Chapter # 16 – Graphics Creation

June 2017 – P31 & P33

9 Dylan works for a graphics design company producing images in GIF, JPEG and PNG file formats. He has been asked to produce some high-quality still images for use in advertising on the World Wide Web. He has to choose one of the file formats to store the images.

Choose the most appropriate file format by comparing the features of the three different formats.

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Answer:

9	***Four** from:* PNG images are lossless/do not lose data when edited so have higher quality JPEG (jpg) format is compressed with data being lost/data is lost during editing but images are of lower quality/have artefacts compared to PNG images GIF only allows limited number of colours/256 colours so is not suitable for high quality image publication GIF allows several images in one file so animations are possible, but this is not required.	**4**

November 2017 – P32

3 An artist has sketched some of the shapes to use in a cartoon image of a snail.

The pre-drawn shapes are shown in Fig. 1.

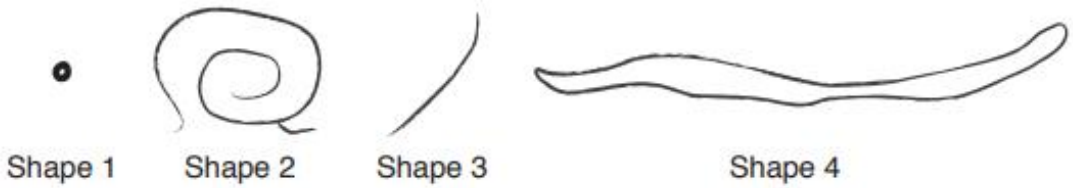

Fig. 1

The final image is then composed and completed using image-editing tools on a computer. It is shown in Fig. 2.

Fig. 2

Question 3 (Continued)

Explain, in detail, how you would use image-editing tools to create the final image from the components.

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Question 3

Answer:

3	***Eight** from:* Create new canvas/image on which to compose the final image of the snail Copy and paste/scan all components into the new canvas so that they are ready for editing Ensure that all backgrounds of all shapes are set to transparent to allow overlap of components Shape 1 has part of the image cut out/erased to produce the eye shape Shape 1 is copied and pasted to produce two images for the eyes of the snail Shape 2 is inverted/flipped horizontally (across the vertical plane) and resized larger/enlarged for the shell Shape 3 is rotated by 90 degrees and inverted horizontally to form one of the antennae ...resulting shape is copied and pasted and stretched horizontally to form the second antenna Shape 4 is resized, filled with black to form the body of the snail All the shapes are positioned/aligned together/grouped to form the composite cartoon snail Brush tool with pencil/small size is used to ensure that the join between shape 2/shell and shape 3/body is complete/no gaps are left ...used to add dotted line at base of shell/shape 2 Text is added and rotated left by 90/right by 270 degrees ...text is positioned as shown Components are grouped and resized together to form final image.	**8**

November 2017 – P33

10 Computers can be used to edit images for advertising features in a printed magazine.

Describe the use of image editing techniques to alter images for use in advertising products.

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Question 10

Answer:

10	***Six** from e.g.:* Cropping of images to remove unwanted areas... ...use of rule of thirds to keep image visual balance ...can lose important detail if poorly used Colour balance adjustment to change 'feel' of image... ...whiter to create warm mood ...bluer to create cooler mood/feel ...restore natural colour to flesh tones Brightness/contrast changes to change appearance of image ...increase in contrast for photos taken on dull days can show more detail ...decrease in contrast for photos taken in bright sun can increase detail in shadows Add a new/missing object/replacing an object in the image ...combining elements of different photos to create a new photo... ...covering/obscuring part of the image with another object Creating a digital illustration/cartoon of the original photo Changing/adding a different/new/fantasy/magical background Create an illusion of depth Create special effects Adjusting the image itself ...change the transparency of an image ...resizing of photos ...reducing noise in the image ..correcting lens distortion/perspective.	**6**

March 2017 – P32

4 A website advertising a tourist resort uses both bitmap and vector graphics.

Evaluate the suitability of these types of graphics for use on the website.

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Question 4

Answer:

4	**Answers/Indicative content**	**Level of Response**	8
	This question to be marked as a Level of Response. Answers may make reference to e.g.: ***Photo-realism***: bitmaps are comprised of small pixels so the bitmap is the most suitable format for photo-realistic images or images with high amounts of fine detail. The vector image, on the other hand, does not possess the same kinds of photo-realistic capabilities because it is comprised of larger objects and cannot achieve the kind of fine detail that is necessary for photo-realism.	**Level 3 (7–8 marks)** Candidates will evaluate in detail the suitability of both bitmap and vector graphics for use on the website. The information will be relevant, clear, organised and presented in a structured and coherent format. There will be a reasoned conclusion/opinion. Subject specific terminology will be used accurately and appropriately. **Level 2 (4–6 marks)** Candidates will explain the suitability of both bitmap and vector graphics for use on the website.	

Question 4

Answer (Continued):

	Scalability: vector images are made of mathematically defined objects so sizes can be easily manipulated with little to no loss in the quality of the image. The objects within a vector image are re-rendered at a greater or smaller scale to provide consistently smooth edges. Bitmaps are more difficult to scale because changing the size of a bitmap requires a complete rearrangement of the pixels. An enlarged bitmap is likely to appear blurry, or "pixelated," meaning that the different pixels of the image have become visible. ***Shape:*** a bitmap image always has four straight edges while vector images can be any shape.	For the most part, the information will be relevant and presented in a structured and coherent format. There may be a reasoned conclusion/opinion. Subject specific terminology will be used appropriately and for the most part correctly. **Level 1 (1–3 marks)** Candidates will describe the suitability of bitmap and/or vector graphics for use on the website. Answers may be in the form of a list. There will be little or no use of specialist terms. **Zero marks:** Response with no valid content		

Question 4

Answer (Continued):

Answers/Indicative content	Level of Response
File size: complex vector images can have a very large file size due to the complex instructions needed to create them; the size of the file is not dependant on the size of the image: small complex images can have a large file size; bitmap images can be large but can be compressed. ***Conversion between file types***: the most common file type for bitmap web images are jpeg or gif, and conversion to these is simple without loss of quality; conversion of vector images often results in more loss of quality.	

June 2018 – P31

9 A graphics artist has drawn a shape on a 600 × 800 pixel resolution grid as shown in Fig. 3.

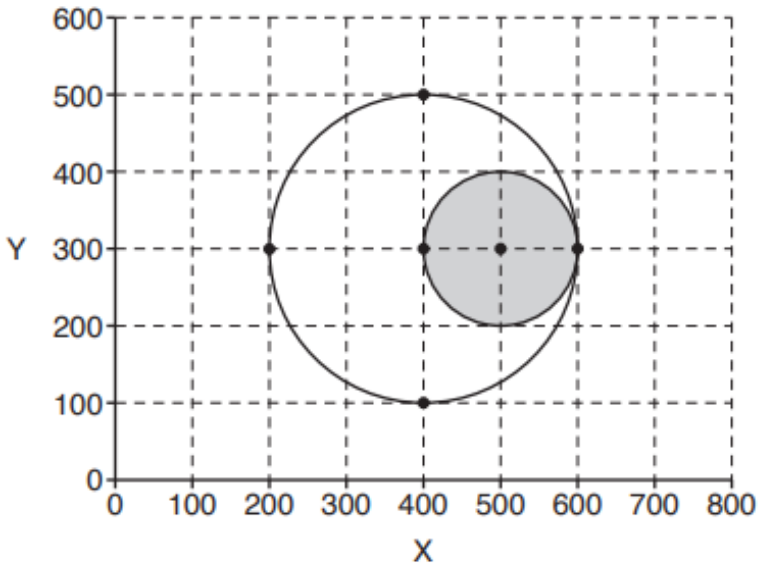

Fig. 3

The shape is to be stored in a computer file as a vector graphic so that it can be opened and displayed in different resolutions without loss of quality.

Question 9 (Continued)

Describe the information about the shape that would be stored in the vector graphic file.

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Answer:

9	**Six** *from:* Information about what is to be drawn/instruction to draw circles/use of (Bezier) curves to draw shape Location of the centre point of the (outer/larger) circle at 400,300 Radius of the (outer/larger) circle as 200 pixels Location of the inner/smaller circle at 500, 300 Radius of the inner/smaller circle as 100 pixels Style/weight of the lines to be drawn Colour(s) of the circle fill(s) Degree of opacity/transparency of the circles.	**6**

June 2018 – P33

6 **(a)** Describe how a bitmap ('raster') graphic is stored in a computer file.

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Answer:

6(a)	**Four** *from:* Made up of pixels Each pixel is represented by bits 1 to 64 bits per pixel Number of pixels depending on colour depth Bits representing pixels packed in rows for bmp Rows rounded to 32 bit words Padding needed for loading into memory locations Usually stored from bottom left up to top right of image.	**4**

Question 6, Part (b)

(b) Vector images are stored in computer files in a different format to how bitmap ('raster') images are stored.

Explain why vector images must be converted to bitmap ('raster') images for display on a digital monitor.

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Answer:

6(b)	**Four** *from:* Vector images are stored as co-ordinates/geometric descriptions of shapes and colours Digital monitors cannot display co-ordinate-based graphics Because all digital monitors are pixel-based Graphics card/computer must convert the co-ordinates/ descriptions into pixels before sending to digital monitor... Uses an ADC-type action Resizes the image to suit the requirements of the user/monitor.	**4**

November 2018 – P32

2 Some text is being written for use as a title in a slideshow presentation. The text is to be zoomed in and out as the titles are displayed in different sizes on the slides.

The sample letter in Fig. 1 has been created as a bitmap graphic while the sample letter in Fig. 2 has been created as a vector graphic.

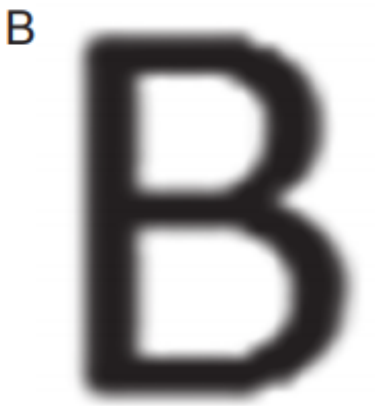

Fig. 1

Fig. 2

Explain, in detail, why letters created as in Fig. 2 are more suitable for use in the slideshow than those created as in Fig. 1.

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Question 2 (Continued)

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Answer:

2	**Six** *from:* Fig. 2 can be scaled/zoomed without loss of quality/clarity Because it is (a vector graphic) made up of instructions/code on how to create the letter When resized/zoomed the graphic is recalculated so no loss of quality Fig. 1 cannot be scaled/zoomed without loss of quality/clarity Because it is (a bitmap image) made of square pixels The rounded appearance is created by pixels of varying density If zoomed/enlarged too much then pixels are visible If zoomed the letter becomes blurred/lacks definition/unreadable.	**6**

November 2018 – P33

1 The photograph shown in Fig. 1 was taken and manipulated into the JPEG image shown in Fig. 2.

Fig. 1

Fig. 2

(a) Describe all the software features used to change the image in Fig. 1 to produce the image in Fig. 2.

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Answer:

1(a)	**Two** *from:* Crop tool to remove excess background/to show just the face Border line added to the whole image Resize tool to make image larger Saved as compressed (JPEG) format.	**2**

Question 1, Part (b)

(b) Explain why the features of the face in Fig. 2 are no longer easy to see.

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Answer:

1(b)	**Six** *from:* The image in Fig. 1 has been created/saved as a bitmap Bitmaps are made of pixels The image in Fig. 2 has been saved as a compressed image with too much compression Loss of pixel/data during compression so detail is lost in the image of the face The compression artefacts are visible to the human eye The pixels in Fig. 2 are no longer small enough to be indistinguishable by the human eye When enlarged the pixels of the face/image become visible The face now looks unrealistic/blocky so the features are not distinguishable.	**6**

March 2018 – P32

1 A website designer can use bitmap or vector images in web pages.

Explain the characteristics of bitmap images that make them suitable for use on web pages that advertise items for sale.

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Answer:

1	***Four** from:* Can be saved/stored in a variety of formats so that the webpage can be viewed on all computer platforms Can be output from many applications so easy to produce Can be created from the pixel arrays in memory Can display vast range of colours depending on bits per pixel Can display subtle gradations of shades/colour/greyscales as it is made of pixels Best for photo-realism/continuous tones compared to vector images so images of advertised items appear more realistic Individual pixels can be modified to customise/edit the image so images of advertised items are more appealing/attractive Can translate easily to dot-format output for use with CRTs/printers Can be used in simple animations e.g. Animated gifs Can be compressed so that file size is reduced and loads faster.	**4**

June 2019 – P31 & P33

1 Explain, with suitable examples, why computer graphics image editing software allows users to save bitmap images in different file formats.

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Question 1

Answer:

1	**Six** *from e.g.:* Some graphics software may not support all file types so different export options allows images to be shared e.g. use of JPEG / GIF is almost universal Images can be saved as compressed images / files to save storage space / allow use in various scenarios / situations e.g. use of JPEG allows compression by various amounts but the more compression the lower the quality GIF allows areas to be made transparent whereas JPEG does not support this Different file types support different colour depths for use in various situations e.g. JPEG supports more colours than GIF Quality of the image is affected by choice of filetype e.g. TIFF retains better quality than JPEG / GIF when compressed Bitmap (BMP) files restrict the use of the images to e.g. Windows OS so availability of other types allows cross-platform use.	**6**

6 Discuss the impact of photo editing in politics.

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Answer:

6	**Six** *from e.g.:* Altered images can dissuade from / reinforce a belief of the viewer Adding people to images can persuade the viewer that the person was present when in fact they were not Removing people from photographs can create the belief that the person did not participate in an event Removing disgraced / out of favour people from photographs can create the belief that the person did not exist Retouching images of politicians can make them appear more attractive than in real life so more likely to appeal to a voter Viewers can be unaware that an image has been manipulated so may make decisions based on false information.	**6**

June 2019 – P32

8 The photograph in Fig. 8.1 has been edited and is shown in Fig. 8.2.

Fig. 8.1

Fig. 8.2

Describe in detail how image editing tools could have been used to change the photograph in Fig. 8.1 to that shown in Fig. 8.2.

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Answer:

8	**Two** *from:* Perspective / transformation tool has been used (to correct perspective) by 'stretching' the image across the top to align the sides of the stores / shops / buildings Rotate right tool used to correct the image to an upright store / shop / building front Curtains (in left windows) have been inserted by copy / paste / clone pixel tools using those in right-hand set of windows as source Image has been cropped to remove some of the building Image has been resized to improve aspect ratio.	**2**

9 Colour gradients can be used when filling shapes in digital images.

(a) Describe **two** properties of the filled shape that can be changed with the use of colour gradients.

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Answer:

9(a)	**Two** *from:* Opacity from completely opaque to totally transparent Fade (actual) colour from one colour into another colour / white across the colour palette.	**2**

Question 9, Part (b)

(b) Describe the **types** of gradient that can be used when filling a shape with colour.

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Answer:

9(b)	**Four** *from e.g.* Linear fills evenly across the image Radial fills with single line paths where the fill starts at centre and fills outwards along all radii …fills evenly along all radii Elliptical fills with two line paths where fill starts at centre and fills outwards along two directions away from the centre …can be skewed along one line or the other Conical fills create the illusion that the image is a cone shape Square fills can produce a star-like view in the colour Three colour fills merge from one colour into two others across the image Four colour fills merge from one colour into three others across the image.	**4**

November 2019 – P31 & P33

10 A new photograph of a person in her office is required but the person is not available for the photo shoot.

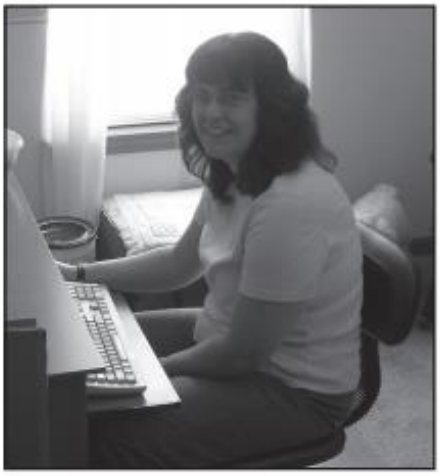

Fig. 10.1

Fig. 10.2

Explain how the image of the person in Fig. 10.1 was extracted and placed in Fig. 10.2.

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Question 10

Answer:

10	*Six from:* Photographs opened in image editor Person image cut out from photograph 1/Fig. 10.1 Mask around person is created to cover background Selection to be cut is highlighted/drawn Selection is modified around edges to ensure accuracy Using of adjustable nib for drawing tool Cut unwanted parts of image of woman Background of cut image changed to transparent Copy cut out (to clipboard) Create new layer for image of woman Import/paste cut out into image of office/photograph of office/Fig. 10.2 Place new image in correct position Resize image of woman (as required to fit in image of office) Bring to front/back as necessary Flatten/merge layers (if required) Correct new image for overlap/misplaced parts/pixels of imported image Crop area of new image/photograph 2 as required.	**6**

November 2019 – P32

1 Vector images use 'nodes'.

(a) Describe what is meant by a 'node' in a vector image.

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Answer:

1(a)	**Two** *from:* Control point for lines/paths in image Has defined positions on the *x*- and *y*- axes Determines direction/vector of path Defines/shows the start and end points of lines/arcs/paths.	**2**

Question 1, Part (b)

(b) Describe how node editing can be used to change a vector image.

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Answer:

1(b)	**Four** *from:* (Unrelated) nodes can be joined together Nodes can be moved to change the shape/path direction Add a new node(s) to change overall shape/add new path Delete a node to change overall shape/delete path Use of symmetrical nodes to create smooth, flowing curves on either side of a node. Use of asymmetrical nodes to obtain a different amount of curve on each side of the node (keeping a smooth flow through the node) Adjusting the length of each control arm without changing the direction Use of cusp nodes to create extreme changes in direction Adjusting the length and direction of each control arm independently Use of smooth nodes to create smooth transitions between straight/curved line segments	**4**

11 Fig. 11.1 shows a photograph of a scene. Fig. 11.2 shows the same scene after the photograph has been edited with image editing software.

Fig. 11.1

Fig. 11.2

Describe how image editing tools could have been used to change the photograph in Fig. 11.1 into that in Fig. 11.2.

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Question 11 (Continued)

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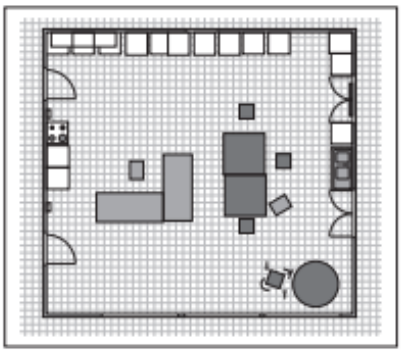
Question 11

Answer:

11	**Eight** *from:* *Removal of 'Private barrier'/structure:* Freehand selection tool(s) to select irregular objects/barrier structure elements Cut tool to remove object from the image Colour picker tool to select background colour next to/behind barrier Paint(brush) tool to fill in area where barrier removed/paint over barrier structure ... using selected colour to match backgrounds/blend with backgrounds where barrier was Use a tool which allows cloning to fill pixels that were removed/use of clone tool/select and copy and paste to disguise where shadow of barrier was on path *Addition of new lamp post:* Freehand select tool to draw around existing lamp post/select lamp post Copy/paste tools to copy lamp post to clipboard (leaving existing in place) Create new layer for additional lamp post/paste new lamp post into layer/image Position new lamp post to precise position required *Clean up pasted image:* Colour picker tool to select colour to be painted into edges of added image and paint tool used to fill pixels around image to make it 'blend' in Use of appropriate brush size *Adding text for title:* Create new layers for text and path Type text and create/draw path for the text Use text to path to create shaped text Position text/title Remove temporary layers used to construct title *Finalising image:* Merge layers (down) to 'flatten' image.	**8**

13 Computer Aided Design software has been used to create a design for a new kitchen as shown:



Plan

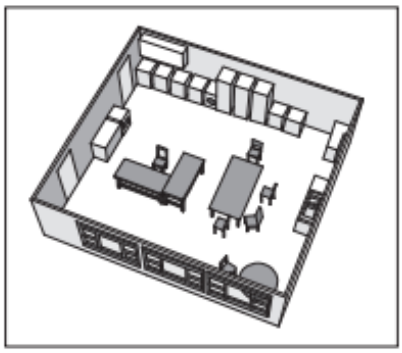


Image 1

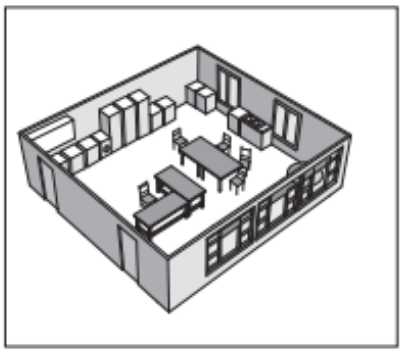


Image 2

Describe how the software tools would have been used to create the plan and the images from it.

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Question 13

Answer:

13	*Four descriptions from e.g.:* *Tools to create plan:* *Editing tools:* The required dimensions of the room are entered Location/position of windows and doors are entered Objects are brought in from the image library and positioned Chairs and cupboards are rotated/flipped/mirrored using rotate/flip tool Chairs are replicated/copied and pasted Use a fill tool to colour the objects Flip/mirror image objects *Tools to create 3D images:* Push tool used to pull 2D object into 3D Drag/pull tool used to move image/pull image around to show interior/other views.	**4**

March 2019 – P32

4 Layers can be used when editing digital images.

(a) Describe what is meant by a 'layer' in computer graphics.

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Answer:

4(a)	**One** *from:* Level at which an object/file is placed in an image Represents part of a graphic/image as pixels (in a bitmap).	**1**

Question 4, Part (b)

(b) Describe how layers could be used to enhance a digital image.

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Answer:

4(b)	**Four** *from*: Can have transparency to allow other layers to show through/be seen Can be overlapped to create a composite image Can be replicated to show multiple instances of same image/object Can be replicated to hide/mask parts of an image Can be used to adjust the brightness/saturation of other layers.	**4**

Question 4, Part (c)

(c) Discuss the impact on society of the use of image editing on photographs in fashion magazines.

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Question 4, Part (c)

Answer:

4(c)	*Command word: Discuss: give important arguments for and against. Often requires a conclusion.* **Eight** *from e.g.:* Editing can enhance attractiveness/look/appearance of items/models Editing can attract attention of viewer to compensate for reduction in attention span in recent years Editing can make poor photos appear neat/presentable to clients/customers to increase sales Less expensive than taking exact/precise/perfect photographs Removing blemishes, wrinkles, flabby parts/altering body shape is flattering to the model/clothes A false/unrealistic body image can be created Viewing of only perfection in clothes/models can lower viewers self-esteem ...cause eating disorders ...cause unnecessary pressure to confirm to unrealistic ideals Editing can be time consuming /tedious and slow down production.	**8**

June 2020 – P31 & P33

5 Describe how compression is used when storing bitmap image files.

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Answer:

5	*Six from:* Lossless compression retains data/pixels. Lossy removes data/pixels. Lossless/lossy compression reduces the file size. Lossless compression (usually) results in larger file size than lossy compression. Lossless compression avoids accumulated stages of re-compression/compression artefacts when editing images. Lossless compression allows editing to be (more easily) reversed whereas lossy does not. Lossless compression keeps original uncompressed image appearance whereas lossy can alter (perceived) appearance. Lossy compression can use variable compression. Saving/storing the file as in a compressed file format/jpeg.	**6**

March 2020 – P32

5 Computer graphics software can create shapes as vector graphics or as bitmap images.

(a) Identify **one** use of vector graphics in computing.

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Answer:

5(a)	*One from:* Used as outline fonts to describe printable characters/glyphs Used as scalable graphics/svg in HTML5 on web pages Used by pen plotters to draw shapes on paper.	**1**

Question 5, Part (b)

(b) Explain, in detail, why vector graphics can be resized without losing image quality but bitmap images usually cannot.

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Answer:

5(b)	*Six from:* Vector images use mathematical descriptions/expressions of shapes to create images Shapes include lines/polygons/curves/ellipses Points defined with x-y axes and direction of path Shapes and positions are recalculated every time the image is resized so quality is retained Bitmap images consist of a set number of pixels When the bitmap is resized, pixels are added/removed/the number of pixels changes so the quality is altered Lines in vector images do not get thinner/thicker proportionately when resized but those in bitmaps do so quality of bitmaps changes.	**6**

10 Evaluate, by weighing up the advantages and disadvantages, the impact of image editing in the making of movies.

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Answer:

10	*Six from e.g.:* Adding visual special effects/computer-generated imagery (CGI) to video sequences allows for creation of images that cannot exist in reality/enhance the entertainment value Colourising monochrome/black and white film stock to increase acceptability to audiences/sales of old films Images can be improved/changed by altering colours/shades/hues to influence viewers Images can be altered to remove/include objects/people not in original scene to influence/mislead viewers Images of impossible objects/situations can be created Altering photographic images to enhance sales of products can mislead buyers Altering photographic images to people to enhance appearance can mislead fans. *Must be at least 1 of each for full marks.*	**6**