

Design & Technology

Advanced GCE A2 7822-3

Advanced Subsidiary GCE AS 3822-3

Mark Schemes for the Units

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MARK SCHEMES FOR THE UNITS

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2520/01 Product Design 1

1 (a) Justified design requirements include:

- clear picture to avoid eye strain
- stable, secure base to avoid falling and possible damage
- easy and clear usage/set up to avoid frustration
- allow effective connection of peripheral equipment to accept/record signals.

No marks awarded for statements referring to obvious product function eg must show programmes.

For **three** justified design requirements 1 x 3 **[3]**

(b) Examples could be:

- screen shape/proportion for effective viewing
- power switch clearly visible for ease of operation
- power switch easily located and operated by hand
- picture image clearly visible
- room for hands/fingers to connect cables.

A clear description related to ergonomic features up to 2 marks

For **three** examples described 2 x 3 **[6]**

(c) Reasons could be:

- rapid technological changes
- expensive items, cannot afford unsold stock
- large range of similar products, slight variations
- frequent demand for new models

For **three** reasons given 1 x 3 **[3]**

(d) Issues included in discussion could be: Examples could be:

- | | |
|--|-----------------------------------|
| • wider choice/new products | • appropriate new product eg ipod |
| • better, cheaper products as a result of advances in manufacturing technologies | • digital tv fears |
| • fear (technophobia)/lack of knowledge | • broadband/internet |
| • pressure to 'keep up with the Jones's' | |
| • differing views on value of technologies such as internet | |

P	relevant points/issues	up to 3 marks	
Q	quality of explanation	up to 2 marks	
S	specific example/evidence	1 mark	[6]

Total [18]

2 (a) Ways could be:

- review manufacturing processes (minimise use of high energy use systems)
- redesign products to reduce number of components required
- buy in components
- site factories closer to suppliers
- effective production, no standby operations
- only produce what is needed (JIT).

For **four** ways

1 x 4 **[4]**

(b) Ways could be:

- HEP
- water wheel
- tidal systems
- wave power systems.

For each:

- | | | | |
|---------------------------------|--------|-------|------------|
| • clear sketch | 1 mark | | |
| • energy input | 1 mark | | |
| • method of transforming energy | 1 mark | | |
| • energy output | 1 mark | 4 x 2 | [8] |

(c) Issues included in discussion could be:

Examples could be:

- | | |
|--|--|
| <ul style="list-style-type: none"> • heavy road usage • air transport/shipping • environmental concerns • global/local transportation • increased expense costs • order delays • effective packaging/tessellation | <ul style="list-style-type: none"> • food products from abroad • small village road usage. |
|--|--|

- | | | | |
|---|---------------------------|---------------|------------|
| P | relevant points/issues | up to 3 marks | |
| Q | quality of explanation | up to 2 marks | |
| S | specific example/evidence | 1 mark | [6] |

Total [18]

3 (a) Justified design requirements include:

- high quality manufacture/finish to meet client/user high expectation
- must be stable, no risk at all to user
- able to have variety of upholstery options to meet lounge décor
- extremely high comfort standard to suit clientele of hotel
- high quality aesthetic design to give luxury feel
- justified specific ergonomic features.

No marks awarded for statements referring to obvious product function eg must be able to sit on it

For **three** justified design requirements 1 x 3 **[3]**

(b) Reasons could be:

- very few manufacturing processes required
- simple design, no complex design features
- very simple assembly of components
- few components.

For **three** reasons 1 x 3 **[3]**

(c) Considerations could be:

- target market, ensuring appropriate, high earning groups are targeted
- appropriate media easily accessed by target group
- method must reflect luxury product, (leaflets not appropriate)
- cost margins, how much would be available

For **three** considerations well explained 2 x 3 **[6]**

(d) Issues included in discussion could be: Examples could be:

- | | |
|--|--|
| <ul style="list-style-type: none"> • simplicity in usage • simplicity in design • successful in terms of sales • successful in terms of function | <ul style="list-style-type: none"> • ipod • Bauhaus principles |
|--|--|

P	relevant points/issues	up to 3 marks	
Q	quality of explanation	up to 2 marks	
S	specific example/evidence	1 mark	[6]

Total [18]

4 (a) Justified design requirements include:

- non rip fabric so that shoes do not fall out
- very easy to fasten and undo - young users
- space/fabric suitable for identification - easily identified
- robust construction, rough usage by pupils
- will accommodate largest possible shoe size, fully enclose shoes.

For **three** justified design requirements 1 x 3 **[3]**

(b) Checks could be:

- visual check for quality of printing
- check on seam quality
- check toggle/fastening system
- check string attached to fastening system.

For **three** checks clearly described 2 x 3 **[6]**

(c) Ways could be:

- specialist school uniform
- school guidance, handouts, website
- internet searches
- other parents.

For three examples 1 x 3 **[3]**

(d) Discussion could include:

Issues included in discussion could be:

- reduction of manufacturing requirements
- guaranteed quality
- choice of suppliers
- reliability of suppliers.

Examples could be:

- products such as cars/torches/bicycles using bought in parts/components.

P relevant points/issues
Q quality of explanation
S specific example/evidence

up to 3 marks
up to 2 marks
1 mark

[6]

Total [18]

5 (a) Justified design requirements include:

- staple correctly applied and folded with no damage/marking of paper
- appropriate amount of leverage required to effectively use without exerting too much pressure
- sufficient 'throat' to staple in a variety of positions
- effective spring to return to original position ready for next staple
- sufficient space to load enough staples to avoid constant re filling
- non slip base to avoid sliding around on table.

No marks awarded for statements referring to obvious product function eg must staple paper

For three justified design requirements 1 x 3 **[3]**

(b) Considerations could be:

- reduce parts/processes
- reduce unnecessary features
- use bought in components eg fixings
- review manufacturing processes, eg press/extrude/injection mould
- review material choice.

For three considerations 1 x 3 **[3]**

(c) Ways could be:

- user testing
- independent review (Which report)
- visual inspection of finish and assembly
- close (micro) examination of staple.

For three ways well explained 2 x 3 **[6]**

(d) Issues included in discussion could be:

- expense (usually first to go in recession)
- possibility of developing new products
- further development of expertise/specialism in product area
- chemical testing.

Examples could be:

- major car companies
- chemical companies.

P	relevant points/issues	up to 3 marks
Q	quality of explanation	up to 2 marks
S	specific example/evidence	1 mark

[6]

Total [18]

2520/02 Product Design 1

- 1 (a) (i) any suitable hardwood such as teak, eg ash, mahogany, oak, beech, sycamore, maple - 1 mark for each [2]
- (ii) the metal thread, mill component dimensions. Ergonomic/anthropometric considerations, the grain of the timber used, the finish, size, environment. Do not accept weight – any 2 [2]
- (b) detailed description of the process to include:
- | | | |
|--|-----|--|
| Design/working drawing produced on suitable CAD software | (1) | |
| Computer linked to CNC lathe | (1) | |
| Material prepared cut to length – or continuous feed of stock material | (1) | |
| Tools selected | (1) | |
| Material placed in machine | (1) | |
| Profile turned | (1) | |
| Second piece inserted | (1) | |
| Central hole bored/drilled | (1) | |
| Base bored out to take mechanism | (1) | |
| Material parted off | (1) | |
| Rough edges removed/sanded | (1) | |
| Pepper mill assembled | (1) | |
| Varnished | (1) | |
| Use of standardised components | (1) | |
- [8]
- (c) discussion could include
- material cost and availability
 - nature of the timber – ie from a managed source
 - durability of products
 - recycled/re-used
 - cost availability of treatments to extend life of product
 - examples of treatments – varnish, wax etc.
- | | | |
|------------------------------------|-----|-----|
| [P] Critical examination of issues | (3) | |
| [Q] Quality of explanation | (2) | |
| [S] Supporting examples/evidence | (1) | [6] |

- 2 (a) (i) strong (must be justified) Hardwearing, tough (qualified), impact resistant, hard-difficult to break/cut through [2]
- (ii) to reduce weight, reduce cost, easier to work, does not rust [2]
- (b) Mention Forging (1)
 Cut stock to length (1)
 File edges (1)
 Place steel bar in forge credit for illustration (1)
 Heat bar (1)
 Remove bar from forge (1)
 Place bar on former (1)
 Clamp in position (1)
 Bend bar to shape (use appropriate force)/reheating if necessary (1)
 Check profile (1)
 Quench bar in water (1)
 Clean bar with abrasive paper (1)
 Reheat to appropriate tempering colour (1)
 Quench (in oil) (1)
 Finish bar 'remove any burrs etc (1) [8]
- (c) discussion could include:
 Cost of New machinery required, new materials may be more expensive, loss of traditional customer base, new products may be better therefore increased sales
- [P] Critical examination of issues (3)
 [Q] Quality of explanation (2)
 [S] Supporting examples/evidence (1) [6]

- 3 (a) (i) lightweight, strong, durable, easily coloured, safe (no sharp edges, warm to the touch, shiny (good for sliding), can easily have textured surfaces applied, weather/corrosion resistant, flexible [2]
- (ii) polypropylene, polycarbonate, ABS, Polystyrene (HIPS), HDPE, (not acrylic)
No Polyester, No PVC [2]
- (b) Detailed description of injection moulding eg:
- | | | |
|---|-----|--|
| hopper | (1) | |
| pellets/granules or sketch | (1) | |
| heating/molten | (1) | |
| forced/pushed into mould under pressure | (1) | |
| split mould | (1) | |
| cooling (water) do not accept set without explanation | (1) | |
| ejection of moulding | (1) | |
| Identification of sprue | (1) | |
| removal waste | (1) | |
- [8]
- (c) discussion could include:
Avoidance of finger traps, maximum height/weight, material choice influence by flammability standards, non toxic, sharp edges, loose/removable components
Reference to standards, allow the use of parts of the slide as an example.
- | | | |
|---|-----|------------|
| [P] Critical examination of issues | (3) | |
| [Q] Quality of explanation | (2) | |
| [S] Supporting examples/evidence | (1) | [6] |

- 4 (a) (i) appeals to consumers, gives companies an ethical dimension, can be lower cost (not always), reduces waste, environmentally friendly. [2]
- (ii) screen printing, roller printing, transfer printing – these do not rely on a flat sheet [2]
- (b) detailed description of vinyl cutting:
- | | | |
|--|-----|--|
| Designs produced on computer | (1) | |
| Designs converted to vector format (if required) | (1) | |
| Computer connected to vinyl cutter | (1) | |
| Vinyl loaded into machine | (1) | |
| Machine set to the correct pressure for the material | (1) | |
| Design cut out | (1) | |
| Waste material 'picked out' | (1) | |
| Low tack tape applied to vinyl | (1) | |
| Design peeled off | (1) | |
| Design carefully aligned on pen | (1) | |
| Vinyl applied/ tape peeled off | (1) | |
| Lightly burnished | (1) | |
| Checked for accuracy | (1) | |
- [8]
- (c) discussion could include:
- Ethical companies highly regarded by customers, may lead to increased sales/profits, important to avoid criticism, may be able to attract grants/additional funding
- | | | |
|------------------------------------|-----|-----|
| [P] Critical examination of issues | (3) | |
| [Q] Quality of explanation | (2) | |
| [S] Supporting examples/evidence | (1) | [6] |

- 5 (a) (i) Acrylic, thin plastic, laminated paper/card, corrugated, PVC, any appropriate sheet material [2]
- (ii) eg waterproof, flexible, strong, lightweight, easy to print onto, readily available, tear resistant, durable [2]
- (b) Detailed description of Screen printing:
- artwork/origination (1)
 - image setter - colour separation, film images produced for each colour, (1)
 - silk screens coated with light sensitive emulsion (1)
 - screens produced by exposure to uv light (1)
 - screen washed to develop image (1)
 - screens attached to printer sign blanks carefully positioned using registration marks/aligned (1)
 - ink applied using squeegee (1)
 - Signs placed in a rack (1)
 - signs left to dry (1)
 - application of second colour (1)
- [8]
- (c) discussion could include: sophisticated software with wide range of fonts does not require traditional sign writing skills, image layout, use of digital images makes designing much easier, however, good quality composition still requires design skills, creative ideas are still a pre-requisite, ease of use, speed, examples of email, types of software.
- [P] Critical examination of issues (3)
- [Q] Quality of explanation (2)
- [S] Supporting examples/evidence (1) [6]

- 6 (a) (i)** eg cotton, wool, polyester, nylon, acrylic weaves, NOT silk [1]
- (ii)** soft, breathable, strong, washable [1]
- (b)** No toxic dyes, components that could be removed by baby (eg buttons), non – allergenic, warning labels, Flame resistant [2]
- (c)** detailed description of process
- | | |
|---|-----|
| 1. Origination of artwork | [1] |
| 2. Print in reverse onto transfer paper | [1] |
| 3. Warm the play-suit | [1] |
| 4. Make sure the garment is flat | [1] |
| 5. Place transfer paper on garment | [1] |
| 6. Check alignment | [1] |
| 7. Cover with Teflon or greaseproof paper | [1] |
| 8. Apply heat for a set amount of time | [1] |
| 9. Apply pressure as above | [1] |
| 10. Remove paper | [1] |
| 11. Quality check for application | [1] |
- [8]
- (d)** discussion could include:
cost, fashion, nature of product, performance characteristics needed
- | | |
|---|-----|
| [P] Critical examination of issues | (3) |
| [Q] Quality of explanation | (2) |
| [S] Supporting examples/evidence | (1) |
- [6]

- 7 (a) (i) eg comfortable, moisture repellent, warm, easy to colour/print, lightweight, resistance to abrasion [2]
- (ii) adds strength, traps air in quilting therefore helps to keep warm, looks attractive, adds to comfort, adds depth to the material [2]
- (b) The fabric [1] is passed through a series [2] of highly polished [1] heated [1] rollers. The combination of heat and pressure [1] smooths the surface [1] and compacts the fabric by pressure thus improving the appearance [1] of the fabric, application of a pattern (embossing) [1] [8]
- (c) For the manufacturer
Additional cost, danger of import/export bans if international legislation not met, company open to litigation, may require investment in new machinery, require to update existing designs, additional processes may be needed such as flame retardant finishes
- [P] Critical examination of issues (3)
[Q] Quality of explanation (2)
[S] Supporting examples/evidence (1)
- [6]

2521/01 Systems and Control Technology 1

1 (a) Justified design requirements include:

- clear picture to avoid eye strain
- stable, secure base to avoid falling and possible damage
- easy and clear usage/set up to avoid frustration
- allow effective connection of peripheral equipment to accept/record signals.

No marks awarded for statements referring to obvious product function eg must show programmes.

For **three** justified design requirements 1 x 3 **[3]**

(b) Examples could be:

- screen shape/proportion for effective viewing
- power switch clearly visible for ease of operation
- power switch easily located and operated by hand
- picture image clearly visible
- room for hands/fingers to connect cables.

A clear description related to ergonomic features up to 2 marks

For **three** examples described 2 x 3 **[6]**

(c) Reasons could be:

- rapid technological changes
- expensive items, cannot afford unsold stock
- large range of similar products, slight variations
- frequent demand for new models

For **three** reasons given 1 x 3 **[3]**

(d) Issues included in discussion could be: Examples could be:

- | | |
|---|---|
| <ul style="list-style-type: none"> • wider choice/new products • better, cheaper products as a result of advances in manufacturing technologies • fear (technophobia)/lack of knowledge • pressure to 'keep up with the jones's' • differing views on value of technologies such as internet | <ul style="list-style-type: none"> • appropriate new product eg ipod • digital tv fears • broadband/internet |
|---|---|

P	relevant points/issues	up to 3 marks	
Q	quality of explanation	up to 2 marks	
S	specific example/evidence	1 mark	[6]

Total [18]

2 (a) Ways could be:

- review manufacturing processes (minimise use of high energy use systems)
- redesign products to reduce number of components required
- buy in components
- site factories closer to suppliers
- effective production, no standby operations
- only produce what is needed (JIT).

For **four** ways

1 x 4 [4]

(b) Ways could be:

- HEP
- water wheel
- tidal systems
- wave power systems.

For each:

- | | | | |
|---------------------------------|--------|-------|-----|
| • clear sketch | 1 mark | | |
| • energy input | 1 mark | | |
| • method of transforming energy | 1 mark | | |
| • energy output | 1 mark | 4 x 2 | [8] |

(c) Issues included in discussion could be: Examples could be:

- | | |
|------------------------------------|-----------------------------|
| • heavy road usage | • food products from abroad |
| • air transport/shipping | • small village road usage. |
| • environmental concerns | |
| • global/local transportation | |
| • increased expense costs | |
| • order delays | |
| • effective packaging/tessellation | |

- | | | | |
|---|---------------------------|---------------|-----|
| P | relevant points/issues | up to 3 marks | |
| Q | quality of explanation | up to 2 marks | |
| S | specific example/evidence | 1 mark | [6] |

Total [18]

3 (a) Justified design requirements include:

- high quality manufacture/finish to meet client/user high expectation
- must be stable, no risk at all to user
- able to have variety of upholstery options to meet lounge décor
- extremely high comfort standard to suit clientele of hotel
- high quality aesthetic design to give luxury feel
- justified specific ergonomic features.

No marks awarded for statements referring to obvious product function eg must be able to sit on it

For **three** justified design requirements 1 x 3 **[3]**

(b) Reasons could be:

- very few manufacturing processes required
- simple design, no complex design features
- very simple assembly of components
- few components.

For **three** reasons 1 x 3 **[3]**

(c) Considerations could be:

- target market, ensuring appropriate, high earning groups are targeted
- appropriate media easily accessed by target group
- method must reflect luxury product, (leaflets not appropriate)
- cost margins, how much would be available

For **three** considerations well explained 2 x 3 **[6]**

(d) Issues included in discussion could be: Examples could be:

- | | |
|--|--|
| <ul style="list-style-type: none"> • simplicity in usage • simplicity in design • successful in terms of sales • successful in terms of function | <ul style="list-style-type: none"> • ipod • Bauhaus principles |
|--|--|

<p>P relevant points/issues</p> <p>Q quality of explanation</p> <p>S specific example/evidence</p>	<p>up to 3 marks</p> <p>up to 2 marks</p> <p>1 mark</p>	[6]
--	---	------------

Total [18]

4 (a) Justified design requirements include:

- non rip fabric so that shoes do not fall out
- very easy to fasten and undo - young users
- space/fabric suitable for identification - easily identified
- robust construction, rough usage by pupils
- will accommodate largest possible shoe size, fully enclose shoes.

For three justified design requirements 1 x 3 **[3]**

(b) Checks could be:

- visual check for quality of printing
- check on seam quality
- check toggle/fastening system
- check string attached to fastening system.

For three checks clearly described 2 x 3 **[6]**

(c) Ways could be:

- specialist school uniform
- school guidance, handouts, website
- internet searches
- other parents.

For three examples 1 x 3 **[3]**

(d) Discussion could include:

Issues included in discussion could be:

- reduction of manufacturing requirements
- guaranteed quality
- choice of suppliers
- reliability of suppliers.

Examples could be:

- products such as cars/torches/bicycles using bought in parts/components.

P relevant points/issues
Q quality of explanation
S specific example/evidence

up to 3 marks
up to 2 marks
1 mark

[6]

Total [18]

5 (a) Justified design requirements include:

- staple correctly applied and folded with no damage/markings of paper
- appropriate amount of leverage required to effectively use without exerting too much pressure
- sufficient 'throat' to staple in a variety of positions
- effective spring to return to original position ready for next staple
- sufficient space to load enough staples to avoid constant re filling
- non slip base to avoid sliding around on table.

No marks awarded for statements referring to obvious product function eg must staple paper

For three justified design requirements 1 x 3 [3]

(b) Considerations could be:

- reduce parts/processes
- reduce unnecessary features
- use bought in components eg fixings
- review manufacturing processes, eg press/extrude/injection mould
- review material choice.

For three considerations 1 x 3 [3]

(c) Ways could be:

- user testing
- independent review (Which report)
- visual inspection of finish and assembly
- close (micro) examination of staple.

For three ways well explained 2 x 3 [6]

(d) Issues included in discussion could be:

- expense (usually first to go in recession)
- possibility of developing new products
- further development of expertise/specialism in product area
- chemical testing.

Examples could be:

- major car companies
- chemical companies.

P relevant points/issues

up to 3 marks

Q quality of explanation

up to 2 marks

S specific example/evidence

1 mark

[6]

Total [18]

2521/02 Systems and Control Technology 1

1	(a)	(i)	LIGHTS ON	DRIVERS DOOR OPEN	SOUNDER	[1]
			0	0	0	
			0	1 [1]	0	
			1	0	0	
			1	1	1	
		(ii)	Astable			[1]
	(b)	(i)	Changes frequency [1]mark space ratio [1]			[2]
		(ii)	Use of correct formula [1] correct answer 0.014Hz [1]			[2]
	(c)	(i)	variable resistor [1] fixed resistor [1] in either position			[2]
		(ii)	3.2v/100mA [1] = 32k [1]			[2]
			8.8v/100mA [1] = 88k [1]			[2]
	(d)		Points could be:			
			<ul style="list-style-type: none"> • Not possible to maintain your car • Specialist equipment required • Cost to consumer • Safety benefits • Better reliability • Emission control • Much broader choice of sensors and processors • Accurate readings from system • Fault code list aids diagnosis 			
			3 Relevant points			[3]
			Two qualified correctly			[2]
			Specific example			[1]

2	(a)	(i)	Speed can be controlled by voltage, switch mode systems, load.	[1]
		(ii)	Reverse by polarity, diode, gearbox.	[1]
	(b)	(i)	Door switch interlock[1] float switch or pressure switch[1] thermistor [1]	[3]
		(ii)	Machine cannot fill with door open[1] Heater will burn out with no water[1] or similar	[2]
	(c)	(i)	Hole blocked so output positive LED does not light.[1] the photo transistor is operated so has 0v at its output [1] LED lights [1]	[3]
		(ii)	Schmitt trigger by op amp, IC , signal conditioner	[1]
		(iii)	$1575 \times 5 \times 2 = 15750$	[1]
	(d)	Points could be:		
		<ul style="list-style-type: none"> • Market drives development • High costs • Need for high volume sales • Risk of manufacturing problems • Reliability issues • Fashions and trends • Age-related products • Diminishing capability in design as complexity rises 		
		3 Relevant points		[3]
		Two qualified correctly		[2]
		Specific example		[1]

Total of 18 marks

3	(a)	Advantage; relative cost, readily available, ease of machining Disadvantage; corrosion, surface finish needed, malleable	[1] [1]
	(b)	Working clamp design [1] Close/open in industrial setting – not hand vice [1]	[2]
	(c)	80mm travel [1] $80/1.6 = 50$ rotations [1]	[2]
	(d)	(i) Bolts – suitable diameter [1] Nut and washer type – nyloc, castellated and split pin, tab washer, or any other suitable type [1] Locking compound or torque setting [1]	[3]
		(ii) Keyway – suitable type, staked, D or slot [1] Washer – suitable thickness, flat type Or tab [1] Nut – Nyloc or other locking type [1]	[3]
	(e)	Points could be: <ul style="list-style-type: none"> • Distance • Software standards • Compatibility • CE standards • British standards • Material choices • Prototype checking • Patterns <p>Communication of modifications 2 points justified Specific example</p>	[3] [2] [1]

Total of 18 marks

4	(a)	Reciprocating and rotating	[1]
	(b)	Health and Safety of operator with rising action of drum forcing dust upwards. [1] Build up of dust in machine [1]	[2]
	(c)	(i) Crank and slider	[1]
		(ii) Allows Vee belt to slip in a jam [1] Toothed belt gives direct drive no slip [1]	[1] [1]
		(iii) 2800/800 [1] = 3.5:1 or 7:2 [1]	[2]
	(d)	Stroke of slider must be 100mm [1] Size of rotary crank must allow this [1] Action must not bind on sides of slider [1] Quality of drawing [1]	[4]
	(e)	Points could include: <ul style="list-style-type: none"> • Plantation management • Environmental issues • Carbon issues • Use of mdf • Growth rate • Adhesives • Transportation 	
		3 Relevant points	[3]
		Two qualified correctly	[2]
		Specific example	[1]

Total of 18 marks

5	(a)	Clean technology, possible to sterilize cylinders	[1]
	(b)	(i) Drain water collecting in tank and release pressure [1] Check for leaks, inspection date [1]	[2]
		(ii) Pressure relief valve	[1]
		(iii) Air consumption of system must be maintained [1] Cylinder performance relies on volume, pressure [1]	[2]
	(c)	Test must show how: <ul style="list-style-type: none"> • Cylinder size – economy of air/cost • Large enough to push bottle [1] • Type(spring return) [1] • Pushing action must be steady and speed controlled [1] • Fitting to match bottle shape [1] • Speed of action to match production line [1] • Fitting to hit bottle in centre [1] • Or any other relevant designs 	[6]
	(d)	Points could include: <ul style="list-style-type: none"> • Size of plant • Cleaning • Air supply • Shielding of systems • Shut downs/weekends • Leaks • Oil in system • Health and safety • Maintenance 	
		3 Relevant points	[3]
		Two qualified correctly	[2]
		Specific example	[1]

Total of 18 marks

- 6 (a) High reliability, low wear rate [1]
 Good repeatability of action, stroke length [1]
- (b) (i) Suitable design of fitting, bolted, magnetically attracted to block [1]
 Threaded connection to piston with flexible, non- flexible fitting
 Lock nut on thread [1]
- (ii) Pressure on outstroke is greater than the instroke [1]
- (iii) Uni-directional restrictors in correct place 2x1 [2]
 Both in correct orientation [2]
- (iv) $F=P \times A$ $150=P \times 10^2 - 5^2$ [1]
 $P= 150/314.2 - 78.5$ [1]
 $P= 0.63 \text{ N/mm}^2$ [1]
- (c) Points could be:
- S ISO 9000, CE, BSI
 - Protects customers and manufacturers
 - Quality control at each stage of making
 - Staff training
 - Material choices
 - Testing programme
 - Packaging
 - Delivery
 - Workplace improvement
- 3 Relevant points (3)
 Two qualified correctly (2)
 Specific example (1) [6]

Total of 18 marks

2524/01 Product Design 2

1 Fig 1 shows a self-assembly wardrobe. The carcass is made from manufactured board.

(a) (i) Two suitable manufactured boards:

- Chipboard
- Plywood
- MDF.

2 x 1 mark [2]

(ii) Two advantages:

- Large board size available
- Stable material
- Can be veneered to different finishes.
- Few/no defects in material
- Consistent sheet size

2 x 1 mark [2]

(iii) Two suitable KD fittings:

- Plastic Corner Block Joints (Fixit Blocks)
- Two block fitting (Lok-Joints)
- Natural Wood Fixing (Square Baton)
- Scan Fittings
- Cam Locks
- Plastic Corner Brackets.

**2 x 1 mark for suitable fitting
2 x 1 mark for correct description [4]**

(b) Description of how the doors of the wardrobe could be constructed. Any suitable stage of production:

- Tongue and groove or straight boarded
- Pre cut lengths
- Cut to length and constructed in rectangular form
- Floating panel
- Door Frame shown constructed separately
- Checking door is squared
- Mention of jig
- CNC Router/router/moulding machine
- Slot in frame produced
- Frame rounded or 'moulded'
- Correct clamping of timbers during assembly
- Suitable adhesives.

8 x 1 mark for each stage or process [8]

(c) Discussion centred on the environmental implications of using manufactured boards in the mass production of furniture.

These discussions could centre on any environmental issue.

- Particleboard and other manufactured boards have had a very positive impact on timber resources
- Stemming almost entirely from the use of recycled materials
- The remaining boards are constructed partially from recycled material and partially from virgin wood
- Significantly more resource efficient than solid wood
- It lessens the need for trees to be felled, while at the same time reducing waste.

P relevant points/issues up to 3 marks

Q quality of explanation up to 3 marks

S specific examples/evidence up to 2 marks [8]

Total: [24]

2 Fig 2 shows a tumble drier.

- (a) (i) Two reasons given why stainless steel is a suitable material for the drum:
- Resistant to corrosion
 - Aesthetic consideration
 - Hard wearing surface
 - Easily cleaned.
- 2 x 1 mark [2]**

- (ii) Two reasons why mild steel is a suitable material for the body:
- Malleable material/easily worked into shape
 - Recyclable
 - Less expensive than stainless steel
 - Can be easily coated to give a suitable finish.
- 2 x 1 mark [2]**

- (iii) Four reasons:
- Manufacturer does not have to make part
 - Availability
 - Consistent fit
 - Can be used by manufacture in a variety of goods
 - Ease of maintenance.
- 4 x 1 mark [4]**

- (b) (i) Description of spot welding:
- Clean joint
 - Electrodes
 - Earthing
 - Clamping
 - Charging regulation.
- 4 x 1 mark [4]**

- (ii) Description of galvanising:
- Pickling to clean
 - Zinc
 - Hot solution
 - Galvanising tank
 - Extraction
 - Dipping into tank
- 4 x 1 mark [4]**

- (c) Discussion centred on the moral implications of producing electrical domestic appliances.

The issues may focus on:

- Non essential items such as domestic driers
- Creating demand/pressures on consumers
- Third world labour issues
- Use of non-renewable energy resources
- Carbon neutrality high carbon footprint
- Increase in energy demand

P relevant points/issues up to 3 marks

Q quality of explanation up to 3 marks

S specific examples/evidence up to 2 marks [8]

Total: [24]

3 Shows a plastic container used for milk.

- (a) (i) Two reasons why PE is a suitable material:
- Easily moulded into complex shapes
 - Does not taint milk
 - Recyclable
 - Lightweight compared to glass
 - Impervious to liquid.
 - Flexible plastic

2 x 1 mark [2]

- (ii) Give **two** reasons why HDPE is not usually used for carbonated drinks:
- Could stretch under pressure
 - Wall thickness would have to be increased/increase in weight of package
 - Difficult to pressure seal.

2 x 1 mark [2]

(iii) **Four other plastics named:**

- PP
- HIPS
- Foamed PS
- PET
- Acrylate polymers.

4 x 1 mark [4]

(b) Description of blow moulding. Any suitable stage of process:

- Continuous extrusion of parison
- Single preformed parison
- Mould closing sealing base of parison
- Heating of parison
- Stretch blow
- Heating continuing
- Final inflation of parison into final shape
- Detail of mould pressing in to form handle
- Cavity in handle sealed
- Cavity removed to form handle
- Cooling of bottle
- Ejection of bottle.

1 mark for each suitable stage

8 x 1 mark [8]

(c) Environmental discussions could include:

- Finite resources
- Energy used to refine virgin material
- Need for recycling/re-use/reduction
- Disposal issues.

P relevant points/issues up to 3 marks

Q quality of explanation up to 3 marks

S specific examples/evidence up to 2 marks [8]

Total: [24]

4 Fig 4 shows a cardboard wrap used for retailing multi-packs of drink cans.

(a) (i) Two reasons why cardboard is suitable:

- Easy to print onto
- Good strength
- Lightweight
- Recyclable
- Easy to cut and fold.

2 x 1 mark [2]

(ii) Two suitable printing methods:

- Offset lithographic
- Gravure
- Flexography.

2 x 1 mark [2]

(iii) The wraps are produced using a press forme.

Description could include:

- Details of cutting blades
- Details of folding bars
- Details of foam protection on cutting blades
- Back board made of plywood
- Some pressing action described.

**2 x 1 mark for suitable fitting
2 x 1 mark for description of detail [4]**

(b) The net could include the following:

- Correct proportion
- Details of fold lines
- Fold lines in correct position
- Six top holes shown in correct position
- Six top holes correct shape to hold cans
- Creasing shown around holes to ensure shape
- Six bottom holes in correct position
- Six bottom holes correct shape to hold cans
- Locking tabs shown tabs
- Locking tabs will hold package together.

8 x 1 mark for each correct detail [8]

(c) Discussion of the economic implications for the manufacturers could include:

- Increased material cost
- Increased machine/tooling cost
- Volume sales could decrease product price to consumer
- Cost of disposal of extra packaging.

**P relevant points/issues up to 3 marks
Q quality of explanation up to 3 marks
S specific examples/evidence up to 2 marks [8]**

Total: [24]

5 Fig 5 shows a design for a greetings card that includes a pop-up mechanism.

(a) (i) Two reasons could include:

- Lightweight
- Strength suitable for mechanism to function
- Quality printing available
- Embossing can be used
- Surface finishes can be used.

2 x 1 mark [2]

(ii) Two suitable materials:

- Foil blocking
- Glitter
- Thermo-printing plastics
- Spray varnish
- Laminate

2 x 1 mark [2]

(iii) Simple description of embossing that could include:

- Embossing die
- Embossing counter-die
- Pressure applied
- Heat
- Particle embossing method acceptable.

**2 x 1 for detail
2 x 1 for description of detail [4]**

(b) Description could include:

- Mechanism will function as intended
- Mechanism will give suitable height of movement
- Detail of joint to card surface
- Detail of joint to pull tab
- Detail of crease lines
- Space allowed for mechanism to operate
- Guides shown to ensure smooth operation
- Mechanism has mechanical stop in 'up' position
- Mechanism has mechanical stop in 'down' position
- Detail of material used.

8 x 1 mark for each detail [8]

(c) Moral discussions could include:

- Gender issues/stereotyping
- Racial issues
- Religious issues
- Alcohol/sexual issues
- Age related.

**P relevant points/issues up to 3 marks
Q quality of explanation up to 3 marks
S specific examples/evidence up to 2 marks [8]**

Total: [24]

6 Fig 6 shows a breathable waterproof jacket with a removable fleece lining.

(a) (i) Any two, one mark each:

- Warm
- Comfortable
- Washable
- Quick drying
- Can be worn as a garment in own right
- Hardwearing/durable
- Lightweight
- Less bulky than a quilted lining.

[2]

(ii) Any two, one mark each:

- Zip
- Buttons and buttonholes
- Velcro
- Press studs/poppers
- Tabs over collar
- Elasticised loops and buttons at cuffs.

[2]

(iii) One mark for each correct point described/drawn:



- Fabric made up of three layers, laminated/bonded together
- Can use a microporous membrane – about 0.02 mm thick (Gortex is an example made from PTFE)
- Can use a hydrophilic membrane which is water loving and absorbs perspiration rapidly and pass it through to the outside eg Sympatex, made from polyester
- The holes in the fabric are too small to allow water droplets through the fabric
- The holes are small enough to allow perspiration through – to escape
- Can use a microfibre fabric with a hydrophobic finish.

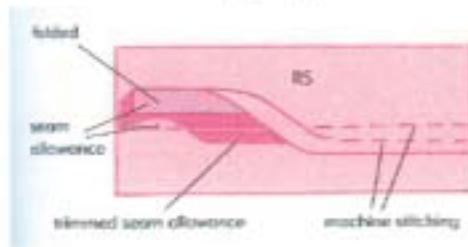
[4]

(b) (i) Any four points in a logical order:

- Input design/select design
- Set up machine – correct thread colour
- Prepare fabric – use of reinforcing fabric/stitch and tear
- Use ring
- Check position on garment
- Start machine stitching – monitor as progresses
- Change threads as required
- Cut threads close to fabric
- Check stitching/quality.

[4]

- (ii) Any four points in a logical order:
- Fabrics right or wrong sides together
 - Stitch along stitching line
 - Press open
 - Trim one side to 5mm
 - Fold other side over the cut edge, folding the raw edge in
 - Stitch close to fold
 - Press and check quality.



[4]

- (c) Discussion could include reference to:
- Kevlar for strength and protection
 - Nomex for sports where fireproofing is an issue
 - Neoprene for wetsuits – warm, soft, and environmentally friendly as recyclable
 - Elastanes for lightweight, flexible garments for ease of movement
 - Microencapsulation – centres filled with crystals or vitamins
 - Thermochromic dyes to indicated temperature – warm up/over heating
 - Fast skins for swimming
 - UV protection for outdoor clothing – swimsuits/outdoor pursuits
 - Breathable fabrics for outdoor activities
 - Glow in the dark dyes – safety
 - Wearable electronics – entertainment/communication
 - Cost
 - Aftercare of products
 - Increased safety/protection
 - Improved performance characteristics.

Range of relevance of issues relating to the question

[3]

Quality of the reasoning and explanation

[3]

Suitable use of examples and evidence to support the discussion

[2]

Total: [24]

7 Fig 7 shows a baby's cot set, with bumpers and a quilt cover.

(a) (i) Any four points, one mark each:

- Comfortable
- Non irritating
- Washable
- Hypo allergenic
- Stain resistant
- Non-toxic
- Absorbent.

[4]

(ii) Any four points, one mark each:

Industrial Method



- Martindale abrasion machine would be used in industry
- Samples of the fabrics to be tested are cut to the same size and fixed in the machine
- The machine 'rubs' the fabric with consistent pressure
- Set for a number of rubs or time allocation
- Appearance of the fabric assessed at the end of the test
- The fabric showing the least damage/best appearance is most durable.

or

Classroom Method



- Use two blocks of wood, one with sandpaper attached, the other with the fabric to be tested
- Keep a control sample of fabric
- Rub the blocks together
- Same direction all the time
- Even pressure
- Either count the number of rubs until a hole is formed, or rub for a set amount of time
- Compare the two fabrics
- The more rubs before a hole forms, or time before the fabric shows damage, the more durable the fabric is.

[4]

(b) Any eight points in a logical order, in diagrams or note form:

- Cut out fabrics
- Hem frill – 2 marks.

hem either a narrow machined hem, raw edge turned under twice and machined

or

use the hemming foot which turns the fabric twice automatically, as stitching

or

use a double width fabric, and fold in half with the right side facing out

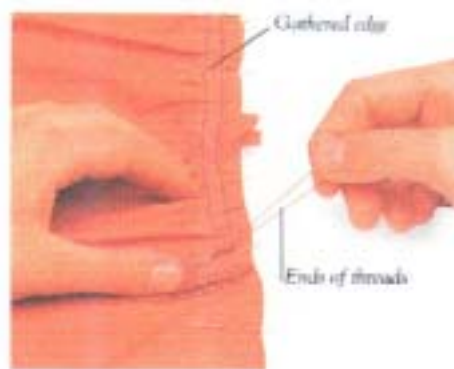


Gather frill – 3 marks

Set up machine, long stitch, loosen top tension, stitch on seam line, then again inside it. Pull up from underneath, secure ends, even out gathers.

or

Use the gathering foot attachment on the machine, set the stitch as indicated in



the manual, stitch along the seam line to gather the fabric.

- Place raw edge of frill level with the raw edge of the duvet fabric, with the neaten edge to the middle of the cover
- Temporarily secure in place
- Fastening may be attached at this point, taking care to maintain the position of the frill
- Place two pieces of cover RS together, keeping frill in place and matching the fastenings
- Stitch on the seam line, neaten
- Turn RS out and press
- Quality check.

[8]

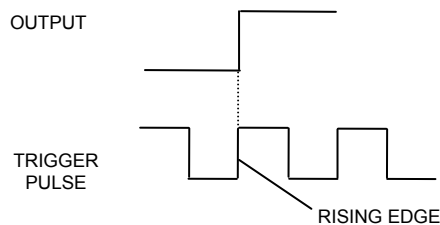
- (c) Discussion could include reference to:
- Eco label is a label indicates the product/material conforms to standards set to reduce the environmental impact
 - Sometimes adverse reaction to clothing from skin – usually abrasive materials or nickel plated buttons, dyestuffs or finishing chemicals
 - Eco label guarantees no potentially carcinogenic dyestuffs have been used
 - Heavy metals present are in such small quantities that they are lower than those permitted in drinking water
 - Pesticides are in lower concentrations than those allowed in food stuffs
 - Formaldehyde levels are restricted
 - pH is neutral or slightly acid like the skin
 - Items intended for babies or small children do not release dyestuffs in contact with saliva
 - Products are sampled during production to ensure they conform
 - Additional costs incurred by the manufacturer
 - Customers assured no harmful substances contained in the product.

Range and relevance of issues relating to the question	[3]
Quality of the reasoning and the explanation	[3]
Suitable use of examples and evidence to support the discussion	[2]

Total: [24]

2525/01 Systems and Control Technology 2

- 1 (a) (i) Pull-down resistor. Reduces current in circuit. [1]
 (ii) 2 input NAND with Schmitt Trigger inputs. [1]
 (iii) Turns a NAND gate into an Inverter. [1]
 (iv) IC1 and IC2 both clean the signal and the combination produces a double inversion. (1) This ensures the correct orientation of the signal. (1) [2]
- (b) (i) Active high. [1]
 (ii) Rising edge triggering.
 Diagram showing clearly change on rising pulse 0-1. (1)
 Clear and correct annotation of diagram. (1)



[2]

- (c) (i) (1) mark for each pair in column X. Binary 0-1, 2-3, 4-5, 6-7.

Sw	B	A	X
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	1

[4]

- (ii) $W = VI$, $7.2 = 12 \times I$ (1), $I = 0.6$ Amps. (1) Must show units. [2]
 (iii) The ratio of a device operating versus cooling down. An 80% duty cycle means that it is capable of running 80% of a specified time period and turned off for the remainder. [2]
- (d) P = Identify a range of relevant issues/points. [3]
 Q = Quality of explanation as to why these issues are relevant. [3]
 S = Use of specific examples or supporting evidence. [2]

Issues could include:

Less current drawn, more fragile, easily broken, more complex, needs backlighting, difficult to see at night, less battery power required, difficult to repair or other relevant points.

Total [24]

- 2 (a) (i) Thermistor. [1]
- (ii) As temperature rises the resistance of the thermistor lowers. A negative temperature coefficient. (1) Thermistors are non-linear devices therefore produces a non-linear curve. (1) [2]
- (iii) Type D. [1]
- (b) (i) $60^\circ = 2k5$
At 60° TH1 and R1 are the same resistance so voltage will be 4.5v [1]
- (ii) At 25° TH1 is 10k so voltage at inverting inputs will be $\frac{4}{5}$ of 9 volts = 7.2 volts (1)
If R6 is 10k when temperature is 60° and voltage at inverting input is 4.5v then,
 $R5 + R4 + R3 + R2 = 10k$ also. (1)
Resistance of $R5 + R4 + R3$ can be found by using,
 $7.2v \times 10k = 4.5v \times (10k + x)$ (1) Where x is $R5 + R4 + R3$
 $72 = 45 + 4.5x$
 $72 - 45 = 4.5x$
 $27 \div 4.5 = x$
 $6k = x$ (1)
Therefore $R2 = 4k$ (1) [4]
- (c) (i) Open-loop gain - refers to the fact that the operational amplifier has a voltage gain in the order of 10^5 for dc and low frequency ac (1) when no feedback is present. (1) (The high amplification of an input voltage when no feedback is present). [2]
- (ii) Low output impedance - refers to the low value of impedance (the ac equivalent of resistance) of the operational amplifier 'seen by a device connected to the output terminals'. (1) Low is around 100 Ohms. (1) [2]
- (iii) This is largely due to the high voltage gain. (1) The linear portion of the characteristic is between A and B. (1) Most operational amplifiers are used at dc voltages around 12 volts and an open – loop gain of 10^5 would mean a maximum input voltage of 120uVolts, a very limited linear section. (1) [3]
- (d) P = Identify a range of relevant issues/points. [3]
Q = Quality of explanation as to why these issues are relevant. [3]
S = Use of specific examples or supporting evidence. [2]

Issues could include:

J.I.T., less control over whole product, quality control, less manufacturing costs, easier assembly, cost implications or other relevant points.

Total: [24]

- 3 (a) (i) A = Crank; (1), B = Connecting Rod or Link arm, (1) C = Slider, block or weight (1) [3]
- (ii) Rotary to linear/reciprocating [1]
- (b) (i) Toggle/ over-centre clamp [1]
- (ii) Longer gives greater force, shorter gives less force. [1]
- (c) (i) Bench vice (metal or wood) [1]
- (ii) Allows fitting of quick release
Only used where force has to act in one direction.
Easily disengaged to move in other direction. Explanation (2), sketch (1). [3]
- (d) (i) $(12/40) \times (20/50) (1) \times 200 = 24 (1)$ [2]
- (ii) Motor torque = $5\text{Nm} \div \text{gear ratio} = 5\text{Nm} \div 8.333 = 0.6\text{Nm} (1)$
Power = $T\omega = 0.6\text{Nm} \times 200 \times 2\pi/60 \text{ rads/s} (1) = 12.56 (1) \text{ Watts} (1) (2\text{dp})$ [4]
- (e) P = Identify a range of relevant issues/points. [3]
Q = Quality of explanation as to why these issues are relevant. [3]
S = Use of specific examples or supporting evidence. [2]

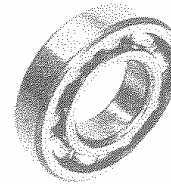
Issues could include:

Moving to cheaper area (rates), reducing workforce, using JIT to reduce storage cost for stock, reducing energy costs, reducing transport costs or other relevant points.

Total: [24]

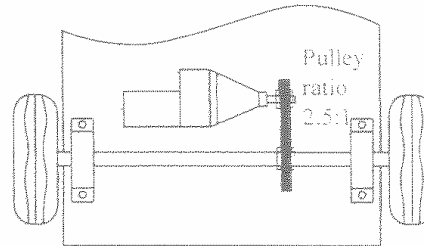
4 (a) (i) Good for axial loads, smooth running. [1]

- (ii) Sketch - up to 2 marks for accuracy.
Annotation - cage, inner race,
outer race, ball/roller.
Up to 2 marks if sketch poor and
two points correct. [3]



(iii) Thrust bearing takes radial load, (1) not suitable for axial load. (1) [2]

- (b) Indication of flexible coupling. (1)
Indication of reduction coupling. (1)
Correct pulley size for 2.5:1 ratio. (1) [3]



- (c) (i) Off-load speed = 3800.
Total reduction ratio = $18 \times 2.5 = 45:1$ (1)
Axle speed = $3800/45 = 84.4$ rpm. (1) [2]

- (ii) Speed = wheel circumference \times rotational speed
= $\pi \times 0.3 \times 84.4$ (allow ecf) (1)
= 79.5 m/min
= 1.3m/s (1) [2]

- (d) Angular increase of 4:1 required.
Non-slip method of coupling (Gears or toothed belt) (1)
Suitable sketch to show method. (1)
Correct ratio. (1) [3]

- (e) P = Identify a range of relevant issues/points. [3]
Q = Quality of explanation as to why these issues are relevant. [3]
S = Use of specific examples or supporting evidence. [2]

Issues could include:

More staff in total, cost of vehicles and fuel, extra cost of warehousing, just-in-time implications, new factory layout, possible increase in unit price to cover increased overheads, links between two sites or other relevant points.

Total: [24]

- 5 (a) Expensive to set up due to cost of machines and moulds so the process is used for very large quantities of a product/part and can produce them quickly and cheaply without the need for expensive finishing. (1) In the workshop the cost and space for such a process is prohibitive and so is rarely used and then only very small scale methods employed. (1) Or similar response. [2]
- (b) (i) When the air bleed is blocked the diaphragm valve receives high pressure air causing it to change over. (1) Air flows 1 to 2 through the diaphragm valve to the 5-port valve 1 4 causing the valve to change over. (1) This action sends mains air from 1 to 4 causing the piston to out-stroke. (1) [3]
- (ii) Flow regulator and second diaphragm valve used to pressure sense the decaying air on out-stroke OR a simple time delay of reservoir and flow regulator to send signal to 1 2 to return valve OR a plunger valve struck by the piston rod.
One for each correct component up to (2), correct piping (1) [3]
- (iii) $F = P \times A$ $F = 0.6\text{N/mm}^2 \times 10^2 \times \pi(1)$ $F = 60\pi\text{N} = 188.5\text{N}$ (1) [2]
- (c) (i) Answer must show suitable method of detecting upside down caps (Eg sensing length of base) (1), a suitable link between sensing and rejection methods (1) and a suitable method of rejection. (Eg SAC pushing tops into bin at side of conveyor) (1)
[3]
- (ii) Answer must show a suitable alignment of caps on conveyor (1), correct orientation of caps (1) and a suitable method of fixing to conveyor. (1) [3]
- (d) P = Identify a range of relevant issues/points. [3]
Q = Quality of explanation as to why these issues are relevant. [3]
S = Use of specific examples or supporting evidence. [2]

Issues could include:

More heavy goods vehicles on the road, more traffic jams, slower traffic, more pollution, less need for warehousing, manufacturing costs down, manufacturing control in hands of suppliers, more efficient production or other relevant points.

Total: [24]

- 6 (a) (i) Y controls the speed of the in-stroke. [1]
- (ii) No air will pass through the regulator, Z, (1) and so the door will remain open as no signal will be available at point D. (1) [2]
- (iii) By including an adjustable air cushion on the piston ring (1) a cushioned cylinder: reduces the speed at the end of the stroke, decreased impact on the system and the external device. Any one. (1). [2]
- (b) (i) One second. [1]
- (ii) Six seconds. [1]
- (iii) The five port valve requires a signal from the time delay circuit to close the door and once the signal is sufficient to trigger the five port valve the remaining air is exhausted through component Z. (1) The pressure gauge at D shows that the air is not exhausting but decaying through component Z. (1) [2]
- (iv) Component Z. [1]
- (c) Answer must show:
 Pressure pad to solenoid - operated valve instead of S. (1)
 Pressure pads in parallel/two three-port valves in parallel at S. (1)
 Correct piping/wiring. (1) [3]
- (d) $W = F \times L$ $W = F \times 0.2\text{m}$
- $A = (20^2 \times \pi) - 256\text{mm}^2$ $A = 1256.64 - 256\text{mm}^2$ $A = 1000\text{mm}^2$ (1)
- $F = P \times A$ $F = 0.6\text{N/mm}^2 \times 1000\text{mm}^2$ $F = 600\text{N}$. (1)
- $W = 600\text{N} \times 0.2\text{m}$ $W = 120\text{Nm}$ (1) [3]
- (e) P = Identify a range of relevant issues/points. [3]
 Q = Quality of explanation as to why these issues are relevant. [3]
 S = Use of specific examples or supporting evidence. [2]

Issues could include:

More land fill sites, land fill sites running out, burning waste, consequential impact of burning, does not decay in the ground, danger of fly tipping, danger to animals and people, land fill is a blot on the landscape or other relevant points.

Total: [24]

Grade Thresholds

Advanced GCE GCE Design and Technology (7822, 7823)
 Advanced Subsidiary GCE Design and Technology (3822, 3823)
 January 2009 Assessment Series

Unit Threshold Marks

Unit		Maximum Mark	A	B	C	D	E	U
2519	Raw	120	96	84	72	60	48	0
	UMS	120	96	84	72	60	48	
2520	Raw	90	54	48	43	38	33	0
	UMS	90	72	63	54	45	36	
2521	Raw	90	52	46	40	34	28	0
	UMS	90	72	63	54	45	36	
2522	Raw	90	72	63	54	45	36	0
	UMS	90	72	63	54	45	36	
2523	Raw	90	72	63	54	45	36	0
	UMS	90	72	63	54	45	36	
2524	Raw	120	81	73	65	58	51	0
	UMS	120	96	84	72	60	48	
2525	Raw	120	81	73	65	58	51	0
	UMS	120	96	84	72	60	48	

Specification Aggregation Results

Overall threshold marks in UMS (i.e. after conversion of raw marks to uniform marks)

	Maximum Mark	A	B	C	D	E	U
3822, 3823	300	240	210	180	150	120	0
7822, 7823	600	480	420	360	300	240	0

The cumulative percentage of candidates awarded each grade was as follows:

	A	B	C	D	E	U	Total Number of Candidates
3822	9.44	30.00	55.56	78.89	97.22	100	180
3823	0.00	7.69	23.08	61.54	92.31	100	13

3822: 180 candidates aggregated this series

3823: 13 candidates aggregated this series

	A	B	C	D	E	U	Total Number of Candidates
7822	7.41	29.63	66.67	88.89	100	100	27
7823	0	0	0	0	0	0	0

7822: 27 candidates aggregated this series

7823: 0 candidates aggregated this series

For a description of how UMS marks are calculated see;
http://www.ocr.org.uk/examsystem/understand_ums.html

Statistics are correct at the time of publication

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