Stage 2 Design and Technology – Communication Products
Assessment Type 1: Skills and Applications Tasks
Materials Application

Name: ...

SACE # ..

All product names have been deleted from the task and the student response.

Task:

Students are required to **investigate** and **evaluate** options available for collection, manipulation & storage of digital data (photographic images) to be used in production of their final product

Approximately 800 words including diagrams and charts are required for this task.

Suggested Outline:

Image Capture

- How a camera captures data ie. CCD or Sensor
- Information captured - megapixels
- Type of data – J peg vs Raw files
- Testing and Evaluating - J peg vs Raw files

Image Manipulation

- Editing / manipulation software – P & Raw editors
- Filing / Image storage options- Jpeg / Tiff / Psd files
- Testing and Evaluating – File size of Jpeg and Tiff

Application of data in final product

- ***Image size & resolution:***
  Examples of resolution - Printing 300dpi, Online 150dpi and Screen 72dpi.
  Note the maximum Image size available due to resolution.

Draw conclusions & make suggestions for final product

Present your work both as a hard copy and electronic copy for assessment

Assessment Criteria:

I3&4, E2&3

See over page for details of assessment.

Final Grade & Comment:

A+ EXCELLENT work
great depth + testing shown - very well done.

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DATA

Camera

Image Capture

How is an image captured?

CCD, or "Charged Coupled Device", is a sensor used in digital cameras to record images *(seen right)*.

When an image is captured with a digital camera, the CCD sensor captures the light that bounces off the subject and converts it to digital data, which is recorded as a "binary pattern" and stored on a memory card. The subject is bought into focus by the lens.

Each binary code (a combination of 1's and 0's) represents a pixel, all of which together form the entire image.

Each pixel comprises of three basic colours – red, blue and green. The intensity of each pixel is changed to create different colours.

CCD Sensor

Image removed due to copyright.

http://oneslidephotography.com/ccd-vs-cmos-dslr-camera-wich-one-is-better/

Image removed due to copyright.

http://microstockinsider.com/files/images/ccd_camera_sensor.jpg

Investigating
In-depth investigation of image capture demonstrated in pp2-4 of response.

Image removed due to copyright.

Diagram of Digital SLR Camera
http://www.jiscdigitalmedia.ac.uk/images/slr02.jpg

Pixels

A pixel is the smallest coloured element of a digital image, arranged in columns and rows to create a picture. There are 1 million pixels in a megapixel.

A camera with a high number of megapixels contains more data, therefore producing a higher resolution image, in contrast to a camera with low megapixels, producing a lower resolution image.

Above Right: table demonstrating how an image taken with a higher megapixel camera can produce a larger image and printing size.

Table comparing megapixels, image size and print size removed due to copyright.

http://www.howitookit.com/?p=369

Investigating
Tests are distributed throughout the response, each occurring within the context of a particular collection, manipulation or storage option. This is the first test (Resolution).

2 MP *8 MP*

Above: 2MP image compared to 8MP image.

Right: Diagram illustrating impact of megapixels on printing size.

Image removed due to copyright.

http://wtands.com/wp-content/uploads/2013/04/megapixel-comparison1.jpg

File Types

JPEG	RAW
Commonly used file type for compressed photographic images. This process involves a significant loss of information, however can be useful for everyday photos (parties/sporting event/family functions) where not much editing required.	Unprocessed data file - not altered, compressed or manipulated. Only opens in RAW file editor, must be saved as a different format (Tiff, JPEG) for further editing/printing. Useful for images where detail and post-processing is required (weddings/portraits).
Advantages • Highly compressed, so smaller file size. • Great flexibility of quality & storage space. • Universal file type - compatible with most editing programs & easier for sharing. • Excellent print quality at high resolution.	**Advantages** • "Lossless" – preserves maximum amount of information. • Data saved in image (focal length, ISO, shutter speed etc). • 2-4 times bigger than a large JPEG file (more detail). • Adjustments with more flexible options available using RAW processing software.
Disadvantages • "Lossy" – permanent loss of some data during capturing image of information. • Image is automatically compressed/adjusted, therefore image has pre-processed colours, levels etc.	**Disadvantages** • More detail means much more space is used. • Requires special software to view images.

Investigating
Information-rich and logically organised table provides evidence of purposeful and in-depth investigation.

Testing & Evaluating

Investigating
Second test compares the effectiveness of JPEG v RAW files.

Image found in Curriculum > Subject Areas > Photography.

Evaluating
The effectiveness of JPEG and RAW files is evaluated with insight.

Image Manipulation

Processing

JPEG

Software such as A , can be used to edit JPEG images. This is a popular and widely used graphics editing program that provides a wide range of manipulative tools, such as saturation, levels, brightness, dodge and burn, shadows and highlights.

JPEG image in A

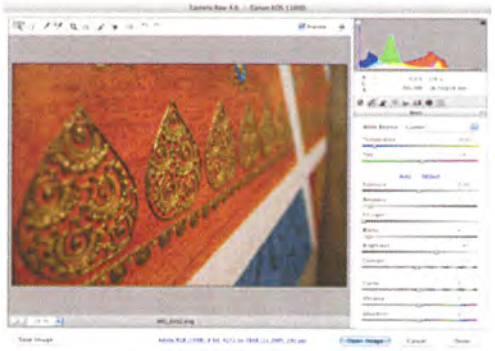
Variety of F tools

RAW

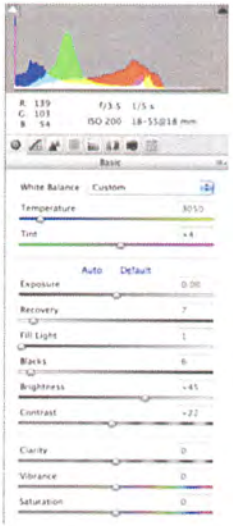
RAW images must be opened and edited in Camera RAW, a program within P . If P detects the image is in RAW format, it automatically opens in Camera RAW. In this program it is possible to control contrast, white balance, exposure, saturation and more. Images are much more detailed and sharp if settings are adjusted using a RAW editor.

Investigating
Process of opening image demonstrates purposeful investigation of the process.

My C takes RAW images in .CR2 format, which is not compatible with P Camera RAW program. This means I must convert the .CR2 RAW files to .DNG RAW files to edit in Camera RAW, using a program called A .



Camera RAW Program within P



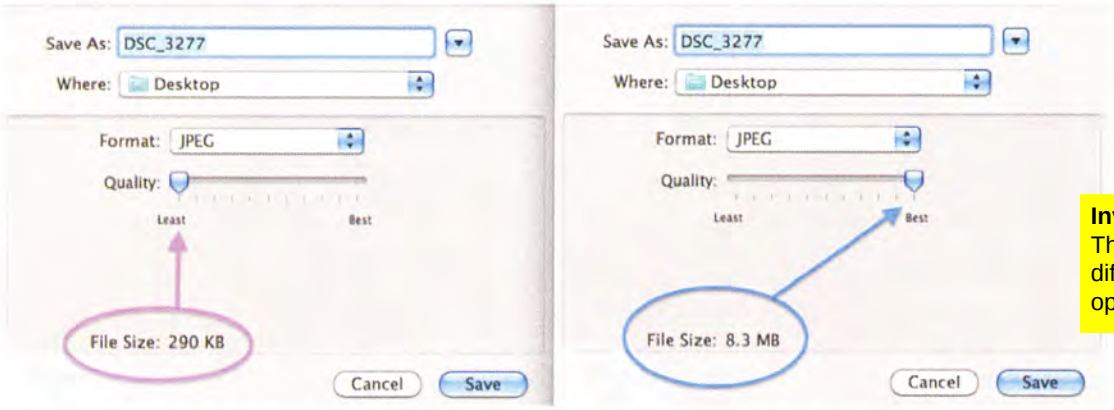
A

Settings in Camera RAW

File Storage

JPEG

As mentioned on page 2, Jpeg images are lossy compression files – they lose information in order for the file size to be smaller. Jpeg is convenient for storing a large amount of images not required for large-scale printing. This is because the image is analysed and unnecessary information is discarded to compress the file, therefore not taking up as much space and memory on the computer/SD card.



The image above shows the adjustable slider when saving an image using the program 'P '. The file size of an image is calculated, depending on the desired image quality. The poorer the quality, the smaller the file size, and vice versa.

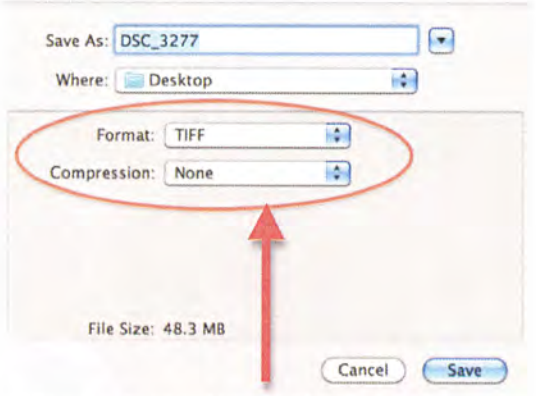
Investigating
Third test compares different file storage options.

TIFF & PSD

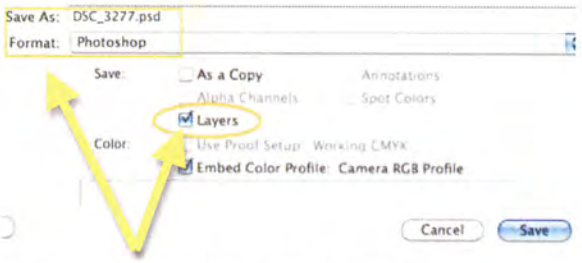
TIFF and PSD files are lossless compression files – file size is reduced with no loss of quality, and the data of original file is re-written more efficiently.

Tiff files maintain image and editing information and take up more space as they hold more information. Tiff files can be altered in after saved and stored. RAW images are best saved as a Tiff file after editing so data is not lost.

PSD files maintain all information, however, they only open in P . PSD files allow multiple overlapping layers on the original image and save the file with the uncompressed layers, which are useful for future editing. This means the file size is large, because the image holds uncompressed layers.



When an image is saved in TIFF format, there is no compression and no data is lost.



When an image is saved in PSD format, the information is contained and layers are uncompressed.

Application of Data in Final Product

Image Size & Resolution

Image resolution can be identified by multiplying the amount of horizontal pixels by vertical pixels, known as **PPI** (pixels per inch). By converting this to physical measurements (e.g. cm/inches), the maximum printing quality can be determined. This is known as **DPI** (dots per inch).

If the size of an image with low PPI is increased to a large image, it will become pixilated. As the image expands, the pixels will become noticeable and the image quality will reduce.

Image removed due to copyright.

http://www.adobe.com/designcenter-archive/keyconcepts/articles/concept_resolution.html

Above: diagram demonstrates how an image of only 60 PPI is much more pixilated than an image of 240 PPI.

Investigating
Fourth test investigates image size and resolution.

72 DPI ***300 DPI***

Printed enlargements such as a poster or banner require a large resolution of about 300 DPI.

Online products such as a book/calendar require a resolution of about 150 DPI.

Screen view images, such as images for websites, only require a DPI of about 72.

Images removed due to copyright.

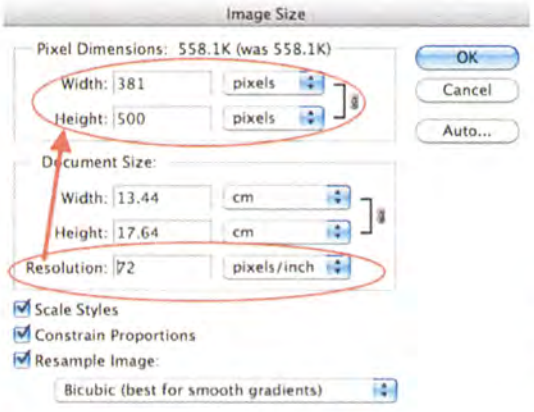
Image resolution/size is adjustable in the *Image* > *Image Size* tab within P . As the resolution of an image increases, the number of pixels in the length and width also increase.

This is demonstrated in the images below.

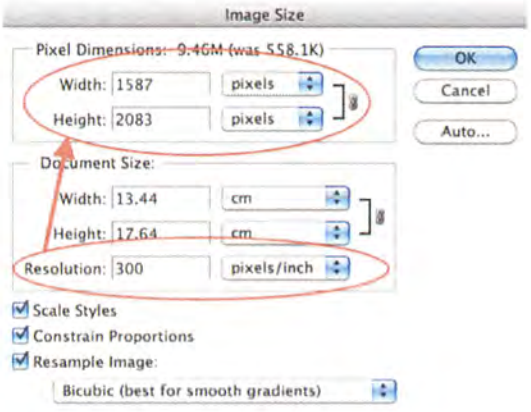
http://w3.unisa.edu.au/printing/new/lvl3/imag

Low DPI – *Image pixilated, maximum printing quality lower.*

High DPI – *image clear/crisp, maximum printing quality higher*



72 PPI = Width 381 pixels
Height 500 pixels



300 PPI = Width 1587 pixels
Height 2083 pixels

Conclusion

I have investigated a variety of options available for collection, manipulation and storage of digital data to be used in the production of my final product of a fashion catalogue. This investigation has helped me realise that to achieve the best results I can, I will need to take my photos in RAW format with 12.2 Megapixels (maximum megapixels offered by my camera) and edit them in the Camera RAW program within P .

I would ideally save/store the edited images as a .PSD or .TIFF file in order for the images to remain lossless files, however, as the program I will be using to create the catalogue only accepts .JPEG images I will need to store them in this format.

The images will need to have a minimum of 150 DPI, as this is the appropriate resolution for products created online such as catalogues and books to allow for a high quality image, which can be adjusted in P .

Evaluating
Refined and well-considered reflection on materials.

Evaluating
Insightful and detailed evaluation of the different options investigated, linking this investigation to the Major Project.

Bibliography

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Resolution, 2010 Adobe, accessed 8 April 2013, <http://www.adobe.com/designcenter-archive/keyconcepts/articles/concept_resolution.html>.

Additional Comments
The communication of major points in this response is assisted by the use of contextual and fully referenced images and tables.
The substantial number of relevant, contemporary and appropriately referenced sources provides evidence of depth of investigation.
The four tests are not grouped in one section of the response but are documented within the appropriate context, a layout consistent with current professional practice.

Performance Standards for Stage 2 Design and Technology

	Investigating	Planning	Producing	Evaluating
A	Clear, comprehensive, and well-considered identification of a need, problem, or challenge. Thorough and insightful creation and validation of initial design brief based on needs analysis and task identification. Purposeful investigation and critical analysis of the characteristics of a broad variety of existing products, processes, systems, and/or production techniques. In-depth investigation into product material options and focused and thorough critical analysis for product use. Focused and perceptive investigation into the impact of products or systems on individuals, society, and/or the environment.	In-depth analysis of information to develop imaginative, innovative, and enterprising solutions to an identified design brief. Accomplished communication of a variety of refined product design ideas, consistently using relevant technical language. Purposeful testing and refined modification and validation of ideas or procedures.	Sophisticated application of appropriate skills, processes, procedures, and techniques to create a product or system to a precise or polished standard and specification. Accomplished use of resources, equipment, and materials to create a product or system safely and accurately. Accomplished and resourceful development of solutions to technical problems that may arise during product or system realisation.	Insightful and well-considered evaluation of product success against design brief requirements. Insightful and detailed evaluation of the effectiveness of the product or system realisation process. Refined and well-considered reflection on materials, ideas, and procedures, with sophisticated recommendations. Resourceful and well-informed analysis of the impact of the product or system on individuals, society, and/or the environment.
B	Well-considered identification of a need, problem, or challenge. Well-considered creation and validation of an initial design brief based on needs analysis and task identification. Thoughtful investigation and analysis of the characteristics of a variety of existing products, processes, systems, and/or production techniques. Detailed investigation into product material options and thorough analysis for product use. Some depth of investigation into the impact of products or systems on individuals, society, and/or the environment.	Thoughtful analysis of information to develop enterprising solutions to an identified design brief. Capable communication of different quality product design ideas, using relevant technical language. Thoughtful testing, modification, and validation of ideas or procedures.	Capable application of appropriate skills, processes, procedures, and techniques to create a product or system to a mostly precise or polished standard and specification. Capable use of resources, equipment, and materials to create a product or system safely and mostly accurately. Thoughtful development of solutions to technical problems that may arise during product or system realisation.	Well-considered evaluation of product success against design brief requirements. Well-considered and detailed evaluation of the effectiveness of the product or system realisation process. Well-considered reflection on materials, ideas, and procedures, with thoughtful recommendations. Well-informed analysis of the impact of the product or system on individuals, society, and/or the environment.
C	Considered identification of a need, problem, or challenge. Considered creation and validation of an initial design brief based on needs analysis and task identification. Competent investigation of the characteristics of some existing products, processes, systems, and/or production techniques. Competent investigation into product material options and analysis for product use. Generally thoughtful investigation into the impact of products or systems on individuals, society, and/or the environment.	Analysis of information to develop appropriate solutions to an identified design brief. Competent communication of product design ideas, using appropriate technical language. Competent testing, modification, and validation of ideas or procedures.	Competent application of skills, processes, procedures, and techniques to create a product or system to an appropriate standard and specification. Competent use of resources, equipment, and materials to create a product or system safely and generally accurately. Development of appropriate solutions to technical problems that may arise during product or system realisation.	Considered evaluation of product success against design brief requirements. Considered evaluation of the effectiveness of the product or system realisation process. Considered reflection on materials, ideas, and procedures, with appropriate recommendations. Informed analysis of the impact of the product or system on individuals, society, and/or the environment.

	Investigating	Planning	Producing	Evaluating
D	Identification of a basic need, problem, or challenge. Creation of a basic initial design brief with some consideration of a needs analysis. Identification of the characteristics of some existing products, processes, systems, or production techniques. Some basic description of material options. Some description of the impact of products or systems on individuals, society, or the environment.	Some identification of information to attempt basic solutions to an identified design brief. Basic communication of some product design ideas with some use of appropriate technical language. Partial testing and some modification of ideas or procedures.	Partial application of skills, processes, procedures, and techniques to make one or more articles to a limited standard and specification. Some use of basic resources, equipment, or materials to create a product or system, with some consideration of safety aspects. Partial development of some basic solutions to technical problems that may arise during product or system realisation.	Description of product progress, with elements of basic testing against design brief requirements. Some description of the effectiveness of the product or system realisation process. Superficial reflection on or description of materials, ideas, or procedures, with basic recommendations. Some consideration of the impact of the product on individuals, society, or the environment.
E	Limited identification of a need, problem, or challenge. Creation of a very basic initial design brief, with support. Statement of one or more characteristics of an existing product, process, system, or production technique. Limited description of one or more product material options. Identification of one impact of a product or system on individuals, society, or the environment.	Attempted identification of some information to develop limited solutions to an identified design brief. Limited communication of one or more product design ideas. Some attempt at testing and limited modification of an idea or procedure.	Attempted application of one or more skills, to follow an appropriate process, procedure, or technique. Attempted use of resources, equipment, or materials, with emerging awareness of safety issues. Some attempted description of problems that may arise during product or system realisation.	Identification of some product progress, with limited testing. Identification of some aspects of the effectiveness of the product or system realisation process. Identification rather than description of materials, ideas, or procedures, with one or more recommendations. Emerging recognition of one or more of the impacts of the product on individuals, society, or the environment.