National Centre for Computing Education

Raspberry Pi

Year 5 – Vector drawing

Unit introduction

In this unit, learners start to create vector drawings. They learn how to use different drawing tools to help them create images. Learners recognise that images in vector drawings are created using shapes and lines, and each individual element in the drawing is called an object. Learners layer their objects and begin grouping and duplicating them to support the creation of more complex pieces of work.

Software and Hardware requirements

This unit uses the Google Drawings application. All Google Drawings files are provided in the lesson plans (the links create a copy of the drawing that can be edited). If you wish to use a different program, the resources are included as Google Slides presentations. The contents of these files can be copied across to your preferred program.
Note: pupils are creating vector-style drawings in this unit, not true vector drawings, as these require specialised software.

If you've adapted this unit to better suit your school, please share your adapted resources with fellow teachers in the STEM community. Alternatively, if this unit isn't quite right for your school, why not see if an adapted version which better suits has already been shared?

Overview of lessons

Lesson	Brief overview	Learning objectives
1 The drawing tools	Learners are introduced to vector drawings and begin to understand that they are made up of simple shapes and lines. They use the main drawing tools	To identify that drawing tools can be used to produce different outcomes

	within the Google Drawings application to create their own vector drawings. Learners discuss how vector drawings differ from paper-based drawings.	• I can recognise that vector drawings are made using shapes • I can experiment with the shape and line tools • I can discuss how vector drawings are different from paper-based drawings
2 Creating images	Learners begin to identify the shapes that are used to make vector drawings. They are able to explain that each element of a vector drawing is called an object. Learners create their own vector drawing by moving, resizing, rotating, and changing the colours of a selection of objects. They also learn how to duplicate the objects to save time.	To create a vector drawing by combining shapes • I can identify the shapes used to make a vector drawing • I can explain that each element added to a vector drawing is an object • I can move, resize, and rotate objects I have duplicated
3 Making effective drawings	Learners increase the complexity of their vector drawings and use the zoom tool to add detail to their work. They are shown how grids and resize handles can improve the consistency of their drawings. Learners also use tools to modify objects to create a new image.	To use tools to achieve a desired effect • I can use the zoom tool to help me add detail to my drawings • I can explain how alignment grids and resize handles can be used to improve consistency • I can modify objects to create a new image
4 Layers and objects	Learners gain an understanding of layers and how they are used in vector drawings. They discover that each object is built on a new layer and that these layers can be moved forwards and backwards to create effective vector drawings.	To recognise that vector drawings consist of layers • I can identify that each added object creates a new layer in the drawing

		• I can change the order of layers in a vector drawing • I can use layering to create an image
5 Manipulating objects	Learners find out how to select and duplicate multiple objects at a single time. They develop this skill further by learning how to group multiple objects to make them easier to work with. Learners then use this knowledge to group and ungroup objects, in order to make changes to and develop their vector drawings.	To group objects to make them easier to work with • I can copy part of a drawing by duplicating several objects • I can recognise when I need to group and ungroup objects • I can reuse a group of objects to further develop my vector drawing
6 Become a graphic designer	Learners use the skills they have gained in this unit to create a vector drawing for a specific purpose. They reflect on the skills they have used to create the vector drawing and think about why they used the skills they did. Pupils will learn about the role of a graphic designer and take this on to create logo designs of their own. Learners then begin to compare vector drawings to freehand paint program drawings.	To apply what I have learned about vector drawings • I can create a vector drawing for a specific purpose • I can reflect on the skills I have used and why I have used them • I can compare vector drawings to freehand paint drawings

Request a computing ambassador

This unit is ideal for linking to the world of careers, and a computing ambassador can support this. Through the [STEM ambassador platform](#), you can search for a computing ambassador. If you cannot find a computing ambassador with an offer to support this unit, then the following request will help to match you with the right person. You will need to edit the areas in red to ensure the request is right for your school.

Year 5 (ages 9-10) are learning about vector graphics though the [Teach Computing Curriculum unit of six lessons](#). Within these lessons, pupils will learn how to create their own vector drawings.

Our lessons are taking place from *date* *to* *date* *and we would appreciate someone with skills in this area to offer some real-world experience to this unit. The unit uses* https://www.getpaint.net/*insert software* *on* *insert devices* *and focuses on the following areas:*
- *understanding vector drawings are made up of shapes and lines*
- *using skills such as moving, resizing, rotating, duplicating, and grouping to create drawings*
- *understand how alignment grids and resize handles can improve consistency*
- *use layering to create an image*

We require an ambassador who can support in any of these areas, which could be via a profession or hobby. We are hoping for an ambassador who would be willing to join us *in the classroom/virtually* *to support our learning by* *providing some handy hints and tips for our projects/giving us constructive feedback on our final projects/discussing how vector graphics are used within their profession and in the real-world.*

Subject knowledge and CPD opportunities

Teachers need a good understanding of the tools available in their chosen software. These tools include shape and line drawing tools, fill, undo and redo, select, and delete. In the unit, learners also need to move, resize, and rotate shapes, including the use of size and alignment guides. Many of these tools are available in presentation software such as Google Slides and Microsoft PowerPoint.

Teachers need to know that vector drawings are created using shapes and lines. In vector drawings, all these shapes and lines are called objects. Within vector drawings, each object is created using a new layer. These can be rearranged using the menu tool, which allows the objects to be sent backwards and forwards (one at a time) or sent to the back or front. Objects within these programs can be grouped, which enables the objects to be treated as though they are a single object. It is important to recognise that although they act as though they are a single object, grouped objects are still a number of individual objects.

Teachers need to have an understanding of how digital images can be made. This could be using shapes and lines in a vector drawing, or using pixels in a freehand paint program.

Continual Professional Development

Enhance your subject knowledge to teach this unit through the following free CPD:

- Getting started in Year 5 – short course
- Introduction to primary computing remote or face to face

Teach primary computing certificate

To further enhance your subject knowledge, enrol on the teach primary computing certificate. This will support you to develop your knowledge and skills in primary computing and gain the confidence to teach great lessons, all whilst earning a nationally recognised certificate!

Progression

This unit progresses learners' knowledge and understanding of digital painting and has some links to the Year 3 'Creating media – Desktop publishing' unit, in which learners used digital images. In this Year 5 unit, learners create images that could be used in desktop publishing documents.

Common Misconceptions

Vector graphics are made using shapes and lines. Learners may think that using shapes means graphic tools are only for creating very simple designs, however this type of graphic design is used to create intricate illustrations and detailed artwork.

When using platforms, learners may have the misconception that graphics are designed on one layer, with all elements on the same level. They may even think it is easier to create all objects on a single layer, as it takes less time. However, vector graphics are made building each object on a new layer, which can be moved forward or backwards. Understanding this, and its importance, is vital, as it makes it easier to edit and manage designs. When learners group objects, they may have the misconception that this makes a new object, thinking they are now one. Although a grouped object acts as a single object, learners should be aware they are still a collection of individual objects, that can be ungrouped and manipulated.

Curriculum links

Computing

- Select, use, and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems, and content that accomplish given goals, including collecting, analysing, evaluating, and presenting data and information.

Art and Design

- to improve their mastery of art and design techniques, including drawing, painting and sculpture with a range of materials [for example, pencil, charcoal, paint, clay]

Assessment

Formative assessment

Assessment opportunities are detailed in each lesson plan. The learning objectives and success criteria are introduced in the slide decks at the beginning of each lesson and then reviewed at the end. Learners are invited to assess how well they feel they have met the learning objective using thumbs up, thumbs sideways, or thumbs down.

Summative assessment

Please see the assessment rubric document for this unit. The rubric can be used to assess student's work from lessons 3 to 6.