

2009 HSC Industrial Technology

Sample Answers

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Section I

Question 1 (a)

Sample answer/Answers could include:

- Advertise
- Sell product/services cheaper
- Sale
- Incentive to buy from eg special offers

Question 1 (b)

Sample answer/Answers could include:

- Reducing size of management. Managerial costs reduce while output remains constant, therefore efficiency increases.
- Outsourcing management sections. More cost effective.
- Flattening management structure. Management more hands on, directly involved in production.

Question 1 (c)

Sample answer/Answers could include:

- Market research
 - Survey customers
 - Phone survey

Question 1 (d)

Sample answer/Answers could include:

- Mandatory working hours
- Breaks for lunch, dinner, etc
- Operating hours for business

Question 2 (a)

Sample answer/Answers could include:

- Notice board
- Memos
- Meetings

Question 2 (b)

Sample answer/Answers could include:

- Financial problems
- Family stress
- Staff morale
- Risk of losing employees

Question 2 (c)

Sample answer/Answers could include:

- Training Packages/Courses
- Signage
- Comply to OHS Standards
- Team structure (Teacher leader for support)
- Skill level compliance

Question 2 (d)

Sample answer/Answers could include:

- Market survey
- Financial analysis
- Evaluate staff skills
- Evaluate existing & required infrastructure

Question 2 (e)

Sample answer/Answers could include:

Design

- Rapid prototyping
- Virtual design
- Ease of change

Production

- Accuracy
- Consistency/Quality control
- Automation vs manual control

Question 3 (a)

Sample answer/Answers could include:

- Quick to draw
- Easy to understand

Question 3 (b)

Sample answer/Answers could include:

- Sign with a red cross through it. Universal language, everyone understands it.
- Head with hearing protection. No words needed to convey meaning.

Question 3 (c) (i)

Sample answer/Answers could include:

Complete the table

The table below shows the weekly wages for IND-TECH.

Employees	Number	Hourly Rate (\$)	Hours Worked	Weekly Wages
Administration Staff	3	17	40	2040
Managers	2	55	40	\$4,400
Tradespeople	7	45	40	\$12,600
Apprentices	2	16	40	\$1,280
			Total Cost	\$20,320

Question 3 (c) (ii)

Sample answer/Answers could include:

Question 3 (d)

Sample answer/Answers could include:

- Speed
- Cut and paste
- Copy
- Multiple printing
- Spell check
- Grammar check
- Range of fonts
- Presentation

Question 3 (e)

Sample answer/Answers could include:

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Graphics Industries

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Section II

Question 4 (a)

Sample answer/Answers could include:

- 1) Single swing door
- 2) Window

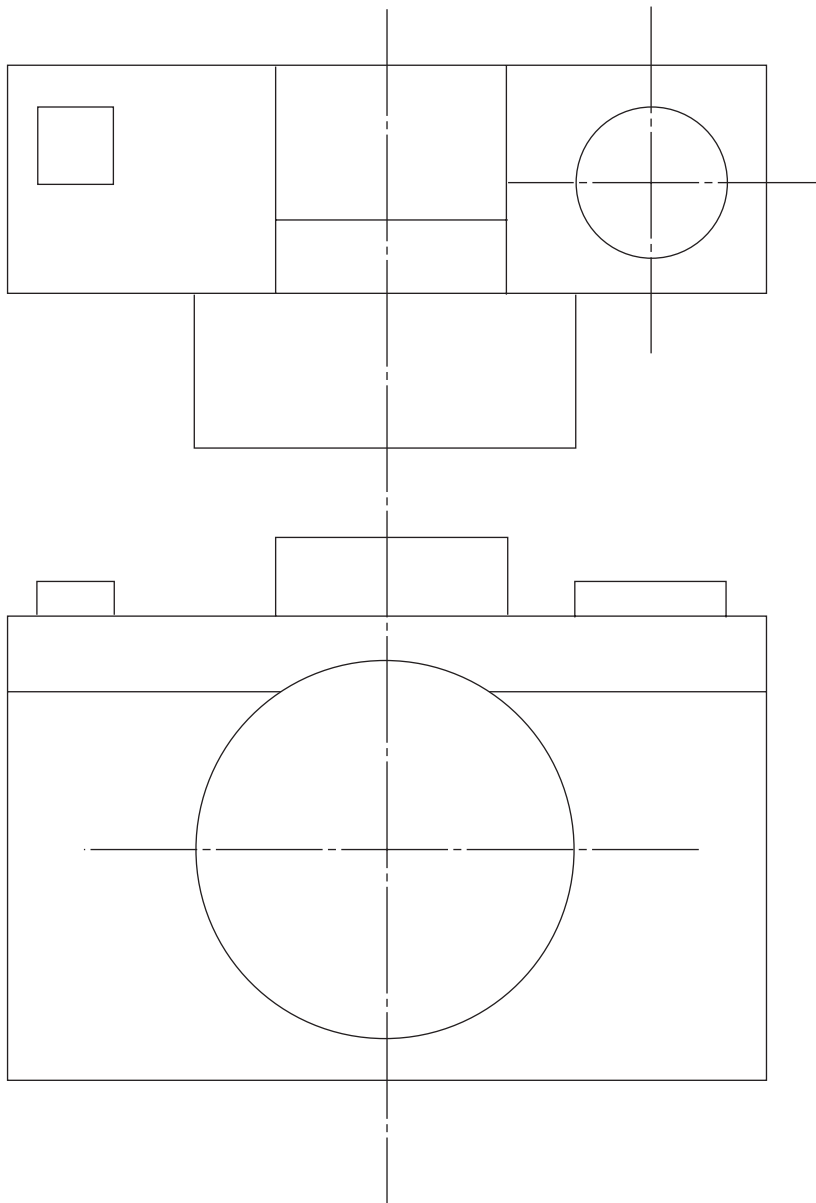
Question 4 (b)

Sample answer/Answers could include:

- Transforms ideas from a thought process to a visible image
- Clearly communicates design ideas
- Variety of views available (top, front, side) from one drawing
- Range of different drawing types: isometric, oblique, planometric etc
- Line, tone and colour can also be implemented with these drawing to enhance a design idea

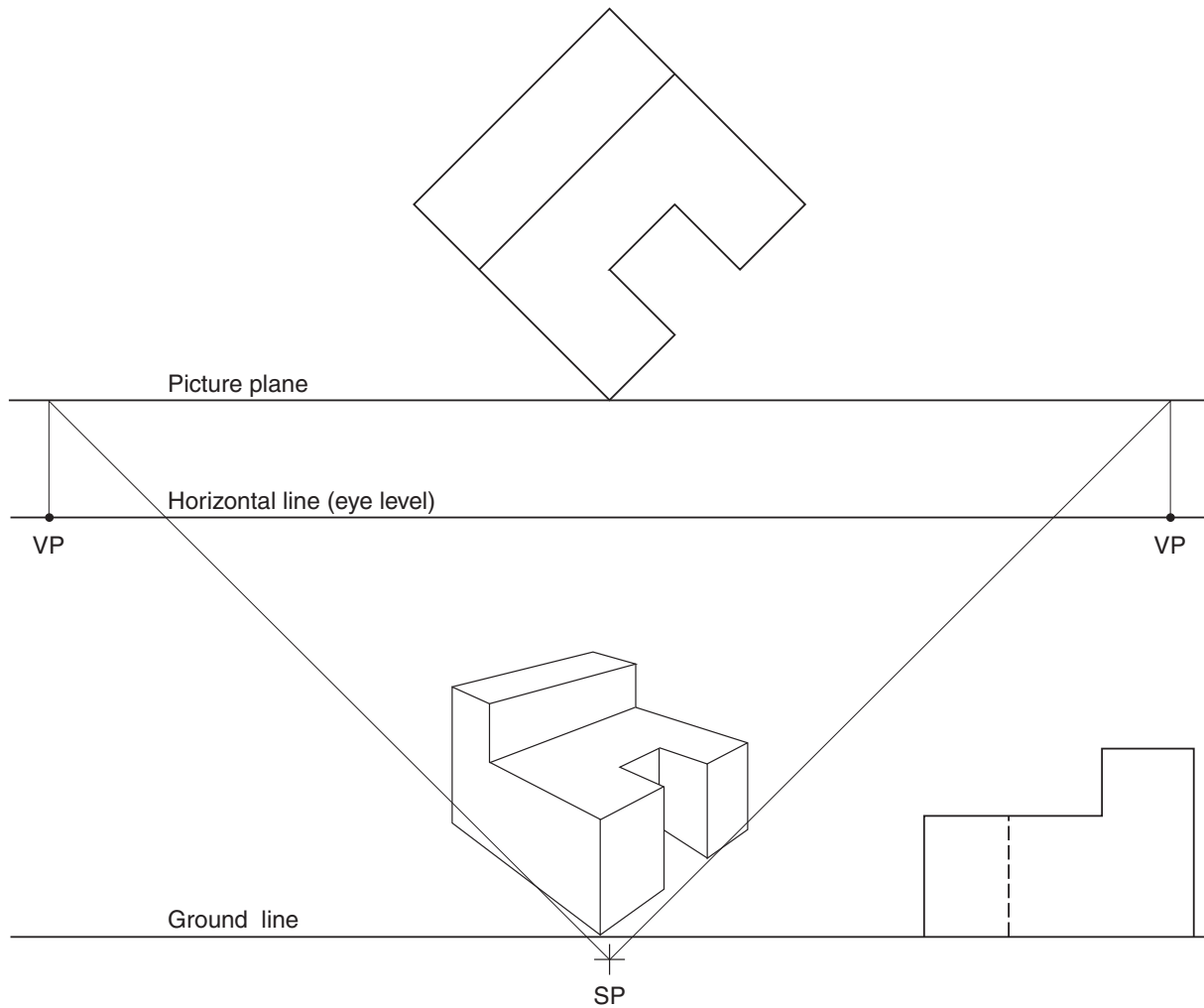
Question 4 (c)

Sample answer/Answers could include:



Question 4 (d)

Sample answer/Answers could include:



Question 4 (e)***Sample answer/Answers could include:***

- Precise presentation (fine detail) for both types
- Similar components ‘lifted’ to new drawing without having to be drawn – computer software package
- Multi-view from pictorial to 2D drawing function to 3D – computer software package
- Stored electronically – computer software package
- Drawings easily amended – computer software package
- Scaling (up or down/zoom) drawing for viewing – computer software package
- Rendering use different values (automatic) – both types
- Drawings layered – computer software package
- Easy to reproduce – computer software package
- Colour printing – computer software package

Question 5 (a)

Sample answer/Answers could include:

1. Reveal interior workings (describes the information inside the object)
2. Relays 'detail' for manufacturing purposes
3. Aspects may be seen and understood ie used in association with assembly drawings
4. People can better understand concepts

Question 5 (b)

Sample answer/Answers could include:

1. Views are positioned differently in each projection
2. 1st angle projection – located in 1st quadrant
3rd angle projection – located in 3rd quadrant
3. 3rd angle – TOP VIEW – located above front view
1st angle – TOP VIEW – located below front view
4. The viewing direction/orientation of an object of top, front and side is not similar.

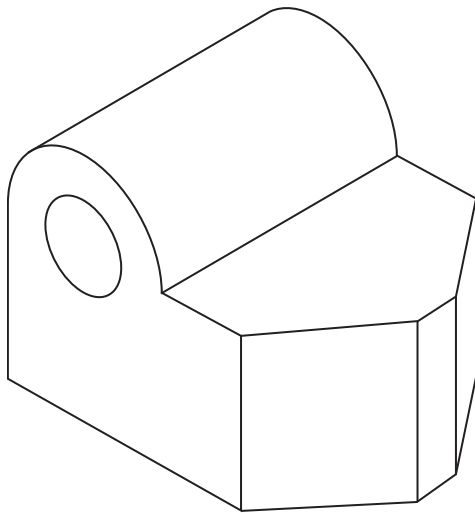
Question 5 (c)

Sample answer/Answers could include:

- Drawing standards are an effective form of communication for designers and manufacturers
- A virtual language for designers and manufacturers
- Creating uniformity of drawing standards to enable consistency in presentation techniques
- Standardising drawing symbols/details for purpose of manufacturing
- Lines of a communication between designers and manufacturers

Question 5 (d)

Sample answer/Answers could include:

**Question 5 (e)**

Sample answer/Answers could include:

- Rendered drawings
- Modelling
- Mock-ups
- Computer generated drawing 2D and 3D
- Walk-through – software presentation
- Fly over/fly around
- Colour presentation
- Product drawings
- Perspectives

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Automotive Industries

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Section II

Question 4 (a)

Sample answer:

- Oil gets thick with use (high viscosity)
- New oil allows good oil flow (low viscosity)
- Oil deteriorates with use from combustion of the fuel (gum, acids and lacquer substances)
- Dust gets into oil from air entering the engine

Answers could include:

- Maximum protection of engine components
- Reduce friction and wear to a minimum

Question 4 (b)

Sample answer:

- Electric motor uses batteries in vehicle
- Petrol engine charges batteries
- Petrol engine only used when necessary
- Electric motor better for environment
- Petrol engine more power

Question 4 (c)***Sample answer:***

Advantage of diesel engine

- Greater efficiency
- Greater fuel efficiency
- Operate at lower rpm
- Less volatile fuel
- Engine lasts longer

Answers could include:

Disadvantage of diesel engine

- Greater frequency of servicing
- Frequently noisier
- Less common
- Availability of fuel – less pumps
- Fuel more expensive

Question 4 (d)***Sample answer:***

- Cylinder head bolts must be tightened in the correct sequence and to the correct torque, using a torque wrench (tension wrench).
- Aligning studs can be installed in two diagonally opposite holes to keep the gasket in place.

Answers could include:

- Before assembling the surfaces of both the cylinder head and cylinder block must be clean. The bolts and threads of the cylinder block must also be clean.

Question 4 (e)***Sample answer:***

The basic function of the cooling system is to transfer heat from inside the engine to the outside air. This is done by water (coolant) circulating through the engine and radiator by the water pump.

Answers could include:

Radiator, water pump, water jackets, radiator hoses, thermostat, fan, coolant.

Question 5 (a)

Sample answer:

- Rotate tyres by rotating wheels
- Regular wheel balancing
- Regular checking of tyre pressure

Answers could include:

- Suspension adjustments
- Wheel alignment
- Shock absorbers checked

Question 5 (b)

Sample answer:

- Drum brakes use the friction of a lining on a brake shoe assembly on a brake drum. The brake shoes are expanded inside the drum by a wheel cylinder.
- Disc brakes use the friction of the pads in the callipers to slow the disc, via a piston.

Question 5 (c)

Sample answer:

Advantages of panel replacement

- Cheaper than repairs
- Polymers used in body parts
- Older cars were designed to be repaired

Answers could include:

Disadvantages of panel repairs

- Labour cost very high
- New cars use rigidity of shape and thinner materials.

Question 5 (d)***Sample answer:***

- Safety
- Pollution
- Legal requirements
- Australian Standards
- Over powering vehicle

Question 5 (e)***Sample answer:***

- New materials → safer → stronger
- Wind tunnels → more aerodynamic → more efficient/safer
- Lighter vehicles → less fuel (environmental)
- Better brake alignment → safer
- Parking sensor
- Auto headlights
- Auto windscreen wipers

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Electronics Industries

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Section II

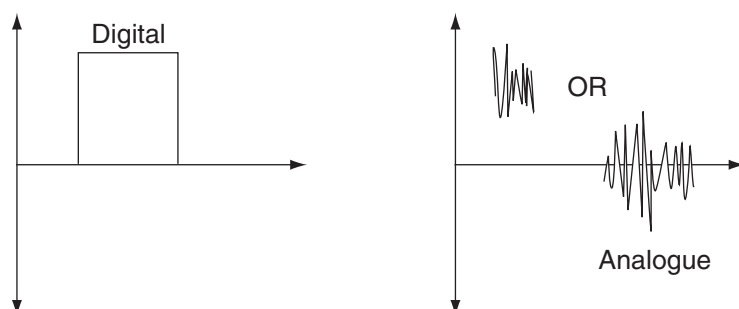
Question 4 (a)

Sample answer/Answers could include:

- Electrical potential – voltage, electromotive force
- Electron flow – current, ampere

Question 4 (b)

Sample answer:




Question 4 (c) (i)

Sample answer:

A	B	F
0	0	0
0	1	1
1	0	1
1	1	1

Question 4 (c) (ii)

Sample answer:

‘OR GATE’ 

Question 4 (d) (i)

Sample answer:

One cycle of a

A and B: sine wave

C and D: Straight line or near straight line representing slight ripple

Question 4 (d) (ii)

Sample answer/Answers could include:

Diode: changes AC to rectified AC

Capacitor: changes rectified AC to smooth DC

Question 4 (e)

Sample answer:

Examples: Traffic intersection lights, auto stop and turn indicator lights, hand torch.

Require low power, radiates low heat.

Applications give equal light intensity by using many LEDs. Lower overall cost because higher initial cost amortised due to reliability.

Question 5 (a)

Sample answer:

Trim pot OR trimming potentiometer
Pot OR potentiometer

Question 5 (b)

Outcomes assessed: H4.3

Sample answer:

‘Free running’ DC motor runs flat out when connected to DC power source.
Stepped motor rotates slightly in steps with a particular pulse from the control circuitry.

Question 5 (c) (i)

Sample answer/Answers could include:

The thermistor controls the current and voltage to the base of the BC548, by varying its resistance inversely to temperature.

Question 5 (c) (ii)

Sample answer/Answers could include:

Operation of BC548 controls operation of 2N3055. Low current in BC548 controls high current in 2N3055.

Higher current collector to emitter in the general purpose transistor means a higher current C to E in the power transistor.

Question 5 (d)*Sample answer/Answers could include:*

	<i>Solenoid</i>	<i>Relay</i>
Size of current that can be switched	Large	Moderate
Number of circuits that can be switched simultaneously	Usually only one	Multiple
Safety – suppressed sparking	Good	Good
Remote circuit control	Yes	Yes
Resets automatically	Yes	Yes
Overcomes limitations of solid state switching	Yes	Yes

Question 5 (e)*Sample answer/Answers could include:*

Generate by solar panel, wind turbine, hydro (water) driven turbine. Recharges an electrical storage battery such as a lead acid, nicad (nickel cadmium) or 'LIPO' (lithium polymer).

Choice depends on type of equipment requiring power and their environment.

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Metals and Engineering Industries

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Question 4 (a)

Sample answer:

Galvanised sheet metal
Tin plate
Aluminium
Stainless steel

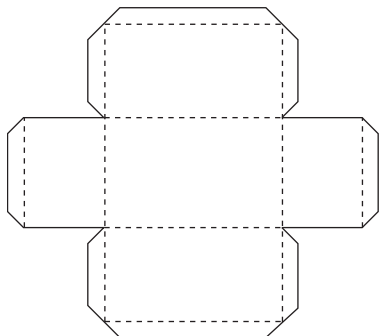
Question 4 (b)

Sample answer:

- Hot dipped galvanising – components prepared then dipped into bath of hot galvanising
- Zinc plated
- Painted
- Powder coated

Question 4 (c)

Sample answer:



Cut sheet out as shown
Fold and flatten safety edges
Fold side tabs
Spot weld or rivet sides together
Magna bend, bench shears, tinsnips/guillotine

Question 4 (d)

Sample answer/Answers could include:

- Stub axle with nut and split pin
- Solid bar with bush washer and split pin
- Axle with Nylock nuts

Question 4 (e)

Sample answer:

Drill tray and chassis, use nut and bolt
Mig weld tray to chassis

Mig weld is permanent not allowing for other uses of the trailer. Nut and bolt allow the trailer to be removed for repairs or other uses.

Question 5 (a)

Sample answer:

- Power hacksaw
- Cold cut saw
- Laser

Question 5 (b)

Sample answer:

- Screw thread
- Riveted
- Friction fit

Question 5 (c)

Sample answer:

Turn between centres. Sharpen lathe tool to thread profile. Adjust lathe to correct feed/speed ratio. Engage feed cut thread. Purchase continuous thread. Cut to length. Hold on lathe. Turn end down to 15 mm. Remove drill 4 mm hole in drill press. Centre drill, drill, assemble screw and screw cap and drill for pin.

Question 5 (d)

Sample answer:

Align jaws on vice. Drill pilot hole.

Drill 5 mm \varnothing hole in vice. Tap using M6 \times 1 tap.

Drill 6 mm \varnothing hole in vice jaws. Drill countersink in vice jaws so head of screw is seated to correct depth.

Question 5 (e)*Sample answer/Answers could include:*

- Processes to casting
 - Moulds
 - Molten metal
 - Expensive setup
 - Casting
 - Drill, TAP
- Processes for fabrication
 - Cutting
 - Welding
 - Drill TAP

Small quantities: Mild steel, minimal set up costs.

Large quantities: Cast iron, large set up costs, minimal labour costs

Simple design: Mild steel preferable

Failure due to impact: Mild steel preferable.

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Multimedia Industries

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Section II

Question 4 (a)

Sample answer/Answers could include:

Digital camera
Scanner
Stills camera
Webcam, video camera

Question 4 (b)

Sample answer/Answers could include:

A hierarchical storyboard allows the website to be planned as it shows the navigation layout of the site in a visual format and indicates the links between specific pages.

Non-linear storyboard, basic page layout design can be viewed.

Question 4 (c)***Sample answer/Answers could include:***

When formatting text for a website a developer must use a font size that is easy to read and not too small. They must also consider the font colour as it may be hard to read against certain background colours.

Font types may not be available to some users, so a common font type is safer to use. Some font types can be hard to read unless large in size. Use a font type that is easy to read in a small font size.

Question 4 (d)***Sample answer/Answers could include:***

Breaching copyright – both customer and video store must follow copyright laws to avoid liability and possible prosecution. Recognition of the artist and owners of copyright materials should be sought by obtaining permission. Loss of profits of the rightful owners.

Loss of profits for artists, owners, industry
Copyright laws/permission/theft
Recognition of artists work

Question 4 (e)***Sample answer/Answers could include:***

File formats could be incompatible (specific players/software)
Resolution (eg HDV) sizes could result in large file sizes (slow streaming or download speeds)
Files sizes of all video files will add up and require large amounts of storage.
Resolution and screen size eg standard definition screen compared to HDV widescreen
Video codecs
Internet bandwidth
Video file types
OS compatibility (eg wmv not available for Apple)
Browser compatibility

Question 5 (a)

Sample answer/Answers could include:

Quicktime movie file, AVI
.mov, .wmv. .mpeg, .avi

Question 5 (b)

Sample answer/Answers could include:

The graphic file can be converted to a lower quality jpeg by reducing the colour palette or reducing the resolution of the original.
Change to a gif. Reduce the canvas size. Lossless/lossy compression.

Question 5 (c)

Sample answer/Answers could include:

A path-based animation technique could be used. This is done by drawing paths for an object to follow and the computer automatically makes the graphic follow that path.

Path-based

A very fast technique
Not as precise as cel-based
Stop motion
Programmed CGI

Cel-based

Individual frames are created
Frames played back in quick succession to create movement
Slow but precise

Question 5 (d)

Sample answer/Answers could include:

Photo manipulation software such as Photoshop can be used to change the images colours to be ready for print. An Ink-jet printer for printing to photographic glossy paper that allows for high quality print outs.

Desktop publishing programs for layouts, laser printer for speed.

Question 5 (e)

Sample answer/Answers could include:

Sample rate – large amounts of samples per second result in higher quality

Sample depth (bit depth) - larger amounts of data captured in each sample result in better quality

Number of channels in sound capture and when playing sound through stereo or 5.1 surround sound

File types – MP3 files are compressed and have some sound frequencies removed – lower playback quality

Speakers/channels File types

Microphones Sound card

Environmental noise Sample rate

Bit depth (sample depth) 8 bit sound, 16 bit sound

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Timber Products and Furnitures Industries

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Section II

Question 4 (a)

Answers could include:

Rule
Try square
Diagonal stick

Question 4 (b)

Answers could include:

Diagonal timber brace (in compression – prevents sagging on the side opposite the hinges)
Turn buckle
Gussets on each corner

Question 4 (c)

Answers could include:

Hardwood – frame, durable

Metal – hinges, latches, corrosion resistant

Question 4 (d)

Answers could include:

Robotics including the use of:

CNC plotted/cut profiles

Computer machine centres

Gang assembly

Question 4 (e)

Answers could include:

Hand tools and machinery

Any suitable hand measuring device

Computerised/robotic machinery (docking saws, jig saws, gang assembly, gang nailing)

Maintenance

Regular cleaning

Rack cutting tools

Routine checking of effectiveness of cutting surfaces (sharpening)

Annual electrical tagging of equipment

Regular indexing of computerised/robotic machinery

Question 5 (a)

Answers could include:

Plywood
Particle board
MDF
Hardboard

Question 5 (b)

Answers could include:

Reduce waste
Components will match and fit together
Reduce assembly time

Question 5 (c)

Answers could include:

Glass sections should be undercut to size.
Grooved slides made from timber, plastic or metal are fitted at the top and bottom of the opening.

Question 5 (d)

Answers could include:

- Joints
 - Dovetail joints – through, secret, secret mitre
 - Cabinet hardware fittings
- Assembly method
 - Jigs
 - Strap clamps

Question 5 (e)

Answers could include:

Manufactured boards

Cost/access
Uniform strength/weight
Dimensional tolerance/density
Should take finish uniformly

Solid timber

Cost/access
Strength/durability
Aesthetic value