



Unit 11: Digital Graphics and Animation

Approaching the unit

This unit will provide learners with opportunities to explore the computing principles behind digital images and the associated implications for creating two- and three-dimensional graphics and animation. Learners should apply analytical thinking to examine the use of digital graphics and animation in a range of vocational areas. They will combine their analytical skills with creative proficiency and project management skills to identify and meet the needs of an identified client. The unit is assessed internally.

This delivery guide does not cover everything that needs to be delivered for completion of this unit but gives examples of delivery methods. You should refer to the specification for full details of all the content that needs to be covered.

Delivering the learning aims

For learning aim A, it can be useful for learners to start with the concepts of how raster/bitmap images are represented and stored in digital format. Learners should explore the nature of digital images (including colour modes, bit depth and 2D arrays) and how this affects the quality and accuracy of an image. Learners should then explore how vector images are stored and rendered. Learners should explore the computing principles behind 3D image representation with particular emphasis on how the features of coordinate systems affect the rendering of 3D images. Learners should examine a range of techniques used to create and process 2D and 3D animated images. Ideally, learners should be given opportunities to explore the use of graphics and animation in a practical way. However, if this is not possible, you could provide learners with high-quality case studies and engage the help of local employers.

Learners should have a sound understanding of how different techniques and processes affect the quality of images and animation and how this has an impact on their use and the success of a project. Learners should also be aware of the associated legal and ethical considerations when working with images and animation and the implications of these for all project stakeholders.

Learners should apply their understanding of the techniques and computing principles to a range of vocational contexts in order to develop analytical and evaluative skills that allow them to identify, select and justify processing and rendering methods in relation to the outcomes of a project.

For learning aim B, learners will need to understand the practical skills required (learning aim B1) and the underlying theoretical principles (as covered in learning aim A) so that they are able to provide detailed plans that discuss and justify the selection of techniques and processes to create images and animation. You should arrange for learners to spend as much time as possible using some of the graphics and animation packages that are available on the internet to develop practical skills and understanding. Each learner should have the opportunity to produce digital content in response to a range of scenarios.

Learners will be required to demonstrate a number of practical project planning and management skills. In preparation for the assignment, you should ensure that learners are familiar with producing planning documentation that is clear and detailed and that they are familiar with effective methods of communicating with others to seek and record feedback in order to refine ideas.

You should ensure that learners are aware of relevant legal and ethical considerations (such as copyright and royalties) and that they know what constitutes good practice and can provide appropriate documentation.

Learners should be able to demonstrate an understanding of how the mathematical principles and processing techniques used to edit and manipulate digital graphics and animation have an impact on the final outcome and how their use affects the project as a whole.

For learning aim C, learners should develop the necessary practical skills (listed for topic C1) in a range of realistic vocational scenarios in order to implement the designs that they planned in learning aim B. You should ensure that learners have a good understanding of selecting and applying different testing methods, creating and completing test documentation and working with others to review and refine ideas and outcomes. Learners should be able to select and apply appropriate methodologies that test, review and optimise graphics and animations and check the technical and quality characteristics (topics C3 and C4) of the files that they produce. They should be able to review them against the required outcomes of a project.

You should provide learners with opportunities for working with others to identify working parameters and success criteria and to review outcomes. It is important that learners can demonstrate the application of all skills in a realistic project environment. It is very helpful to have the assistance of, and engagement with, local professionals when delivering the content. Guest speakers can provide valuable insight into how digital graphics and animation are used in larger projects. They can also provide examples and case studies relating to the project management skills required in the computing industry.

Throughout their practical work, learners should be encouraged to keep a diary, in which they can keep a record of their progress, any issues they encountered and how they overcame them. This will be valuable when writing the evaluation and reflecting on their own performance as part of the second assignment.

High-quality, accurate communication skills in written and verbal forms are vital for progression into higher education and in employment. As such, learners should be confident in presenting thoughts and ideas to others, as well as producing well-presented, accurate and appropriate documentation for all stages of a project. Learners must be able to effectively evaluate the success of a project and the factors that contributed to the final outcomes, including their own skills, knowledge and behaviours.



Learning aim	Key content areas	Recommended assessment approach
<p>A Investigate the purpose and principles of digital graphics and animation</p>	<p>A1 Digital image representation</p> <p>A2 3D image representation</p> <p>A3 Digital animation techniques</p> <p>A4 Uses and applications of digital graphics and animation</p>	<p>A report on the techniques used to produce, store and represent graphics and animation in digital format and the impact of using digital formats to produce these types of products.</p>
<p>B Design digital graphics and animation products to meet client requirements</p>	<p>B1 Digital graphics and animation planning and design</p> <p>B2 Design documentation</p> <p>B3 Digital graphics and animation processes and techniques</p> <p>B4 Reviewing and refining designs</p>	<p>A design specification showing the planning, preparation and design of digital graphics and animation products which meets client requirements. Digital graphics and animation files that fulfil the design specification accompanied by supporting development and testing documentation.</p>
<p>C Develop digital graphics and animation products to meet client requirements</p>	<p>C1 Digital graphics and animation processing techniques</p> <p>C2 Testing digital graphics and animation</p> <p>C3 Reviewing digital graphics and animation</p> <p>C4 Quality characteristics</p> <p>C5 Skills, knowledge and behaviours</p>	<p>A report evaluating the digital graphics and animations against the design specification.</p>

Assessment guidance

It is recommended that this unit be assessed as two separate assignments. The first assignment should assess learners' understanding of learning aim A and the second assignment should cover learning aims B and C.

For the assignment for learning aim A, learners could produce a report, based on their own individual research and practical experience, on the techniques used to store, process and create graphics and animation in digital format and the implications of using digital data to represent these types of images. The report could cover an explanation of the features of 2D and 3D digital images, an examination of the uses and application of digital animation techniques in a range of contexts, and the implications of using these techniques for producing animated products. A blog or some form of audio or visual evidence would also be an acceptable alternative to a written report and would allow learners to develop their creativity, provided the information is communicated in a clear and detailed manner using appropriate language.

To achieve distinction, learners should also provide an evaluation of the impact that using digital processing, storage and creation techniques have on the characteristics, uses and formats of digital products.

The assignment for learning aims B and C should take the form of a practical project that provides evidence of planning and developing a number of digital graphics and animations for use in a larger digital product. The scenario for the assignment should provide enough scope to allow the learners to be able to consider different solutions to parts of the problem (such as processing and rendering techniques) and demonstrate a range of testing methodologies to ensure that the outcomes meet the project criteria.

It is important that the context is realistic, and that learners have a 'client' for whom they are producing graphic and animation files. Learners should work closely with the client throughout the project to review outcomes and time scales. The 'client', where possible, should be a real-world client with whom the learner can engage. While the project might be 'simulated', in that it may not be a live project, it is invaluable to engage with local employers to provide a vocational setting wherever possible. If real-world clients are not available, a tutor or other adult may simulate the role of 'client'. Other learners should not fulfil the role of client, although they may be test users. It is important that the 'client' has a sound knowledge of the project and the related computing requirements.

The scenario should provide learners with the scope to produce digital graphics and animation that can then be edited into at least two videos for different purposes. The project could involve the production of files that are intended to be incorporated into a larger digital product: however, learners are not required to present the final files as part of a larger product. To be effective, their testing and evaluation should consider, evaluate and justify choices made in relation to the target product and platform.



Getting started

This gives you a starting place for one way of delivering the unit, based around the suggested assignments and tasks in the specification.

Unit 11: Digital Graphics and Animation

Introduction

Digital graphics and animation play a key role in many areas of, and are related to, the computing industry to enhance products as well as to engage and support users. This unit is designed to provide learners with the skills and understanding to create and manipulate graphics and animation for use on computer systems. Learners will apply practical skills and underpinning knowledge to produce digital graphics for a range of purposes. The unit provides learners with project planning, management and analytical skills that can prepare them for a range of apprenticeships or higher education courses so that they can eventually enter the workplace as professionals in a wide range of computing areas.

Learning aim A – Investigate the purpose and principles of digital graphics and animation

- To begin, you should introduce the overall aim of the unit, providing learners with the 'big picture'. Explain that they will be required to produce two assignments: one that concentrates on learning aim A and one that focuses on learning aims B and C.
- You should provide learners with an initial presentation on the theoretical concepts of digital image representation. You could start with the concept of how the data is stored and how the characteristics of the stored data (and how it is collected) affect the resulting image. Learners should explore different image formats and understand how compression has an impact on the quality of the image.
- Through a combination of tutor input, independent research and practical application, learners should explore the computing principles of raster and vector images and should explore their use, and the implications of their use, in a range of contexts. Learners should have a solid grasp of the ways in which the application of processing techniques and manipulation of the features of an animation or graphic have an impact on the final outcome and the implications of this for users and other key stakeholders.
- Learners should be aware of how the principles of 2D images translate to the rendering of 3D images and should explore the principles and applications of 3D images, with particular focus on the use of coordinate systems.
- You should provide learners with opportunities to develop their analytical and evaluative skills by exploring the effects of using digital graphics and animation within different contexts. Learners should understand how and why different processes are used and be able to select different processes to meet identified needs, justifying their choices.
- You should spend time exploring how the final outcomes of a graphic or animation are affected by the use and application of the file (e.g. intended audience, target format/platform or required features) across a range of contexts and combinations of characteristics to ensure a wide understanding.
- Learners should have a thorough understanding of how legal and ethical considerations would affect the process and final outcomes of a digital graphic and animation project, particularly, in terms of the ownership of content and how to acquire permissions to ensure that the law is not broken. In addition, they could

discuss the ethics of airbrushing celebrity publicity images and the refusal of some celebrities to accept this (such as the incidents in 2016 with Meghan Trainor who published the original and the digitally altered versions of her music video).

Learning aim B – Design digital graphics and animation products to meet client requirements

Learners should be competent and possess a range of skills and knowledge before starting the assignment, which should not be used as a vehicle to teach the content.

- You should provide learners with opportunities to develop the practical application of creating, sourcing, processing and editing digital graphics and animations. It is important that learners have a sound understanding of what can, or cannot, be done, as well as having realistic ideas of the resources and timings required, before they start to plan a project. After an initial presentation from you to provide them with introductions to software-specific skills, it would be useful for learners to develop their skills through tasks involving responding to realistic, vocational scenarios. Scenarios could come from marketing, events management and the leisure industry, all of which are heavy users of digital graphics and animation.
- For B2, you should teach learners how to use a range of planning documents to identify user requirements, plan the development process (including sketches of initial ideas, tools and techniques to use and time scales) and identify and set success criteria/project parameters. Documentation requirements for this unit are varied and learners will need to know about different styles of documents in varying levels of detail, depending on the situation/project. However, it is likely that most, if not all, areas listed in topic B2 should be included to a greater or lesser extent. Learners need to be aware that planning documents should be clear and detailed and provide a vehicle for discussion with the client (and other relevant parties) to ensure that the project is efficient and outcomes are accurate. As a general guide, planning documents must contain sufficient detail so that (as may be the case in a real-world situation) a third party could take the planning documentation and continue the project without any input from the original designer.
- Learners should be able to demonstrate an understanding of the impact that the mathematical principles and processing techniques used to edit and manipulate digital graphics and animation have on the final outcome, and the implications for the project as a whole. They can demonstrate this in many ways and it is likely to be a multi-stage process. For instance, they can include details of a rotation or transformation in an animation's storyboard, whereas the discussion and justification for its use may be presented elsewhere, such as in communications with the client or review documents.
- It is likely that learners will make use of a wide range of sources for their work and therefore should be aware of, and comply with, the associated legal, ethical and practical considerations. Learners should be equipped with the analytical understanding to choose appropriate sources as well as the skills to produce their own assets, as required.
- You should ensure that learners have sufficient time to develop strong vocational skills and can manage projects effectively. These skills should include organising meetings with a client, recording outcomes from meetings and other forms of feedback, and adjusting plans and timescales for the project, as appropriate.
- You should work with learners to ensure that they have effective and appropriate communication skills. All project documents and communication with clients should use the appropriate style, tone and content.



Learning aim C - Develop digital graphics and animation products to meet client requirements

Understanding of this learning aim should flow naturally from learning aim B and learners will need to be able to apply this understanding as part of a larger project. As with learning aim B, learners should be equipped with a range of practical skills and associated theoretical knowledge before starting the assignment. The assignment should not be used as a vehicle to teach the content.

- You should provide learners with opportunities to develop the practical skills of sourcing, processing and editing digital graphics and animations. Learners should have a thorough understanding of how to use appropriate hardware and software to select and apply appropriate processing tools and techniques (as listed in topic C1) to produce graphic and animation audio files to fulfil the requirements identified in the specification.
- Learners should explore the use of digital graphics and animations in a range of contexts and consider how the purpose, audience, target file type/size and target platform affect the choice of processing method. Learners should be able to evaluate the requirements of different scenarios and be able to select and justify the use of appropriate tools and techniques.
- Learners should be able to select appropriate testing methodologies so that outcomes can be thoroughly tested and reviewed. They should be able to appropriately and thoroughly plan and document their selected testing processes. Learners should have a strong grasp of a range of formative and summative testing and review methods and should be able to appropriately select, apply and justify the use of these to ensure that the outcomes of the project meet the needs of the identified client.
- To develop understanding of the testing and review process, you could provide learners with graphics and animations created by others (and associated project criteria) that they could test and review, identifying areas for development and ways of improving the files. It would be beneficial for learners to have access to editable versions of the files so that they can explore the tools and techniques used, and make adjustments and improvements, as necessary.
- You should also help to develop learners' evaluative skills. Learners should be able to use the outcomes of testing and review to evaluate the quality of solutions (and their own performance, as appropriate) against the requirements of a project and client expectations. Learners should be taught the skills to enable them to deliver and receive positive feedback and constructive criticism.
- It is important to work with learners to ensure that they develop effective and appropriate presentation skills. All project documents and communication with clients should use appropriate style, tone and content, with workshops provided to improve learners' skills if needed.
- The assignment should provide a valid, vocational context and learners are expected to work with a 'client' for the duration of the project, who will set the expectations, provide the operating requirements and set and negotiate timescales of the project. The 'client', where possible, should be a real-world client with whom the learner can engage. It is important that the 'client' should have a sound knowledge of the project and the related computing requirements.
- It will benefit learners if they maintain a diary or take notes as they complete the various practical activities in the lessons relating to this learning aim. They should also note the comments that their peers make when they give feedback.
- Ensure that learners understand how to fulfil the assessment criteria for the pass, merit and distinction grades.

Details of links to other BTEC units and qualifications, and to other relevant units/qualifications

Pearson BTEC Level 3 Nationals in Computing (NQF):

- *Unit 12: Digital Audio*
- *Unit 13: Digital Video*
- *Unit 14: Computer Games Development*
- *Unit 15: Website Development*
- *Unit 16: Object-oriented Programming*
- *Unit 17: Mobile Apps Development*
- *Unit 24: Software Development*
- *Unit 25: Web Application Development*
- *Unit 27: 3D Modelling.*

Resources

In addition to the resources listed below, publishers are likely to produce Pearson-endorsed textbooks that support this unit of the BTEC Nationals in IT. Check the Pearson website (<http://qualifications.pearson.com/en/support/published-resources.html>) for more information as titles achieve endorsement.

Websites

- www.cs.cf.ac.uk/Dave/Multimedia/node189.html
This is an academic website for arrays and digital image representation.
- www.digitaltutors.com/subject/3d-animation-tutorials
Pluralsight. This gives tutorials on using a range of different digital animation software programmes.
- www.nyfa.edu/student-resources/best-free-open-source-animation-software
New York Film Academy. This is a guide and links to a range of open-source animation software.
- www.creativebloq.com/graphic-design/free-graphic-design-software-8134039
This is a guide and links to a range of open-source digital graphics software.
- www.digitalartsonline.co.uk
An online magazine dedicated to digital graphics, animations and associated fields. It contains, features, reviews guides and tutorials.

