

# Supporting NCEA Numeracy in Drama

Numeracy and Drama can be woven together to provide opportunities for ākonga to explore the lives and worlds of others, where mathematics is used as a tool in the subject of Drama to enrich the learning experiences of ākonga.

In Drama, ākonga develop numeracy capability when they:

- » reflect on their movement, expression, and communication in a performance
- » plan, develop, create, and analyse set designs, props, and costumes when preparing for performances and in response to theatre viewed as a member of the audience
- » explore lighting design and technical use when exploring Theatre Aotearoa, theatre form or in response to live performance
- » investigate the spaces used in Drama, historically in relation to specific theatre forms and by ākonga and kaiako in the classroom.

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



# Drama Numeracy Pedagogy Guide



Operations with numbers	What can this look like in Drama?	What can I do as a teacher of Drama?
<b>Recognise the (degree of) precision required for the context</b>	The degree of precision required when hitting a mark or the degree of precision needed for lights to hit the face or body certain angles can communicate expression when performing on stage or in a theatre.	<p>Connect levels of precision in Drama with precision in other learning areas.</p> <p>Support ākonga to identify when precision is necessary in a scene, and when an approximation is appropriate.</p>
<b>Choose an appropriate approach to calculation (written, mental or digital)</b>	<p>Calculate a budget for a project and compare the cost of different materials for a scene or performance. This could be part of wider teaching and learning when preparing to bring a production or performance to the stage. Ākonga could also explore this idea when viewing and responding to professional theatre.</p> <p><i>Ākonga are given a set budget for elements such as costumes, staging or props. They compare costs across different retailers and suppliers to justify best value.</i></p> <p><i>In the context of technology that is available at school, for some performances ākonga might compare costs of different theatre technology services such as lighting, staging, and sound hire.</i></p>	<p>Encourage ākonga to communicate their mathematical working in written form and to use calculators or spreadsheets where appropriate.</p> <p>Provide ākonga with a printed budget template to assist with comparing the costs of materials.</p>
<b>Work with whole numbers up to billions, fractions, decimals to 3 places, percentages, and integers</b>	<p>Use strategies to find a fraction of a quantity.</p> <p><i>Ākonga write stage directions that find a position a quarter-way across the stage.</i></p> <p>Identify where the foreground, middle ground and background are on a stage.</p> <p>When planning to bring a performance to the stage, when exploring historic theatre forms or when attending live theatre; calculate ticket prices to ensure any costs involved in the scenes or performances are covered.</p> <p><i>Ākonga explore the cheap seat theory. They discuss varying ticket prices in a theatre and use this to determine the monetary return given a full house or a percentage of a full house.</i></p> <p><i>When exploring Elizabethan theatre, ākonga think about the different amounts each class paid to attend the Globe Theatre (capacity 3000 people). Groundlings paid a penny while a covered seat was two pence.</i></p>	<p>Ask ākonga to describe location on a stage using fractional terms such as half, thirds and quarters.</p> <p>Discuss with ākonga how fractions are relative to the whole and are evenly split. This means that if a stage is smaller, a third will be smaller than on a bigger stage.</p> <p>Provide opportunities for ākonga to experience a range of different beats in a scene where ākonga pause for impact, subtext or thought. Make connections between beats and fractions such as a half (<math>\frac{1}{2}</math>), third (<math>\frac{1}{3}</math>) and quarter (<math>\frac{1}{4}</math>) by explaining that both involve dividing something into equal parts.</p> <p><i>For example, specific scripts will have a timing that conveys the emotional state of the character. Have ākonga count and clap out the beat.</i></p>

	<p>Identify and use varied timing of a beat in a scene (or scenes).</p> <p>When exploring how technology could be used to connect with an audience to heal, educate, entertain, or transform in the context of Theatre Aotearoa or when responding to live theatre, allow ākonga the opportunity to experience physically using lighting to create impact or effect. Use decimals and percentages to discuss and record values of individual dimmers in lighting.</p>	<p>Provide opportunities for ākonga to manipulate lighting and connect the brightness or dimness of lights with the numerical values of individual dimmers. Break numbers into 0.5 to regulate the levels for each cue and encourage ākonga to use exacting values when referencing lighting.</p> <p>Annotate scripts with ākonga around how specific levels, hues and angles of lighting can impact mood, tension, and atmosphere.</p>
<b>The problems that learners solve will include commonly encountered rates, ratios, and powers</b>	<p>When creating drama for performance (this could be in the context of teaching and learning around a theatre form, Theatre Aotearoa, devising or a class production), apply knowledge of ratios when exploring lighting, set design, costume design and props.</p> <p><i>Ākonga consider how the width and height of an object that is projected in a performance space will change depending on where it is projected and how it is projected.</i></p> <p><i>Ākonga create props that are sized relative to their height to create a specific aesthetic.</i></p>	<p>Encourage ākonga to investigate how sizes of objects can change relative to another measure, such as performance space or the height of a human.</p> <p>Model how to identify the use of ratios in lighting, set design, costume design and props when annotating a script.</p> <p><i>For example, melodrama, commedia dell'arte and Greek drama require the props and costumes to be too big or too small relative to the performers.</i></p>

Spatial properties and representations of objects	What can this look like in Drama?	What can I do as a teacher of Drama?
<b>Recognise symmetry</b>	<p>Use symmetry to create an effect of balance that can be contrasted with asymmetric groupings to reflect disruption and tension.</p> <p>Use knowledge of symmetry to maintain balance on the stage.</p> <p>When ākonga are exploring theatre form, Theatre Aotearoa, devising a drama or preparing for a production they could design a set that has symmetry to shape the actions onstage or suggest harmony or using asymmetry to reflect opposition or aggression in the scene.</p>	<p>Ask ākonga to define line symmetry and rotational symmetry<sup>1</sup>.</p> <p>Draw the attention of ākonga to where performers are located at any point in a scene. Encourage ākonga to analyse how the positioning of performers is symmetrical (line symmetry or rotational symmetry) and how this affects the sense of balance.</p> <p><i>For example, on an Elizabethan stage, the positioning of performers needs to be symmetrical and/or balanced, with the speaker in a "command" position.</i></p> <p>Relate the definitions used in Drama to the definitions used in Mathematics.</p>

1. Line symmetry (also called reflectional symmetry or mirror symmetry) is where one half of an artwork is the reflection of the other half. Rotational symmetry is the number of times an image can turn onto itself within one full turn (360°). This means that every object has at least one order of rotational symmetry. Total order of symmetry = number of line symmetries + order of rotational symmetry.

<p><b>Transform objects to design for purpose (i.e. enlarge, reflect, rotate, and translate)</b></p>	<p>Use Laban Movement to explore weight, direction, effort and pathways/ patterns on the floor.</p> <p><i>Ākonga work in groups to illustrate patterns where performers might:</i></p> <ul style="list-style-type: none"> <li>» <i>increase the shapes they are making onstage by moving directionally and non-directionally towards the audience (enlargement)</i></li> <li>» <i>mirror movement to create a sense of balance (reflection)</i></li> <li>» <i>turn in sync or asynchronously to demonstrate a narrative technique (rotate)</i></li> <li>» <i>flock together and engage in repeated movements (translation)</i></li> </ul> <p><i>Ākonga transfers knowledge of Laban Movement from a group learning activity to a group or solo performance.</i></p> <p>Use body sphere activities.</p> <p><i>Ākonga imagine a string connected to the ceiling, running through the centre of their head and bodies, connecting to the floor. They use this imaginary string as a central axis to test balance, body angles and shapes.</i></p>	<p>Connecting the language used in drama with the language of mathematical transformations.</p> <p>Seek opportunities to be inspired by the different ways in which transformations are used in other learning areas within scenes.</p> <p>The <a href="#">Numeracy Support Guide: Transformations</a> can be used to further develop understanding of reflection, rotation, translation and enlargement.</p>
<p><b>Make connections between representations of objects in simple 2D and 3D</b></p>	<p>Connecting two dimensional sketches provided by theatre companies, when viewing live theatre, to how the set looks like as a member of the audience</p> <p><i>Ākonga use set sketches or photos to annotate and discuss meaning of the set and designers' intention.</i></p> <p>Connect the two-dimensional shadow with a three-dimensional object.</p>	<p>Use technological tools to move from concrete to pictorial models to help ākonga connect two-dimensional and three-dimensional representations.</p> <p>Use lighting to demonstrate how the angle and brightness of the lights can impact how a three-dimensional object on stage can be viewed as a two-dimensional shadow.</p>

Location and navigation	What can this look like in Drama?	What can I do as a teacher of Drama?
<b>Describe position and orientation in situations that are flexible in the system being used</b>	<p>Instruct performers on stage using grid references, angles and/or distances.</p> <p><i>Ākonga analyse the proxemics (space between people) and the subtext of body positioning in a performance. Use proxemics to non-verbally communicate relationships between characters.</i></p> <p>Use grid-markings to identify specific locations on a stage and when creating a stage plan, lighting design or making choices about the actors' use of Drama Techniques in a scene or performance.</p>	<p>Model how stage direction can locate performers and objects with directional language, including grid references, angles, and compass directions.</p> <p>Acknowledge the ways in which a performer's location can be described.</p> <p><i>For example, ākonga use downstage, centre stage, upstage to locate themselves. Left and right are used relative to where they are located and where they are facing the audience. Ākonga can also be located on a stage using grid references.</i></p> <p>Connect a stage that marks out a 3 by 3 grid with masking tape to a drawing of the stage. Have ākonga locate themselves on the stage using instructions from the drawing.</p> <p>Provide repeated exposures between the drawing of the stage with the physical stage to enable ākonga to visualize the grid in their heads.</p>

Measurement	What can this look like in Drama?	What can I do as a teacher of Drama?
<b>Use and interpret results of the measurement (including timetables and time charts)</b>	<p>When preparing for a class or public performance, ākonga create a rehearsal timetable to incorporate key deadlines such as the rehearsal period, dress rehearsals and final performances.</p> <p>Identify where time is used to impact flow, mood, and tension in a performance when responding to live theatre.</p> <p><i>Ākonga consider how time is portrayed in a performance.</i></p> <p><i>Ākonga annotate their scripts with time fades, where:</i></p> <ul style="list-style-type: none"> <li>» <i>A snap is zero seconds</i></li> <li>» <i>A normal fade is three to six seconds</i></li> <li>» <i>A cross fade is around 10 seconds</i></li> </ul>	<p>Provide ākonga with a page to stage planner to help them estimate the amount of time they have to work on a project.</p>

<p><b>Select appropriate units and convert between metric measures for the same attribute</b></p>	<p>Use appropriate units for length.</p> <p><i>Ākonga use appropriate units to measure to create props, costumes, pieces of staging for their scenes.</i></p> <p>Convert between metric measures as appropriate.</p> <p><i>Ākonga convert between seconds, minutes and hours when planning:</i></p> <ul style="list-style-type: none"> <li>» <i>the structure, transitions, and dramatic unity of a devised scene</i></li> <li>» <i>a rehearsal timetable</i></li> <li>» <i>how they might edit scenes within a play for a shorter performance</i></li> </ul> <p>Sketch sets, costumes and props to scale and annotate these.</p>	<p>Discuss with ākonga which units would be appropriate for a particular context.</p> <p>Measure two items and discuss with ākonga how they could be drawn in their sketch to preserve the sense of size difference.</p>
<p><b>Solve measurement problems in practical contexts:</b></p> <p>» <b>area (rectangles, parallelograms, triangles)</b></p>	<p>These concepts contribute to the development of numeracy skills:</p> <ul style="list-style-type: none"> <li>» Create pathways in the shape of two-dimensional shapes such as rectangles, triangles and parallelograms</li> <li>» Use language to describe types of shapes and the shape themselves.</li> </ul> <p>Use area to express the amount of space that indicates confinement on stage.</p> <p><i>Ākonga locate the smallest area to balance in. They mark this out with masking tape and calculate the area to determine which location(s) create a greater sense of boundaries to the audience.</i></p>	<p>Encourage ākonga to describe the shapes that are made between performers using appropriate language.<sup>2</sup></p> <p><i>Elizabethan acting requires symmetry and/or balance on stage. If there are three performers on stage, they should be working to maintain the shape of an equilateral triangle.</i></p> <p><i>In Greek Theatre the chorus works in the orchestra space, between the audience and the actors. Their choreography works with ideas of symmetry, unison, repetition, levels, flocking, and shapes created by formations. The formations can be accurately described using shapes and having a shared understanding of the shape.</i></p> <p>Use masking tape to illustrate the size of a square that is 1m by 1m to create an area of 1m<sup>2</sup> (or one metre squared). Compare this area to other spaces ākonga may perform in.</p>

2. Equilateral triangle. Three-sided shape, where all the sides are the same length, and all the angles are the same.

Isosceles triangle. Three-sided shape where two of the sides are the same length, and two of the angles are the same.

Scalene triangle. Three-sided shape where all sides are different lengths, and all angles are different.

Right-angled triangle. Three-sided shape where two of the sides in the triangle create a 90 degree angle.

Rectangle. Four-sided shape, where the angles are 90 degrees. A square is a special rectangle, where all the sides are the same length.

Parallelogram. This is a rectangle, that has been “pushed” one two parallel lengths.