Differentiating existing learning sequences for English as an Additional Language students

Mathematics, Level 7, for EAL learners at Level CL

Existing learning sequences linked to particular learning areas in the Victorian Curriculum F–10 can be adapted to support differentiated teaching for English as an Additional Language (EAL) students. Teachers can adapt, remove or add to elements of their learning sequences in order to cater for all students in their classrooms.

1. Identify an existing learning sequence

**Existing learning sequence:** Programming patterns – Computational and algorithmic thinking in Mathematics

**Curriculum area and levels:** Mathematics, Level 7

2. Identify the level of language learning of your students

The EAL curriculum is a continuum structured as three EAL pathways (A, B, C). Each pathway describes a different stage of English-language learning (early, mid and late), and each pathway is divided into different levels of language learning (A1, A2, BL, B1, B2, B3, CL, C1, C2, C3, C4).

While the implementation of the EAL curriculum is the responsibility of all teachers, the EAL specialist plays a leading role in its delivery, as the expert in the field. Your EAL specialist will determine the most appropriate pathway for each EAL learner in your classroom and advise you of their current level of learning.

**The differentiation suggestions provided in this document are for students working at Level CL of the EAL curriculum.**

EAL learners at Level CL will typically be able to:

* understand common instructions and questions, and simple descriptions and explanations when strongly supported in familiar contexts
* provide short explanations and descriptions
* read and complete simple, structured activities around a wide range of familiar, short, simple texts that use repetitive structures and features and are strongly supported by illustrations
* write short, grammatically simple texts based on well-rehearsed spoken and well-practised written English.

3. Adapt the learning sequence to differentiate for EAL students

| Existing learning sequence | Differentiated teaching for EAL learners at Level CL |
| --- | --- |
| **Overview** | Overview |
| **Learning intentions:**   * Students will use dynamic geometry software (DGS) to create geometric shapes and patterns * Students will define a tessellation and create an example using DGS * Students will use a general purpose programming language such as Python (using the Python Turtle), JavaScript or Wolfram Language (Mathematica) to create geometric shapes and patterns | **Learning intentions:**   * Students will use language effectively to use dynamic geometry software (DGS) to create geometric shapes and patterns * Students will use language effectively to define a tessellation and create an example using DGS * Students will use language effectively to use a general purpose programming language such as Python (using the Python Turtle), JavaScript or Wolfram Language (Mathematica) to create geometric shapes and patterns |
| **Relevant content descriptions in Mathematics, Level 7:**  Design and implement mathematical algorithms using a simple general purpose programming language ([VCMNA254](http://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCMNA254)) | **Additional EAL Level CL content descriptions:**  Comprehend some familiar questions with support from the speaker [(VCEALC483)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCEALC483)  Interact simply with peers in group work activities [(VCEALC485)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCEALC485)  Develop basic digital technology skills that support reading of digital texts [(VCEALC508)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCEALC508)  Use a picture dictionary to find unfamiliar words, asking for support in home language [(VCEALA512)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCEALA512)  Use memory and/or home language knowledge to retrieve newly learnt words and structures [(VCEALA531)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCEALA531) |
| **Relevant achievement standard:**  Students develop … models for situations, make predictions based on these models, solve related equations and check their solutions. | **Relevant achievement standard:**  At Level CL students … understand common instructions and questions, and simple descriptions and explanations when strongly supported in familiar contexts … [They] provide short explanations and descriptions … [They] read and complete simple, structured activities around a wide range of familiar, short, simple texts that use repetitive structures and features and are strongly supported by illustrations … [They] write short, grammatically simple texts based on well-rehearsed spoken and well-practised written English. |

|  |  |
| --- | --- |
| Existing learning sequence | Differentiated teaching for EAL learners at Level CL |
| Teaching and learning activities | Teaching and learning activities  Differentiated teaching is required to support EAL learners with the following learning activities. |
| **Activity 1: Explore and define polygons**  Define the following terms for students, either directly or through student-led research and feedback within small groups and to the class:   * **Polygon**: a two-dimensional shape with straight sides, such as a triangle or rectangle. A circle, for example, is not a polygon. * **Regular polygon**: a two-dimensional shape with all equal sides and angles at each vertex (corner). For example, the four regular polygons below are the equilateral triangle, square, regular pentagon and regular hexagon.   A row of polygons showing (left to right): triangle, square, pentagon, hexagon.  Polygons are (usually) named for the number of sides they have (prefix indicated in **bold**):   |  |  |  |  | | --- | --- | --- | --- | | **Shape** | **Number of sides** | **Shape** | **Number of sides** | | **Tri**angle | 3 | **Hept**agon/  **Sept**agon | 7 | | **Quad**rilateral | 4 | **Oct**agon | 8 | | **Pent**agon | 5 | **Non**agon | 9 | | **Hex**agon | 6 | **Dec**agon | 10 |   A row of polygons showing (left to right): an irregular four-sided shape, a right-angled triangle, a rectangle, an irregular five-sided shape.**Irregular polygon**: a two-dimensional shape with not all equal sides and angles at each vertex (corner). For example, the following are irregular polygons:  **Concave** and **convex** **polygons**: polygons may be described as concave if they have any interior angles greater than 180° (any sides that ‘cave in’) and convex if all interior angles are less than 180°. The triangle below could be described as a regular convex triangle. The second shape below is an example of an irregular concave hexagon.  a regular convex triangle (left). an irregular concave hexagon (right)  **Tip**: Students may work through the following online resource on polygons:   * [Polygons (Maths is fun)](https://www.mathsisfun.com/geometry/polygons.html)   **Create a visual display:**  Students should create a visual display to summarise the different types of polygons. Encourage students to find polygons in the world around them and/or online, to collect photos or images and to classify the polygons accordingly.  Discussion prompts (small groups or whole class):   * What are the most common polygons you see in buildings and other large, manufactured structures (for example, bridges and cranes)? Why do you think these might be seen so often? * Which shapes in your images are not polygons? Why? | **Activity 1: Explore and define polygons**  See [Appendix 1 – Vocabulary reference table](#App1) for a helpful vocabulary table that you can refer to and add to throughout the learning activities. You may need to pre-teach some of this vocabulary to students.  Give each student a printed copy of the table below (see [Appendix 2](#App2)). Take time to directly teach the terms, including ‘geometric shape’ (pronunciation, spelling and meaning). Draw students’ attention to the prefix indicated in **bold** to explain that these shapes are usually named for the number of sides they have.  For example, for the word ‘triangle’, follow the steps below and information in the table (projected to the board) to teach the word:   1. Point to the shape of the triangle and ask: ‘How many angles and sides are there in this shape?’ (Three; demonstrate what ‘angle’ and ‘side’ mean by pointing at the shape.) 2. Tell students: ‘This is a triangle’ and point to the word. 3. Draw students’ attention to the prefix ‘**tri**-’ and explain that it means three. ‘A triangle has three angles and three sides.’ 4. Point to the pronunciation under the word and say the word a few times. Ask students to repeat the word each time.  |  |  |  |  | | --- | --- | --- | --- | | **Name** | **Number of sides** | **Geometric shape** | **Name in home language** | | **Tri**angle  [**trai**·ang·gl] | 3 |  |  | | **Quad**rilateral  [kwo·druh**·lat**·ruhl] | 4 |  |  | | **Pent**agon  [**pen**·tuh·gon] | 5 |  |  | | **Hex**agon  [**hek**·suh·gon] | 6 |  |  | | **Hept**agon/**Sept**agon  [**hep·**tuh·gon] / [**sep**.tuh.gon] | 7 |  |  | | **Oct**agon  [**ok**·tuh·gon] | 8 |  |  | | **Non**agon  **[no**.nuh.gon] | 9 | nonagon |  | | **Dec**agon  [**de**.kuh.gon] | 10 |  |  |   Ask students to share if they know the names of these shapes in their home languages. Ask them to work in home language pairs to check a bilingual dictionary, discuss and write the home language names in the last column of the Polygons table ([Appendix 2](#App2)).  Explain that all the shapes in the table above are **polygons*.*** Write the word ‘polygon’ on the board and ask students to read the word after you several times.Draw students’ attention to the prefix **‘poly**-’ indicated in **bold** and explain that it means ‘**many**’. For example:   * **poly**technic: a college that teaches many technical subjects * **Poly**nesia: an area that is made up of many islands * **poly**glot: a person who speaks many languages.   Refer back to the shapes in the table above and comment that all of the shapes have many (at least three) angles and sides, so they are all called ‘polygons’.Provide a handout of the definition of a polygon as follows:  ***Polygon***: a two-dimensional shape with many *straight sides*, such as a triangle or rectangle. A circle, for example, is not a polygon.  A row of three shapes showing (left to right): polygon (straight sides), Not a polygon (has a curve), Not a polygon (open, not closed)  ([Mathsisfun](https://www.mathsisfun.com/definitions/two-dimensional.html))  Tell students that there are different types of polygons. Put the following terms on the board or screen and say that these are four types of polygons.   * regular polygons * irregular polygons * concave polygons * convex polygons.   Ask students to work in pairs to research these terms. Ask them to start with the following online resource on polygons:   * [Polygons (Maths is Fun)](https://www.mathsisfun.com/geometry/polygons.html)   Ask students to follow the steps below. You may need to model the steps on your screen, using a dominant home language. If you do not speak this language, the steps can still be modelled.   1. Look up the English word in your bilingual dictionary. 2. Find the translation of the word in your home language. 3. Read the definition in your home language. 4. Explain it to your partner in English.   **Tip**: Where possible, pair two students with the same home language and allow them to research and discuss in their home language. Encourage them to use a bilingual dictionary (online or paper) if they have difficulty understanding the resource.  While students are researching, move around the classroom to support students. Ensure that students are reading accurate information based on the visuals they are looking at and any language clues. Pay close attention to translations into English and the explanations. Provide support with both language and content knowledge at this stage.  After the above steps, ask students to report back their English definitions. Some students may not be able to formulate full sentences or use mathematical language to define the terms. You may need to provide such terms during this process. For example, use relevant visuals for ‘angle’, ‘vertex’, ‘equilateral triangle’ and ‘interior angle’.  Finally, provide each student with a copy of the definitions:  **Polygon:** a two-dimensional shape with straight sides, such as a triangle or rectangle. A circle, for example, is not a polygon.  **Regular polygon**: a two-dimensional shape with all equal sides and angles at each vertex (corner). For example, the four regular polygons below are the equilateral triangle, square, regular pentagon and regular hexagon.  A row of polygons showing (left to right): triangle, square, pentagon, hexagon.  **Irregular polygon**: a two-dimensional shape with not all equal sides and angles at each vertex (corner). For example, the following are irregular polygons:  A row of polygons showing (left to right): an irregular four-sided shape, a right-angled triangle, a rectangle, an irregular five-sided shape.  **Concave** and **convex** **polygons**: polygons may be described as concave if they have any interior angles greater than 180° (any sides that ‘cave in’) and convex if all interior angles are less than 180°. The triangle below could be described as a regular convex triangle. The second shape below is an example of an irregular concave hexagon.  a regular convex triangle (left). an irregular concave hexagon (right)  **Create a visual display:**  Ask students to work in groups of three to create a visual display of the different types of polygons based on their previous research. Group EAL students with non-EAL students at this stage to encourage peer learning. Encourage students to take photos of polygons in the world around them and/or go online to collect images of polygons. Ask them to create four groups as follows and add images to each group:   * regular polygons * irregular polygons * concave polygons * convex polygons.   As students are creating their visual displays, monitor their work and provide feedback on their search and classification.  Ask groups to show their visual displays. Hold a class discussion using the prompts below while looking at groups’ displays.   * What are the most common polygons you see (for example, in structures such as buildings, bridges and cranes)? Why do you think these might be seen so often? * Which shapes in your images are not polygons? Why? |
| **Activity 2****: Explore and define tessellations**  In this activity, students explore the concept of tessellations. Once students have explored this, they can recreate tessellations and other geometric patterns using technology in the subsequent activities.  Have students research the term ‘tessellation’ on the internet before providing them with the following definition:   * **Tessellation** (tiling): a repeated pattern in the plane or on a surface where shapes completely fill all the space around a given point where their boundaries meet. For example, a honeycomb is a tessellation using hexagons. Tiling patterns are tessellations using rectangular tiles or brick pavers in paths, mosaics in buildings, quilts and art.   Two geometric images created using GeoGebra: a regular tessellation of hexagons (left), a semi-regular tessellation of triangles, hexagons and squares (right)**A regular tessellation** is created by tessellating regular polygons. If more than one regular polygon is used, it is a **semi-regular tessellation**. Examples of a regular tessellation of hexagons, and a semi-regular tessellation of triangles, hexagons and squares, are below.  Images created using [GeoGebra](https://www.geogebra.org/geometry) | **Activity 2: Explore and define tessellations**  In this activity, students explore the concept of tessellations. Once students have explored this, they can recreate tessellations and other geometric patterns using technology in the subsequent activities.  red and white checkered fabric  herringbone pattern of rectangular tileswall of orange rectangular bricksShow the visuals below on the screen.  pattern of white octagons black and squares  Ask students: ‘What types of polygon can you see?’ (1. rectangles, 2. octagons and squares, 3. rectangles, 4. squares)  Tell students that these images are examples of tessellations or tiling. Write the terms ‘tessellation’ and ‘tiling’ on the board. Have students write down the words in their books and then read after you several times to teach both spelling and pronunciation. Provide the following definition in both oral and print forms:   * **Tessellation** (tiling): A tessellation is a repeated pattern on a surface where shapes completely fill all the space around a given point where their boundaries meet. For example, a honeycomb is a tessellation using hexagons.   photo of a honeycomb with bees on it  Write ‘regular tessellation’ and ‘semi-regular tessellation’ on the board. Have students work in home language pairs where possible to search for images and definitions of these in the following online resource:   * [Tessellation (Maths is fun)](https://www.mathsisfun.com/geometry/tessellation.html)   Encourage students to use a bilingual dictionary if needed, then search the internet in their home languages and explain to each other what they understand tessellations to be. Provide feedback and support as students work in pairs.  Ask pairs to report back on regular tessellations and semi-regular tessellations using visuals and explanation. Provide further feedback and draw their attention to ‘patterns’ in their images. Finally, provide each student with a printed copy of the definitions below:   * **Pattern:** a regular arrangement of lines, shapes or colours. * **Tessellation** (tiling): a repeated pattern in the plane or on a surface where shapes completely fill all the space around a given point where their boundaries meet. * **A regular tessellation** is created by using regular polygons, such as a honeycomb.   a regular tessellation of hexagons   * If more than one regular polygon is used, it is a **semi-regular tessellation**.   a semi-regular tessellation of triangles, hexagons and squares  (Images created using [GeoGebra](https://www.geogebra.org/geometry)) |
| **Activity 3: Drawing using dynamic geometry software**  In this activity, students use dynamic geometry software to create geometric shapes. The software discussed in this lesson is [GeoGebra](https://www.geogebra.org/geometry), but any equivalent system could be used.  Students create their own patterns or find patterns online or in the world around them to replicate. Some examples of geometric patterns student could recreate are below:  Three photos showing (left to right): a building with square shapes, a vase with hexagons, a pattern of square tiles  Students access [GeoGebra](https://www.geogebra.org/geometry) and use it to draw geometric shapes. In addition, teachers and students can explore [classroom resources](https://www.geogebra.org/materials). Students can view the below video demonstrating how to draw basic shapes in GeoGebra:   * [GeoGebra video (Grace Jefferson, YouTube)](https://www.youtube.com/watch?v=vx3DrQvcNeI&feature=youtu.be)   **Tip:** Students can sign up to [GeoGebra](https://www.geogebra.org/geometry) for free. Students will be able to save their creations if they have a login.  Run this activity in two parts. Students may work in pairs or individually.   1. Tell students to recreate basic polygons using software and label these using the text feature; for example, ‘convex regular hexagon’. Students can save their work if they are logged in or capture their work using a screenshot. 2. Have students undertake research online and create a folio of geometric patterns and tessellations (the patterns don’t all have to be tessellations). Their folios could include drawings and photographs if time permits. Encourage students to *recreate* their patterns using the chosen software. Remind students to save their work or take a screenshot.   At the end of the lesson, have students print their work to create a classroom demonstration of what can be created using dynamic geometry software.  Discussion prompts (small groups or whole class):   * Are there any shapes that are more difficult to recreate than others? Why? * What are the advantages of drawing geometric shapes using this kind of software? What are the disadvantages? * What type of polygons are in your design? * Are there tessellations that don’t work? Why? What is it about the shapes used that prevent you tiling the plane? | **Activity 3: Drawing using dynamic geometry software**  In this activity, students use dynamic geometry software to create geometric shapes. The software discussed in this lesson is [GeoGebra](https://www.geogebra.org/geometry), but any equivalent system could be used.   1. Ask students to access [GeoGebra](https://www.geogebra.org/geometry) on their devices. 2. As a class, watch the below video demonstrating how to draw basic shapes in [GeoGebra](https://www.geogebra.org/geometry):  * [GeoGebra video (Grace Jefferson, YouTube)](https://www.youtube.com/watch?v=vx3DrQvcNeI&feature=youtu.be)  1. Ask students to practise the steps on their devices as they view the video on the large screen. Pause the video after each presented step to help students with understanding and practising the step. At each pause, you can check their understanding by looking at their drawings on their screens. Students who draw the same shape as on the video show understanding, and those with different drawings need your support. You can support them by replaying the video section or demonstrating the step to them on their own devices. 2. Ask students to recreate basic polygons using the software and label these using the text feature, such as ‘convex regular hexagon’. Model this on the large screen with [GeoGebra](https://www.geogebra.org/geometry). Students can save their work if they are logged in or capture their work using a screenshot. As students work on this, check on their drawing and labelling to provide feedback.   Hold a class discussion using the prompts below:   * What type of polygons are in your drawing? * Are there any shapes that are more difficult to draw than others? Why?   After the steps above, students should have been scaffolded so they are able to perform basic steps in drawing geometric shapes on [GeoGebra](https://www.geogebra.org/geometry). Now ask them to work in pairs to recreate a tessellation of their choice. Give them the following instructions, then explain the steps to make sure everyone understands. Monitor and provide feedback during the process.   1. Three photos showing (left to right): a building with square shapes, a vase with hexagons, a pattern of square tilesLook for an image of a tessellation on the internet. You can also choose one from Activity 2 or one of the following examples: 2. Recreate your selected tessellation on [GeoGebra](https://www.geogebra.org/geometry). 3. Print your work. 4. Create a classroom demonstration.   **Tip:** Where possible, pair an EAL student with someone who previously demonstrated good understanding and practice of the drawing process on [GeoGebra](https://www.geogebra.org/geometry) to foster peer learning.  After the class demonstration, hold a class discussion using the following prompts:   * What are the advantages of drawing shapes using [GeoGebra](https://www.geogebra.org/geometry)? What are the disadvantages? * Are there tessellations that can’t be drawn on [GeoGebra](https://www.geogebra.org/geometry)? Why? What shapes did you have difficulty using in drawing your tessellation?   At the end, let students play a game or do a quiz to revise the new terms learned in the lesson. For example, you can create a quiz on [Kahoot](https://kahoot.com/) or use word cards with one side having the key term and the other side having its definition or a shape. The following words can be used: ‘polygon’, ‘regular polygons’, ‘irregular polygons’, ‘concave polygons’, ‘convex polygons’, ‘tessellation’, ‘regular tessellation’, ‘semi-regular tessellation’. |

Additional resources

You can access the EAL curriculum on the [Victorian Curriculum F–10 website](https://victoriancurriculum.vcaa.vic.edu.au/english/english-as-an-additional-language-eal/introduction/rationale-and-aims).

You can access a range of resources to assist with implementing the EAL curriculum on the [VCAA English as an Additional Language webpage](https://www.vcaa.vic.edu.au/curriculum/foundation-10/resources/english-as-an-additional-language/Pages/default.aspx), including profiles of EAL learners, sample progressions through the EAL pathways, a language and learning interview, FAQs, professional learning opportunities and links to external resources.

Appendices

Appendix 1 – Vocabulary reference table

|  |  |  |  |
| --- | --- | --- | --- |
| **Content-specific vocabulary** | **Linguistic-specific vocabulary  (verbs of instruction)** | **Language for interaction** | **Language for clarification** |
| geometric shape  triangle  quadrilateral  pentagon  hexagon  heptagon/septagon  octagon  nonagon  decagon  polygon  regular polygons  irregular polygons  concave polygons  convex polygons  angle  side  vertex  equilateral triangle  interior angle  pattern  tessellation  tiling  regular tessellation  semi-regular tessellation | Draw…  Share …  Explain …  Discuss …  Search …  Report back …  Create …  Recreate …  Design …  Explore …  Define … | First you …  Then …  Okay, now you have to …  What’s next? | Can you say that again, please?  What was the step again?  I don’t understand.  What does this mean in your home language?  Say that in your home language. |

Appendix 2 – Polygons

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Number of sides** | **Geometric shape** | **Name in home language** |
| **Tri**angle  [**trai**·ang·gl] | 3 |  |  |
| **Quad**rilateral  [kwo·druh**·lat**·ruhl] | 4 |  |  |
| **Pent**agon  [**pen**·tuh·gon] | 5 |  |  |
| **Hex**agon  [**hek**·suh·gon] | 6 |  |  |
| **Hept**agon/**Sept**agon  [**hep·**tuh·gon] /  [**sep**·tuh·gon] | 7 |  |  |
| **Oct**agon  [**ok**·tuh·gon] | 8 |  |  |
| **Non**agon  **[no**·nuh·gon] | 9 | nonagon |  |
| **Dec**agon  [**de**·kuh·gon] | 10 |  |  |