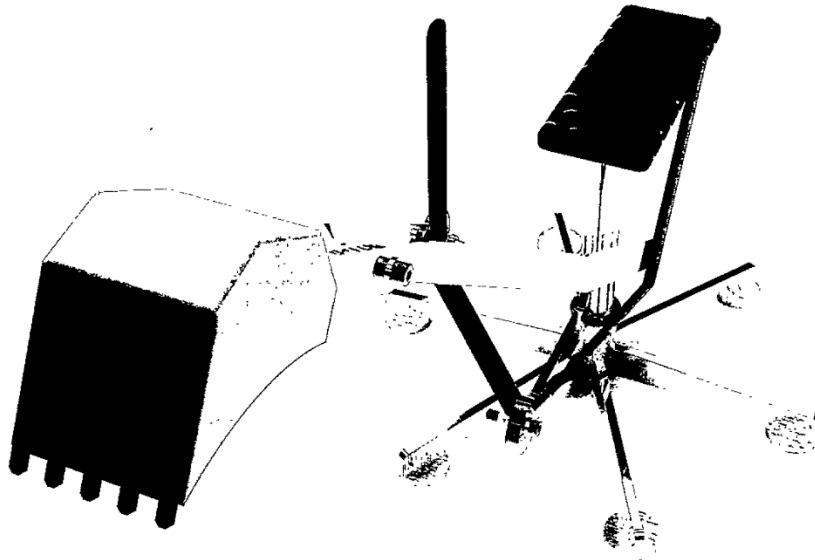


Total marks — 80
Attempt ALL questions

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1. A manufacturing company has produced an excavator toy, which is shown below.



A CAD technician working for the company used bottom up modelling to create the individual parts. Sub-assemblies were then produced before being joined in the final model.

Drawings generated from the model are shown on the Supplementary Sheets 1 and 2 for use with Question 1.



1. (continued)

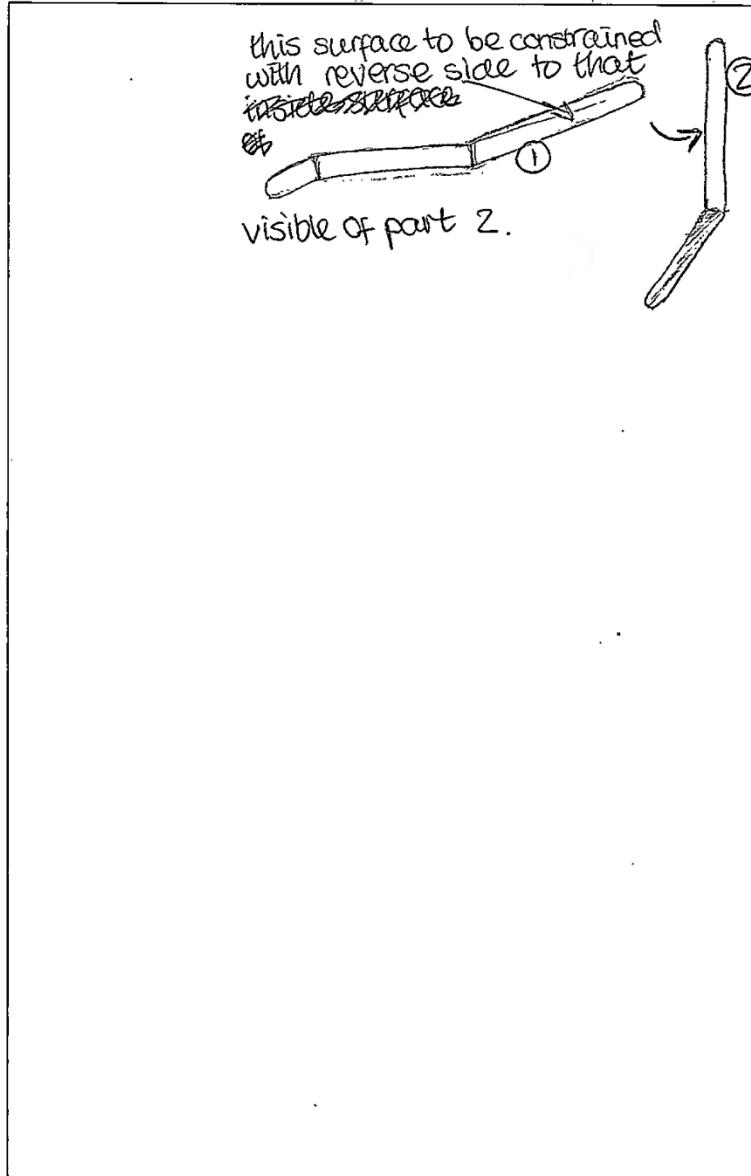
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- (a) Describe the 3D CAD constraints used to assemble the lever bend to the lever extension. You may use sketches to support your answer.

4

You should refer to the left-hand lever sub-assembly shown on Supplementary Sheet 1 for use with Question 1(a).



[Turn over



* X 7 3 5 7 7 0 1 0 3 *

1. (continued)

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(b) On Supplementary Sheet 2 for use with Question 1(b) various views and a dimension have been annotated with the letters A to C.

Name each view or dimension and describe the information that it would provide to the manufacturer. You must use the correct British Standard terms.

(i) View A isometric view to give the manufacturer 1
an visualisation of the part

(ii) View B angle, with tolerance, informing the 1
manufacturer of the angle to bend the lever
as well as stating the tolerance to allow for

(iii) Dimension c section view, to allow manufacturer
to see any internal detail that may not
otherwise be visible. ~~(hidden detail)~~



1. (continued)

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(c) A problem has been identified with the seat of the excavator toy and a redesign is required. Specific information about the current seat is saved within the following file formats — .DWG, .STL and .3DS

Explain how the information contained in these files would be used in the redesign of the replacement seat.

(i) .DWG used for the working document, while it is still in the process of being designed 1

(ii) .STL used for use with rapid digital prototyping, allowing designer to test product prior to being manufactured 1

(iii) .3DS used to show client, other members of the design team a 3 Dimensional image/view of the part 1

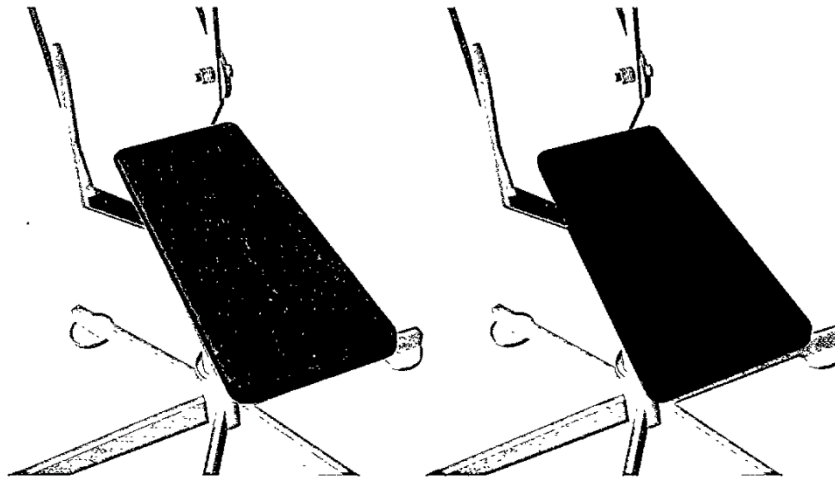
[Turn over



1. (continued)

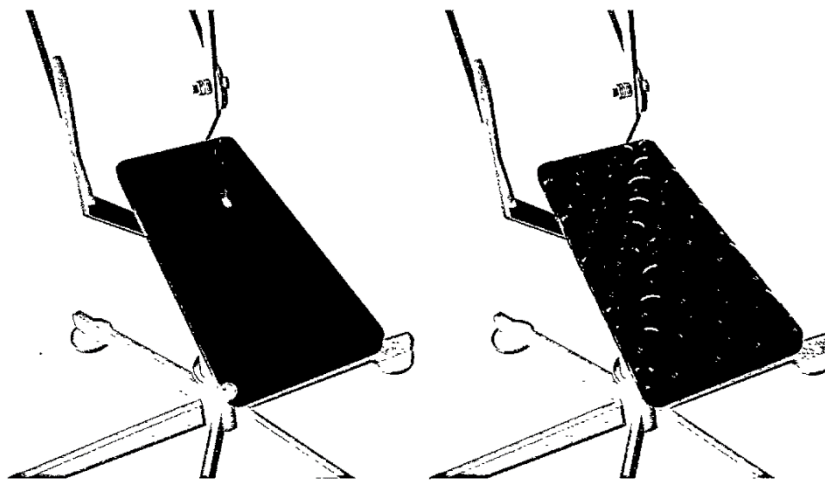
(d) A CAD illustration of the seat detail is produced. The stages of creating this detail are shown below. Stage 4 shows the final illustration.

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Stage 1

Stage 2



Stage 3

Stage 4



1. (d) (continued)

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Name the computer-aided techniques which have been applied between the following stages of the process and explain how they have been used.

(i) Stage 1 to Stage 2

1

change of material, from wood to plastic,
maybe following tests revealing unsuitability
of wood surface.

(ii) Stage 2 to Stage 3

1

Surface mapping - adds a reflection to surface
creating a more realistic model, and suggests
it is in a lit environment.

(iii) Stage 3 to Stage 4

1

Bump-mapping to create impression of
3D surface, featuring texture, shown
by the use of white pixel highlights along
the edge of lines, all coming from
particular, same direction.
Adding this ~~surface~~ adds ~~surf~~ surface &
feature to the grips to the seat, improving safety of the
toy. [Turn over



1. (continued)

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(e) A presentation about the excavator toy is to be created in printed and digital media using a variety of file types.

(i) State the name of a file type that could be used to show an animation of how the excavator toy is assembled.

1

Quicktime video file for use on ~~the~~ mac computers

(ii) State the name of a vector file type that could be used to show a rendered image of the finished excavator toy.

1

Bitmap

(iii) The printed presentation takes the form of a poster, which includes both images and text.

Explain what would need to be considered by the designer prior to the poster being sent to the print technician.

3

the designer would have to consider, the printing process that is to be used, as this will determine whether they will need to include features such as bleed, registration & crop ~~marks~~ etc. As it is a poster, it is likely to be printed ~~on~~ using offset lithography, this will therefore need to be printed on OS paper, the designer will have to consider this when creating the document upon start up.



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2. A vacuum cleaner manufacturer uses motion capture technology as a test procedure to ensure that their products are easy and comfortable to use.

An image of the test is shown below.



- (a) Motion capture has advantages and disadvantages.

- (i) Describe three advantages of motion capture technology to the manufacturer.

3

- motion capture technology creates highly accurate animations.
- modern technology allows the creation of motion capture, without the use of suits, this is therefore quicker as well as produces ^{even} more accurate
- it allows the manufacturer to accurately see where the product works & does not work well. ^{shows}



* X 7 3 5 7 7 0 1 1 0 *

2. (a) (continued)

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(ii) Describe three disadvantages of motion capture technology to the manufacturer.

3

- traditional methods that use suits are time consuming & expensive to set up.
- it does not give as good an indication of how a product will perform under pressure as Finite Element Analysis (FEA), which specifically indicates areas of strengths & weaknesses.

[Turn over



2. (continued)

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(b) After testing, the manufacturer wants to design a new nozzle. Two designs are being considered.

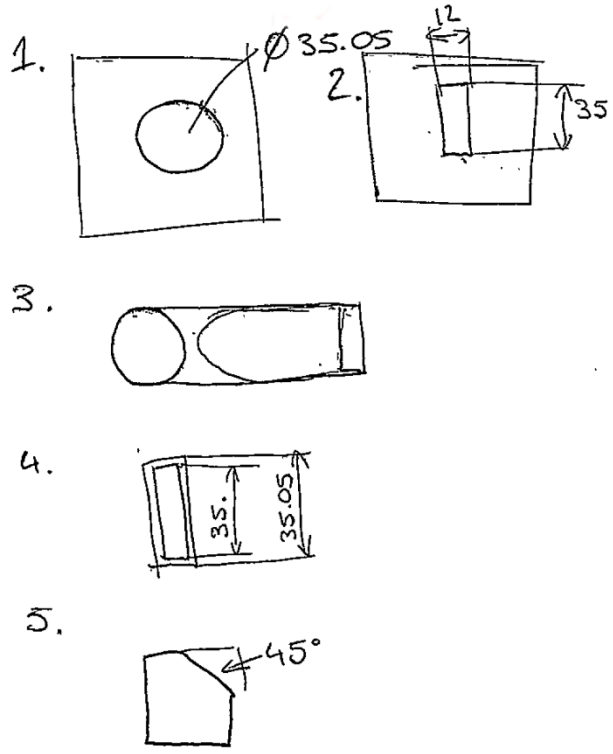
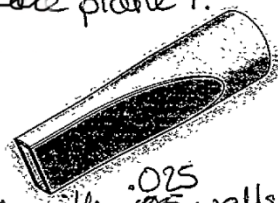
You should refer to Supplementary Sheets 3 and 4 for use with Questions 2b(i) and (ii). Nozzle 1 is shown on Supplementary Sheet 3. Nozzle 2 is shown on Supplementary Sheet 4.

Describe the 3D CAD modelling techniques used to create the two replacement nozzles. You may use sketches to support your answer. Dimensions do not need to be included in your responses.

(i) Nozzle 1

5

1. create 2D sketch of circle on surface plane 1.
2. create 2D sketch of rectangle on surface plane 2. - at 68°
3. loft between the two surfaces.
4. shell object ~~and~~ completely ~~from~~ with .025 walls.
5. ~~fillet~~ chamfer edges



2. (b) (continued)

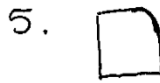
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4

(ii) Nozzle 2

1. create 2D sketch of circle on surface plane 1.
2. create 2D sketch of oval on surface plane 2.
3. left between the two surfaces
4. shell object completely with ^{0.25} walls
5. ~~chamfer~~ edges.
fillet



[Turn over



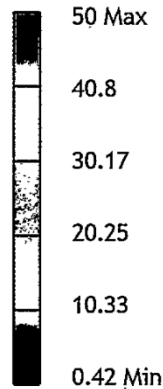
2. (continued)

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The 3D CAD models of the nozzles are being tested using Finite Element Analysis (FEA) methods.

The results of the test on Nozzle 1 are shown below.

Type: Von Mises Stress
Unit: Pa
06/04/2016, 13:54:28



(c) Describe four set-up requirements that are necessary before the FEA simulation test can begin. 4

- material has to be established & allocated to part
- all dimensions must be accurate
- location of pressure to be chosen & established
- force of pressure to be established
- ^ all to allow for fair & equal testing.



3. A company has launched a series of products that carry the same branding. The graphic designer has maintained the brand across a range of products and a website using design elements and principles.

MARKS DO NOT WRITE IN THIS MARGIN



Special K website homepage

- (a) Identify four design elements or principles and explain how they have been used in the web page shown above. 4

1 line - the simple use of the red line under the slogan effectively draws the eye across the page, the outline of the two large boxes also creates depth within the page.

2 unity - there is much unity within the page, shown primarily through use of colour, the same red colour/tone has been used across the page, in the text boxes, titles, logo & within the main image.

3 drop shadow - used for with images, logos & line at top of page, this adds depth to the page, creating an interesting & appealing design.



3. (a) (continued)

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4 alignment - at the bottom of the page the text has been left aligned, along with the red text boxes, this creates

a well structured design is smart. the text is also neatly aligned to the edge of the image with both

(b) It is important that the branding on the web page exactly matches that on the product packaging. Three examples of this packaging are shown below.

columns having equal margins.



Coated cardboard packaging for biscuits



Plastic packaging for individual cereal bars



Coated cardboard and foil yoghurt container with plastic lid

Describe three factors that a company may have to consider when maintaining consistency across digital and printed media. You must mention specific printed and digital media in your responses.

3

- Digital media uses the additive colour group RGB, whereas the printed media uses the subtractive colour group CMYK.
- Digital screens often appear brighter (more vibrant) and more blue-ish in hue than printed media.
- To avoid this difference designers can colour calibrate the printer & digital monitor/computer.

Four horizontal lines for writing.



3. (continued)

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(c) A camera-ready copy of the biscuit packaging is produced.

Describe four requirements of a camera-ready copy for commercial printing.

4

- It must feature a full bleed to allow for content to reach all edges after cropping.
- for offset printing, registration marks are necessary to ensure each colour layer (C, M, Y & K) are printed exactly on top of each other
- crop marks must feature, to inform where the document is to be cropped following printing
- the size of OS paper must be established
- colour match boxes should also be present

(d) State a suitable printing process to mass produce the cardboard biscuit packaging.

1

offset lithography printing

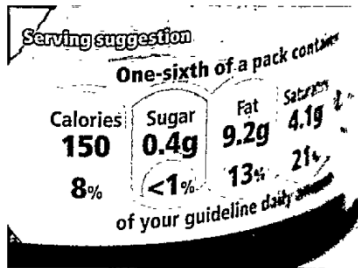


3. (continued)

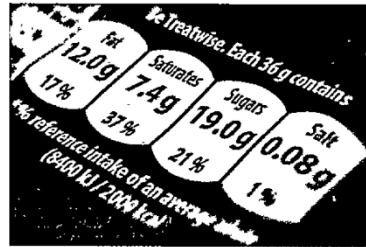
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(e) Food manufacturers are required to display nutritional information on food packaging.

Two examples are shown below.



Label 1



Label 2

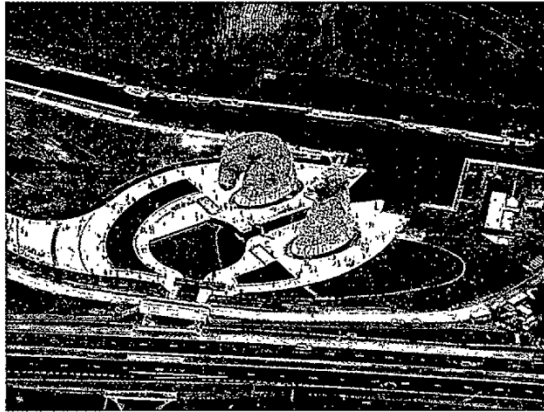
Explain, with reference to the labels shown above, how graphic techniques have been used to make the nutritional information as clear as possible. 4

- white outlines have been used in both labels, around the individual boxes - this clearly separates the information from the image behind
- bold font has also been used in both labels, this employs dominance & importance for the information/text that is bold, - suggesting that the quantities & percentages are important for the consumer to know
- in label one, different colours have been used for each box, this differentiates each value/number, and gives it its own importance.
- in label two, a transparent version of the text colour has been used as the background for each box, this creates unity ~~between~~ ^[Turn over] between the boxes, as well as with the text.

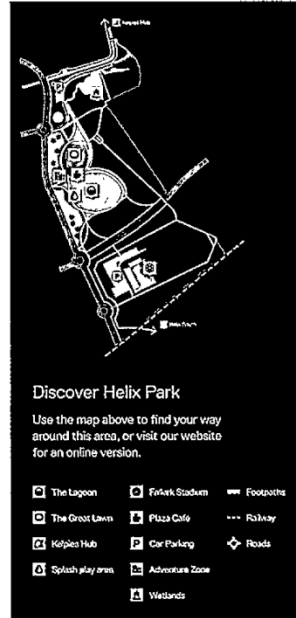


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- 4. The Kelpies and surrounding Helix Park have become a popular tourist attraction in the heart of Scotland.



Aerial photograph of the Kelpies and the visitor's map of the Helix Park



- (a) Prior to the construction of the Kelpies and Helix Park, three different surveys were undertaken.
Name three surveys and explain their purpose in ensuring the success of this project.

6

Survey 1 underground survey

Purpose to establish where existing pipes & water works exist.



4. (a) (continued)

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Survey 2 _____

Purpose _____

Survey 3 _____

Purpose _____



4. (continued)

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(b) Many professionals from the built environment sector were involved in the design and construction of the Kelpies sculptures. These included a model maker, structural engineer and a representative from the construction trades.

During the project they all made use of a computer generated 3D model of the sculptures.

Describe two ways the following professions could make use of the 3D computer model. You must give different answers for each profession.

(i) model maker

2

gather information of the dimensions, which they would then scale down to produce their model.

(ii) structural engineer

2

use 3D model along with FEA to ensure the sculptures are structurally sound & safe to build.

(iii) construction trades

2

take information on the materials needed to go to suppliers to buy materials ready for construction.



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5. Advances in technology have changed the way in which we access information.



- (a) Describe three ways an advertiser can use digital media to appeal to the consumer.

3

- * design & create a website benefits include:
- being able to view more than one page at a time by having multiple windows or tabs open
 - the ability to easily produce a website that can be presented in different languages.
 - websites can be viewed all over the world, allowing advertisers to attract a large audience.
- * interactive digital media is a great way for advertisers to appeal to customers as:
- it instantly creates a physical relationship between customer & company.
 - makes the customer feel involved & part of the activity/company.
- * tv adverts are a popular way to appeal to consumers as they are an easy way to reach out to a large audience and can be even a short video.



5. (continued)

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A website called “foodfactsaware.com” helps consumers understand more about information displayed on food packaging. The web page shown in the image below features drop down menus allowing consumers to access additional content. This takes the form of video interviews with professionals, printable fact sheets on nutrition and annotated photographs explaining food labelling.



(b) Explain how the web designer has made the website shown above informative and easy to use, with reference to the following.

(i) Web page layout

3

- the page has a grid structure, this means all the information is presented clearly & orderly.
- the colour fill boxes in the centre of the page have equal spacing & margins within & between each.
- all text has been aligned neatly, for example the ^{sub} headings is aligned right, to the edge end of the heading text. ~~the bottom of the page has been~~



5. (b) (continued)

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(ii) User interface

3

• the use of drop down menus is a clear & simple way of allowing the user to understand & see where they can reach further information

• Use of sophisticated colour scheme gives smart & professional overall appearance, giving ~~good~~ ^{good} impression to user.

• much white space is present giving a clear impression & makes the page easy on the eye for the user

• each section has been clearly identified & separated allowing ease of use for user.

(iii) Graphic media file formats

3

• the use of a variety of media file formats adds depth to the content of the website.

• having video interviews means the user can watch & listen to information instead of reading

• having printable fact sheets allows users to physically interact with the information as they please in ~~read~~ a physical way

• use of annotated photographs creates a clear & visual way of reading information.

All of these help make the website ~~is~~ user-friendly as well as informative.

[END OF QUESTION PAPER]



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ADDITIONAL SPACE FOR ANSWERS

5b.i. the text in the middle of the page, over the image has been aligned right, this draws the eye across the screen to the right side.



* X 7 3 5 7 7 0 1 2 6 *