$\square$

## National

## S835/76/01

## Graphic Communication

Date - Not applicable
Duration - 2 hour 30 minutes

Fill in these boxes and read what is printed below.

Full name of centre

$\square$

Town


Number of seat


Surname


Forename(s)


Date of birth

| Day |
| :--- | | Month |
| :--- | | Year |
| :--- | | Scottish candidate number |
| :--- | | Y |
| :--- |

Total marks - 90
Attempt ALL questions.
You may use a calculator.
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.

## Total marks - 90

## Attempt ALL questions

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.
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
(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
$\qquad$
$\qquad$
(ii) manufacturing
$\qquad$
$\qquad$

## 1. (continued)

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

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

You may use sketches to support your answer.


## 1. (continued)

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


ETAIL B
RO. 3
PCD 14
Repeat 38 times



## 1. (continued)

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

You may use sketches to support your answer.
$\square$

## 1. (continued)

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
(ii) flat on shaft


## 1. (continued)

(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 .

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


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.

You may use sketches to support your answer.
$\square$
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
$\qquad$
$\qquad$
$\qquad$
$\qquad$
(ii) Colour
$\qquad$
$\qquad$
$\qquad$
$\qquad$
2. (a) (continued)
(iii) Typeface 2
$\qquad$
$\qquad$
$\qquad$
$\qquad$
(b) Explain how the graphic designer has used proportion in the layout.
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
(c) Describe how the graphic designer has created depth in the layout.
$\qquad$
$\qquad$
$\qquad$
$\qquad$
(d) Describe how the graphic designer has used line to enhance the layout.
$\qquad$
$\qquad$
$\qquad$
$\qquad$
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.
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
[Turn over
2. (continued)

The final layout for the article is shown below.


The final layout was produced in layers using DTP software.


2. (continued)
(f) Describe three advantages to the graphic designer of using layers for this layout.
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
(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
$\qquad$
$\qquad$
(ii) the main body text
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.
$\qquad$
$\qquad$
(ii) Describe the purpose of registration marks in printing.
$\qquad$
$\qquad$
$\qquad$
$\qquad$
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.
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$

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.
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
$\qquad$
(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.
$\qquad$
$\qquad$
(ii) State two reasons why a jpeg would be a suitable file format for these images.
$\qquad$
$\qquad$
(d) The architect also created initial digital sketches on a touch-screen tablet.

Describe two advantages to the architect of using digital sketching.
$\qquad$
$\qquad$
$\qquad$
$\qquad$
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.
4. (continued)

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.
 above others on higher ground.
(a) Identify three features of this drawing which should be shown on a British Standards location plan.
$\qquad$
$\qquad$
$\qquad$
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.
(c) The architect used the following symbols in the floor plan drawings. State the correct name for each of the symbols.

(ii)
(i) $\qquad$
$\qquad$ (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 .

You may use sketches to illustrate your answer.
$\square$

## 6. (continued)

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.
You must refer to the dimensions given in the drawing.
$\square$
6. (continued)

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

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.

You may use sketches to illustrate your answer.
$\square$
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.
$\square$
(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.


## 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.
$\square$
[END OF SPECIMEN QUESTION PAPER]

## ADDITIONAL SPACE FOR ANSWERS

## Acknowledgement of Copyright

Question 2 (Image is used behind the word 'FAB') - Image is taken from
http://wallpaperswide.com/blue_jeans_and_white_shirt-wallpapers.html. (Author: Unknown).

SQA has made every effort to trace the owners of copyright materials in this question paper, and seek permissions. We will be happy to incorporate any missing acknowledgements. Please contact question.papers@sqa.org.uk.
Question $2 \quad$ Image of blonde girl wearing sunglasses is taken from
http://therooster.sparepartslife.com/wp-content/uploads/2014/07/MG_4434.jpg.
SQA has made every effort to trace the owners of copyright materials in this question paper, and seek permissions. We will be happy to incorporate any missing acknowledgements. Please contact question.papers@sqa.org.uk.
Question 2 Image is taken from http://rheabue.com/i-see-crop/.
SQA has made every effort to trace the owners of copyright materials in this question paper, and seek permissions. We will be happy to incorporate any missing acknowledgements. Please contact question.papers@sqa.org.uk.
Question $2 \quad$ Ray-Ban images and logos.
SQA has made every effort to trace the owners of copyright materials in this question paper, and seek permissions. We will be happy to incorporate any missing acknowledgements. Please contact question.papers@sqa.org.uk.
Question 3 Two images of Dundee Station by Nicoll Russell Studios. Reproduced by kind permission of Nicoll Russell Studios.
Question $6 \quad$ Three images of the Glasgow Riverside Museum of Transport by Zaha Hadid Architects. Reproduced by kind permission of Zaha Hadid Architects.

## Marking Instructions

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

The information in this publication may be reproduced to support SQA qualifications only on a non-commercial basis. If it is reproduced, SQA should be clearly acknowledged as the source. If it is to be used for any other purpose, written permission must be obtained from permissions@sqa.org.uk.
Where the publication includes materials from sources other than SQA (ie secondary copyright), this material should only be reproduced for the purposes of examination or assessment. If it needs to be reproduced for any other purpose it is the user's responsibility to obtain the necessary copyright clearance.

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


| Question |  |  | Expected response <br> - Top down modelling allows sizes to be captured from another part, without measuring <br> - Top down modelling allows geometry (form $\&$ shape) to be captured without redrawing <br> - Top down modelling ensures the 3D CAD model is automatically assembled <br> - Top down modelling allows the change of one component to automatically update another component <br> - Components can be created in context within an assembly | Max | Additional guidance |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 1. | (c) |  |  | 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. |


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


|  | stion | Expected response | Max mark | Additional guidance |
| :---: | :---: | :---: | :---: | :---: |
| 1. | (e) | Loft Method <br> - Using the loft command (1 mark) <br> - Describing relevant dimensions, 3 offset distances for 4 workplanes (1 mark) <br> - Creating a circle on a perpendicular plane and extrude subtract (1 mark) <br> - Describing the dimensioning of circle diameter 4 mm on the perpendicular workplane and its position 9 mm up from the base (1 mark) <br> - Creating diameter 5 mm circle on the base, extrude subtract to 11 mm depth (1 mark) <br> Creating ridges: Loft method <br> - Creating a circle for ridge on top face (1 mark) <br> - Creating bottom circle and loft between profiles (subtract) (1 mark) <br> - 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 <br> mark | Additional guidance |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 1. | (f) | (i) | Correct symbol in <br> correct position <br> (1 mark) | (f) ii. Flat symbol |  | Both for 1 mark |


| Question |  |  | Expected response |  | Additional guidance |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 2. | (a) | (i) | - Area of white space underneath FAB emphasises the heading and attracts the eye to it <br> - Area of white space bleeds from left page onto the right <br> - Area of white space creates breathing space/a rest for the eye <br> - Areas of white space make the page look less cluttered <br> Triangular white space creates <br> - balance <br> - interest <br> - rhythm | 2 | Any two |
|  |  | (ii) | - Warm colour yellow is used that has connotations of summer and warmth <br> - Harmonious colour scheme <br> - The repeated use of the colour yellow creates unity in the layout <br> - 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 <br> - The layout has a combination of serif and sans serif and script fonts creating a stylised feel - reflecting the target market <br> - Contrasting fonts in the layout create visual interest | 2 | When referring to a specific typeface, candidates must mention serif, sans serif or script fonts. <br> Any two |


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


| Question |  |  | Expected response <br> - Scalable without pixelation <br> - 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 <br> - The white text can be made transparent within the DTP software <br> - The red background could be stretched easily within the DTP software without the need for prior editing in another package | Max | Additional guidance |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 2. | (e) |  |  | 2 | Any two |
|  | (f) |  | - Text and images can be edited separately <br> - Layers can be turned on and off to improve clarity during the production of the layout <br> - The mask for FAB could be easily created <br> - The layers can provide a master page for similar future layouts <br> - Edit layers without affecting other parts of the layout <br> - 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 <br> - Each register mark should overprint exactly for accurate registration | 2 |  |


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



| Question |  | Expected response | Max mark | Additional guidance |
| :---: | :---: | :---: | :---: | :---: |
| 4. |  | 1 mark for each correctly sectioned component (5 in total) | 5 | Do not deduct marks for extra areas hatched. <br> For each component which has 2 areas hatched, the hatching style must match. <br> Hatching style applied must reflect clear distinction between components. |


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


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


| Question |  | Expected response | Max mark | Additional guidance |
| :---: | :---: | :---: | :---: | :---: |
| 6. | (c) | Wall bracket <br> - Extruding L-shape bracket (1 mark) <br> - Wall thickness of bracket is 10 mm (1 mark) <br> - Circular recess profile is between DIA114mm and 120 mm and extrude (subtract) circular recess 5 mm deep (1 mark) <br> - Ensuring centre of hook is 32 mm from the back of the wall bracket and positioned vertically (1 mark) <br> - Ensuring hook is equal to or less than DIA10mm (1 mark) <br> - Applying four screw holes to bracket (1 mark) <br> - Height from bottom of recess to the bottom of the pin, size 376 mm (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 | Additional guidance |
| :---: | :---: | :---: | :---: | :---: |
| 7. | (a) | 3Ps <br> Figure 1 - Promotional graphic <br> - realistic rendering of the building <br> - shows how the completed building will fit in with its environment <br> - promotion or advertising for the building <br> Figure 2 - Preliminary graphic <br> - gives a sense of scale and form <br> - no specific construction information can be gained <br> - used to give a sense of how the concept may look <br> Figure 3 - Production graphic <br> - Shows how the building will be laid out <br> - gives details of internal partitions and accommodation | 3 | Award one mark per graphic. <br> For one mark, candidate must identify where the graphic fits in the development process (3Ps) and explain how it would be used. |
|  | (b) | Scale <br> - Size of item <br> - Size of paper <br> - Degree of detail required | 3 | One mark for each. |
|  | (c) | Cross hatching <br> - Describe different materials <br> - Describe different components <br> - Show parts that have been cut by the cutting plane | 2 | One mark for each correct benefit. |

[END OF SPECIMEN MARKING INSTRUCTIONS]

Published: June 2024

Change since last published:
Addition to front cover: 'You may use a calculator.'

