FOR OFFICIAL USE

National
Qualifications
SPECIMEN ONLY

Mark

S835/76/01 Graphic Communication

Date — Not applicable

Duration — 2 hour 30 minutes

S8357601

Fill in these boxes and read what is printed below.

Full name of centre

Town

Forename(s)

Surname

Number of seat

Date of birth

Day Month Year

Scottish candidate number

Total marks — 90

Attempt ALL questions.

All dimensions are in mm.

All technical sketches and drawings use third angle projection.

You may use rulers, compasses or trammels for measuring.

In all questions you may use sketches and annotations to support your answer if you wish.

Write your answers clearly in the spaces provided in this booklet. Additional space for answers is provided at the end of this booklet. If you use this space you must clearly identify the question number you are attempting.

Use **blue** or **black** ink.

Before leaving the examination room you must give this booklet to the Invigilator; if you do not, you may lose all the marks for this paper.

SQA ©

S835760101

Total marks — 90

Attempt ALL questions

MARKS | DO NOT WRITE IN THIS MARGIN

1. A CAD technician created the 3D CAD model of an electric guitar.

The technician made use of a **CAD library** in the production of the guitar 3D CAD model.

(a) Describe **two** benefits of using a CAD library. **2**

(b) The 3D CAD model of the guitar will be used to create production and promotional graphics.

Describe **one** benefit of using 3D CAD models in:

(i) advertising **1**

(ii) manufacturing **1**

MARKS

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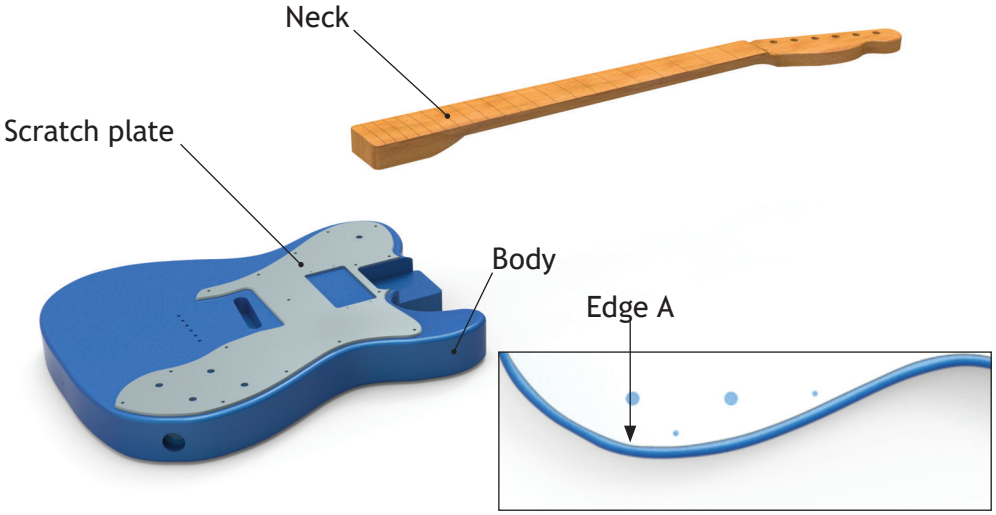
An exploded view and a partial enlargement of the guitar are shown below.



Exploded view

Partial enlargement of scratch plate

(c) The CAD technician used the process of **top down modelling** to ensure the neck would fit with the body.

Describe the process of **top down modelling**. **2**

You may use sketches to support your answer.

(d) The CAD technician wanted the scratch plate to follow the same shape as the body.

(i) State the name of the 2D CAD tool used to ensure the scratch plate was the same shape as the guitar body at **Edge A**, shown above. **1**

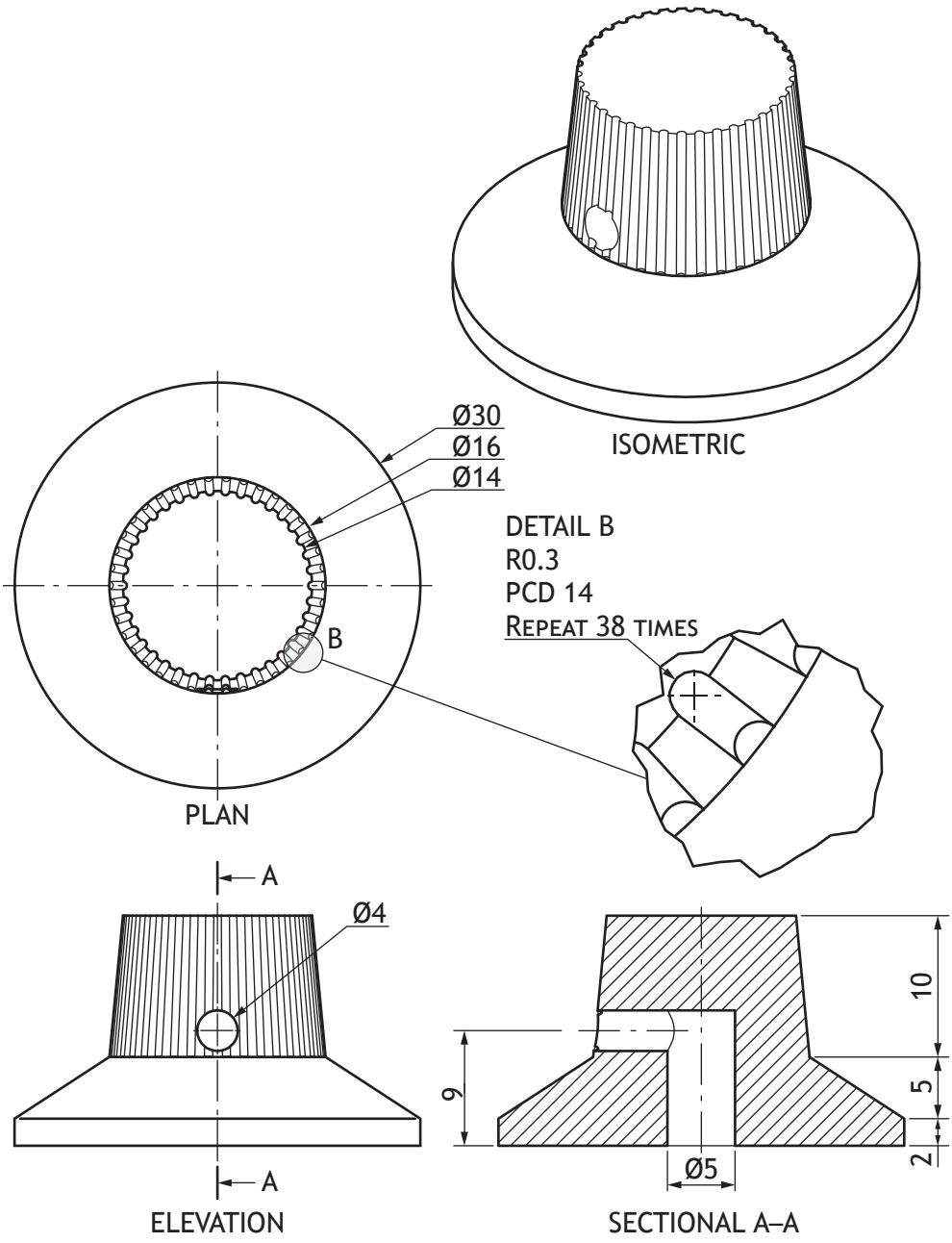
(ii) Describe how this 2D CAD tool was used. **1**

You may use sketches to support your answer.

1. (continued)

DO NOT WRITE IN THIS MARGIN

A production drawing for a control dial for the guitar is shown below.



MARKS

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(e) Describe the 3D CAD modelling techniques required to produce the control dial. You must refer to the dimensions given in the production drawing. **8**

You may use sketches to support your answer.

MARKS

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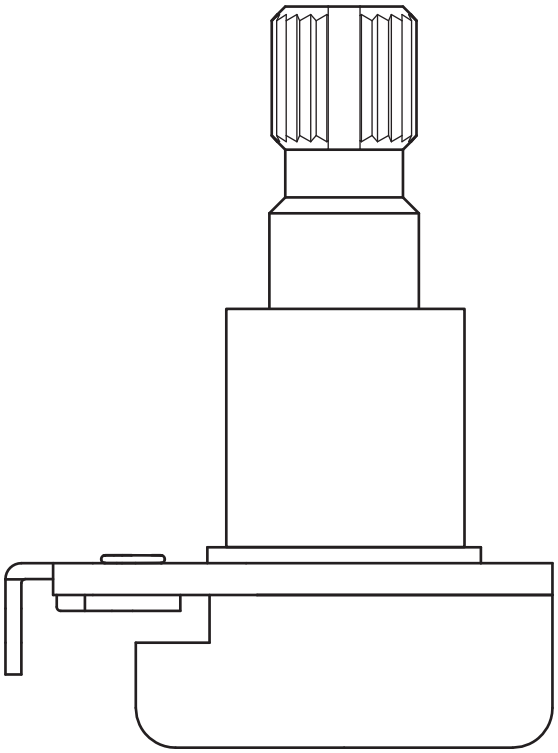
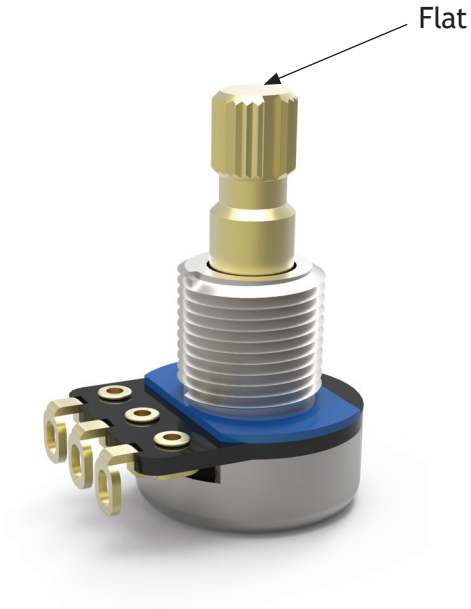
An incomplete elevation and a rendered pictorial drawing of a component of the guitar are shown below.

(f) Sketch the British Standard conventions in the correct location on the incomplete elevation for:

(i) thread **1**

(ii) flat on shaft **1**





MARKS

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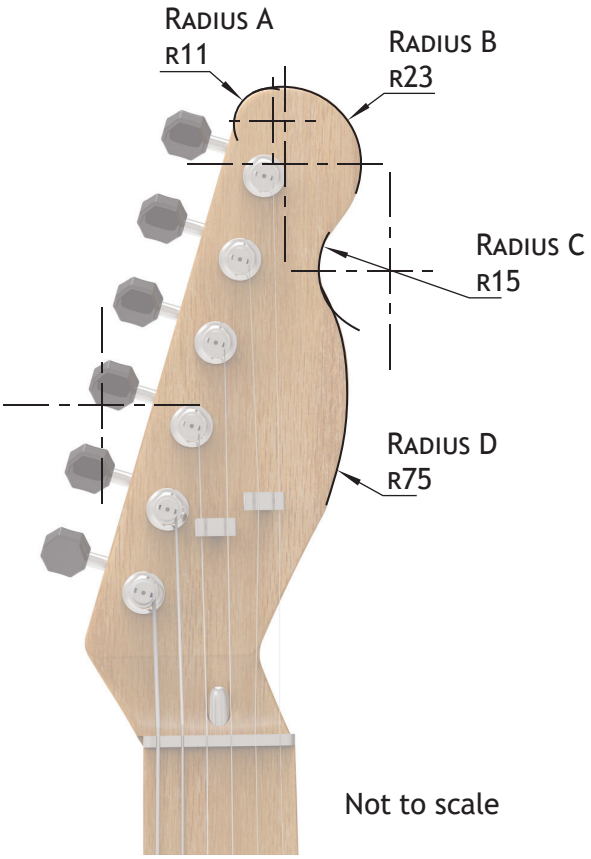
(g) Look at the guitar headstock shown below. The CAD technician modelled the headstock using the principles of tangency.

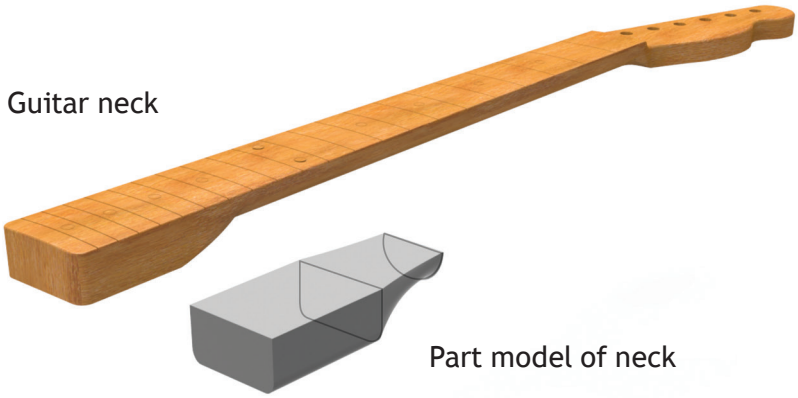


(i) Calculate the distance from the centre of **radius C** to the centre of **radius D.** **1**

(ii) Calculate the distance from the centre of **radius A** to the centre of **radius B.** **1**

1. (continued)

(h) The 3D CAD model of the guitar neck and a part model are shown below.



Describe the 3D CAD modelling technique used to create the part model of the neck. **3**

You may use sketches to support your answer.

2. A fashion magazine is producing an article on sunglasses. A graphic designer created a draft layout for the article shown below.

(a) Describe the effects the graphic designer has created in the layout by using the following.

(i) White space **2**

(ii) Colour **2**

2. (a) (continued)

(iii) Typeface **2**

(b) Explain how the graphic designer has used **proportion** in the layout. **4**

(c) Describe how the graphic designer has created **depth** in the layout. **2**

(d) Describe how the graphic designer has used **line** to enhance the layout. **2**

2. (continued)

(e) The Ray-Ban logo is a vector file.

Explain **two** advantages of using a vector file format in the production of the layout. **2**

[Turn over

2. (continued)

DO NOT WRITE IN THIS MARGIN

The final layout for the article is shown below.

The final layout was produced in layers using DTP software.

MARKS

DO NOT WRITE IN THIS MARGIN

(f) Describe **three** advantages to the graphic designer of using layers for this layout. **3**

(g) The graphic designer has used different types of justification for the sub-heading and main body text of the layout.

Explain why the graphic designer has chosen to do this for:

(i) the sub-heading **1**

(ii) the main body text **1**

[Turn over

2. (continued)

(h) The pre-press layout shown above contains crop and registration marks.

(i) Explain why the yellow boxes bleed beyond the crop marks. **1**

(ii) Describe the purpose of registration marks in printing. **2**

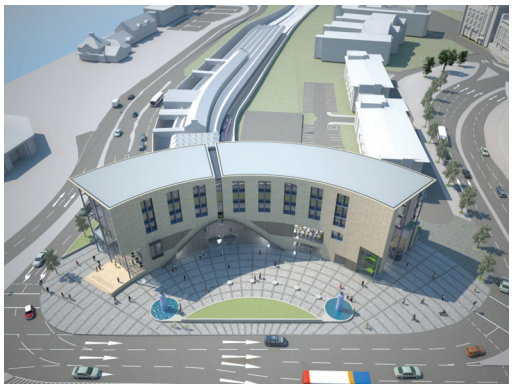
3. Dundee Waterfront is undergoing a £1 billion redevelopment.

The official website includes various types of graphics aimed at promoting the development to the local community. These include:

- **location plans** of the entire development
- **site plans** of some of the proposed new buildings

(a) Describe the features of **both** types of plans for providing information about the redevelopment to the local community. **4**

A selection of rendered CAD pictorial images of the new train station were uploaded to the website.



[Turn over

3. (continued)

(b) Explain **three** advantages of using rendered CAD pictorials to communicate the design to the local community. **3**

(c) The architect shared initial sketches of a building idea on the website. These sketches were created using pencil and marker pen.

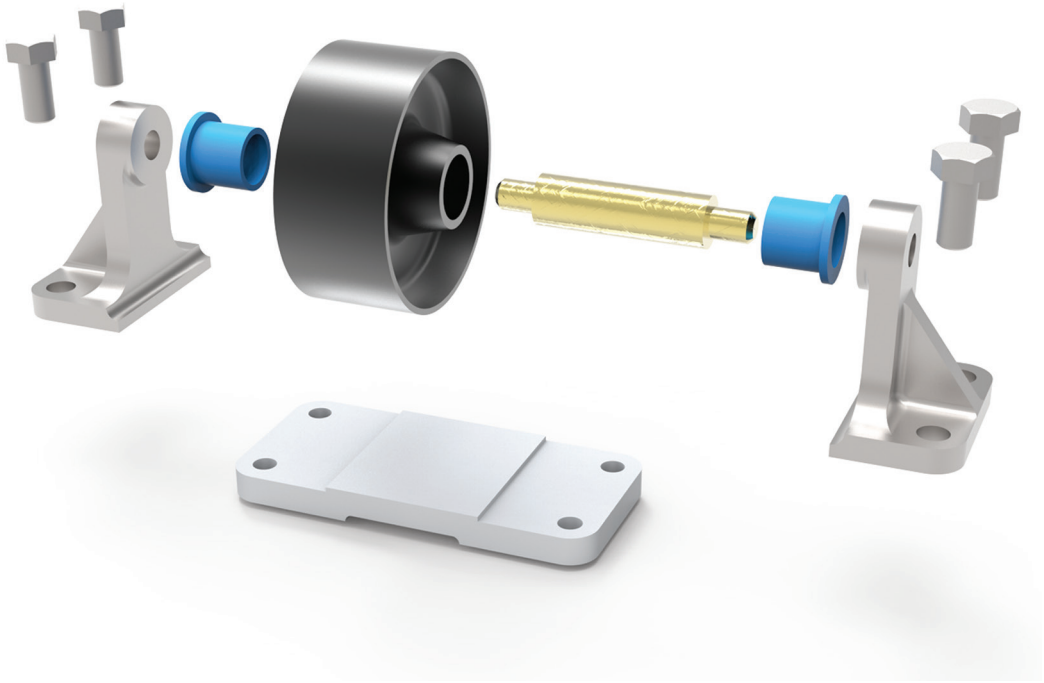
(i) Describe how the manual sketches can be converted to digital images for use on the website. **1**

(ii) State two reasons why a **jpeg** would be a suitable file format for these images. **2**

(d) The architect also created initial digital sketches on a touch-screen tablet.

Describe **two** advantages to the architect of using digital sketching. **2**

4. Look at the exploded CAD illustration of a castor wheel assembly shown below.



The assembly is made up of several parts that include four M12 bolts.

The **plan** and **incomplete stepped sectional elevation A–A** are shown on *page 18*.

Complete section A–A by applying hatching lines to appropriate areas in accordance with British Standards. **5**

[Turn over

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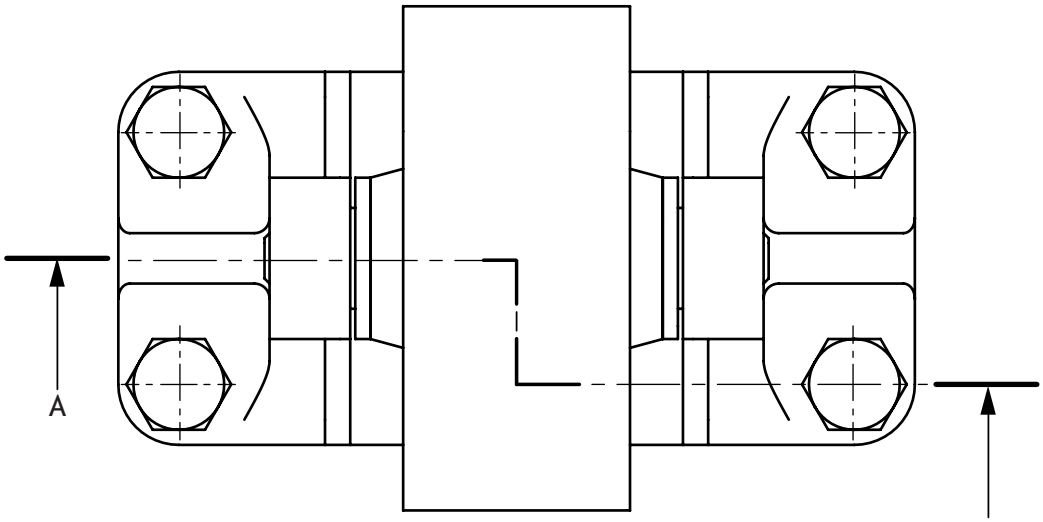
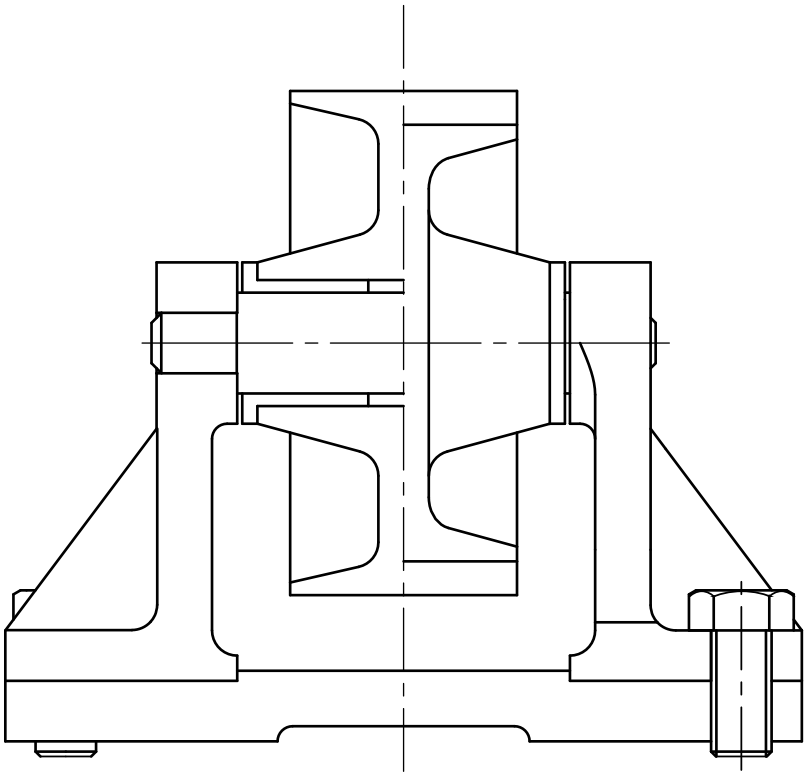
4. (continued)



PLAN



SECTION A–A

5. A building company is planning a new residential area. The plan shown below has been illustrated for potential customers. It does not use British Standard conventions.

Houses 19 to 25 are elevated above others on higher ground.

(a) Identify **three** features of **this drawing** which should be shown on a **British Standards** location plan. **3**

_____

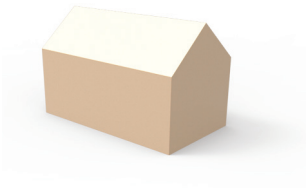
_____

_____

[Turn over

5. (continued)

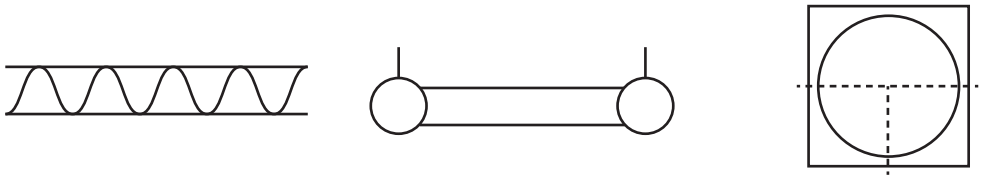
(b) A 3D model of one of the house styles is shown below.



State the total number of houses of this style in the location plan. **1**

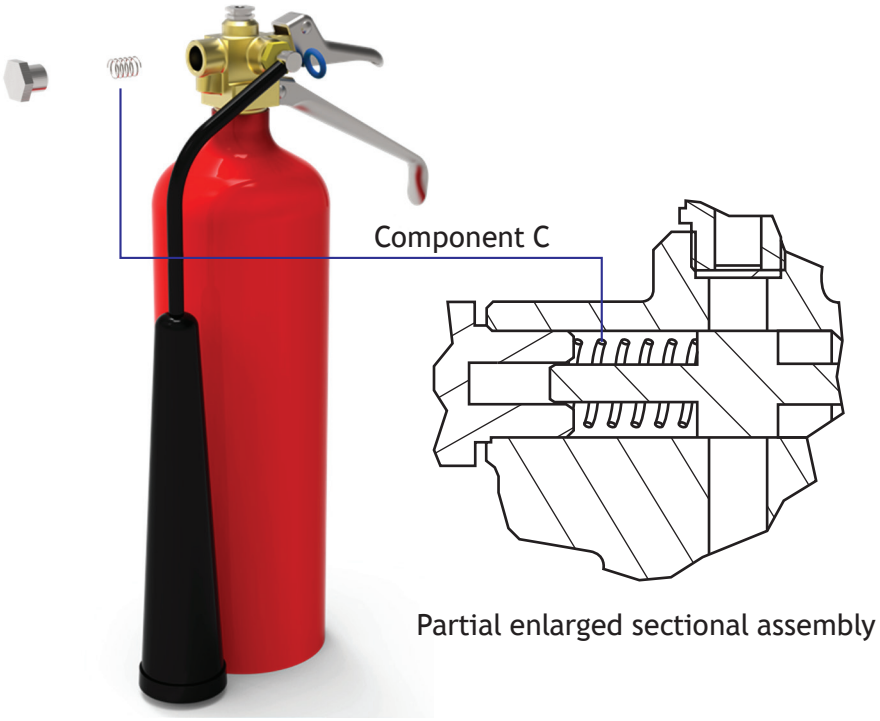
_____

(c) The architect used the following symbols in the floor plan drawings.
State the correct name for each of the symbols. **3**



(i) _____ (ii) _____ (iii) _____

6. A CAD technician created a 3D model of the fire extinguisher, shown below.

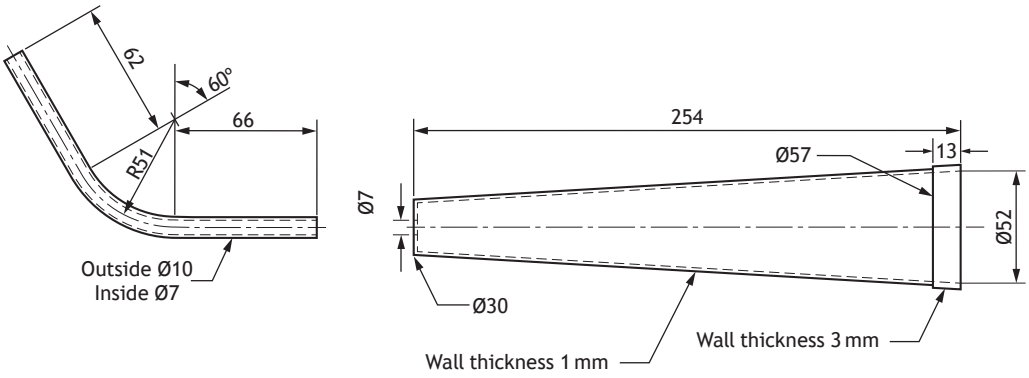


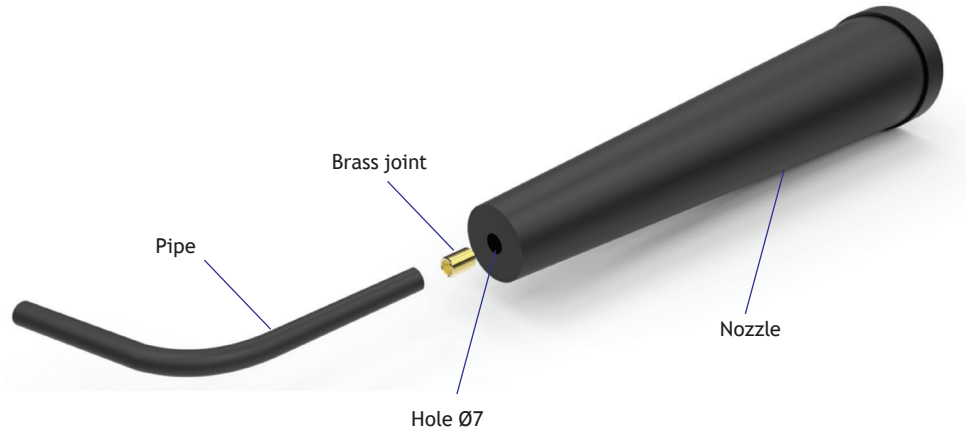
(a) Describe the 3D CAD modelling technique used to create component C. **2**
You may use sketches to illustrate your answer.

MARKS

DO NOT WRITE IN THIS MARGIN

Look at the drawing of the pipe and nozzle sub-assembly shown below. The CAD technician used this to create models of the individual components.



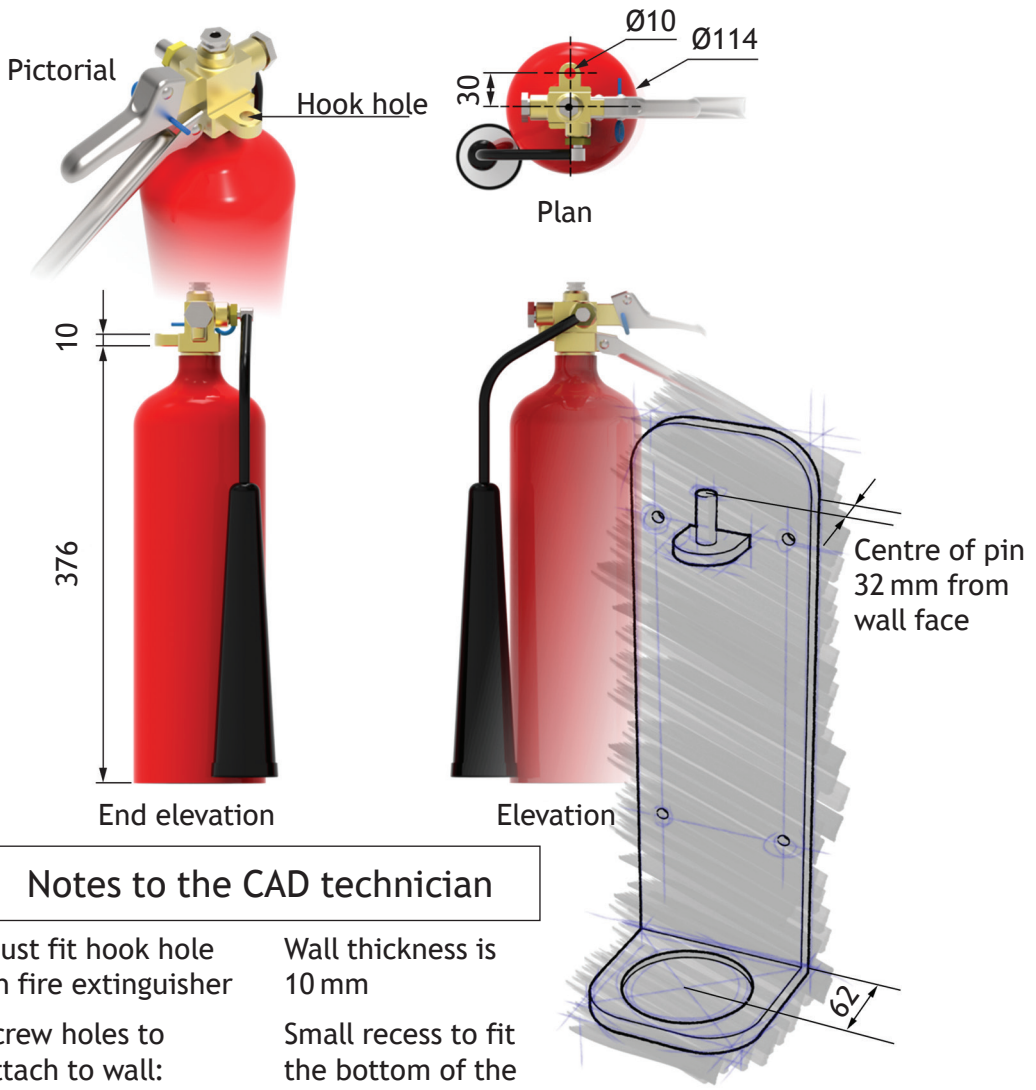


(b) Describe the 3D CAD modelling techniques used to create the **pipe** component. **3**

You must refer to the dimensions given in the drawing.

DO NOT WRITE IN THIS MARGIN

The manufacturer of the fire extinguisher would like to provide a simple wall bracket to hold their product.



Notes to the CAD technician

Must fit hook hole on fire extinguisher

Wall thickness is 10 mm

Screw holes to attach to wall: must have four holes.

Small recess to fit the bottom of the fire extinguisher 5 mm deep.

[Turn over

6. (continued)

(c) Describe the 3D CAD modelling techniques used to create the wall bracket.

Use measurements from the rendered orthographic and the notes to the CAD technician. **7**

You may use sketches to illustrate your answer.

DO NOT WRITE IN THIS MARGIN

7. Glasgow Riverside Museum opened in 2011. The architect firm was required to submit a number of drawings to the local authority to gain planning permission. During this process the architects also produced a number of other graphics for different purposes.

Figure 1

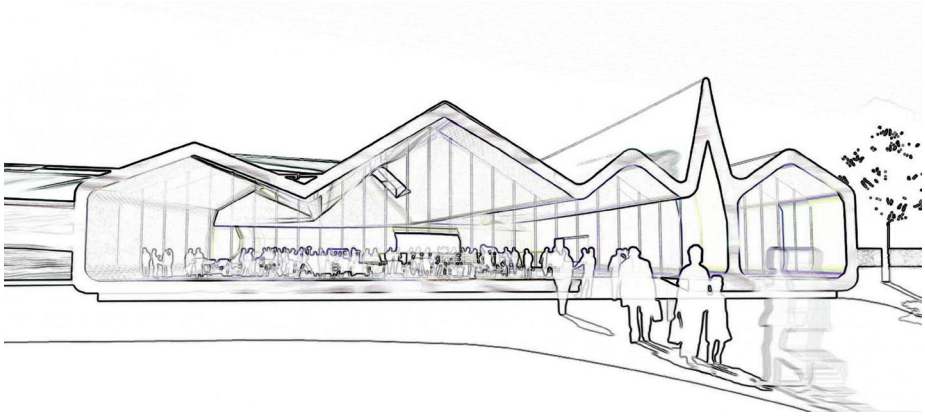


Figure 2

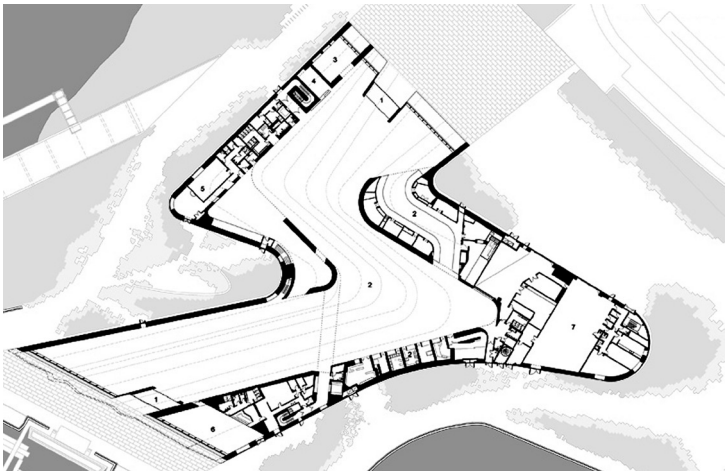


Figure 3

7. (continued)

(a) **Explain**, with reference to the 3Ps, the purpose of each of the graphics shown in Figures 1, 2 and 3. **3**

(b) The scales commonly used for Figure 3 are 1:50 or 1:100.

State **two** factors that influence the choice of scale in this type of graphic. **2**

7. (continued)

Sectional views are commonly used in the construction industry.
Cross-hatching is a feature found in sectional construction views.

(c) Describe two benefits of applying cross-hatching to a sectional construction drawing. **2**

[END OF SPECIMEN QUESTION PAPER]

ADDITIONAL SPACE FOR ANSWERS

MARKS | DO NOT WRITE IN THIS MARGIN

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Qualifications
SPECIMEN ONLY

S835/76/01 Graphic Communication

Marking Instructions

These marking instructions have been provided to show how SQA would mark this specimen question paper.

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General marking principles for Higher Graphic Communication

Always apply these general principles. Use them in conjunction with the specific marking instructions, which identify the key features required in candidates' responses.

(a) Always use positive marking. This means candidates accumulate marks for the demonstration of relevant skills, knowledge and understanding; marks are not deducted for errors or omissions.

(b) If a candidate response does not seem to be covered by either the principles or detailed marking instructions, and you are uncertain how to assess it, you must seek guidance from your team leader.

(c) For 'Describe' questions
Candidates must provide a statement or structure of characteristics and/or features, not just an outline or a list. For example they can refer to a concept, experiment, situation or facts in the context of and appropriate to the question. The number of marks available for a question indicates the number of factual/appropriate points required.

(d) For 'Explain' questions
Candidates must relate cause and effect and/or define relationships. This must be in the context of the question, or a specific area within the question.

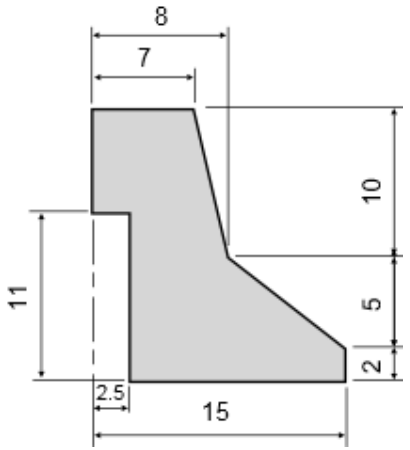
(e) For 'Compare' questions
Candidates must demonstrate knowledge and understanding of the similarities and/or differences between things, methods, or choices. This must be in the context of the question, or a specific area within the question.

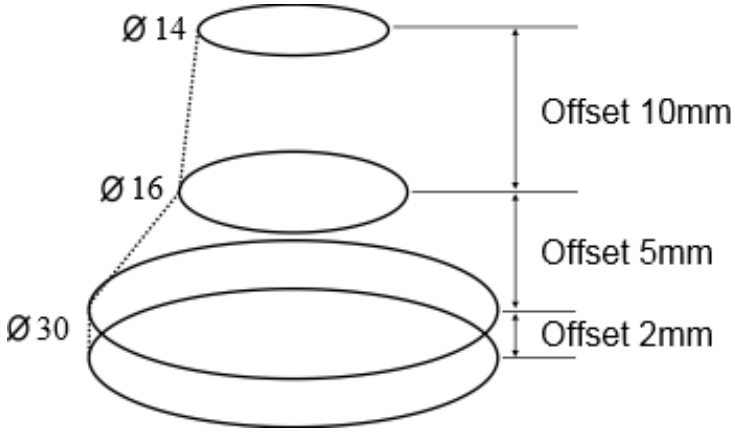
(f) Candidates can respond to any question using text, sketching, annotations or combinations of these. Award marks for the information conveyed. Do not award marks for the quality of sketching.

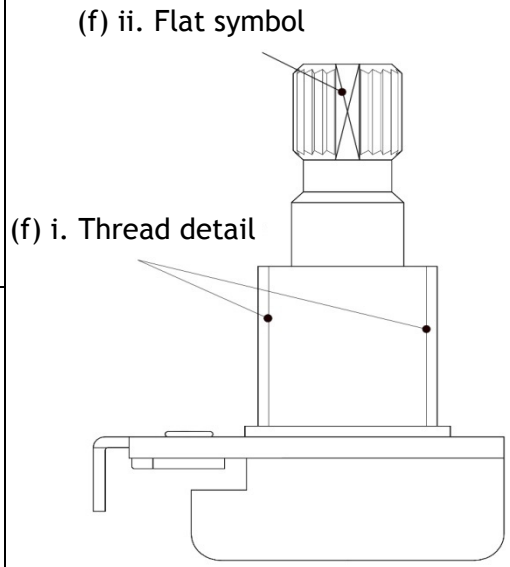
Marking instructions for each question

Question			Expected response	Max mark	Additional guidance
1.	(a)		• Reduce time required to model each component • Reduce likelihood of CAD technician making errors • Represents actual standard component parts • A library would contain all common component parts • The same parts would be used by all CAD technicians in the company • Library components can be used by CAD users worldwide	**2**	Any two points No marks for 'much quicker/faster' unless justification is given eg: Much quicker as you don't have to create the components.
	(b)	(i)	• Gives a realistic representation of what the final product will look like • 3D models can be used to create photorealistic renders • 3D models can be used to show different materials, colours and textures • 3D models can be animated • 3D models can be put into different scenes or contexts • Used for promotional material (print or digital)	**1**	Any one point Do not accept 'for advertising'.
		(ii)	• 3D models can be used to directly manufacture (CNC/CAM) • To enable dimensions to be extracted from the CAD model, without production drawings • 3D models can be used to show how complex items are assembled • 3D models do not need a manufacturer to interpret complex production drawings • Production drawings can be created and fully dimensioned from the CAD model	**1**	Any one point Do not accept 'for manufacture', without reference to CNC or CAM technologies. Candidates must justify the purpose of the drawing eg dimensions, tolerances, materials, surface finish.

Question			Expected response	Max mark	Additional guidance
1.	(c)		• Top down modelling allows sizes to be captured from another part, without measuring • Top down modelling allows geometry (form & shape) to be captured without redrawing • Top down modelling ensures the 3D CAD model is automatically assembled • Top down modelling allows the change of one component to automatically update another component • Components can be created in context within an assembly	**2**	A generic description of top down modelling can be given or top down modelling in relation to the guitar.
	(d)	(i)	Use 'Offset' command	**1**	
		(ii)	Select the bottom edge of the guitar and set a distance	**1**	Accept use of offset from bottom edge of guitar.

Question			Expected response	Max mark	Additional guidance
1.	(e)		**Revolve method** • Using the revolve command (1 mark) • Describing the profile to be revolved, with dimensions (1 mark) • Creating a circle on a perpendicular plane and extrude subtract (1 mark) • Describing the dimensioning of circle diameter 4mm on the perpendicular workplane and its position 9mm up from the base (1 mark) • Creating diameter 5mm circle on the base, extrude subtract to 11mm depth (1 mark) Creating ridges: **Extrude along a path method** • Creating a circle for ridge on top face (1 mark) • Creating a sketch-path to correct length, extrude-along-a-path (subtract) (1 mark) • Radial array ridge feature 38 times over PCD 14 (1 mark)	**8**	 Award 1 mark where candidate has added this feature in the revolve.

Question			Expected response	Max mark	Additional guidance
1.	(e)		**Loft Method** • Using the loft command (1 mark) • Describing relevant dimensions, 3 offset distances for 4 workplanes (1 mark) • Creating a circle on a perpendicular plane and extrude subtract (1 mark) • Describing the dimensioning of circle diameter 4mm on the perpendicular workplane and its position 9mm up from the base (1 mark) • Creating diameter 5mm circle on the base, extrude subtract to 11mm depth (1 mark) Creating ridges: **Loft method** • Creating a circle for ridge on top face (1 mark) • Creating bottom circle and loft between profiles (subtract) (1 mark) • Radial array ridge feature 38 times over PCD 14 (1 mark)	**8**	(Also accept extrude for bottom lip and loft between 3 workplanes.) 

Question			Expected response		Max mark	Additional guidance
1.	(f)	(i)	Correct symbol in correct position (1 mark)		**1**	Both for 1 mark
		(ii)	Correct symbol in correct position (1 mark)		**1**	Both for 1 mark
	(g)	(i)	90mm		**1**	
		(ii)	12mm		**1**	
	(h)		Describing using loft command (1 mark) Describing workplanes offset (1 mark) Describing profiles (1 mark)		**3**	No marks for extrude (question asks for single modelling technique) Award marks for workplane and loft where candidate has used extrude for the first segment.

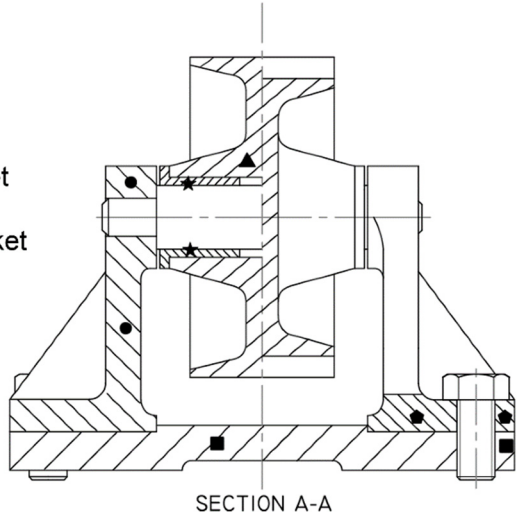
Question			Expected response	Max mark	Additional guidance
2.	(a)	(i)	• Area of white space underneath FAB emphasises the heading and attracts the eye to it • Area of white space bleeds from left page onto the right • Area of white space creates breathing space/a rest for the eye • Areas of white space make the page look less cluttered Triangular white space creates • balance • interest • rhythm	**2**	Any two
		(ii)	• Warm colour yellow is used that has connotations of summer and warmth • Harmonious colour scheme • The repeated use of the colour yellow creates unity in the layout • Contrast in colours on sunglasses blue and yellow	**2**	Any two
		(iii)	• Sans serif font used for FAB title. Its simplicity works well with the image behind it • The layout has a combination of serif and sans serif and script fonts creating a stylised feel – reflecting the target market • Contrasting fonts in the layout create visual interest	**2**	When referring to a specific typeface, candidates must mention serif, sans serif or script fonts. Any two

Question			Expected response	Max mark	Additional guidance
2.	(b)		• Emphasis created by enlarged heading being larger than all other elements • Triangular images very similar in size, helping to create unity/consistency – also means that no image is more dominant than the other • Areas of body text are similar in size which helps create consistency and balance • Enlarged cropped images within triangular frames create visual interest	**4**	
	(c)		• Pictorial/perspective view of the sunglasses themselves gives the illusion of depth against the flat background • Drop shadow on Ray-Ban logo yellow background • Drop shadow on sunglasses image • Drop shadow on bottom yellow box • Image behind FAB transparency gives depth • Transparency added to top-left image creates illusion of depth • Different sizes of figures in images creates depth	**2**	Any two Do not accept 'drop shadow' on its own.
	(d)		• The yellow colour of the line creates unity with other yellow elements on the page • The line draws the reader's eye from left to right and around the image • The stroke/thickness of the line is consistent and narrow, meaning it is not overpowering/dominant • Angle of lines creates interest/shape on the page • Lines are used to emphasise the triangular image and the triangular white space • Lines separate/split elements on the page	**2**	Any two

Question			Expected response	Max mark	Additional guidance
2.	(e)		• Scalable without pixelation • The red background could be easily changed to yellow within the DTP software. Had the image been a bitmap it would have to have been edited using specialist software • The white text can be made transparent within the DTP software • The red background could be stretched easily within the DTP software without the need for prior editing in another package	**2**	Any two
	(f)		• Text and images can be edited separately • Layers can be turned on and off to improve clarity during the production of the layout • The mask for FAB could be easily created • The layers can provide a master page for similar future layouts • Edit layers without affecting other parts of the layout • Layers can be reordered, moved to front, moved to back	**3**	Any three
	(g)	(i)	Centred justification for all the text on the left-hand page creates balance and/or symmetry or alignment or contrast	**1**	No mark for simply stating centred justification.
		(ii)	• Fully-justified text provides neatness as there are no jagged edges on the sides of columns	**1**	No mark for simply stating full justification.
	(h)	(i)	• No white spaces will appear outside the yellow boxes after cropping	**1**	
		(ii)	• To allow the multicolour printing to be set up correctly • Each register mark should overprint exactly for accurate registration	**2**	

Question			Expected response	Max mark	Additional guidance
3.	(a)		Answer should summarise points that include the following. **CAD location plans show** • Location of building in relation to streets • Location of building in relation to other buildings • Size of building to scale • Contours show the slope in the land • Geographical features eg rivers, woodland, greenbelt • Position of existing railways, bridges • North symbol will show the direction the building is facing **CAD site plans show** • Proposed building in relation to the property boundaries • Size and position of the building • Position of drainage • Landscape elements • Gas, electrical and water supplies • Contours show the slope in the land • Trees shown in position • North symbol will show the direction the building is facing • Size of the building and site to scale	**4**	**Do not award marks** for: • simply stating the scale • simply stating a feature • repetition

Question			Expected response	Max mark	Additional guidance
3.	(b)		• Photo real image of how the building will look • Realistic representation of materials • Adjacent buildings shown • Building is shown in its proposed environment • Shows adjacent roads and direction of traffic flow • Realistic representations of different lighting conditions day time, night time. • Useful for users who cannot read or interpret 2D drawings such as floor plans, site plans and location plans • Rendered CAD pictorials can be sent out to the community by email	**3**	Any three points for 3 marks
	(c)	(i)	The sketches would have to be captured/scanned using a suitable device (flatbed, hand, photocopier used as a scanner, digital camera, digitiser/graphics tablet)	**1**	No marks for simply stating the hardware device - candidates must mention the use of the device.
		(ii)	• Jpeg files are compressed • Jpeg files are a small size • Jpeg is a common file type • Jpegs are easily accessible without any specialist software	**2**	Any two points
	(d)		• The sketches could include realistic material representations • They can be built up in a series of layers to ease editing • They are automatically stored electronically and do not require scanning to upload to the website • Able to show client any changes instantly • Sketches can be exported into other packages • Easy to share via email	**2**	Any two points

Question			Expected response	Max mark	Additional guidance
4.			1 mark for each correctly sectioned component (5 in total) ▲ 1 mark Pulley ★ 1 mark Bush ● 1 mark Left bracket ■ 1 mark Base ⬟ 1 mark Right bracket  	**5**	Do not deduct marks for extra areas hatched. For each component which has 2 areas hatched, the hatching style must match. Hatching style applied must reflect clear distinction between components.

Question			Expected response	Max mark	Additional guidance
5.	(a)		• Symbols for existing trees OR proposed trees OR trees to be removed OR trees • North symbol • Contour lines • Boundary lines	**3**	Accept any type of tree as candidates cannot tell from the plan if they are existing, proposed or to be removed. Any three
	(b)		Four	**1**	
	(c)	(i)	Insulated board/Insulation board	**1**	
		(ii)	Towel rail	**1**	
		(iii)	Drainage	**1**	

Question			Expected response	Max mark	Additional guidance
6.	(a)		**Helix** • Describing a **profile** and **axis** (1 mark) • Describing feature command as **helix** (1 mark)	**2**	
	(b)		**Pipe** • Describing **path**, with all **dimensions** (1 mark) • Describing **profile** with OD10 & ID7 (1 mark) • Feature command as **extrude along a path** (1 mark)	**3**	Accept feature commands as sweep. Candidates may also use shell command, no need to mention selecting faces.

Question			Expected response	Max mark	Additional guidance
6.	(c)		**Wall bracket** • Extruding L-shape bracket (1 mark) • Wall thickness of bracket is 10mm (1 mark) • Circular recess profile is between DIA114mm and 120mm and extrude (subtract) circular recess 5mm deep (1 mark) • Ensuring centre of hook is 32mm from the back of the wall bracket and positioned vertically (1 mark) • Ensuring hook is equal to or less than DIA10mm (1 mark) • Applying four screw holes to bracket (1 mark) • Height from bottom of recess to the bottom of the pin, size 376mm (1 mark)	**7**	The L-shape could be created from 2 extrudes or from a solid cuboid with a subtraction of material. Candidate must mention subtract or remove material to gain the mark.

Question			Expected response	Max mark	Additional guidance
7.	(a)		**3Ps** Figure 1 – **Promotional graphic** • realistic rendering of the building • shows how the completed building will fit in with its environment • promotion or advertising for the building Figure 2 – **Preliminary graphic** • gives a sense of scale and form • no specific construction information can be gained • used to give a sense of how the concept may look Figure 3 – **Production graphic** • Shows how the building will be laid out • gives details of internal partitions and accommodation	**3**	Award one mark per graphic. For one mark, candidate must identify where the graphic fits in the development process (3Ps) **and** explain how it would be used.
	(b)		**Scale** • Size of item • Size of paper • Degree of detail required	**3**	One mark for each.
	(c)		**Cross hatching** • Describe different materials • Describe different components • Show parts that have been cut by the cutting plane	**2**	One mark for each correct benefit.

[END OF SPECIMEN MARKING INSTRUCTIONS]