Higher National unit specification

General information

Unit title: Computer Games: Creating Graphics (SCQF level 7)

Unit code: HH39 34

Superclass: CB

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Source: Scottish Qualifications Authority

Version: 02

Unit purpose

The purpose of this unit is to enable learners to develop knowledge and skills in digital image creation for use in computer games. Learners will create 2D bitmap and vector graphics and gain knowledge and understanding of their use in computer games. They will use bitmap and vector graphics editors to create and edit graphics that can be used as game components, characters and environments. The graphics should be created to be used in the context of a computer game.

The unit is suitable for learners who have limited or no experience of using graphic editing packages and wish to gain or enhance their knowledge and skills in the creation of graphics for use within a games development context.

Outcomes

On successful completion of the unit the learner will be able to:

1 Explain the use of graphics within computer games.
2 Plan a range of 2D graphics for use in a computer game.
3 Create 2D bitmap and vector graphics for use in a computer game.

Credit points and level

1 Higher National unit credit at SCQF level 7: (8 SCQF credit points at SCQF level 7)

Higher National unit specification: General information (cont)

Unit title: Computer Games: Creating Graphics (SCQF level 7)

Recommended entry to the unit

Access to this unit is at the discretion of the centre. However, it is recommended that learners should have basic competency in the use of modern computer operating systems and software packages. It would be advantageous if they have completed a relevant National Progression Award or National Certificate award at level 5 or 6, such as the NPA in Computer Games Development or the NC in Computer Games Development at level 5.

Core Skills

Achievement of this Unit gives automatic certification of the following Core Skills component:

Complete Core Skill	None
Core Skill component	Critical Thinking at SCQF level 5 Planning and Organising at SCQF level 5

Context for delivery

If this unit is delivered as part of a Group Award, it is recommended that it should be taught and assessed within the subject area of the Group Award to which it contributes.

The Assessment Support Pack (ASP) for this unit provides assessment and marking guidelines that exemplify the national standard for achievement. It is a valid, reliable and practicable assessment. Centres wishing to develop their own assessments should refer to the ASP to ensure a comparable standard. A list of existing ASPs is available to download from SQA's website **(http://www.sqa.org.uk/sqa/46233.2769.html)**.

Equality and inclusion

This unit specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence.

Further advice can be found on our website **www.sqa.org.uk/assessmentarrangements**.

Higher National unit specification: Statement of standards

Unit title: Computer Games: Creating Graphics (SCQF level 7)

Acceptable performance in this unit will be the satisfactory achievement of the standards set out in this part of the unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to SQA.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the Knowledge and/or Skills section must be taught and available for assessment. Learners should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

Outcome 1

Explain the use of graphics within computer games.

Knowledge and/or Skills

- Purpose of graphics
- Types of graphics
- Attributes of graphics types
- Attributes and features of graphics file formats
- Importance of file size and compression of graphics
- Graphics editing software applications

Outcome 2

Plan a range of 2D graphics for use in a computer game.

Knowledge and/or Skills

- Plan for the creation of 2D graphics
- Uses of 2D vector graphics
- Uses of 2D bitmap graphics
- Media requirements specification

Outcome 3

Create 2D bitmap and vector graphics for use in a computer game.

Knowledge and/or Skills

- Creation of bitmap graphics
- Editing bitmap graphics
- Creation of vector graphics
- Use of appropriate tools and software
- Use of appropriate file formats for graphics

Higher National unit specification: Statement of standards (cont)

Unit title: Computer Games: Creating Graphics (SCQF level 7)

Evidence Requirements for this unit

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills across all Outcomes.

The evidence for this unit may be written or oral or a combination of these. Evidence may be captured, stored and presented in a range of media (including audio and video) and formats (analogue and digital). Particular consideration should be given to digital formats and the use of multimedia.

Outcome 1 is knowledge based and requires that candidates demonstrate their cognitive competence.

Evidence of this may be sampled across the knowledge domain which must encompass all of the knowledge statements in Outcome 1. Where sampling is used to assess the candidate's knowledge and understanding, an appropriate pass mark should be set.

The assessment may take any form (including oral) but must be supervised, unseen and timed. The contents of the assessment must sample broadly and proportionately from the contents of the knowledge domain.

Access to reference material is not appropriate for this type of assessment. If other methods of assessment are used, such as a report, open-book conditions must be applied. Refer to the assessment guidelines for further information.

Candidates must demonstrate that they will be able to:

- explain the purposes of graphics in computer games such as game characters, backgrounds, collectables etc.
- describe the types of graphics used in the creation of computer games including 2D bitmap, 2D vector and 3D graphics.
- explain attributes of graphics types such as resolution, colour depth, polygons, etc.
- explain attributes and features of graphics file formats used in the creation of computer games eg PNG, JPEG, GIF, SVG, FBX, 3DS, MAX, etc.
- explain importance of file size and compression of graphics for use within a computer game.
- describe appropriate software applications for the creation and editing of different types of game graphics. Candidates should be able to identify what graphics editors are best for creating the various types of graphics.

The assessment for **Outcome 1** will be closed-book.

Higher National unit specification: Statement of standards (cont)

Unit title: Computer Games: Creating Graphics (SCQF level 7)

Outcomes 2 and 3 require that candidates demonstrate their practical competence in planning and creation of 2D bitmap and vector graphics for use in a computer game, including:

- A plan for the creation of at least six 2D graphics, at least two of which must be bitmap graphics and two must be vector graphics. The plan could take the form of a typed report, storyboards, concept art, reference diagrams, mood boards or any other valid approach.
- A media requirements specification table to include details of file types.
- Creation of the six 2D graphics specified in the plan produced in Outcome 2.
- At least one bitmap graphic captured using a digital camera or scanner.
- An edited version of at least one captured bitmap graphic demonstrating that at least two edits are made.
- At least one bitmap graphic created using the drawing/editing tools in a bitmap graphics editor application.
- At least two vector graphics which should be created using the tools in a vector graphics application package.
- A media catalogue.
- Graphics saved in appropriate file formats for bitmap and vector graphics.
- Graphics exported to appropriate file formats.

Evidence of practical competence for Outcomes 2 and 3 may be produced over an extended period of time under open-book conditions; but where it is generated without supervision some means of authentication must be carried out.

Higher National unit Support Notes

Unit title: Computer Games: Creating Graphics (SCQF level 7)

Unit Support Notes are offered as guidance and are not mandatory.

While the exact time allocated to this unit is at the discretion of the centre, the notional design length is 40 hours.

Guidance on the content and context for this unit

The purpose of this unit is to enable learners to develop skills in digital image creation for use in computer games. Learners will create both bitmap and vector graphics and gain experience of their use in computer games. They will use graphic editing software to both create and edit graphics that can be used as game components, characters and environments.

Learners should become familiar with at least one bitmap graphics editor; at the time of writing examples would be Adobe Photoshop, Paint.net or GIMP and one vector graphics editor such as Adobe Illustrator, Corel Draw or Inkscape.

The unit sits within the Content Selection section of the HNC and HND Computer Games Development Group Award from which 1 credit minimum is required. It is anticipated when this unit is delivered as part of that Group Award, that learners will create 2D graphic assets for use within other units in the award. For instance, learners could create graphics in this unit which could be used in the creation of animated game sprites in the 2D Animation for Games unit which is also part of the same Group Award. If both units are being delivered, this unit should be delivered first. However, it may also be delivered as a stand-alone unit.

Outcome 1

The primary purpose of this Outcome is that learners gain an understanding of the key concepts and techniques involved in creating graphics for computer games. This includes looking at the purpose of graphics in computer games and the attributes of the different types of graphics used, including bitmap, vector and 3D. Learner's should understand the features and attributes of the various different graphic file formats used in computer games development, so that they will be able to select the correct format to use for a particular project. Learner's should become familiar with the various graphic editor application packages available for creating and editing different types of graphics and what the advantages and disadvantages of each package are.

Graphics can be made using a variety of methods, from drawing them digitally using a drawing tablet to capturing them using a digital camera or scanner.

Higher National unit Support Notes (cont)

Unit title: Computer Games: Creating Graphics (SCQF level 7)

Outcome 2

In this Outcome learners will become familiar with different approaches to planning the creation of graphics for use in a computer game such as proposals, storyboards, mood boards, concept art, reference diagrams, media requirements and other valid approaches. They will also learn how to create a selection of these and use them in the planning of graphics for a computer game.

Outcome 3

In this Outcome learners will gain experience of using 2D bitmap and vector graphics editors to create and edit graphics for use in computer games. Learners should also become familiar with using hardware equipment such as digital cameras, scanners and graphics/drawing tablets in the creation of digital images and art.

Learners must be able to use the main facilities of a 2D bitmap editor such as Photoshop, Paint.net or GIMP to create and edit digital images and graphics. Learners should become competent in using tools such as paint brush. pen, pencil, eraser, gradients, shapes, paint bucket, layers, selection tools and be able to carry out tasks such as cropping, resizing, recolouring, adding transparency, recolouring, etc.

Learners must be able to use the main facilities of a 2D vector editor such as Illustrator or Inkscape or Corel Draw to create vector graphics. Learners should become competent in using tools such as shapes, fill, stroke, colour gradients, lines, brushes, spray can, nodes, paths, etc in the creation of game graphics and characters.

All of the above should be put into the context of creating graphics for use within a computer game. So special consideration should be taken with file formats/types, resolution, file size, etc.

Guidance on approaches to delivery of this unit

If this unit is delivered as part of a Group Award, it is recommended that it should be taught and assessed within the subject area of the Group Award in which it contributes. If taught as part of the HNC or HND Computer Games Development Group Award it is anticipated that learners could create graphics in this unit which could be used in the creation of animated game sprites in the 2D Animation for Games unit which is also part of the same Group Award. If both units are being delivered, this unit should be delivered first.

The most appropriate approach to delivery of this unit would be to utilize a holistic approach to delivery. The knowledge covered in Outcome 1 could be taught in tandem with the practical skills of Outcomes 2 and 3 thereby maximising the potential for the learners to better prepare for the Outcome 1 assessment, at the same time allowing more time to focus on the practical elements of the unit. The knowledge gained in Outcome 1 can be put into practice in the skills required for Outcomes 2 and 3.

Higher National unit Support Notes (cont)

Unit title: Computer Games: Creating Graphics (SCQF level 7)

In order to provide the best possible learning experience, consideration should be given to utilising a variety of methods of content delivery. These various methods could include (but should not necessarily be limited to) the following:

- Tutor-led presentations on computer game graphics.
- Videos about 2D game art, design and graphics.
- Research tasks where learners look into the types of graphics used in games and report back to the whole class. This could be done in a traditional manner or via a shared document or presentation stored on a cloud service.
- Class driven discussions allowing for peer input and positive engagement by learners, where they discuss the qualities of specific examples of 2D digital art in games. For instance, they may want to put forward a game which in their opinion makes excellent use of graphics or has graphics of a particularly high standard.

For **Outcome 2** learners should spend the majority of their time learning about the various approaches to planning the creation of graphics for use within a computer game or animated game sprite. Learners should gain practical experience in the creation of planning documents and art, such as written proposals, storyboards, mood boards, concept art, reference diagrams, media requirements, etc.

For **Outcome 3** learners should spend the majority of their time learning how to create and edit 2D bitmap and vector graphics using industry standard graphics editors (where possible) for use within the creation of a computer game or animated game sprite.

In order to provide the best possible learning experience, consideration should be given to utilizing a variety of methods of content delivery. These various methods could include (but should not necessarily be limited to) the following:

- Tutor-led demonstrations, eg using a Smartboard to demonstrate how to create and edit graphics using bitmap and vector graphics editors.
- Video captured demonstrations of how various tools and techniques are applied using a graphics editor. These could be shared with students via a cloud service, an online video sharing service or via a college virtual learning environment.
- Practical exercises where learners have to create graphics using bitmap and vector graphics editors. This should also include how to export the finished graphics into appropriate file formats for use within a computer game or animated game sprite.

Guidance on approaches to assessment of this unit

Evidence can be generated using different types of assessment. The following are suggestions only. There may be other methods that would be more suitable to candidates.

Centres are reminded that prior verification of centre-devised assessments would help to ensure that the national standard is being met. Where candidates experience a range of assessment methods, this helps them to develop different skills that should be transferable to work or further and higher education.

Higher National unit Support Notes (cont)

Unit title: Computer Games: Creating Graphics (SCQF level 7)

Assessment evidence is required at all stages and Outcomes. It must be documented and recorded electronically or in written/printed form, however it is encouraged to look at alternate approaches such as web blog, video blog, pod casts and even social media. Alternate approaches making use of modern technology is encouraged.

Outcome 1 is a closed-book assessment and is best assessed by a set of 20 objective questions. This assessment must be carried out under supervised, closed-book conditions. It can be carried out via an on-line assessment or a paper based one.

If a traditional test is used to assess the candidate's knowledge and understanding, this test should be timed and should be completed in a single assessment occasion ('sitting') and an appropriate pass mark being set. Where reassessment is required, it should contain a different sample from that previously used.

If a centre is presenting the assessment for Outcome 1 on-line the following assessment methods, where appropriate, may be selected:

- Multiple-choice
- Drag and drop
- Multiple response
- Mix and match
- A combination of the above

Candidates should gain an understanding of the following topics, these should be put into a game context whenever possible:

- Purpose of graphics in computer games:
  - Backgrounds
  - Scenery
  - Characters
  - Objects, eg collectable items, weapons, etc
  - Effects
  - User Interface

- Types of graphics used in the creation of computer games:
  - 2D bitmap graphics
  - 2D vector graphics
  - 2D animated graphics, eg Sprite sheets
  - 3D graphics
  - 3D animated graphics

  It should also be considered that most games creation packages do not allow 2D vector graphics to be used directly, so in most cases vector graphics will be exported into a suitable bitmap format like PNG at an appropriate resolution and size.

Higher National unit Support Notes (cont)

Unit title: Computer Games: Creating Graphics (SCQF level 7)

- Attributes of graphics types:
  - Pixels
  - Points/nodes
  - Resolution
  - Colour
  - Curves
  - Paths
  - Shapes
  - Lines
  - Vectors
  - Polygons
  - 3D Models/Meshes
  - Rigging
  - Materials/Textures

- Attributes and features of graphics file formats used in the creation of computer games, eg PNG, JPEG, GIF, SVG, FBX, 3DS, MAX, etc:
  - Attributes:
    - Image Quality
    - Compression type (lossy or loseless)
    - Typical file sizes (linked to resolution and compression)
    - Colour range
  - Features:
    - Transparency
    - Animation
    - Scalable without quality loss
- Importance of file size and compression of graphics for use within a computer game
- Appropriate software applications for the creation and editing of different types of game graphics. Candidates should know what graphics editors are best for creating the various types of graphics:
  - Vector Graphics, eg Illustrator, Inkscape
  - Bitmap Graphics, eg Photoshop, Paint.net, GIMP
  - 2D Animated Sprites, eg Spriter, Puppet2D, Spine
  - 3D Graphics, eg 3DS Max, Maya, Blender

This is not an exhaustive list of all relevant topics in regards to the use of graphics within computer games and tutors are free to cover other topics as they see fit, as well as encourage candidates to study other approaches to creating graphics for computer games.

Outcome 2 requires that candidates produce the evidence: A plan for the creation of at least six graphics, at least two of which must be bitmap graphics and two must be vector graphics. The plan could take the form of a typed report, storyboards, concept art, reference diagrams, mood boards or any other valid approach. It is expected that a combination of at least two approaches will be used. It should state the purpose for each graphic, for instance a bitmap graphic could be created to be used as the background for a game and vector graphics could be created for use in the creation of an animated game sprite.

Higher National unit Support Notes (cont)

Unit title: Computer Games: Creating Graphics (SCQF level 7)

Media requirements specification which will specify for each graphic, the graphic type (bitmap or vector) how it will be created (digitally drawn, captured on a camera, etc), what software and/or hardware will be used in the process and the intended file formats that the final graphics will be outputted to. The evidence for the media requirements could take the form of a simple word processed table, but other appropriate methods are acceptable.

Outcome 3 requires that candidates provide the following evidence:

- At least one bitmap graphic captured using a digital camera or scanner.
- An edited version of at least one captured bitmap graphic demonstrating that at least two edits are made, eg cropping, resizing, recolouring, adding transparency, recolouring, etc. Saving a before and after version of a graphic would demonstrate this.
- At least one bitmap graphic created using the drawing/editing tools in a bitmap graphics editor application, eg paint brush, pen, pencil, eraser, gradients, shapes, paint bucket, layers, selection tools, etc. A graphics drawing tablet may be used in conjunction with the software graphics editor to aid the creation of the graphic.
- At least two vector graphics which should be created using the tools in a vector graphics application package, eg Shapes, fill, stroke, colour gradients, lines, brushes, spray can, nodes, paths, etc.
- A media catalogue which will list the file name of each graphic produced including file type, graphic type (vector or bitmap), software and/or hardware used to create it and edits made (if any).
- Graphics saved in appropriate file formats for bitmap and vector graphics.
- Graphics exported to appropriate file formats appropriate for importing into the target games development engine and/or 2D animation application package.

Outcomes 2 and 3 require that candidates demonstrate their practical competence in their planning and creation of 2D bitmap and vector graphics for use in a computer game. It is recommended that a holistic approach to assessment is taken and that the practical skills required for Outcomes 2 and 3 are assessed by a single assessment instrument. Evidence should be generated by the planning of at least six graphics, at least two of which must be bitmap graphics and two must be vector graphics. Digital submission of the final graphics is recommended via a virtual learning environment or cloud service.

The evidence for these Outcomes should be generated under open-book conditions. Whether this need be under supervised or unsupervised conditions is at the discretion of the assessor and the centre; however, evidence should be produced under controlled conditions whenever possible and where appropriate. Where the amount of control is low, the amount of authentication should rise. It is not acceptable to produce evidence in lightly controlled conditions with little authentication.

Authentication may take various forms including, but not limited to, oral questioning and plagiarism checks. Some forms of evidence generation (such as video recordings) have intrinsic authentication and would require no further means of verification.

Higher National unit Support Notes (cont)

Unit title: Computer Games: Creating Graphics (SCQF level 7)

Opportunities for e-assessment

E-assessment may be appropriate for some assessments in this unit. By e-assessment we mean assessment which is supported by Information and Communication Technology (ICT), such as e-testing or the use of e-portfolios or social software. Centres which wish to use e-assessment must ensure that the national standard is applied to all learner evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. The most up-to-date guidance on the use of e-assessment to support SQA's qualifications is available at **www.sqa.org.uk/e-assessment**.

Opportunities for developing Core and other essential skills

This Unit provides opportunities to develop some of the components of the following Core Skill:

- *Information and Communication Technology (ICT)* (SCQF level 6)

This Unit has the Critical Thinking and Planning and Organising components of Problem Solving embedded in it. This means that when learners achieve the Unit, their Core Skills profile will also be updated to show they have achieved Critical Thinking at SCQF level 5 and Planning and Organising at SCQF level 5.

History of changes to unit

Version	Description of change	Date
02	Core Skills Components Critical Thinking and Planning and Organising at SCQF level 5 embedded.	21/02/17

General information for learners

Unit title: Computer Games: Creating Graphics (SCQF level 7)

This section will help you decide whether this is the unit for you by explaining what the unit is about, what you should know or be able to do before you start, what you will need to do during the unit and opportunities for further learning and employment.

The purpose of this unit is to enable you to develop skills in digital image creation for use in computer games. You will create bitmap and vector graphics and gain knowledge and understanding of their use in computer games. You will use bitmap and vector graphics editors to both create and edit graphics that can be used as game components, characters and environments.

The unit is suitable if you have limited or no experience of using graphic editing packages and wish to gain or enhance your knowledge and skills in the creation of graphics for use within a games development context.

The unit sits within the Content Selection section of the HNC and HND Computer Games Development Group Award from which 1 credit minimum is required. It is anticipated when this unit is delivered as part of that Group Award, that you will create 2D graphic assets for use within other units in the award. For instance, you could create graphics in this unit which could be used in the creation of animated game sprites in the 2D Animation for Games unit which is also part of the same Group Award.

In **Outcome 1** you will be required to demonstrate an understanding of the use of graphics within computer games. This may be assessed by means of a closed-book assessment consisting of a set of 20 objective questions. This assessment will be carried out under supervised, closed-book conditions.

In **Outcome 2** you will plan a range of 2D graphics for use in a computer game. You will do this using a variety of approaches, such as written proposals, storyboards, mood boards, concept art, reference diagrams, media requirements, etc.

In **Outcome 3** you will create and edit 2D bitmap and vector graphics for use in a computer game using bitmap and vector graphics editor applications. You will also use hardware devices such as digital cameras, scanners and graphics tablets to create digital images and art.

Outcomes 2 and 3 will be assessed via a practical assessment carried out under open-book conditions.

This unit provides you with opportunities to develop some of the components of the following Core Skill:

- *Information and Communication Technology (ICT)* (SCQF level 6)

This Unit has the Critical Thinking and Planning and Organising components of Problem Solving embedded in it. This means that when you achieve the Unit, your Core Skills profile will also be updated to show you have achieved Critical Thinking at SCQF level 5 and Planning and Organising at SCQF level 5.