



National  
Qualifications  
2017

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# **2017 Graphic Communication**

## **Advanced Higher**

### **Finalised Marking Instructions**

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## General marking principles for Advanced Higher Graphic Communication

*This information is provided to help you understand the general principles you must apply when marking candidate responses to questions in this paper. These principles must be read in conjunction with the detailed marking instructions, which identify the key features required in candidate responses.*

- (a) Marks for each candidate response must always be assigned in line with these general marking principles and the detailed marking instructions for this assessment.
- (b) Marking should always be positive. This means that, for each candidate response, marks are accumulated for the demonstration of relevant skills, knowledge and understanding: they are not deducted from a maximum on the basis of errors or omissions.
- (c) If a specific 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.
- (d) For each candidate response, the following provides an overview of the marking principles. Refer to the detailed marking instructions for further guidance on how these principles should be applied.
  - (i) Questions that ask candidates to **describe**  
Candidates must provide a statement or structure of characteristics and/or features. This should be more than an outline or a list. Candidates may refer to, for instance, a concept, experiment, situation, or facts in the context of and appropriate to the question. Candidates will normally be required to make the same number of factual/appropriate points as there are marks available.
  - (ii) Questions that ask candidates to **explain**  
Candidates must generally relate cause and effect and/or make relationships between things clear. These will be related to the context of the question or a specific area within a question.
  - (iii) Questions that ask candidates to **compare**  
Candidates must generally demonstrate knowledge and understanding of the similarities and/or differences between, for instance, things, methods, or choices. These will be related to the context of the question or a specific area within a question.
- (e) Candidates can respond to any question using text, sketching, annotations or combinations where they prefer. No marks shall be awarded for the quality of sketching. Marking will relate only to the information being conveyed.

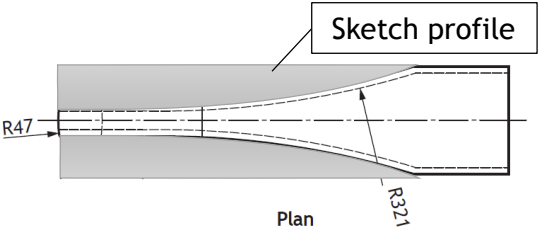

Question			Expected response	Max mark	Additional guidance
1.	(a)		<p>LEVER BEND to LEVER EXTENSION</p> <ul style="list-style-type: none"> <li>• Mate or align at 90 degrees between lever bend and lever extension</li> <li>• Tangent between top end of lever extension and lever bend</li> <li>• Offset 182.5 from top end of lever bend (radius horizontal edge of lever extension)</li> <li>• Mate between lever bend and lever extension</li> </ul>	4	<p>Offset 182.5 could be replaced by offset 141 from bottom edge of Lever Bend</p> <p>(Explanation  <math>170 + R12.5 = 182.5</math>  <math>158 - 25 + 8 = 141</math>)</p>
	(b)	(i)	<p>VIEW A: auxiliary plan view</p> <p>Description: shows the true shape/length of the sloping surface.</p>	1	Accept: 'auxiliary' view
		(ii)	<p>VIEW B: sectional end elevation Y-Y</p> <p>Description: shows the radius of the irregular fillet (at its maximum value R4).</p>	1	<p>Accept: 'section' or 'sectioned' (terms 'end elevation', and Y-Y expected but not necessary)</p> <p>Accept: shows if bar is solid or hollow(ed)</p>
		(iii)	<p>DIMENSION C: Angle or angular dimension with tolerance of + or - 2 degrees.</p> <p>Description: shows the range of values of the angle to meet quality control standards</p>	1	Accept: shows the acceptable/allowable range in the angle

Question			Expected response	Max mark	Additional guidance
1.	(c)	(i)	<p>.DWG contains data on dimensions, tolerances, layers and position of features such as holes etc</p> <p>Explanation: relevant dimensions or position of relevant features can be used in the redesign of the new seat</p>	1	<p>Reference must be made to the 'redesign' or the 'seat' or similar</p> <p>Accept: the same layers, tolerances and or BS conventions will be maintained between the original drawing and the new drawing of the seat</p>
		(ii)	<p>.STL file contains data on the surface geometry of a three dimensional object</p> <p>Explanation: surface geometry data can be edited and used for rapid prototyping or 3D printing the new seat (to physically test aspects of its design)</p>	1	<p>Reference must be made to the 'redesign' or the 'seat' or similar</p>
		(iii)	<p>.3DS file contains 3 dimensional data including geometry, texture, and material attributes, it may also include environment data including lighting styles and camera locations</p> <p>Explanation: data used to make the positioning, joining and securing the new seat on the existing seat support</p>	1	<p>Reference must be made to the 'redesign' or the 'seat' or similar</p> <p>Accept: new seat could be adapted from existing 3DS model (top down modelling) could show animation of assembly to seat support</p>

Question			Expected response	Max mark	Additional guidance
1.	(d)	(i)	<p>Stage 1 to Stage 2: Name: Texture mapping</p> <p>Explain: application of 2D image/colour to the surface of the object to represent the final material</p>	1	Candidates must name and explain to get the 1 mark
		(ii)	<p>Stage 2 to Stage 3: Name: Applied lighting or Specularity or Reflection (in the applied material)</p> <p>Explain: indicates that the amount of light reflected from the surface has increased, adding realism</p>	1	Candidates must name and explain to get the 1 mark
		(iii)	<p>Stage 3 to Stage 4: Name: Bump Mapping</p> <p>Explain: to give the impression of variations in geometry of the surface (although the actual physical properties/ number of polygons has not changed) it adds further realism without increasing the rendering time</p>	1	<p>Candidates must name and explain to get the 1 mark</p> <p>Accept: displacement mapping with a suitable explanation</p> <p>Do not accept 'texture mapping' for Stage 3 to Stage 4</p>

Question			Expected response	Max mark	Additional guidance
1.	(e)	(i)	Animation file types: .AVI .WMV .MOV .MPEG .3GP	1	Accept: 3DS and VRML
		(ii)	Rendered Image Vector file types: .AI, .SVG, .VRML	1	
		(iii)	<ul style="list-style-type: none"> <li>document is ready to be exported in a commonly used file format (e.g. .PDF .AI)</li> <li>does the page size on the DTP package match that of</li> <li>digital rights management issues resolved</li> <li>the final printed piece, so no scaling is required, fonts used in the digital file must be converted to the vector graphic format (e.g. EPS)*</li> <li>if bleed is required it must be extended off the digital page file by the correct amount (i.e. crop marks/bleed margins should be specified)**</li> <li>spot colours specified if required</li> <li>raster image files created at high enough resolution settings (300 dpi for printing)</li> <li>if coloured images, CMYK colours should be specified</li> <li>appropriate printing method is specified</li> <li>appropriate substrate (e.g. type of paper) is specified</li> </ul>	3	Accept: appropriate reference to quality of substrate  * sending the original font file to the print technician acceptable instead of font converted to vector ** a maximum of one mark will be awarded for printing marks e.g. crop marks

Question			Expected response	Max mark	Additional guidance
2.	(a)	(i)	<p>Motion capture</p> <p>advantages</p> <ul style="list-style-type: none"> <li>• records the position and movement of the body accurately, the data captured could be used to make improvements to the vacuum cleaner's design</li> <li>• rapid/real time results can be achieved.</li> <li>• the data/ images captured could be used for promotional purposes</li> <li>• provides data over the time duration that the product might be used</li> <li>• records position and movement of parts of the vacuum cleaner relative to the user to check for ease of movement</li> <li>• mechanical motion capture can provide data on the amount of force required to complete an action</li> </ul>	3	Any 3 points, 1 mark each
		(ii)	<p>Motion capture</p> <p>disadvantages</p> <ul style="list-style-type: none"> <li>• large amount of data is generated that needs to be processed and not all of it will be relevant</li> <li>• expense of outsourcing the process or investing in specialist equipment and /or software</li> <li>• may have limited use as not all consumers will use the product in the same way</li> <li>• specialist operator/interpreter required</li> <li>• significant post processing operations required</li> </ul>	3	Any 3 points, 1 mark each

Question			Expected response	Max mark	Additional guidance
2.	(b)	(i)	<p>Nozzle 1</p> <ul style="list-style-type: none"> <li>Extrude the cylinder (1 mark)*</li> <li>New work plane, create sketch profile (arc and lines-grey area) and extrude subtract to create curved profile then mirror 'extrude subtract' feature (1 mark)**</li> <li>Shell to make the nozzle hollow removing end faces (1 mark)</li> <li>New work plane and sketch profile to create slope and extrude subtract to create slope on end (1 mark)</li> <li>Apply appropriate fillets (1 mark)</li> </ul>	5	<p>* Cylinder can also be created using revolve.</p> <p>** Accept: drawing another sketch profile (shown below) and repeat extrude subtract process rather than using mirror feature</p>  <p>Loft can only be used if a suitable number of work planes and suitable rails/guides are mentioned</p>
		(ii)	<p>Nozzle 2</p> <ul style="list-style-type: none"> <li>Work planes with appropriate profile sketches (1 mark)</li> <li>Loft to create solid (1 mark)</li> <li>Shell to make the nozzle hollow removing end faces (1 mark)</li> <li>New work plane, sketch profile and extrude subtract to create slope (1 mark)</li> </ul>	4	<p>Nozzle can also be created through combination of loft and extrude</p> <p>3 work planes and 3 sketch profiles are needed for a successful loft. If 2 work planes/ sketches are specified then appropriate rails or guides must be included</p> <p>The mark for shell can be awarded if profile sketches on the offset work planes show both inner and outer edges</p> <p>e.g. profile sketch </p>



Question			Expected response	Max mark	Additional guidance
2.	(c)		<p>Test Parameters</p> <ul style="list-style-type: none"> <li>• select material for the nozzle</li> <li>• apply constraints or fixing points</li> <li>• apply load(s)/forces in the correct position and/or direction and/or magnitude</li> <li>• specify environmental conditions (e.g. temperature)</li> <li>• select static or dynamic load or force variance over time</li> <li>• set scale of units to achieve clearest visual results</li> </ul>	4	<p>1 mark for each bullet point</p> <p>Accept: 'define (results) analysis parameters' instead of 'set scale of units'</p>
	(d)		<ul style="list-style-type: none"> <li>• centre of mass to ensure part is supported during manufacture</li> <li>• datum surface so the measurements are correct from this reference point for the manufacturing process</li> <li>• dimensions to ensure parts function and assemble correctly</li> <li>• tolerances to ensure parts assemble correctly and there is interchangeability of parts</li> <li>• surface finish specified so appropriate manufacturing/finishing method can be chosen</li> </ul>	3	<p>1 mark for each bullet point</p> <p>Explanation must refer to manufacturing, assembly or finishing methods to get the mark</p>

Question		Expected response	Max mark	Additional guidance
3.	(a)	<ul style="list-style-type: none"> <li>• Unity/proximity is achieved/ use of red/ reverse text/position of images on the left hand side/rectangular shape/ repeated gradient fills connecting different features on the page</li> <li>• White space is generous across all the wide rectangular zones and creates a relaxed feel</li> <li>• The large bowl of cereal creates dominance and captures the viewer's attention</li> <li>• The cereal and milk provide texture and add variety and interest to the web page</li> <li>• Alignment of areas of extended text and red box feature leads the viewer's eye</li> <li>• Asymmetrical balance ensures both text and image impact the viewer</li> <li>• Rhythm created by repetition of the red box/reverse text, leads eye to each section</li> <li>• Rule of Thirds creates an attractive layout with cereal image within 1/3 of the page and 'eat special feel special' /text 2/3 across the page</li> <li>• Focal Point is created where the milk hits the cereal drawing attention to a key product.</li> <li>• Contrast is achieved by the high value red text against the lighter gradient background making it stand out; also by the serif font for heading/ subheading contrasting with the sans serif body font adding interest and blue gradient fill contrasting the red/brown fills used elsewhere</li> <li>• Capital K and product boxes with drop shadow creates some depth</li> </ul>	4	<p>Candidates must identify and explain each element or principle for 1 mark</p> <p>Each element or principle can only attract one mark</p>

Question		Expected response	Max mark	Additional guidance
3.	(b)	<ul style="list-style-type: none"> <li>• Some colours on a computer monitor (in RGB) cannot be reproduced accurately using CMYK process colour inks so pantone colour matching may be needed to maintain colour space</li> <li>• Differences in screen resolution (72 dpi) and print resolution (300 dpi) may confuse clarity of branding</li> <li>• If there are changes on the website or in a digital advertisement it may take time for the change to be made to printed media</li> <li>• Digital rights management issues may be different between online and printed media</li> <li>• Converting images or fonts from raster to vector format may affect the brands appearance</li> <li>• File types for printed and digital media will be different so compatible or exchange file formats will need to be used</li> <li>• Font/colour/logo/ colour must all be maintained to ensure customer loyalty and ensure quality and consistency are maintained</li> <li>• Selecting an appropriate printing method to ensure quality is maintained</li> <li>• Selecting an appropriate substrate for printed media to ensure quality is maintained</li> </ul>	3	<p>Candidates must mention the effect on the branding to gain a mark</p> <p>For example, the company branding on the <b>website</b> must match that on the <b>cardboard packaging</b> by ensuring the correct image resolution for both printed and digital logos</p>

Question			Expected response	Max mark	Additional guidance
3.	(c)		<ul style="list-style-type: none"> <li>• Raster or other image files, high resolution (300 dpi)</li> <li>• Fonts used must be converted to vector format</li> <li>• Bleeds set at appropriate value</li> <li>• Scale 1:1 (or size to avoid scaling)</li> <li>• Must be CMYK specified colour space</li> <li>• Must be exported as suitable file format: .PDF or .AI</li> <li>• Pantone colour matching information provided as required</li> <li>• Position/inclusion of either crop marks or registration marks, or densitometer bars or size of margins (gains maximum of 1 mark)</li> </ul>	4	
	(d)		Offset Lithography	1	Accept: Rotogravure, Gravure, Flexography

Question		Expected response	Max mark	Additional guidance
3.	(e)	<ul style="list-style-type: none"> <li>• colour coding (like traffic lights) for low, medium, high quantities of food groups clear and easily understood</li> <li>• appropriate use of bold text for key information</li> <li>• colour also adds interest to otherwise easily ignored information</li> <li>• use of grid structure to lay out information and make connections between similar content making interpretation easier</li> <li>• unity or rhythm created by repeated curved shape provides visual reference for identifying similar information</li> <li>• reverse text makes key information stand out*</li> <li>• use of 'symbols': grams (g) percentages (%) or calories (kcal): understood internationally easing communication</li> <li>• unusual shape attracts attention and makes information more distinctive</li> <li>• horizontal alignment helps leads the eye across the data</li> <li>• white space around key information makes it stand out</li> <li>• the text contrasts with the coloured background on label</li> <li>• sans serif font is clear and easy to read</li> </ul>	4	<p>Accept: a repeat of the same graphic technique is acceptable (e.g. use of colour) provided a different explanation is given</p> <p>*Accept: 'reverse' and 'reverse text'</p>

Question		Expected response	Max mark	Additional guidance
4.	(a)	<p>Candidates response will refer to 3 out of the 4 surveys listed here</p> <p>Drainage Survey:</p> <ul style="list-style-type: none"> <li>• to understand the existing drainage systems</li> <li>• to determine the best position for new drainage channels and interconnectivity with existing drains</li> <li>• to control the amount of surface and possible flood water</li> <li>• to determine how the park will be affected by or will affect neighbouring waterways</li> <li>• to determine the flood risk and prevention methods under different weather or seasonal conditions</li> </ul> <p>Underground Survey:</p> <ul style="list-style-type: none"> <li>• to analyse the ground conditions, depth of rock, soil types and previous land use; includes mining reports and data on water tables</li> <li>• influences the nature and location of foundations used for the kelpies structure</li> <li>• influences the location/ foundations of buildings, roads and walkways on site</li> <li>• will determine the nature of waterway boundaries</li> <li>• will determine if any decontamination is needed</li> </ul>	<p>1</p> <p>1</p> <p>1</p>	<p><b>6 marks in total</b>  1 mark for correct identification of the survey  1 mark for identifying the specific purpose of the survey in this context</p> <p><b>Repeated responses will not attract marks</b> however some drainage survey answers may be valid in the context of the underground survey e.g. the level of the water table may affect the size or position of drains</p>

Question		Expected response	Max mark	Additional guidance
4.	(a)	<p>Topographical Survey:</p> <ul style="list-style-type: none"> <li>to analyse the existing landscape (contours, features) in order to create an interesting and accessible landscape</li> <li>to assess what earthmoving/landscaping is required to meet the needs of the end user in terms of creating an interesting accessible park</li> <li>ensuring accessibility for all types of users making the most suitable or effective use of the land</li> </ul> <p>Feature Survey:</p> <ul style="list-style-type: none"> <li>to analyse existing manmade features and determine the best location for access roads, pathways and other hard and soft landscaping</li> <li>to locate position of walkways around the kelpies, access to play areas, walking routes, locations of seating, social spaces</li> <li>access for visitors includes foot, cars and public transport</li> <li>appropriate position and nature of lighting including consideration of different users</li> </ul>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>	<p>Accept: 'Topological Survey' however topographical is the accepted term</p> <p>Accept: survey could be used to update the map for visitors</p>

Question			Expected response	Max mark	Additional guidance
4.	(b)	(i)	<p>Model Maker:</p> <ul style="list-style-type: none"> <li>• scaled dimensioned drawings generated from the computer model so that the models proportions are correct</li> <li>• orthographic part drawings, exploded, assembled or sectional views to ensure accurate construction.</li> <li>• enlarged views to try and match as far as possible the details of the final sculpture</li> <li>• rendered images (including texture mapping, applied lighting and IBL) to match as far as possible the details of the finish/lighting on the final sculpture</li> <li>• CAD model could be used create 3D printed model</li> </ul>	2	<p>Two marks for each, but same answer cannot be used for different professions</p> <p>Accept: Dimensions could be extracted from 3D CAD model (e.g. from orthographic CAD drawings) and used to create a physical model from a variety of materials</p>
		(ii)	<p>Structural Engineer:</p> <ul style="list-style-type: none"> <li>• component parts saved as an appropriate files to be manufactured using CAD/CAM</li> <li>• dimensioned orthographic drawings generated from the model to ensure dimensional accuracy in manufacturing processes</li> <li>• exploded/assembly drawings or animations to show assembly techniques required in the final sculpture</li> <li>• information from FEA analysis of model to test strength of parts/members or joints in the structure.</li> <li>• CFD testing to determine the effects of wind/environment on the structure</li> </ul>	2	<p>Accept: as a result of testing the model, modifications could be made to the design</p>



Question			Expected response	Max mark	Additional guidance
4.	(b)	(iii)	<p>Construction Trades:</p> <ul style="list-style-type: none"> <li>• annotation on assembly drawings, in particular tolerances, joining methods e.g. type/size of weld, type of nut/bolt/washer that has been specified</li> <li>• material specifications on part drawings/models OR on parts lists in assembly drawings/models so correct parts are ordered are functionally/aesthetically correct</li> <li>• animations/ assembled/ exploded view to communicate assembly methods to construction workers</li> <li>• parts lists generated from model used to check correct number of parts</li> <li>• quantities of parts and size of parts as this would directly affect man hours, plant requirements and scheduling</li> </ul>	2	

Question			Expected response	Max mark	Additional guidance
5.	(a)		<ul style="list-style-type: none"> <li>advertisers can provide up to date information to the consumer, for example pricing, special offers etc...</li> <li>advertisers can use multimedia content which can enhance the consumers experience</li> <li>advertising can reach large numbers of people almost instantly using mobile phone networks and the Internet</li> <li>adverts can include direct links to online shopping sites</li> </ul>	3	<p>Mentioning digital media such as: websites, social media, apps will not attract marks unless it mentions how it increases the adverts appeal</p> <p>Accept: allows advertisers to target consumers based on previous online behaviour or based on consumer's subscriptions to digital publications</p>
		(i)	<p>Web page layout:</p> <ul style="list-style-type: none"> <li>clear grid structure divides the page into different sections to aid navigation</li> <li>use of rule of thirds (vertical division) to emphasise 'SUMMER SUPERFOODS' or rule of thirds (horizontal division) to emphasise page structure</li> <li>golden section (starts on TRHC of 'recent stories' green brown box and spirals out) to create an attractive layout and/or visually appealing proportions</li> <li>generous gutters to clearly delineate content areas</li> <li>generous white space or 'lack of clutter' makes text legible or images easy to interpret</li> <li>clear visual hierarchy using both text and images creates order</li> </ul>	3	<p>Responses to web page layout may also be valid for user interface (and vice versa) e.g. the use of white space. Repeated responses however will not gain additional marks</p>

Question			Expected response	Max mark	Additional guidance
5.	(b)	(ii)	<p>User interface:</p> <ul style="list-style-type: none"> <li>• appropriate number of navigational options reduces clutter but maintains range of content</li> <li>• use of visual clues or hierarchy such as emphasis, positioning of information and/or differences in proportion to visually guide the audience through navigational options</li> <li>• tab based navigation to maximise content to space ratio</li> <li>• generous white space or margins makes it easier to 'click' in the correct place</li> <li>• images have been carefully selected to be distinctive and draw attention to specific topics (for example; images with depth of field, fully cropped images, images with unusual edits)</li> <li>• sans serif font is easy to read/quick to interpret</li> </ul>	3	<p>Also accept:</p> <p>drop down menus in a familiar location</p> <p>diversity of content contained in drop down menus means that the home page can be kept clear</p>
		(iii)	<p>Graphic media file types:</p> <ul style="list-style-type: none"> <li>• file types that allow for the different informative content (.JPG for photographic images .PDF for fact sheets, .AVI, .WMV or QuickTime for video)</li> <li>• files that are not platform dependent so can be opened on any operating system</li> <li>• files that can be downloaded quickly</li> <li>• appropriate resolution for image files to aid communication</li> </ul>	3	

[END OF MARKING INSTRUCTIONS]