VICTORIAN CURRICULUM AND ASSESSMENT AUTHORITY

2005 Design and Technology GA 3: Written examination

GENERAL COMMENTS

Most students completed all questions within the time limit of one hour and 30 minutes (plus 15 minutes of reading time).

Strengths

- Some students were able to put a great deal of detail into their designs within the examination time limit. Most students' design options were clear and showed some degree of detail.
- Identification of the most important specifications was well done.

Weaknesses

- Although students were able to identify specifications, the annotation of these specifications that justified where/how they had been addressed could not be seen on many design options.
- Knowledge of ethics in marketing and the stages of the product cycle were not evident in many student responses.

SPECIFIC INFORMATION

Note: Student responses reproduced herein have not been corrected for grammar, spelling or factual information.

The following information should be read in conjunction with the 2005 VCE Design and Technology examination paper.

Section A

Question 1

Marks	0	1	2	3	4	Average
%	16	23	24	11	26	**2.1**

Students were required to complete the four missing steps of the product cycle. These were:

- 1 – product concept
- 3 – production and distribution
- 5 – product evaluation and modification
- 6 – research.

Question 2

Marks	0	1	2	3	4	Average
%	5	9	21	29	36	**2.8**

This question related to properties and characteristics of materials and those that could cause problems in the production and use of a product.

Selected material	Visual appearance	Property/characteristic that may cause a problem during production or use
redgum	• red/brown colour • fine, even texture	• dense, hard wood that is hard to work with • tools blunt easily • pre-drilling is required • not easy to work on some faces due to interlocking grain
silk taffeta	• fine and smooth uneven texture • lustrous sheen • plain weave • looks crisp	• creases easily • slips when sewing, does not ease well • requires dry cleaning
nylon tulle	• stiff, fine net • available in a variety of colours	• tears easily when sewing and when in use • not suitable for buttonholes • very scratchy feel
wool felt	• dense • non-woven • coarse	• creates bulk when used in garment construction • requires pattern weights when laying pattern, as pins tear through tissue

	• matted • meshed fibre	• requires dry cleaning
stainless steel	• bright, shiny silver colour	• hard to weld, high temperature needed • special tools required to work with • should not be mixed with other metals • blunts tools
copper	• reddish brown colour • oxidisation occurs over time and changes colour	• very soft, dints and marks easily • changes colour due to oxidisation
terracotta	• coarse red-brown colour	• porous • easily broken or chipped • needs controlled, slow drying before firing • needs to be glazed to contain liquids • susceptible to mould
MDF	• grey to beige colour • very smooth surface	• tends to sag in long lengths • low moisture resistance • no grain rating • fine dust is a health and safety problem • requires specialised screws
blackwood	• golden brown to reddish brown with darker streaks • lustrous • tends to have very distinct grain	• not durable for external use unless treated • fairly soft to work with, not very tough
porcelain	• translucent, fine body • pale grey/white colour	• difficult to throw on wheel • low porosity when glazed • brittle • requires high temperature to fire
bone china	• translucent, fine body • pale grey/white colour	• very fragile when drying • not suitable for throwing
mild steel	• smooth appearance • grey colour	• corrodes easily • requires surface treatment/coating to stop rust • tarnishes quickly
acrylic (plastics)	• transparent to translucent • available in very smooth, large surfaces • available in a variety of colours • pre-finished appearance	• brittle, cracks easily • easily scratched • damaged by the sun over time
PVC	• smooth surface • many colours available • pre-finished look	• not durable over a long time • (sunlight affected) weakened by sunlight
crystal	• very clear • sparkles in light • transparent	• fragile, easily broken • has to be hand washed • needs to be worked at high temperatures
polystyrene	• varies in colour • opaque • pre-finished look	• weakens and yellows under strong sunlight • UV light deteriorates the material over a long period • easily affected by heat
concrete	• traditionally grey • solid	• requires framing, moulding and structural support when working • strength increases over time • sets quickly • once set it cannot be manipulated
soda lime	• clear or coloured • solid • can be translucent, opaque or transparent	• brittle • chips easily, easily broken • shatters • needs to be worked at high temperatures

Question 3a.

Marks	0	1	2	3	4	5	Average
%	9	10	16	21	25	19	**3.0**

This question asked students to select a product and describe the negative environmental impacts at different stages of its life cycle.

Refrigerator

- Source of material: plastic comes from petro-chemicals and metals require open-cut mining. Both are finite resources.
- Manufacture: requires the use of electricity to run the machines. Uses gas and petrol to work metal. Material offcuts/wastage is a problem.
- Packaging and transport: uses expanded polystyrene for packaging, which contributes to the greenhouse effect. Trucks are needed and the diesel fuel fumes pollute the air. The disposal of packaging produces rubbish/landfill.
- Use: brown coal is used manually to create electricity. Open cut coal mining creates pollution and contributes to the greenhouse effect.
- Disposal: difficult to separate materials, so it ends up in landfill. Old fridges use gas/fluorocarbons which damage the environment.

Flat-pack particle board shelves

- Source of material: logging of forests removes native habitats when timber is wood chipped. Pine forests require the use of high quality land, therefore diversity of habitat is reduced.
- Manufacture: the glues used in particle board are toxic. Machinery uses power/energy. The dust created when cutting creates health problems.
- Packaging and transport: disposal of packaging produces rubbish/landfill. Energy is used and fumes are produced during transportation.
- Use: could generate toxic substances.
- Disposal: particle board cannot be recycled, so it adds to landfill. As the product breaks down, toxic chemicals could leak into the environment.

Plastic milk bottle

- Source of material: petro-chemicals required to produce bottles. Uses finite resources. Uses energy to produce the plastic material.
- Manufacture: a range of machinery and equipment that use energy/power are required to make the bottles.
- Packaging and transport: disposal of packaging produces rubbish/landfill. Energy is used and fumes are produced during transportation.
- Use: energy is required for refrigeration to keep milk drinkable.
- Disposal: can be recycled but it requires a range of complex machinery and equipment, or bottles are added to landfill. Energy is used during recycling.

Cotton lycra swimsuit

- Source of material: growing cotton requires a large amount of water and uses pesticides. Lycra is made from petro-chemicals. There is a high use of energy from machinery refining and producing the end fabric.
- Manufacture: requires machinery and factory, thus using power/energy.
- Packaging and transport: energy is used and fumes are produced during transportation. Not usually pre-packaged, so packaging is not an issue.
- Use: water and detergents are used in washing the swimsuit.
- Disposal: recycled, or ends up in landfill.

Stoneware cup and saucer

- Source of material: taken from the ground, uses a finite resource. Need to clear land to access the raw material.
- Manufacture: firing requires energy for bisque ware and glazing. Machinery is used in the moulding process, thus energy used/consumed.
- Packaging and transport: protective polystyrene is used to minimise breakage, which contributes to the greenhouse effect. Trucks are needed, diesel fuel fumes are produced and energy is used in transportation.
- Use: water and detergents are used in washing the cup and saucer.
- Disposal: cannot be recycled, almost never breaks down in landfill.

Soda lime (glass) drink bottle

- Source of material: requires machinery (thus energy is used) to access materials in large quantities. Mining is needed to extract materials.
- Manufacture: requires machinery and factory, thus using power/energy.
- Packaging and transport: protective polystyrene is used to minimise breakage, which contributes to the greenhouse effect. Trucks are needed, diesel fuel fumes are produced and energy is used in transportation.
- Use: water and detergents are used in washing the drink bottle.
- Disposal: recycling can occur but it requires a range of complex machinery and equipment, or the bottle is added to landfill. Energy is also used in the recycling process.

Question 3b.

Marks	0	1	2	3	4	5	6	Average
%	37	10	9	16	12	8	8	**2.1**

bi.

Students were asked to identify the stage at which the greatest negative impact is made on the environment.

- refrigerator: disposal, source of material, manufacture
- flat-pack particle board shelves: manufacture
- plastic milk bottle: manufacture, disposal
- cotton lycra swimsuit: manufacture, source of material
- stoneware cup and saucer: manufacture, disposal
- soda lime (glass) drink bottle: manufacture

bii.

Students had to identify a change that could be made to reduce the negative impact on the environment.

Refrigerator

- disposal: components could be separated so that they can be recycled
- source of material: incorporate recycled materials into the product design
- manufacture: use energy in an efficient way; use alternative energies

Flat-pack particle board shelves

- manufacture: use solid pine instead of particle board

Plastic milk bottle

- manufacture: use more environmentally friendly sources of energy; alter machinery to ensure less power consumption
- disposal: use alternative plastic that is easily broken down by UV rays

Cotton lycra swimsuit

- manufacture: use alternative energy sources; use energy more efficiently
- source of material: use an alternative to cotton that has less impact on the environment

Stoneware cup and saucer

- manufacture: use more efficient energy resources
- disposal: reuse or recycle into another product, for example, garden path material, artistic material or mosaic work

Soda lime (glass) drink bottle

- manufacture: use more efficient energy resources
- disposal: reuse or recycle into another product, for example, garden/artistic material; look at more effective ways of recycling

biii.

Students had to explain how the change given in part ii. could reduce the negative impact on the environment.

Refrigerator

- disposal: landfill would be reduced
- source of material: sourcing of materials would be reduced
- manufacture: would use less energy

Flat-pack particle board shelves
- manufacture: no toxic glues would be used and timber could be recycled.

Plastic milk bottle
- manufacture: would reduce the greenhouse effect and ensure cleaner air to breathe

Cotton lycra swimsuit
- manufacture: would use less energy
- source of material: would reduce the amount of pesticides and the amount of water being consumed

Stoneware cup and saucer
- manufacture: would use less energy
- disposal: if the cup and saucer were crushed and reused it would reduce landfill and make a new material available by reducing the energy used for use

Soda lime (glass) drink bottle
- manufacture: would use less energy
- disposal: would reduce the energy used for recycling, for example, less energy is used to recycle into a material that could be used in the garden than making a bottle

Question 4a.

Marks	0	1	2	3	Average
%	27	16	16	41	**1.7**

Students had to give any three of the following client needs.
- people can go further, longer distances
- people can carry more with them
- people can move more quickly
- it can go anywhere a person can walk

Question 4b.

Marks	0	1	2	Average
%	41	33	26	**0.9**

Students should have listed any two of the following client needs.
- adjustable handles
- size is no larger than the average adult body
- it emulates human balance to keep upright
- the standing platform and handle relationship are determined by the height of the user

Question 4c.

Marks	0	1	2	Average
%	14	41	44	**1.3**

Students needed to list any two of the following disadvantages.
- discourages exercise/walking, thus leading to a less healthy lifestyle
- pedestrian footpaths are being used, thus it could be dangerous to people using footpaths
- cannot go long distances without being recharged
- unable to travel up stairs
- cost

Question 4d.

Marks	0	1	2	3	Average
%	7	34	40	19	**1.7**

The Segway would be tested during production and before distribution to ensure:
- consistent quality of all parts used during manufacture
- the completed product works as it was intended
- there are less recalls, thus ensuring greater profits

- better client satisfaction, in order to build a positive reputation
- safety/Australian standards.

Question 4e.

Marks	0	1	2	Average
%	62	14	25	**0.6**

Selling a database of clients' details would be an invasion of the clients' privacy and could lead to possible law suits or a decline in the company's reputation.

Question 4f.

Marks	0	1	2	Average
%	44	31	25	**0.8**

Students had to provide any two of the following strategies the company might use to ensure quality management.

- staff training
- materials quality control/inputs
- time and motion – efficiency of machinery
- production planning and monitoring

Question 5a.

Marks	0	1	2	3	4	5	6	Average
%	23	11	13	15	16	12	10	**2.6**

ai.

Expenses the company might have in the research and development period could include:

- use of capital equipment or machinery
- market research, including knowledge and information on competitors' developments
- designing
- prototyping
- material research and testing
- purchasing samples
- travel – visiting trade shows
- purchasing ideas – for example, CSIRO, invention centres
- patents and publications
- observing overseas industries
- testing.

aii.

Between the end of research and development and the beginning of product sales, the following could occur:

- materials purchased
- machinery purchased
- a factory rented
- factory staff trained
- pre-production runs
- packaging designed
- advertising
- distribution.

Question 5b.

Marks	0	1	2	3	4	Average
%	14	29	34	17	6	**1.7**

bi.

The company might be concerned that research and development time was too long for the following reasons:

- research and development time is very costly for the company
- no money is being generated at this stage
- market research is costly
- testing products is costly.

bii.

The company could reduce research and development time by:

- using information and communications technology for modelling
- modifying existing products that are available
- repackaging existing technology.

Question 5c.

Marks	0	1	2	3	Average
%	10	25	36	29	**1.9**

To stop sales from declining the company could:

- relaunch the product
- alter the marketing strategies
- reduce the cost of the product
- offer an incentive to purchase.

Section B

Question 6

Product chosen	None	Uniform	Chair	Jug and drinking vessels	Table
%	1	35	32	29	3

Question 6a.

Marks	0	1	Average
%	29	71	**0.7**

The length of the planned obsolescence is three years.

Question 6b.

Marks	0	1	Average
%	9	91	**0.9**

The age range of the target customers is 14 to 25 years.

Question 6c.

Marks	0	1	Average
%	23	77	**0.8**

The function of the Sharp Juice business is:

- the café (selling drinks and snacks)
- selling clothing and records
- promoting their corporate brand.

Question 6d.

Marks	0	1	2	3	Average
%	8	10	20	62	**2.4**

The three most important specifications included:

- the use of images to inspire the design
- the ease of cleaning and maintaining the finished product
- standard materials and processes to be used.

Other logical specifications were accepted. The specifications had to come from the design brief.

Question 6e.

Marks	0	1	2	Average
%	21	34	45	**1.3**

Students had to provide any two of the following things to be considered before developing design options:

- availability of materials and parts
- colour scheme
- finishes
- availability of skilled labour
- access to tools and equipment.

Question 6f.

Marks	0	1	2	Average
%	15	23	62	**1.5**

The evaluation criteria had to be written as a question or no marks were awarded.

Question 7

Use of selected images for inspiration

Marks	0	1	2	3	Average
%	8	30	41	21	**1.8**

Annotation of design considerations/constraints

Marks	0	1	2	3	Average
%	24	32	27	16	**1.4**

Clarity and detail of drawing

Marks	0	1	2	3	Average
%	3	29	50	18	**1.8**

Function/suitability for use

Marks	0	1	2	3	Average
%	6	23	40	32	**2.0**

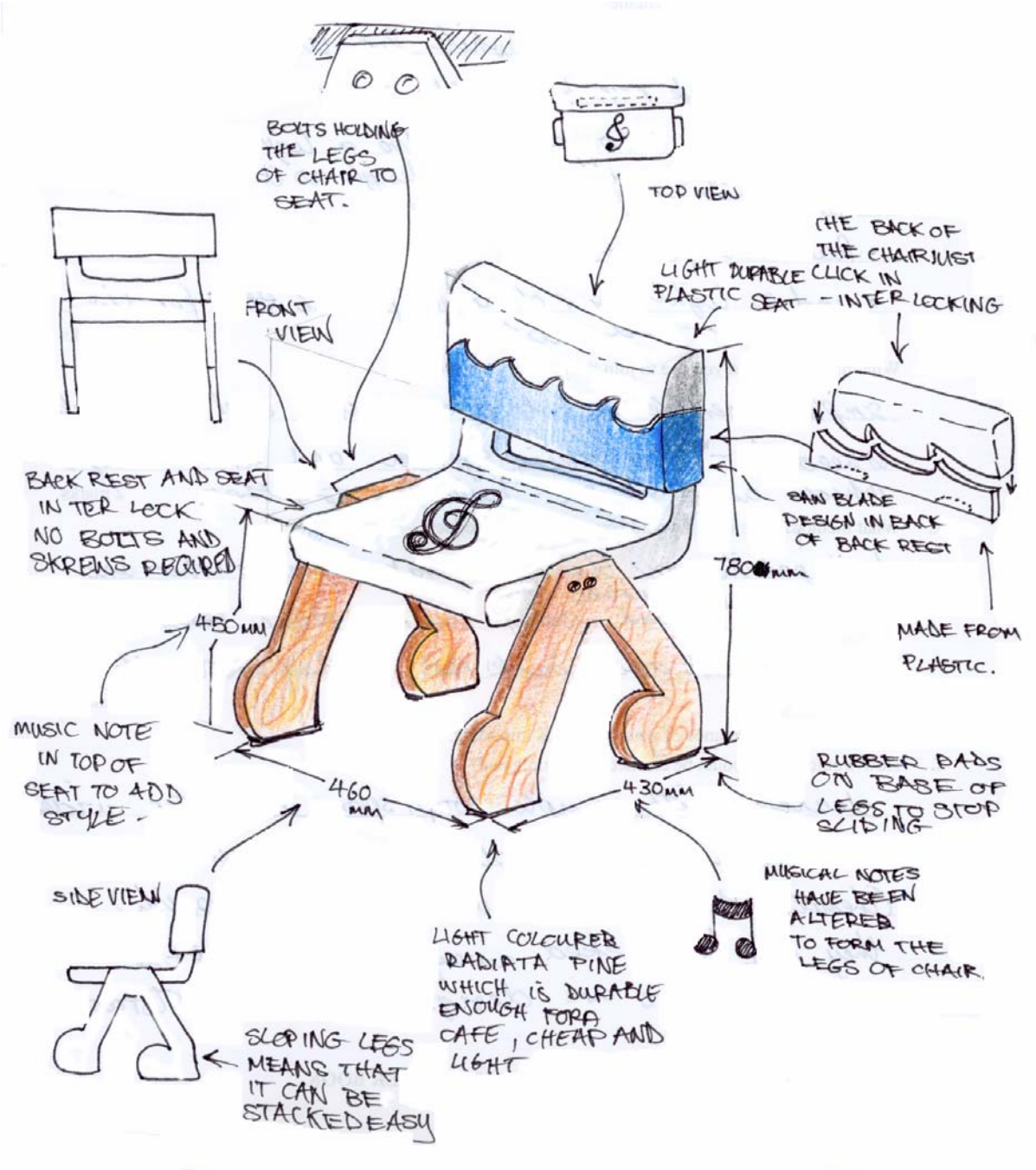
Creativity/innovation

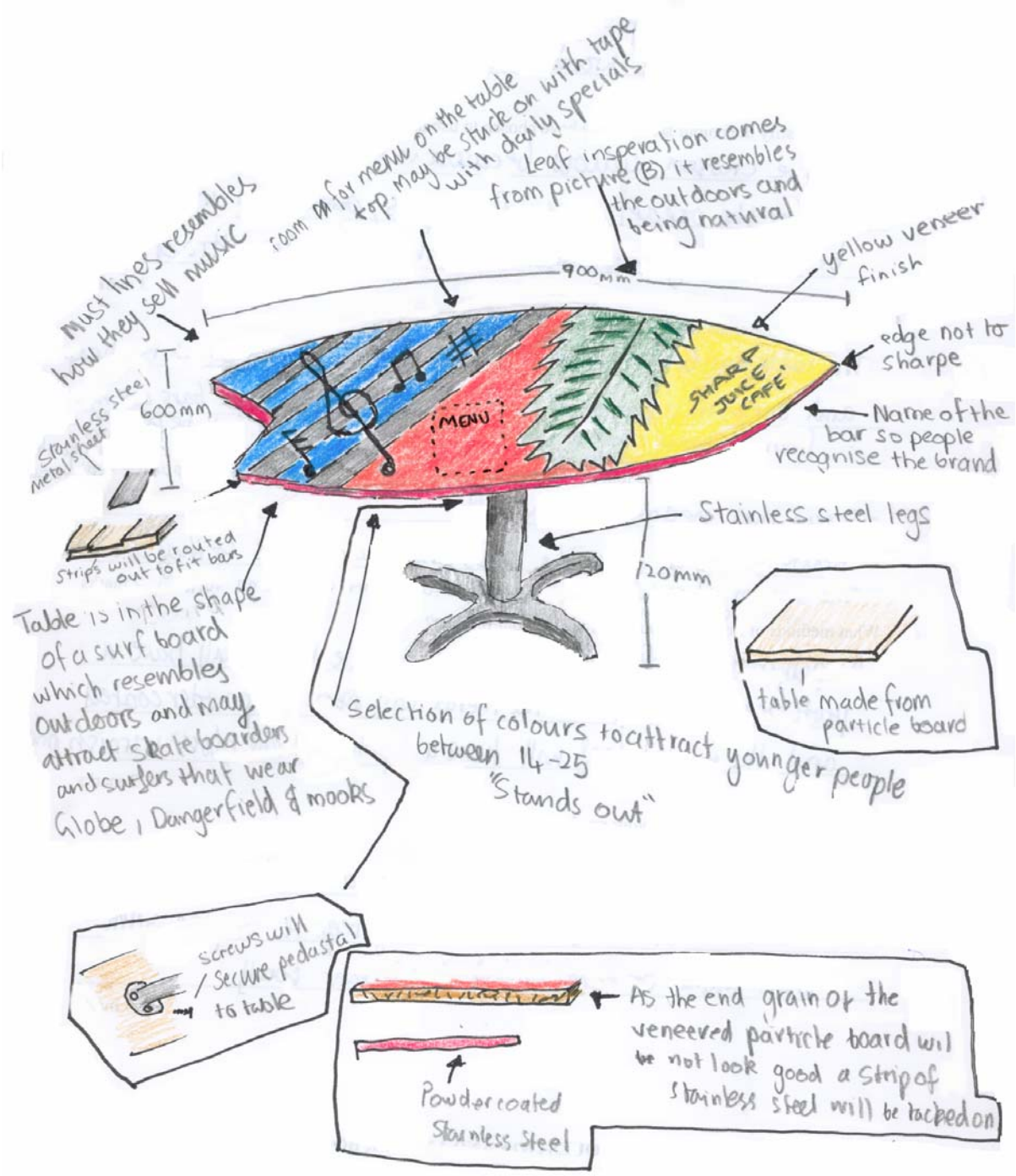
Marks	0	1	2	3	Average
%	10	36	36	19	**1.7**

Product safety

Marks	0	1	2	3	Average
%	29	34	27	10	**1.2**

Following are three example of high-scoring student work.


BOLTS HOLDING THE LEGS OF CHAIR TO SEAT.
TOP VIEW
FRONT VIEW
LIGHT DURABLE PLASTIC SEAT
THE BACK OF THE CHAIR JUST CLICK IN - INTER LOCKING
BACK REST AND SEAT IN TER LOCK NO BOLTS AND SKREWS REQUIRED
SAW BLADE DESIGN IN BACK OF BACK REST
780 MM
450 MM
MADE FROM PLASTIC.
MUSIC NOTE IN TOP OF SEAT TO ADD STYLE.
460 MM
430 MM
RUBBER PADS ON BASE OF LEGS TO STOP SLIDING
SIDE VIEW
MUSICAL NOTES HAVE BEEN ALTERED TO FORM THE LEGS OF CHAIR
LIGHT COLOURED RADIATA PINE WHICH IS DURABLE ENOUGH FOR A CAFE, CHEAP AND LIGHT
SLOPING LEGS MEANS THAT IT CAN BE STACKED EASY


must lines resembles how they sell music
room for menu on the table top may be stuck on with tape with daily specials
Leaf insperation comes from picture (B) it resembles the outdoors and being natural
900mm
yellow veneer finish
edge not to sharpe
Name of the bar so people recognise the brand
Stainless steel
600mm
MENU
SHARP JUICE CAFE
Stainless steel legs
120mm
Strips will be routed out to fit bars
Table is in the shape of a surf board which resembles outdoors and may attract skate boarders and surfers that wear Globe, Dangerfield & moobs
table made from particle board
Selection of colours to attract younger people between 14-25 "Stands out"
screws will secure pedastal to table
As the end grain of the veneered particle board will be not look good a strip of Stainless steel will be tacked on
Powder coated Stainless steel

Question 8a.

Marks	0	1	2	3	Average
%	17	28	35	20	**1.6**

Students were asked how the selected images influenced their design. Responses had to mention the actual image(s) and how that image had influenced the design. For example, *I chose to use the image of the saw teeth in the back section of the chair and the musical notes as the legs of the chair.*

Question 8b.

Marks	0	1	2	3	Average
%	8	24	39	28	**1.9**

The colours used in the colour scheme had to be named and a justification made as to why this colour scheme was used for the design. For example, *Pale blue and white are the colours that were used for the chair as they are cool, light colours that would give the café a clean fresh feel.*

Question 8c.

Marks	0	1	2	Average
%	12	28	60	**1.5**

The materials listed had to be specific, therefore generic classifications of materials – such as wood, metal, plastics, etc. – were not accepted.

Question 8d.

Marks	0	1	2	Average
%	16	34	50	**1.4**

Particular joining/construction methods were required in responses.

Question 8e.

Marks	0	1	2	3	Average
%	17	26	37	21	**1.6**

Methods used to actually finish off the product were required in responses.

Question 8f.

Marks	0	1	2	3	Average
%	6	31	44	19	**1.8**

Responses had to mention methods for both cleaning and maintaining in order to gain three marks.