

Supporting NCEA Numeracy in Dance



This resource is aligned to the New Zealand Curriculum (2007) and provides support for the teaching and learning of literacy and numeracy in preparation for the NCEA Co-requisite. It aims to support those students who are using the NCEA qualification pathway.

Dance provides unique opportunities for ākonga to develop their understanding of numeracy in ways that are creative, accessible, physical, kinesthetic, and social.

It draws on the diverse cultural knowledge of ākonga and the community to explore ways that number patterns and relationships are evident in beats, rhythms, and dance formations.

In Dance ākonga develop their numeracy skills when they:

- » apply symmetry and asymmetry in body shapes, pathways, and formations
- » use mathematical language to describe movement, for example, shapes, pathways, angles, rotation, facings, direction, and canons.

This Numeracy Pedagogy Guide (NPG) takes a selection of mathematical content ideas from [Unpacking Numeracy](#)¹ and illustrates small, effective steps that you can trial and weave into your teaching practice.



Dance Numeracy Pedagogy Guide



Operations with numbers	What can this look like in Dance?	What can I do as a kaiako of Dance?
Work with whole numbers up to billions, fractions, decimals to 3 places, percentages, and integers	Work with fractions such as halves, thirds, quarters, eighths, and sixteenths. <i>Ākonga use a range of differentiated body percussions to create beats divided into halves, thirds, quarters, eighths, and sixteenths.</i> <i>Ākonga create a polyrhythm, with one group stamping a beat, one group clapping out beats in thirds, and another group slapping thighs in fourths.</i>	Discuss and demonstrate through movement, sound, and notation the beats and rhythms of dance patterns such as those performed in sāsā, kapa haka, or other dance forms ākonga have knowledge of. Discuss how beats can be divided in multiple ways (for example, into halves, thirds, fourths, and eighths) and transformed into dance forms or shapes.

Spatial properties and representations of objects	What can this look like in Dance?	What can I do as a kaiako of Dance?
Recognise symmetry	Recognise symmetry in dance performances. <i>Ākonga identify, describe, and discuss how symmetry and asymmetry are used in dance performances.</i> Explore and apply symmetry and asymmetry in choreography. <i>Ākonga work with a partner to create a sequence of symmetric and asymmetric shapes and air pathways that transition from one shape to the next.</i>	Lead ākonga in activities to physically explore line symmetry and asymmetry², for example, in individual and partner shapes. Discuss the impact and effect of using line symmetry, for example, to create a sense of visual harmony, in both their own and others' work. Use Math dance: Erik Stern and Karl Schaffer at TEDxManhattanBeach to explore symmetry and number patterns through dance.
Transform objects to design for purpose (i.e. enlarge, reflect, rotate, and translate)	Apply aspects of transformation to develop dance motifs. <i>Ākonga understand that a dance motif equivalent to a repeated shape in visual designs such as kōwhaiwhai or tīvaevae patterns.</i> <i>Ākonga work in groups to physically explore ways to integrate elements of kōwhaiwhai patterns into dance movements and formations.</i> <i>Ākonga develop a motif by applying aspects of transformation such as enlargement (augmentation), rotation (varying direction), reflection, and translation (same shape or movement performed by multiple dancers in different locations on stage e.g. shadowing).</i> <i>Ākonga apply rotational symmetry in group shapes based on tīvaevae patterns.</i>	When ākonga are developing a movement motif to choreograph a dance, identify parallels between choreographic devices and corresponding mathematical transformations. Show ākonga excerpts of works by Moss Patterson (Ngāti Tūwharetoa) inspired by kōwhaiwhai patterns, curved koru shapes and reflection, translation, rotation, and repetition. For example, see Excerpts from 'Moko' - Atamira Dance Company YouTube. Display kōwhaiwhai patterns and ask ākonga to discuss and physically explore ways to represent repetition, rotation, enlargement in dance movements¹, for example, to emphasise and develop a motif and idea through the use of repetition. Explore angles and rotation using a range of facings in choreography. Check ākonga understanding of common angles of rotation such as 45°, 90°, 135°, 180°, 225°, 270°, 315° and 360° by asking them to rotate a number of degrees. Explain to ākonga that rotational symmetry in dance occurs when several dancers perform the same shape (or movement) facing different directions around a common central point. Ask ākonga to identify rotational symmetry in tīvaevae patterns and discuss how this can be reflected in dance formations and movements.
Make connections between representations of objects in simple 2D and 3D	Understand the difference between 2D and 3D body shapes in dance. <i>Akonga perform the same shape facing different directions: side (90° and 270°), back (180°), front (360°) and diagonal facings (45°, 135°, 225° or 315°) and have a partner take photographs of each.</i> <i>Ākonga analyse photographs of 2D (front, back and side on facings) and 3D (diagonal-facing) shapes, exploring the impact and effect of each.</i>	Explain that in dance, flat facings (front, back and side on) present a 2D view of the body, while diagonal facings present a 3D perspective, providing depth as well as width and height, offering the viewer a more interesting perspective with more to look at.

Location and navigation	What can this look like in Dance?	What can I do as a kaiako of Dance?
Have a way to navigate between points	Describe and follow floor and air pathways. Ākonga to draw a map of their journey to school and translate it into a floor pathway using locomotor movement.	Explore ways to describe floor and air pathways in dance.
Describe position and orientation in situations that are flexible in the system being used	Follow or use stage directions to describe location and orientation in a performance space. <i>Ākonga give and follow stage directions in rehearsals.</i> Interpret formation diagrams to determine individual location within a group formation. <i>Ākonga draw diagrams of the most interesting or effective formation in their group's choreography and to explain why it was effective.</i>	Provide ākonga with a stage directions diagram (from the view of the dancer), for example, showing upstage left, centre, down stage right. Use stage directions to play games requiring dancers to move to different locations. When choreographing a dance on students or spacing a dance in a venue to prepare for performance, provide opportunities for ākonga to follow stage directions, for example, by saying "Can you position yourself further upstage left please?". Encourage ākonga to use and give stage directions when choreographing with others. When choreographing with ākonga, display a formation diagram on the whiteboard and ask ākonga to use the diagram to locate themselves in the performance space.

Footnotes

¹ The Unpacking Numeracy document outlines key content that ākonga will need to understand in order to achieve NCEA Numeracy.

² Line symmetry (also called reflectional symmetry or mirror symmetry) is where one half of an image is the reflection of the other half. Asymmetry is a lack of symmetry.

³ Chapter 3 of the ESA Study Guide Level 1 Dance (2019) provides examples of shapes, floor pathways, locomotor and nonlocomotor movements based on kōwhaiwhai patterns.