question 8 **(18 marks)**

(a) With reference to the radar chart, identify which timber would be most suitable for this chair and justify your selection against the other timbers available. (5 marks)

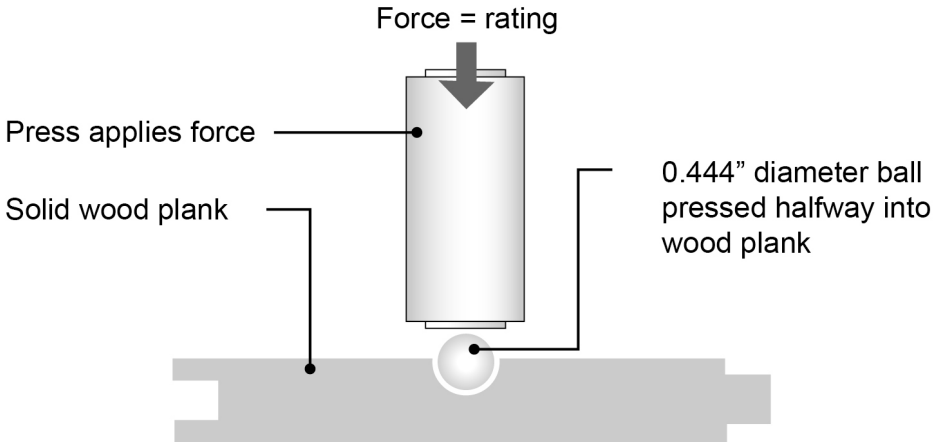
Description	Marks
Identifies the correct timber	1
Justification of the timber selection	
Justifies the suitability of the timber selected against other timbers available	4
Explains the suitability of the timber selected against other timbers available	3
Describes the suitability of the timber selected against other timbers available	2
Makes a statement about the suitability of the timber selected	1
Subtotal	**4**
Total	**5**
Answer: Bamboo is the most suitable timber for the chair. It has the highest elasticity making it suitable for twisting and manipulating. Bamboo has the highest workability, giving it good properties for shaping. Whilst not the hardest timber it still rates high making it resistant to dents and scratches. Bamboo is also the least dense improving its ability to absorb glue and the fibres ability to compress and stretch to the shapes required.	
Accept other relevant answers.	

(b) Select **one** of the four properties from the radar chart and in the space below sketch and annotate a method for testing that property. (6 marks)

Description	Marks
For the sketch	
Highly detailed sketch of a property test from the four listed on the radar chart	3
Detailed sketch of a property test from the four listed on the radar chart	2
Legible sketch of a property test	1
Subtotal	**3**
For the annotations	
Highly detailed annotations	3
Detailed annotations	2
Limited annotations	1
Subtotal	**3**
Total	**6**

Sample answer:

Hardness test



Question 8 (continued)

(c) Outline **three** factors you must consider to ensure reliability of test results. (3 marks)

Description	Marks
One mark for each factor to a maximum of three	1–3
Total	**3**

Answers could include:

- to ensure that results are reliable when testing different timbers it is important that all the variables remain the same for each material and for each test
- same timbers should all be the same length, width and length, they should also contain the same moisture content and ideally be cut from the same section of the tree (spring wood/dead wood etc)
- it is also beneficial to carry out the test on several different pieces of the same timber and to take the average figure
- the testing parameters need to be consistent with every test carried out, the height at which a weight is dropped for example needs to be consistent
- the recording of results also needs to be laid out clearly to avoid misinterpretation.

Accept other relevant answers.

(d) Identify an adhesive and explain the properties that make it most suitable to laminate the pieces of timber together to make the curves. (4 marks)

Description	Marks
One mark for identifying appropriate adhesive	1
Explanation of the properties	
Explains the properties of the adhesive which make it appropriate for laminating	3
Describes the properties of the adhesive which make it appropriate for laminating	2
Makes a statement about the properties of the adhesive	1
Subtotal	**3**
Total	**4**

Answers could include:

Appropriate adhesives:

- low setting epoxy
- two-part urea formaldehyde.

The main properties required for a bent lamination such as the one in the chair design are rigidity and working time. A slow setting epoxy adhesive such as West Systems allows the user plenty of time to glue up and thus they do not need to rush, compared to PVA in which you would have very little time to glue up before the glue starts to go off. The other consideration is the stress that the timbers will be under, PVA can allow timbers to creep whereas an epoxy sets very rigid, decreasing the likelihood of delamination.

Accept other relevant answers.

Question 9 **(9 marks)**

(a) Outline **three** safety checks that should be carried out on the machine before switching it on. (3 marks)

Description	Marks
One mark for each relevant safety check that should be carried out	1–3
Total	**3**
Sample answer: • ensure all guards are fitted and functional • check workspace and walkways are clear, to ensure no slip/trip hazards are present • ensure the chuck key has been removed from the chuck • inspect power cords for damage • ensure work is securely clamped to table • set spindle to correct speed to suit drill diameter.	
Accept other relevant answers.	

(b) A student is using a 30 mm Forstner bit to drill a hole and wants to stop drilling at a depth of 20 mm. Describe how this process could be completed accurately. (2 marks)

Description	Marks
Description of how the process could be completed accurately	2
Makes a statement about the process	1
Total	**2**
Answers could include: Setting the depth stop – after tightening the forstner bit into the chuck, mark a 20 mm line on the side of a piece of wood. Lower the drill bit down to the line and then tighten the depth stop collar. Test depth on a piece of scrap first.	
Accept other relevant answers.	

(c) Outline **four** strategies that a company could implement to establish and maintain a safe work culture. (4 marks)

Description	Marks
One mark for each relevant strategy	1–4
Total	**4**
Answers could include: • 333333 • establish an OSH committee • conduct risk assessments • conduct periodic site maintenance and inspections • training of employees • practice evacuation procedures • improve communication around safety issues – meetings, posters, emails • keep and maintain incident reports • supply PPE.	
Accept other relevant answers.	

Question 10 **(16 marks)**

(a) Complete the table for **three** finishes that enhance and protect the appearance of timber. (6 marks)

Description	Marks
One mark for each type of finish	1–3
One mark for each enhancement and protection of the timber	1–3
Total	**6**

Name of finish	Enhance and protect the timber
Danish oil	• fairly durable • easy application • fast to reapply
Wax	• creates a shine • easy to apply • can easily be removed with solvent • excellent rubbing qualities • easy to reapply
Polyurethane varnish	• able to create a thick protective coat • tough finish • very durable

Accept other relevant answers.
Note: finish name must be specific.

(b) Using an example, outline **three** ways in which finishes add value to products. (4 marks)

Description	Marks
One mark for the example	1
One mark for each of the ways in which finishes add value to product	1–3
Total	**4**

Answers could include:
Finishes can:
- improve quality by making them stronger, more attractive, more durable
- reduce price
- increase functional and aesthetic properties
- improve comfort/ergonomics
- reduce manufacturing techniques needed
- increase speed of manufacture
- increase sustainability and green characteristics – improve recyclability/reuse
- improve desirability
- increase competitiveness of the product in the market.

Example: adding polyurethane varnish can give the product a longer life, thus reducing the environmental impact of replacing the product.

Accept other relevant answers.

(c) The development of new materials impacts how products can be used by designers and consumers. Explain **two** ways in which new materials generate innovation and create new design possibilities. (6 marks)

Description	Marks
For each explanation	
Explains the way in which new materials generate innovation and create new design possibilities	3
Describes the way in which new materials generate innovation and create new design possibilities	2
Makes a statement about new materials	1
Subtotal	**3**
Total	**6**

Answers could include:

- materials/products can be used in different environments – waterproof, heatproof, UV resistant, flame resistant, thermal properties – warmer, cooler, lighter weight, etc.
- materials that give different structural and stability qualities allow designers to reduce structure supports in new designs and manipulate materials in different ways
- materials/products can be used in different ways as they can make them stronger, more durable, antimicrobial, stain resistant, resistant to oxidisation or conductive for electronic uses
- designers can improve existing products and invent new ones

Sample answer:
Designers' opportunities to extend the way they use a material and create new products. For example, making a material waterproof, stain repellent, or UV resistant so it can be used outdoors in sun and rain.

A new material can decrease the impact on the environment by giving products a longer life and reducing the need to replace them so frequently, improve recycling, reduce materials going to landfill, reduce pollution through improved processing techniques and potentially reduce processing.

Using new materials designers can create new products, reach new and wider target markets, and give consumers improved lifestyle, improved health outcomes, and more choice.

Accept other relevant answers.

Question 11 **(11 marks)**

(a) Define the term CNC. (2 marks)

Description	Marks
Defines CNC	2
States a fact about the term	1
Total	**2**
Answers could include: Computer numeric control is a way of using a computer to control the operation of a machine. Mills, lathes, routers, laser cutters and grinders are common machines which now predominantly imbed CNC technology within industry.	
List is not exhaustive.	

(b) List **three** advantages and **three** disadvantages to the manufacturer of investing in this new technology. (6 marks)

Description	Marks
One mark for each advantage. Maximum of three marks	
Advantages: • faster production times • consistent quality control • reduction in work place accidents • greater economic benefit • less labour costs • cheaper production costs • reduced number of employees • intricate designs that would otherwise not be financially viable.	1–3
Subtotal	**3**
One mark for each disadvantage. Maximum of three marks	
Disadvantages: • initial financial outlay • need to upskill workers • designs may need to be altered to fit limitations of machines • cost of down time if a machine needs maintenance • loss of range of skilled workers as they specialise in one task.	1–3
Subtotal	**3**
Total	**6**
List is not exhaustive.	

(c) Identify **one** CNC machine used in the furniture-making industry and explain how it works. (3 marks)

Description	Marks
One mark for correctly identifying the CNC machine	1
Explanation of how it works	
Explains how the CNC machine works in the furniture-making industry	2
Makes a statement about the CNC machine	1
Subtotal	**2**
Total	**3**
Answers could include: CNC laser cutter – using CAD software the user can design parts and then send them to the laser cutter to have them either cut out or engraved. Using a focus beam of light to cut or engrave a variety of materials. This machine is very quick and accurate allowing repetitive work to be completed by unskilled workers. Accept: CNC router, CNC edge bander, CNC spray booth, CNC lathe, CNC milling machine, 3D printer.	
List is not exhaustive.	

Question 12 **(8 marks)**

(a) The pine is available from several suppliers. Complete the table below to calculate the cost per metre for each supplier. Round the costs to the nearest cent.

(2 marks)

Description	Marks
One mark for each correct cost	1–2
Total	**2**

Supplier	Length size (metres)	Price per length	Cost per metre ($)
A	3.6	$17.40	$4.83
B	3.6	$18.51	$5.14
C	3.9	$19.05	$4.88

(b) The pine will be purchased from Supplier A. Complete the cutting list below and calculate the cost of the materials to manufacture the hall table. Round the costs to the nearest cent. (3 marks)

Description	Marks
One mark for correct cost of each part	1–3
Total	**3**

Part name	Number required	Length	Cost of part(s)
Long rails	4	850 mm	$16.42
Short rails	4	200 mm	$3.86
Legs	4	762 mm	$14.72

(c) Complete the adjusted cutting list below and calculate the cost of the materials to manufacture the hall table. Round the costs to the nearest cent. (3 marks)

Description	Marks
One mark for correct cost of each part	1–3
Total	**3**

Part name	Number required	Length	Cost of part(s)
Long rails	4	1210 mm	$23.38
Short rails	4	250 mm	$4.83
Legs	4	790 mm	$15.26

Question 13 **(10 marks)**

Outline **five** ethical issues Australian manufacturers face and how they manage the ethical production of their goods.

Description	Marks
Ethical issues	
One mark for each ethical issue faced by Australian manufacturers	1–5
Subtotal	**5**
Management of production	
One mark for each management of production of goods in an ethical manner	1–5
Subtotal	**5**
Total	**10**

Answers could include:

Ethical issues to be discussed in manufacturing:

- sweat shop conditions: inhumanly low pay, poor working conditions, poor standards of WHS, traps workers in a cycle of poverty
- child labour, slave labour, forced labour
- loss of jobs to Australian workers
- poor standards of training and development
- fast lead times causing suppliers to take short cuts, exploit workers, abuse resources
- discrimination and harassment: gender, age, status, racial, ethnicity, disability
- unethical leadership: taking bribes, cutting corners, favouritism, falsifying figures/data
- controlling manufacturing and supply chain to ensure ethical providers down the chain
- toxic workplace culture
- unrealistic and conflicting goals between companies and workers
- environmental degradation and impacts on waterways, land and atmosphere: use of pesticides, water, land, energy, transport
- animal cruelty
- waste management
- consumer over-consumption enabled by advertising and cheap products, fast fashion and furniture
- cultural appropriation – taking design ideas from other cultures without remuneration or acknowledgement
- brand name forgery
- exclusivity and inequality issues created by expensive trends.

Management of production:

- purchase from ethical sources
- research environmental impacts of materials and processes
- establish Fairtrade codes and systems
- use social media watchdogs and publications such as newspapers and magazines, and independent websites that monitor companies
- educate consumers to check company practices such as sources of labour and materials
- bringing awareness to appropriate societal standards
- cultural and sensitivity training in businesses
- public pressure on companies to change their practices
- support organisations that are monitoring global production, i.e. Oxfam, Baptist World Aid Australia
- use manufacturing systems designed to prevent waste
- support measures by governments on ethical standards and sanctions for unethical practices.

List is not exhaustive.

Section Three: Metal context **60% (72 Marks)**

Question 14 **(18 marks)**

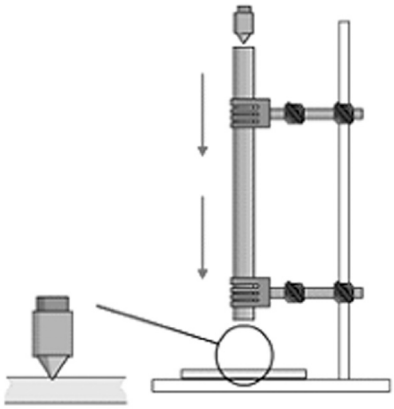
(a) With reference to the radar chart, identify which metal would be most suitable for this chair and justify your selection against the other metals available. (5 marks)

Description	Marks
Identifies the correct metal	1
Justification of the metal selection	
Justifies the suitability of the metal selected against other metals available	4
Explains the suitability of the metal selected against other metals available	3
Describes the suitability of the metal selected against other metals available	2
Makes a statement about the suitability of the metal selected	1
Subtotal	**4**
Total	**5**
Answer: Mild Steel is the most suitable metal for the chair. Mild Steel has a relatively high tensile strength, which is important for the chair to resist deformation under load, whilst been sat upon. Mild Steel has the highest weldability, allowing for it to be manufactured easily via MIG or TIG welding processes. Whilst not the hardest metal it still rates high making it resistant to dents and scratches. Mild Steel has a relatively high malleability which will allow the tube to be bent and shaped into complex curves without breaking.	
Accept other relevant answers.	

(b) Select **one** of the four properties from the radar chart and in the space below sketch and annotate a method for testing that property. (6 marks)

Description	Marks
For the sketch	
Highly detailed sketch of a property test from the four listed on the radar chart	3
Detailed sketch of a property test from the four listed on the radar chart	2
Legible sketch of a property test	1
Subtotal	**3**
For the annotations	
Highly detailed annotations	3
Detailed annotations	2
Limited annotations	1
Subtotal	**3**
Total	**6**

Sample answer:
Hardness test – indentation testing – measuring the diameter of the indentation left on the surface of a metal. E.g. dropping a centre punch down a tube to indent the surface of metal, and measuring the diameter of the indentation (the smaller the indent, the harder the material).



Note: List is not exhaustive.

(c) Outline **three** factors you must consider to ensure reliability of test results. (3 marks)

Description	Marks
One mark for each factor to a maximum of three	1–3
Total	**3**
Answers could include: • variables remain the same for each material and for each test • test results must be repeatable • test results must be reproducible • the values obtained must be accurate • the testing parameters need to be consistent with every test carried out, the height at which a weight is dropped for example needs to be consistent. The recording of results also needs to be laid out clearly to avoid misinterpretation.	
Accept other relevant answers.	

(d) State a joining method for metal that would be suitable to manufacture the bar chair and identify **three** benefits of using this method over others. (4 marks)

Description	Marks
One mark for identifying appropriate joining method • MIG (MGAW) welding **or** • TIG welding **or** • Brazing	1
One mark each for identifying three benefits of using this method over others	1–3
Total	**4**
Answers could include: MIG welding benefits: • easy process to learn compared to other welding techniques • high speed • high quality, strong welds • minor weld spatter produced, and therefore less cleanup • variable wire speed and power means it can be used on different thicknesses of material. TIG welding benefits: • clean, precise welds • high quality, strong welds • can weld hard to reach places • affordable price to setup. Brazing: • does not melt the base metal of the joint • clean joint without the need for secondary finishing • allows for tighter control over tolerances • less thermal distortion than other types of welding.	
Accept other relevant answers.	

Question 15 **(9 marks)**

(a) Outline **three** safety checks that should be carried out on the machine before switching on. (3 marks)

Description	Marks
One mark for each relevant safety check that should be carried out	1–3
Total	**3**
Sample answer: • ensure all guards are fitted and functional • check workspace and walkways are clear, to ensure no slip/trip hazards are present • ensure the chuck key has been removed from the chuck • inspect power cords for damage • ensure work is securely clamped to table • set spindle to correct speed to suit drill diameter.	
Accept other relevant answers.	

(b) A student is using the machine to drill a 10 mm diameter hole in 6 mm thick mild steel and notices that the drill bit overheats and does not cut properly. Describe how this problem could be overcome. (2 marks)

Description	Marks
One mark for each relevant description on how overheating can be prevented	1–2
Total	**2**
Answers could include: • ensure speed of drill is correct based on size of drill bit. Big drill bits require slower speed than small drill bits • use correct feed rate – either feed too slow (not pushing hard enough) or feed to fast (too hard pressure) • use of a lubricant or cutting fluid • use of a carbide tipped drill bit that is more efficient at dissipating heat • ensure drill bit is sharp.	
Accept other relevant answers.	

(c) Outline **four** strategies that a company could implement to establish and maintain a safe work culture. (4 marks)

Description	Marks
One mark for each relevant strategy	1–4
Total	**4**
Answers could include: • SOP attached to all machinery • SDS sheets kept up to date • establish an OSH committee • conduct risk assessments • conduct periodic site maintenance and inspections • training of employees • practice evacuation procedures • improve communication around safety issues – meetings, posters, emails • keep and maintain incident reports • supply PPE.	
Accept other relevant answers.	

Question 16 **(16 marks)**

(a) Complete the table for **three** finishes that enhance and protect the appearance of metals. (6 marks)

Description	Marks
One mark for each correct type of finish	1–3
One mark for a correct advantage to each finish	1–3
Total	**6**

Name of finish	Enhance and protect metal
Powder coating	• increases durability • resistant to fading • does not contain solvents (better for environment)
Chrome plating	• attractive (decorative shiny smooth surface) • increases hardness • increases durability
Galvanising	• attractive • corrosion resistant • lower cost than stainless steel

Other possible finishes for metals:
- anodising (aluminium only)
- buff finish
- grinding
- sand blasting
- brushed metal
- plastic finish
- paint
- lacquer
- enamel
- oil blacking.

Accept other relevant answers.

(b) Using an example, outline **three** ways in which finishes add value to products. (4 marks)

Description	Marks
One mark for each of three ways outlined	1–3
One mark for one example	1
Total	**4**

Answers could include:
Finishes can:
- improve quality by making them stronger, more attractive, more durable
- reduce price
- increase functional and aesthetic properties
- improve comfort/ergonomics
- reduce manufacturing techniques needed
- increase speed of manufacture
- increase sustainability and green characteristics – improve recyclability/reuse
- improve desirability
- increase competitiveness of the product in the market.

For example, motorcycles parts are commonly chromed to increase attractiveness amongst collectors and enthusiasts.

Accept other relevant answers.

Question 16 (continued)

(c) The development of new materials impacts how products can be used by designers and consumers. Explain **two** ways in which new materials generate innovation and create new design possibilities. (6 marks)

Description	Marks
For each explanation	
Explains the way in which new materials generate innovation and create new design possibilities	3
Describes the way in which new materials generate innovation and create new design possibilities	2
Makes a statement about new materials	1
Subtotal	**3**
Total	**6**

Answers could include:

- materials/products can be used in different environments – waterproof, heatproof, UV resistant, flame resistant, thermal properties – warmer, cooler, lighter weight, etc.
- materials that give different structural and stability qualities allow designers to reduce structure supports in new designs and manipulate materials in different ways.
- materials/products can be used in different ways as they can make them stronger, more durable, antimicrobial, stain resistant, resistant to oxidisation or conductive for electronic uses
- designers can improve existing products and invent new ones.

Sample answer:
New materials allow innovation and create new design possibilities for designers when creating products. A new material can enable it to be used in a different environment than normal giving designers' opportunities to extend the way they use a material and create new products. For example, making a material waterproof, stain repellent, or UV resistant so it can be used outdoors in sun and rain. It can increase the number of functions of a material or product, by making it stronger, more durable, antimicrobial, resistant to oxidisation or conductive for electronic uses.

A new material can decrease the impact on the environment by giving products a longer life and reducing the need to replace them so frequently, by decreasing the care needs – requiring less reapplication of finishes, improve recycling to produce new products, reduce materials going to landfill, reduce pollution through improved processing techniques and potentially reduce processing.

Using new materials designers can create new products, reach new and wider target markets, and give consumers improved lifestyle, improved health outcomes, and more choice.

Accept other relevant answers.

Question 17 **(11 marks)**

(a) Define the term CNC. (2 marks)

Description	Marks
Defines CNC	2
States a fact about the term	1
Total	**2**
Answers could include: Computer numeric control is a way of using a computer to control the operation of a machine. Mills, lathes, routers, laser cutters and grinders are common machines which now predominantly imbed CNC technology within industry.	
List is not exhaustive.	

(b) List **three** advantages and **three** disadvantages to the manufacturer of investing in this new technology. (6 marks)

Description	Marks
One mark for each advantage. Maximum of three marks	
Advantages: • faster production times • consistent quality control • reduction in work place accidents • greater economic benefit • less labour costs • cheaper production costs • reduced number of employees • intricate designs that would otherwise not be financially viable.	1–3
Subtotal	**3**
One mark for each disadvantage. Maximum of three marks	
Disadvantages: • initial financial outlay • need to upskill workers • designs may need to be altered to fit limitations of machines • cost of down time if a machine needs maintenance • loss of range of skilled workers as they specialise in one task.	1–3
Subtotal	**3**
Total	**6**
List is not exhaustive.	

(c) Identify **one** CNC machine used in the metal-fabrication industry and explain how it works. (3 marks)

Description	Marks
One mark for correctly identifying the CNC machine	1
Explanation of how it works	
Explains how the CNC machine works in the metal-fabrication industry	2
Makes a statement about the CNC machine	1
Subtotal	**2**
Total	**3**
Answers could include: A CNC waterjet is a tool used to cut metal with a very high pressure stream of water. It does not produce heat during the process and is capable of very intricate cuts in metal. Accept – CNC spray booth, CNC metal lathe, CNC milling machine, laser cutter.	
List is not exhaustive.	

Question 18 **(8 marks)**

(a) The tubular steel is available from several suppliers. Complete the table below to calculate the cost per metre for each supplier. Round the costs to the nearest cent. (2 marks)

Description	Marks
One mark for each correct cost	1–2
Total	**2**

Supplier	Length size (metres)	Price per length	Cost per metre ($)
A	6.1	$26.07	$4.27
B	6.1	$28.20	$4.62
C	6.5	$29.90	$4.60

(b) The tube will be purchased from Supplier A. Complete the cutting list below and calculate the cost of the materials to manufacture the hall table. Round the costs to the nearest cent. (3 marks)

Description	Marks
One mark for correct cost of each part	1–3
Total	**3**

Part name	Number required	Length	Cost of part(s)
Long rails	4	900 mm	$15.37
Short rails	4	200 mm	$3.42
Legs	4	762 mm	$13.01

(c) Complete the adjusted cutting list below and calculate the cost of the materials to manufacture the hall table. Round the costs to the nearest cent. (3 marks)

Description	Marks
One mark for correct cost of each part	1–3
Total	**3**

Part name	Number required	Length	Cost of part(s)
Long rails	4	1210 mm	$20.67
Short rails	4	250 mm	$4.27
Legs	4	790 mm	$13.49

Question 19 **(10 marks)**

Outline **five** ethical issues Australian manufacturers face and how they manage the ethical production of their goods.

Description	Marks
Ethical issues	
One mark for each ethical issue faced by Australian manufacturers	1–5
Subtotal	**5**
Management of production	
One mark for each management of production of goods in an ethical manner	1–5
Subtotal	**5**
Total	**10**

Answers could include:

Ethical issues to be discussed in manufacturing:

- sweat shop conditions: inhumanly low pay, poor working conditions, poor standards of WHS, traps workers in a cycle of poverty
- child labour, slave labour, forced labour
- loss of jobs to Australian workers
- poor standards of training and development
- fast lead times causing suppliers to take short cuts, exploit workers, abuse resources
- discrimination and harassment: gender, age, status, racial, ethnicity, disability
- unethical leadership: taking bribes, cutting corners, favouritism, falsifying figures/data
- controlling manufacturing and supply chain to ensure ethical providers down the chain
- toxic workplace culture
- unrealistic and conflicting goals between companies and workers
- environmental degradation and impacts on waterways, land and atmosphere: use of pesticides, water, land, energy, transport
- animal cruelty
- waste management
- consumer over-consumption enabled by advertising and cheap products, fast fashion and furniture
- cultural appropriation – taking design ideas from other cultures without remuneration or acknowledgement.
- brand name forgery
- exclusivity and inequality issues created by expensive trends.

Management of production:

- purchase from ethical sources
- research environmental impacts of materials and processes
- establish Fairtrade codes and systems
- use social media watchdogs and publications such as newspapers and magazines, and independent websites that monitor companies
- educate consumers to check company practices such as sources of labour and materials
- bringing awareness to appropriate societal standards
- cultural and sensitivity training in businesses
- public pressure on companies to change their practices
- support organisations that are monitoring global production, i.e. Oxfam, Baptist World Aid Australia
- use manufacturing systems designed to prevent waste
- support measures by governments on ethical standards and sanctions for unethical practices.

List is not exhaustive.

Section Three: Textiles context **60% (72 Marks)**

Question 20 **(18 marks)**

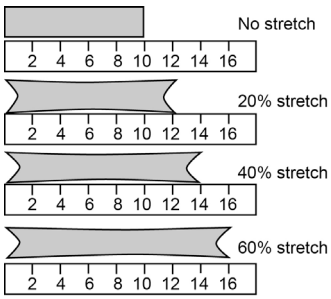
(a) With reference to the radar chart, identify which fabric will be the most functional and ergonomic for the skinsuit, and justify your selection against the other fabrics available.
(5 marks)

Description	Marks
Identifies the fabric	1
Justification of the fabric selection	
Justifies the suitability of the fabric selected against other fabrics available	4
Explains the suitability of the fabric selected against other fabrics available	3
Describes the suitability of the fabric selected against other fabrics available	2
Makes a statement about the suitability of the fabric selected	1
Subtotal	**4**
Total	**5**
Answer: Jersey is the most suitable fabric for the skinsuit. While bamboo is more absorbent and durable than jersey and lycra, it is significantly lower for elasticity and dimensional stability. Good elasticity is essential for comfortable movement, and jersey and lycra have the equal highest rating for this. Jersey has the best rating for dimensional stability which is very important as the fabric needs to return to its original shape to maintain the function of the suit, and not be loose when riding. Durability has minimal impact on ergonomics, so the lower scores for this property have less impact, making jersey the best overall choice.	
Accept other relevant answers.	

(b) Select **one** of the four properties from the radar chart and in the space below sketch and annotate a method for testing that property. (6 marks)

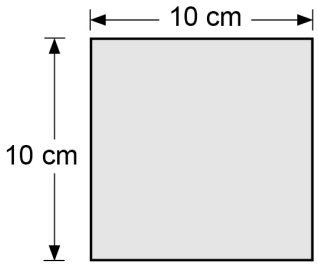
Description	Marks
For the sketch	
Highly detailed sketch of a property test from the four listed on the radar chart	3
Detailed sketch of a property test from the four listed on the radar chart	2
Legible sketch of a property test	1
Subtotal	**3**
For the annotations	
Highly detailed annotations	3
Detailed annotations	2
Limited annotations	1
Subtotal	**3**
Total	**6**

Answers:
Tests: elasticity, absorbency, strength, dimensional stability.
Example 1: Elasticity

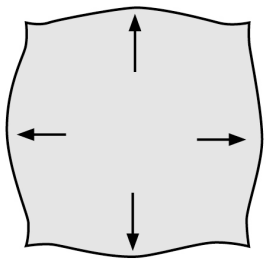


1. measure fabric
2. stretch and measure to test elasticity
3. compare to original size

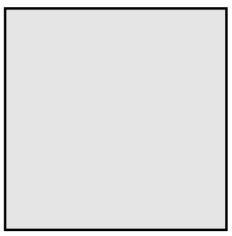
Example 2: Dimensional stability



1. Measure fabric square 10 cm x 10 cm



2. Stretch fabric in four directions to full stretch



3. Remeasure to test immediate recovery.
4. Rest fabric and measure the amount of distortion remaining.

- measure and cut a sample of fabric
- clamp fabric on each side and stretch the fabric for a set time
- remove the fabric and remeasure to compare data to the original size
- assess how well the fabric has recovered and the amount of distortion remaining.

Accept other relevant answers.

Question 20 (continued)

(c) Outline **three** factors you must consider to ensure reliability of test results. (3 marks)

Description	Marks
Three factors from the list below to a maximum of three marks	1–3
Total	**3**
Answers could include: • variables remain the same for each material and for each test. e.g. amount of water used to test absorbency, amount of stretch applied to test elasticity • test results must be repeatable • test results must be reproducible • the values obtained must be accurate • the testing parameters need to be consistent with every test carried out, for example the height at which the weight is dropped needs to be consistent • the recording of results also needs to be laid out clearly to avoid misinterpretation.	
Accept other relevant answers.	

(d) With reference to its characteristics, explain what method of joining would be most suitable for the seams of the skinsuit. (4 marks)

Description	Marks
One mark for correct seam	1
Explanation of the joining method	
Explains the characteristics of the joining method most suitable for the seams of the skinsuit	3
Describes the characteristics of the joining method most suitable for the seams of the skinsuit	2
Makes a statement about the join	1
Subtotal	**3**
Total	**4**
Answers could include: • closed seam using an overlocker • characteristics: three or four yarns used to make stitches, stitching is strong under pressure, stitches go over the edge of the seam in a zigzag shape, stitches stretch with fabric, construction is simple and fast. Reasons for suitability: • stretch stitches allow body movement without breaking, because stitches do not fail when stretched it gives the garment a longer life • this improves the impact on the environment as it will not have to be replaced so frequently • construction is fast, reducing time and cost of production.	
Accept other relevant answers.	

Question 21 **(9 marks)**

(a) Outline **three** safety checks that should be carried out on the machine before switching it on. (3 marks)

Description	Marks
One mark for each relevant outline of a safety check that should be carried out	1–3
Total	**3**
Sample answer: • ensure machine is positioned safely on bench • check workspace around machine is clear • check work zone to ensure no slip – trip hazards are present • ensure the power cords are positioned away from the workspace • inspect power cords for damage • ensure no water is present in work zone • check that needle is not broken.	
Accept other relevant answers.	

(b) A student is using the machine to sew a seam and notices that the fabric is not moving, and the machine is stitching repeatedly in the same place. Describe how this problem could be corrected. (2 marks)

Description	Marks
Description of how the problem could be corrected	2
Makes a statement about the problem	1
Total	**2**
Answers could include: • check threading is correct • remove bobbin and check for correctly wound thread • rethread machine • check that feed dogs are engaged • check that stitch length is not set to zero • check stitch settings • ensure presser foot is down.	
Accept other relevant answers.	

(c) Outline **four** strategies that a company could implement to establish and maintain a safe work culture. (4 marks)

Description	Marks
One mark for each relevant strategy	1–4
Total	**4**
Answers could include: • SOP attached to all machinery • SDS sheets kept up to date • establish an OSH committee to manage safety practices and workplace culture • conduct risk assessments/hazard analysis • conduct periodic site maintenance and inspections • identify potential hazards to prevent injuries • conduct training for employees • practice evacuation procedures • improve communication around safety issues – meetings, posters, emails • keep and maintain incident reports • supply appropriate PPE in all areas of need • install appropriate signage to inform employees.	
Accept other relevant answers.	

Question 22 **(16 marks)**

(a) Complete the table for **three** finishes that enhance the appearance of fabric. (6 marks)

Description	Marks
One mark for each type of finish	1–3
One mark for each enhancement and protection of the timber	1–3
Total	**6**

Name of finish	Enhance the appearance
calendaring includes moireing, glazing, embossing, stonewashing	creates a flat, smooth, glossy surface creates textured patterns
pressing	creates a flat, smooth, glossy surface
mercerising/polishing	creates sheen or lustre
creping	creates interesting texture
brushing	removes loose threads
fulling or felting	creates tightness and thickness
sizing	creates stiffness
weighting	increases weight/body
napping and shearing	creates pile, to increase warmth
crease resistant	reduces creasing
flurochemistry, Scotchguard	protects from staining to maintain quality appearance
printing/dying	creates colour

Accept other relevant answers.

(b) Using an example, outline **three** ways in which finishes add value to products. (4 marks)

Description	Marks
One mark for each of three ways outlined	1–3
One mark for one example	1
Total	**4**

Answers could include:
Finishes can:

- improve quality by making them stronger, more attractive, more durable
- reduce price
- increase functional and aesthetic properties
- improve comfort/ergonomics
- reduce manufacturing techniques needed
- increase speed of manufacture
- increase sustainability and green characteristics – improve recyclability/reuse
- improve desirability
- add cultural value
- increase competitiveness of the product in the market.

Example: crease resistant finish increases appeal to consumers as it reduces their workload and makes them look good for longer.

Accept other relevant answers.

(c) The development of new materials impacts how products can be used by designers and consumers. Explain **two** ways in which new materials generate innovation and create new design possibilities. (6 marks)

Description	Marks
For each explanation	
Explains the way in which new materials generate innovation and create new design possibilities	3
Describes the way in which new materials generate innovation and create new design possibilities	2
Makes a statement about new materials	1
Subtotal	**3**
Total	**6**

Answers could include:

- materials/products can be used in different environments – waterproof, heatproof, UV resistant, flame resistant, thermal properties – warmer, cooler, lighter weight, etc.
- materials/products can be used in different ways as materials make them stronger, more durable, antimicrobial, stain resistant, resistant to oxidisation or conductive for electronic uses
- designers can improve existing products and invent new ones.

Sample answer:
New material allow innovation and create new design possibilities for designers when creating products. A new material can be used in a different environment than normal giving designers' opportunities to extend the way they use a material and create new products. For example, making a material waterproof, stain repellent, or UV resistant so it can be used outdoors in sun and rain. It can increase the number of functions of a material or product, by making it stronger, more durable, antimicrobial, resistant to oxidisation or conductive for electronic uses.

A new material can decrease the impact on the environment by giving products a longer life and reducing the need to replace them so frequently, by decreasing the care needs – requiring less water and detergents for cleaning, improve recycling to produce new products, reduce materials going to landfill, reduce pollution through improved processing techniques and potentially reduce processing.

Using new material designers can create new products, reach new and wider target markets, and give consumers improved lifestyle, improved health outcomes, and more choice.

Accept other relevant answers.

Question 23 **(11 marks)**

(a) Define the term CNC. (2 marks)

Description	Marks
Defines CNC	2
States a fact about the term	1
Total	**2**
Answers could include: Computer numeric control is a way of using a computer to control the operation of a machine. Seamless knitting machines, sewing machines, weaving looms, 3D printers, laser cutters and embroidery machines are common machines which now frequently imbed CNC technology within industry.	
Accept other relevant answers.	

(b) List **three** advantages and **three** disadvantages to the manufacturer of investing in this new technology. (6 marks)

Description	Marks
One mark for each advantage. Maximum of three marks	
Advantages: • faster production times • consistent quality control • reduction in work place accidents • greater economic benefit • less labour costs • cheaper production costs • reduced number of employees • intricate designs that would otherwise not be financially viable.	1–3
Subtotal	**3**
One mark for each disadvantage. Maximum of three marks	
Disadvantages: • initial financial outlay • need to upskill workers • designs may need to be altered to fit limitations of machines • cost of down time if a machine needs maintenance • loss of range of skilled workers as they specialise in one task.	1–3
Subtotal	**3**
Total	**6**
List is not exhaustive.	

(c) Identify **one** CNC machine used in the clothing manufacturing industry and explain how it works. (3 marks)

Description	Marks
One mark for correctly identifying the CNC machine	1
Explanation of how it works	
Explains how the CNC machine works in the clothing manufacturing industry	2
Makes a statement about the CNC machine	1
Subtotal	**2**
Total	**3**

Answer could include:

- seamless technology. Knits garments in one piece on a circular bed of needles. Sizes and shapes can be adjusted using different stitches and structures. Reduces number of processes needed to make garments such as hosiery, underwear, swimwear, sportswear
- Optifit body measuring technology. Uses laser technology to measure the human body and provide highly accurate data for perfectly fitted, tailored garments
- computer linked sewing machines. Uses computer programs to sew thousands of designs with repeatable accuracy, in a short space of time and with minimal human intervention
- Nanotechnology. This can include wearable electronics that can be incorporated into clothing, and it can be used for coatings for protective properties of the textile. Embedding nano-sized particles or fibres in fabric results in improved fabric properties without significant changes in thickness and weight.

List is not exhaustive.

Question 24 **(8 marks)**

(a) The Duchess silk satin is available from several suppliers. Complete the table below to calculate the cost per metre for each supplier. Round the costs to the nearest cent. (2 marks)

Description	Marks
One mark for each correct cost	1–2
Total	**2**

Supplier	Length (metres)	Price per length	Cost per metre ($)
A	6.1	$326.04	$53.45
B	6.1	$368.20	$60.36
C	6.1	$349.90	$57.36

(b) The fabric will be purchased from Supplier A. Complete the cutting list below and calculate the cost of the materials to manufacture the bridal gown. Round the costs to the nearest cent. (3 marks)

Description	Marks
One mark for correct cost of each part	1–3
Total	**3**

Part name	Number required	Length	Cost of part(s)
Skirt front	1	2.2 m	$117.59
Skirt back	1	3.15 m	$168.37
Bodice	1	0.75 m	$40.09

(c) Complete the adjusted cutting list below and calculate the cost of the materials to manufacture the bridal gown. Round the costs to the nearest cent. (3 marks)

Description	Marks
One mark for correct cost of each part	1–3
Total	**3**

Part name	Number required	Length	Cost of part(s)
Skirt front	1	2.5 m	$133.63
Skirt back	1	5.15 m	$275.27
Bodice	1	0.95 m	$50.78

Question 25 **(10 marks)**

Outline **five** ethical issues Australian manufacturers face and how they manage the ethical production of their goods.

Description	Marks
Ethical issues	
One mark for each ethical issue faced by Australian manufacturers	1–5
Subtotal	**5**
Management of production	
One mark for each management of production of goods in an ethical manner	1–5
Subtotal	**5**
Total	**10**

Answers could include:

Ethical issues to be discussed in manufacturing:

- sweat shop conditions: inhumanly low pay, poor working conditions, poor standards of WHS, traps workers in a cycle of poverty
- child labour, slave labour, forced labour
- loss of jobs to Australian workers
- poor standards of training and development
- fast lead times causing suppliers to take short cuts, exploit workers, abuse resources
- discrimination and harassment: gender, age, status, racial, ethnicity, disability
- unethical leadership: taking bribes, cutting corners, favouritism, falsifying figures/data
- controlling manufacturing and supply chain to ensure ethical providers down the chain
- toxic workplace culture
- unrealistic and conflicting goals between companies and workers
- environmental degradation and impacts on waterways, land and atmosphere: use of pesticides, water, land, energy, transport
- animal cruelty
- waste management
- consumer over-consumption enabled by advertising and cheap products, fast fashion and furniture
- cultural appropriation – taking design ideas from other cultures without remuneration or acknowledgement
- brand name forgery
- exclusivity and inequality issues created by expensive trends.

Management of production:

- purchase from ethical sources
- research environmental impacts of materials and processes
- establish Fairtrade codes and systems
- use social media watchdogs and publications such as newspapers and magazines, and independent websites that monitor companies
- educate consumers to check company practices such as sources of labour and materials
- bringing awareness to appropriate societal standards
- cultural and sensitivity training in businesses
- public pressure on companies to change their practices
- support organisations that are monitoring global production, i.e. Oxfam, Baptist World Aid Australia
- use manufacturing systems designed to prevent waste
- support measures by governments on ethical standards and sanctions for unethical practices.

List is not exhaustive.

Published by the School Curriculum and Standards Authority of Western Australia
303 Sevenoaks Street
CANNINGTON WA 6107