# Levels 7/8 MEDIA ARTS Activity

## LET’S ANIMATE

### Introduction to Numeracy in Media Arts

In Media Arts, students critically engage with communication theories and technologies, including creating and deconstructing hybrid analogue and digital media forms. The digital artwork, as a mathematical construct, has become a key component of students’ everyday lives, as there exists a personal entanglement on social, cultural, technical and biological levels (Thayne & West, 2019).

Media Arts tools are dominated by digital technologies; thus, numeracy knowledge and skills are needed in order for students to address broad curriculum outcomes in Media Arts (Grushka & Sellars, 2018). Students use multiple numeracy skills in their everyday planning, processual investigations, and creation and evaluation of media artworks. Relevant numeracy skills include calculating and estimating with numbers, as well as understanding and employing spatial reasoning, scale, proportion, ratios and time concepts.

Students work within defined digital spaces and understand quantitative technical values and their relationship to the production of aesthetic qualities and symbolic representations. They read and assess graphs, tables and diagrams, and may create graphical representations when creating media artworks (Australian Curriculum, Assessment and Reporting Authority [ACARA], n.d.). Students scrutinize effect and reception studies, and critique statistical and aesthetic information from a range of sources in order to form critical understanding of social issues, ideologies and representations. Students develop data literacy through becoming aware of the algorithms of social media, including how personal data are used by media and data collection organizations.

Students use Media Arts knowledge and numeracy skills to deconstruct and create artworks in a range of media forms and styles whilst considering, evaluating and comparing attributes of specific audiences, media forms, reception contexts and distribution networks. Students critically engage in technical experimentation by utilising digital software tools to produce, evaluate and refine media products in order to create meaning and communicate ideas (Mason, 2016).

Students manipulate and/or replicate conventional media forms (using ratios and geometry) and structures (using templates, timings, patterns and space). They also learn to assess defined audiences through demographic and behavioural statistics. Students identify and manipulate the symbolic and patterned orders of genre, codes and conventions. Topics that might be explored include camera angles, positioning, shutter speed, depth of field and framing. Students can consider and measure patterns of music/sound rhythm; calculate the intensity, quality, and colour of light; and consider time via editing techniques of duration, measured on timelines, in the creation of meaningful and technically successful products.

Students gain skills and understanding in the production of digital products (e.g., film or social media pages). Students calculate the statistics of distribution networks, media forms and demographic information from different categories of audiences. Media forms and audiences are investigated and evaluated through ratings, censorship measurements and classification statistics. Statistics relating to media ownership, distribution, and monopolisations are investigated and related to multiple media forms. Students examine the historical and social contexts of media forms and products. They consider and compare changing social values recorded through media forms at various historic times and contextualise understandings through data and various communication models and theories in order to evaluate how media forms influence audiences and how audiences influence the media.

### Developing Numeracy Understanding in Media Arts

According to ACARA (n.d.), “The most relevant sub-elements of the numeracy learning progression for Media Arts are Comparing Units, Interpreting Fractions, Understanding Units of Measurement, Understanding Geometric Properties, Positioning and Locating and Interpreting and Representing Data.” By utilising such numeracy skills, Media Arts students will be able to confidently produce and deconstruct media artworks and products, and make sense of how the media, in various forms, impact on their world. Students’ numeracy capabilities will be amplified when a teacher explicitly focuses on the numeracy skills relevant to the particular task at hand.

Students undertaking Media Arts studies compare units of measurement for various digital and analogue inputs and outputs suitable for the distribution of media products. Patterning is critiqued through the deconstruction of codes and conventions used to create narratives and convey symbolic meaning in various media forms. Visual representations, such as graphs and flowcharts of storylines, are used to explain the various cycles and components used in a range of media narratives, genres and styles.

Students explicitly interpret fractions when learning technical skills, such as using a Digital Single Lens Reflex (DSLR) camera. They understand that to render both high-quality technical outcomes and a successful aesthetic in their media arts outputs requires mastery of the technical equipment and processes used. Students learn to calculate exposure, lighting quality, aperture readings and shutter speed. These technical calculations are integrated with planned aesthetic outcomes, including measurements of tone, contrast and colour. Evaluation of frames per second is also required in both filmmaking and animation, and is related to motion speeds, the capture of movement and exposure and the duration of time.

Understanding geometric properties includes knowledge of ratios in media forms and investigations of composition such as various mathematical framing techniques, including the Rule of Thirds and the Golden Ratio. Students need to understand how to create media that fit pre-determined outcomes using technical language of production, such as a quality 300 Dots Per Inch (DPI) A4 poster print or a 20 cm x 25 cm photographic print. They also learn the aspect ratio relevant to numerous media forms and screens.

Understanding positioning and locations within a given measured frame of a camera or a physical set is imperative for students to successfully produce media artworks. Students calculate spaces and distances that will influence their choice of camera lens length, camera movements (including panning, zoom and dolly), and other object/equipment placement within a set. Measuring the quality, colour temperature, positioning, direction and strength of light is a basic consideration that students need to understand when creating photo-based media artworks. The measurement, monitoring, and creation of sound involve the exploration of quality, intensity and amplification via digital tools.

Students learn how to both read and create digital and graphic representations of statistics from various media sources. They critique dominant media discourse by analysing the production of statistics and create graphs from data sourced through their own research, including the nature of codes and systems embedded in algorithmic systems on digital media sites.

## Lesson Plan: Let’s Animate

In this series of activities, students are introduced to the basic principles of animation and will plan, produce, and display a 30-second animation. Students will work in groups to create a narrative that represents and communicates meaning to a specific audience. The topic is ‘difference,’ with the target audience being the school community. The final products can be shown on the school website or at an end-of-term art show. Students will be introduced to the stages of media production: pre-production, production, post-production, and distribution. Students will gain skills in narrative creation (as a story arc graphical representation), storyboard techniques, stop-motion animation and digital editing. Students will understand the importance of framing, editing and sound in their productions. Students will be introduced to notions of copyright and directed to access copyright-free music and sound effects (or they can make their own).

### Prerequisite/Corequisite Knowledge: Media Arts

Students need to have and/or develop the ability to:

* graph a narrative arc for a target audience
* consider a point of view of a narrative
* understand the differences between two-dimensional (2D) and three-dimensional (3D) animation
* appreciate the production process in making media artworks, by interpreting and creating representations using scale and proportion
* understand the technical codes of camera framing, angle, size, focus and movement
* employ technical skills used creating storyboards, models, and sounds; use a camera to create animation; edit; and format (ratio) for digital distribution
* appreciate ethics regarding copyright laws.

### Background Mathematical Skills and Understandings

Teachers of Media Arts are not expected to teach the mathematical knowledge and skills that students will draw upon when engaging with this activity. The students will have learnt and should be adept with the required mathematical knowledge and skills to complete the activity. According to the Victorian Curriculum: Mathematics, the required mathematical knowledge and skills should have been developed in earlier years of schooling, that is, by the end of Level 6.

For this activity, the background mathematical skills and knowledge are:

* ability to multiply whole numbers (with and without technology)
* ability to estimate measurements of distance, time, angles etc., and to complete calculations involving these measurements
* knowledge of units of measurement, and ability to measure and compare objects using familiar metric units of length (N.B. the terms scale and proportion may not be familiar to some students)
* knowledge of the concepts of time, units of time and duration of time
* knowledge of angles, angle measurements and related terminology; ability to measure angles
* knowledge of 2D and 3D shapes; experience with the changing visualisation of shapes with location
* familiarity with grids
* knowledge of the Cartesian co-ordinate system and x- and y-axes; ability to plot co-ordinates.

## Lesson Description

There are many types of animation that can be created in the classroom. Some examples of simple animation techniques are stop motion, still photographs, hand drawing using photographs and PowerPoint. There are also more complex programs such as Adobe Animate. Thus, animation can be either 2D or 3D. In this lesson, students will use simple 3D stop motion to animate. It is an accessible option for most students and does not require expensive software. Students will use iPads and a stop-motion program such as I Can Animate (<https://www.kudlian.net/Kudlian_Software/ICAiOS.html>). Designated stop-motion programs are best as they have a function called ‘onion skin’ that allows students to align their images between shots (i.e., they have a ghost image of the last frame) which assists in creating continuity.

### Resources Required

Graph paper; storyboard templates; digital camera, iPad, or phone camera; tripod (Egg cartons can be used for phone cameras); table lamps (with directional capacity) and tissue paper (to diffuse light, if desired); cardboard box (set construction); acrylic paint; plasticine (assorted colours); tape; pencils; editing program; copyright-free music and sound effects; audio sound recorder or sound editing program; example videos and websites (e.g., <https://www.acmi.net.au/education/school-program-and-resources/make-stop-motion-animation/>); and flipbook (post-it note) for demonstration.

### Teacher-Led Activity

1. The teacher should lead a discussion about the term difference by asking students to tell them what that word means to them. The teacher should create a mind map on the board. Then, the teacher should introduce the story arc as a graphic representation.
2. The teacher should first show ‘Uncle’ by Adam Elliot (6:08): <https://www.youtube.com/watch?v=F2Q-kSyTXYE>

Then, they should show ‘Ngayuku Papa’ (My Dog): Tiny by Tjanpi Desert Weavers (2:48): <https://vimeo.com/326957707>

In groups, students will create an individual story arc (using graph paper) to represent a visualisation of the narrative, over time, of these two animations. Students will compare and discuss any variations between their graphs in their groups.

Students will watch ‘Harvey Krumpet’ (<https://youtu.be/3ClRsCpQfTQ>), Adam Elliot’s Academy Award-winning stop-motion animation, in their own time. The teacher may ask students to plot a story arc as a homework task.

1. Following the viewing of Uncle and Ngayuku Papa, the teacher should ask the following questions:
* How do these stories relate to our theme of ‘difference’?
* How is difference represented in our story arcs?
* What techniques are used to tell these stories?
* What did you like most about these animations? Why?
* What codes and conventions were used by these animators to engage the audience?
* List the types of camera framing, camera angle, and camera movement that were used.
* Why were these technical codes used?
* Who do you think the target audience is for each of these animations?
* Did you notice that one animation is by a single author and another is by a ‘collective’? How does this authorship impact the narrative?
* From whose point of view is the narrative told?
1. Next, the teacher should demonstrate how these animations work. First, the teacher should show the students a simple flip book (a teacher pre-made post-it notebook) to demonstrate. The faster that the single frames are flipped, the faster the action and the shorter the event. The teacher should then allow the students to play with the flip book.

By engaging with the flip book, students will be able to understand the links between frame speed, motion, and duration. To consolidate these ideas, the teacher should show ‘Animation Basics: The Optical Illusion of Motion’ video (5:11): <https://www.youtube.com/watch?v=V8A4qudmsX0&t=191s>

1. The teacher should next demonstrate the skill of stop-motion creation using a premade stage of a large cardboard box with a simple plasticine figure and a lamp for lighting. The teacher should discuss these specific elements whilst demonstrating making, including:
* The stage as the bounded space in which the action occurs.
* The placement of the camera: The camera needs to be placed appropriately to ensure that the framing is contained within the stage.
* The position and quality of light: The lighting must be good enough for a quality exposure and for rendering appropriate qualitative aesthetics.
* The creation of an animation to ensure that students understand the basic principle of 12 frames per second to ensure smooth movement. Each shot should be taken at least three times, or movement will be rendered too quickly.
1. The teacher will then guide students to calculate (in the same groups) how many frames they will need to shoot for a 30 second animation (if they are using three frames of every shot and timing of 12 frames per second). (Answer: 120 separate frames) Students should compare and discuss their calculations.

### Student Activity

1. *Research*

In groups of four, students will respond to the following questions: What animations can you think of that tell a story of difference? From whose point of view are these stories told? Each group must come up with four examples to evaluate and compare in their visual diaries. [Note: The visual diary is a record of process for all work. This ‘record of process’ should also form part of the assessment (Wolfe, 2011).]

1. *Storyline*

Working in the same groups, students will create a simple story on the theme of ‘difference.’ Students will then create a graph that represents the story arc of the narrative. The time is shown on the x-axis, and the narrative events are shown on the y-axis. The narrative needs to include the introduction of a character, followed by a problem arising and the character addressing the problem.

Students will share their story arcs with the teacher for formal feedback. Students will also share and peer review each other’s stories.

1. *The teacher will next introduce the skill of storyboarding*

The storyboard is a prescribed visual representation of the story in a time-based format that is taken from the original story arc but in which the details of action and technical codes are explained. The storyboard must include any information about camera movement, shot size, and camera angle. Students must refer to direction of light and the quality of the light (diffuse, direct light, colour). They should discuss what time of day is it and what angle would the sun be. Dialogue and sound can also be included beneath the template frame.

The teacher should revisit some scenes from ‘Uncle’ and ‘Ngayuku Papa’ with the class and discuss how shot size, angle, lighting and timings relate to storytelling. The teacher should ask the students to consider why these choices have been made.

The teacher should use a simple storyboard template to assist students. The teacher should then show storyboard examples (<https://www.acmi.net.au/education/school-program-and-resources/make-stop-motion-animation/>).

Students will then be instructed to create a storyboard for their ‘difference’ story in their groups. They may use a storyboard software program such as Storyboarder (<https://wonderunit.com/storyboarder/>). Alternatively, students can draw their storyboard frames. Students are to document what will appear on the final screen as a trace or sketch. Storyboards should not necessarily to be considered artworks in themselves but a plan for the stop motion. Storyboards should be added to students’ visual diaries.

1. *Make sets*

Next, students will create a cardboard box set. They can use acrylic paint and other items and props in their defined cardboard box stage. Students must consider the distance, scale, proportion, and relationship between objects, including where they place the lights and camera as demonstrated by the teacher. Measurements for camera placement are needed to ensure exact placement in regard to the set for continuity. Students need to keep a record of the process in their visual diaries, using the following question prompts as headings: What did you do? Why did you do it? What problems did you have? What successes did you have?

1. *Create characters*

Students will then create their character(s) out of plasticine. Alternatively, students can create characters out of Lego or other inanimate objects. Students need to consider scale and proportion for characters, props and sets. Students need to keep a record of process in their visual diaries, using the following question prompts as headings: What did you do? Why did you do it? What problems did you have? What successes did you have?

1. *Shoot*

Students will all have roles as part of the production team: camera operator, set director, lighting director, director and continuity person. The students need to ensure that the storyboard is followed and that the correct sequencing occurs, including measurements of distance and the relationships between the objects in the prescribed space. The teacher should remind the students to take three frames of every shot (Some stop-motion programs will do this automatically). Students will make interpretations from their storyboard. They will order their shooting sequence and make calculations regarding motion speed and the duration and depiction of time relating to frames per second. Students need to keep a record of processes in visual diaries, using the following question prompts as headings: What did you do? Why did you do it? What problems did you have? What successes did you have?

1. *Edit*

While editing their videos, students need to represent time as frames per minute in a timeline graphic. Students need to recognise the format of their digital footage and match it to the appropriate aspect ratio settings required to output the animation as a mpeg 4 file. Sound files need to be represented through numerical scales of volume and graphical representations of amplification, with associated numerals in the editing timeline.

The teacher will begin by demonstrating the various editing tasks that they expect the students to complete (adding text, transitions and sound; controlling speed using the software available). Students will upload their video files to their individual devices in order to edit them. By working individually in this step, all students will develop their editing skills and produce their own animation. Thus, each student from each group will produce a different 30-second animation based on their group’s footage.

In relation to the ‘difference’ theme, it is a discussion point (see Step 8) to consider how each student provided their own different narrative from the point of ‘difference,’ with each version being of value.

The students are required to export their individual animations as mpeg 4 files. Students should again be reminded to keep a record of the process in their visual diaries, including any calculations and numerical settings used, using the following question prompts as headings: What did you do? Why did you do it? What problems did you have? What successes did you have?

1. *Exhibit*

The teacher will compile the animations and have a class showing. After the showing, the students will conduct a peer review of the animations and also a self-evaluation in their visual diary. The self-evaluation should include a discussion of:

* 1. aesthetics and creation of meaning
	2. technical skills and knowledge
	3. working in a group
	4. point of view
	5. what was most difficult
	6. what was most rewarding
	7. what was learnt.

The compiled file of animations can be added to the school’s website with an introduction, written collaboratively by the teacher and students, regarding the theme of ‘difference.’

## Table 1: Links to the Victorian Curriculum – Media Arts

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| Strand and Sub-Strand (if applicable) | Content Description (Code) | Elaboration(s) |
| * Media Arts Practices
 | Develop and refine media production skills using the technical and symbolic elements of images, sounds and text to represent a specific story, purpose and meaning(VCAMAM035). | Creating their own media artworks that fulfil audience expectations through story structure, such as including a point of conflict, building characters and achieving a resolution.Discussing how genres can be created through settings, images and sound, for example, creating mood and setting through images, sound and framing.Documenting the process of making their media artwork in journals, blogs, video or audio recordings, analysing and evaluating the structural choices they made.Analysing and evaluating the different contexts of media artworks and their effect on meaning for an audience, for example, how media artworks change when viewed outside the cultural context of Aboriginal and Torres Strait Islander peoples. |
| * Media Arts Practices
 | Plan, structure and design media artworks for a range of purposes that engage audiences using media elements, technologies and production processes (VCAMAM036). | Selecting footage captured on a camera, editing the footage into a sequence and applying a soundtrack that matches the edited sequence’s pace, rhythm and style.Manipulating sound and camera angles to create mood and setting.Documenting the use of technical and symbolic elements in media artworks providing specific examples that demonstrate an awareness of responsible media practices. |

## Table 2: Links to the 21st Century Numeracy Model (Goos et al., 2014)

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| --- | --- |
| Aspect of the Model |  How This Aspect is Addressed by the Lesson |
| **Attention to Real-Life Contexts*** Citizenship
* Work
* Personal and Social Life
 | In this lesson, students discuss the notion of ‘difference’ as an affirmative value to their school community and then develop a relevant narrative from a particular point of view. Students are required to work in collaborative groups in pre-production and to take on assigned production roles (as in a media work environment) when they shoot their animation. Students also will conduct an ethical review of their own and their peers’ role in the production that connects them to each other. They learn the ethics behind copyright laws, which are connected to aspects of citizenship. |
| **Application of Mathematical Knowledge*** Problem Solving
* Estimation
* Concepts
* Skills
 | Linear progression of storytelling is taught through the graphic representations of a story arc. Students engage in spatial reasoning through informal mapping of storyboarding in which they consider timings, angles, positionings and proportions. Students consider frame rates needed for smooth movement and estimate timings for completion of movement across space. Students interpret scales as ratios and also interpret plans involving scale when making the set and models for the stop-motion animation. Students use both informal and formal units of measurement to arrange objects and how they move in the prescribed space whilst shooting. When shooting, students must also calculate exposure, framing, lighting, timings and continuity. When editing, students must be able to use time points and sequencing whilst using a timeline. They must also understand formatting ratios as inputs and outputs for suitable display of the digital artwork. |
| **Use of Tools*** Physical
* Representational
* Digital
 | Students will learn to plan, produce and manipulate artworks. They will use prescribed storyboard templates to create representations which they will then interpret and scale to produce characters and sets. Students will use digital cameras, editing software and stop-motion applications in which they must manipulate numerical values in order to create and display their artworks. |
| **Promotion of Positive Dispositions*** Confidence
* Flexibility
* Initiative
* Risk
 | Students will become confident with using ratio, time, scale and angles as they move through the structured production process. They are encouraged to explore multiple possibilities through their planning and pre-production tasks and must work together as a flexible team whilst in production. Individual initiative is required to create stories and to finalise individually-edited animation using correctly calculated units and digital formats. Students will become confident in their numeracy capabilities through peer support and ongoing affirming self-reflection and teacher skill demonstrations and feedback on their work in process. |
| **Critical Orientation*** Interpreting Mathematical Results
* Making Evidence-Based Judgements
 | Whilst planning and producing their animations, students are continually reflecting on and evaluating the processes undertaken, which include timings, scale and proportion. Students apply prescribed measurements of scale, time and duration, and learn how these measurements relate to the communication of meaning. All student processes are recorded by students in their visual diaries to ensure that their calculations and estimations are recorded as evidence-based judgement. |

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