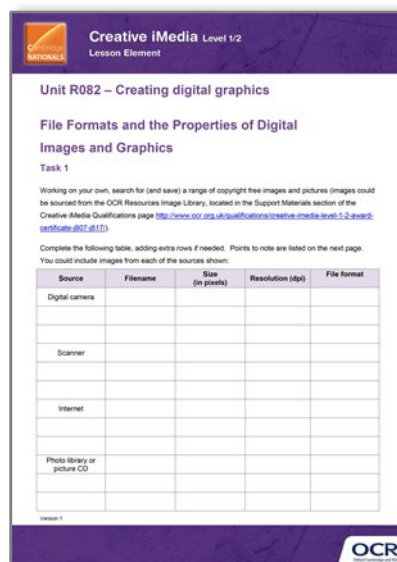


Unit R082 – Creating digital graphics

File Formats and the Properties of Digital Images and Graphics

Instructions and answers for teachers

These instructions should accompany the OCR resource 'File Formats and the Properties of Digital Images and Graphics' activity which supports OCR Cambridge Nationals in Creative iMedia Level 1/2 Unit R082 – Creating digital graphics.



The screenshot shows the OCR resource activity sheet for Unit R082 – Creating digital graphics. It includes the title 'File Formats and the Properties of Digital Images and Graphics' and 'Task 1'. The task instructions ask students to search for and save a range of copyright-free images and pictures from various sources. Below the instructions is a table for recording the properties of the images found.

Source	Filename	Size (in pixels)	Resolution (dpi)	File format
Digital camera				
Scanner				
Internet				
Photo library or picture CD				

The Activity:

This resource comprises of 5 tasks.



123

This activity offers an opportunity for maths skills development.

Associated materials:

'File Formats and the Properties of Digital Images and Graphics' Lesson Element learner activity sheet.

Suggested timings:

Task 1: 45 minutes

Task 2: 30 minutes

Task 3: 15 minutes

Task 4: 15 minutes

Task 5: 15 minutes

Introduction

Learners could investigate the properties of images sourced from digital cameras, scanners, the internet and photo libraries. This should include pixel dimensions, resolutions and suitability for use ie 200-300dpi for print use and 72dpi for web use.

Teachers could illustrate examples of both bitmap/raster images and vector based graphics to show the impact of magnification and scalability.

Task 1

Working on your own, search for (and save) a range of copyright free images and pictures (images could be sourced from the OCR Resources Image Library, located in the Support Materials section of the Creative iMedia Qualifications page <http://www.ocr.org.uk/qualifications/creative-imedia-level-1-2-award-certificate-j807-j817/>).

Complete the following table, adding extra rows if needed. You could include images from each of the sources shown: Sample answers are shown below.

Source	Filename	Size (in pixels)	Resolution (dpi)	File format
Digital camera	IMG_0541	3648 x 2736	180	jpg
	DSCN1957	4000 x 3000	300	jpg
	DSC_2195	3872 x 2592	300	RAW
Scanner	Scan_0234	2552 x 3508	300	tiff
	Car-3	1800 x 1200	300	jpg
Internet	London_eye	1024 x 768	72	jpg
	Banner_1	600 x 120	72	png
	Turtle	320 x 200	72	jpg
Photo library or picture CD	10038174	3000 x 2000	300	jpg
	P_403689	1024 x 768	72	jpg

Points to note:

1. The size of an image from a digital camera will be made up of two numbers. When multiplied together, this gives you the number of megapixels. When looking at camera specifications, they always quote the total number of megapixels (or Mp).
2. The scanner can be set up to scan using different resolutions. There are usually some options to select this (you may need to look at the advanced options in the scan menu).
3. The internet generally only uses images that are 72dpi even if they have a large number of pixels. However, using image editing software this can be changed.

Task 2a

The table below lists a range of images and their sizes. Add a tick to the Print use column or the Web/Multimedia use column to indicate what purpose you think each image would be used for.

Image	Size in pixels	Resolution	Print use	Web/Multimedia use
10342859.jpg	1024 x 768	72 dpi		✓
Scan_1.tif	3508 x 2480	300 dpi	✓	
Forest.jpg	600 x 400	72 dpi		✓
Dsc_1024.jpg	4928 x 3280	300 dpi	✓	

Task 2b

Using the Forest.jpg file properties from the table above, what would be the print size if converted to 200dpi?

Width 600 pixels and 200 pixels used per inch:

$$600 \div 200 = 3 \text{ inches}$$

Height 400 pixels and 200 pixels used per inch:

$$400 \div 200 = 2 \text{ inches}$$

Task 2c

Using the Scan_1.tif file properties from the table above, calculate the print size.

Width: $3508 \div 300 = 11.69$ inches

Height: $2480 \div 300 = 8.27$ inches

Task 2d

Convert the size (from Task 2c) from inches to millimetres (mm). Compare this with the size of A4 paper (297mm x 210mm)

The conversion is calculated using 25.4mm per inch.

Width: $11.69 \times 25.4 = 296.92$

Height: $8.27 \times 25.4 = 210.05$

Therefore

11.69×8.27 inches = 297 x 210 mm. This is the same as A4 size.

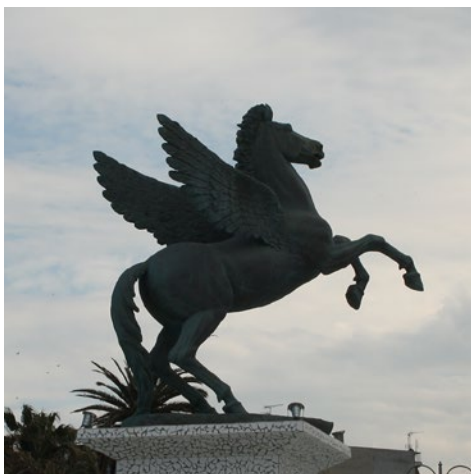
Task 3

The following table lists common file format/extensions. Tick the Print use or Web/Multimedia use column to indicate where each of these file format/extensions would typically be used.

File format/extension	Print use	Web or multimedia use
.jpg	✓	✓
.png		✓
.tif	✓	
.pdf	✓	✓
.bmp	✓	
.gif		✓

Task 4

When working with images, you need to be aware of the difference between vector and raster/bitmap graphics. Look at the example below. It shows what happens when you zoom in on a raster graphic:



The pixels become visible as tiny squares, and the overall effect is rather blurred. This effect is called pixelation. A different type of file is a vector graphic, which stores the image information as a series of coordinates and lines using mathematical equations. When enlarging a vector graphic, it does not become pixelated.

Photographs and scans are always raster/bitmap images. Vector graphics are created by drawing them in an image editing software application. However, vector graphics are not supported by all image editing software.

Complete the table below, entering examples of file types and advantages and disadvantages for both bitmap or raster graphics and vector graphics. You should comment on the following factors in the advantages/disadvantages columns:

- Making the graphic much larger by scaling
- Software that is used to edit or create
- Whether used for print products or web pages.

	File Types	Advantages	Disadvantages
Bitmap or raster graphics	.bmp .jpg .tiff	Supported by all image editing software Used for both print and web	Cannot be scaled much larger without pixelation
Vector graphics	.eps .ai .svg	Can be scaled to any size since uses mathematical expressions for lines and curves. Edges stay smooth.	Not always supported by basic image editing software More limited use.

Task 5a

Teacher Guidance

It is likely that the digital graphics work in unit R082 would be most appropriately done at high resolution, and conversion done at the end of the task to acquire the low-resolution 72dpi image/s required in the final product, rather than working at low resolution and upscaling.

Teachers may wish to explain to learners that altering dpi from 72 to 300 will produce graphics which are very small in physical size, and that learners should avoid converting images to 72dpi and then stretching and enlarging them to achieve the desired physical appearance.

Furthermore, if quality is important in the final print image then it would be better to work with an original image which is of higher resolution than eventually required wherever possible, and resample downwards.

Background information

Whilst you may sometimes want to convert a file from 72dpi to 300dpi to create a version for printing, you may also sometimes need to do the reverse, and generate a low-resolution version of a graphics file for use on a website page.

Many digital cameras will now happily capture images at more than 10 Megapixels, storing them in RAW, TIFF or JPG format. An original high quality image would be unsuitable for web use – even with high speed broadband connections it would take time to download because of the large file size. The screen also has a limited size and cannot physically show the detail that the image contains.

A practical example where a low-resolution file might be used would be a picture of an item that is for sale. The image would need to be 72dpi and with a lower number of pixels – probably between 200 and 1,024 pixels in either height or width. This size of image would be suitable to show the item as a thumbnail or small image when users are scrolling through the website page and items for sale. A link could be provided to a higher resolution, larger image if the user wants to see it. This means that you would need two image files for use on the website, one which is a high resolution and one that is a low resolution thumbnail.

Task 5b

Take the example of a high-resolution image located in the OCR Resources Image Library 'Lesson Element File Formats' folder (image 'guitar_high_res_01') and open it in your graphics software.

If you look at the image properties you will see that it is saved at 300dpi, and has a file size of 7,396kb, (or over 7Mb).

Change the properties of the graphic to resample it and make it 72dpi. Save the new image using a different filename in a jpg file format.

Record the new file size here _____.

The image guitar_high_res_01.tif when repurposed as a jpg will be significantly smaller in size. The actual file size will depend on the software and specific settings used.

Task 5c

Now repeat this process of resizing and resaving for some of the images in the high_res_images folder of the OCR Resources Image Library, located in the Support Materials section of the Creative iMedia Qualifications page <http://www.ocr.org.uk/qualifications/creative-imedia-level-1-2-award-certificate-j807-j817/>

Each time, try to achieve a final file which is smaller than 300kb.

File size can be altered by more than just a change to the number of pixels in the image. When saving a file as a jpg you can also alter the amount by which the file is compressed. Increasing the file compression will reduce the final file size although the quality also goes down. Try changing the amount of compression on some of your jpg files as you save them and see what impact it has on the file size.

Complete the tables on the following page as you work.

Properties	Original file	Repurposed file
File name		
File type / format		
File size		
Physical dimensions		
dpi		
Screenshot of image properties or image size dialogue box		



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