



Game lesson title	Mathematically transforming food with InBento		
Brief intro	Explore mathematical transformations and create delicious bento lunchboxes with <i>InBento</i>. <i>InBento</i> is a cozy puzzle game about making the perfect bento lunch box. But don't be fooled, some lunch boxes are harder to put together than others. <i>InBento</i> is a single-player video game where players shift rice, egg and fish around to create the purrfect bento lunch. There are many levels to play through with the puzzles starting off easy but become increasingly challenging. The controls are simple and easy for players of all ability levels to learn.		
Lesson hook	Rotate, translate and transform your way to a full belly as we explore mathematical transformations to make the perfect bento lunch box in <i>InBento</i> .		
Suggested year level	Year 5 - Year 6	Suggested age level	8+ years old
Suggested duration	2x 50 min lessons (flexible)	Costs involved? (detail below)	Yes
Author	You are free to copy, communicate and adapt this lesson plan which was created by Megan Pusey and licensed under a Creative Commons Attribution 2.0		
Subject/s			
☒ Maths			
Curriculum/Capabilities Alignment (VIC/AC) and Skills			
ACMMG114 (Year 5) VCMMG200 (Year 5)	Describe translations, reflections and rotations of two-dimensional shapes. Identify line and rotational symmetries.		
ACMMG142 (Year 6)	Investigate combinations of translations, reflections and rotations, with and without the use of digital technologies.		



<u>VCMMG229 (Year 6)</u>	Investigate the effect of combinations of transformations on simple and composite shapes, including creating tessellations, with and without the use of digital technologies.
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Game Used	InBento		
Game play required?	Yes. Play during class – approx. 30 mins.		
CLASSIFICATION	CONSOLE	INTERNET REQUIRED?	COST (RRP)
G	Windows, Mac, iOS, Android, Nintendo Switch, Xbox	No	AU\$7.50 (Computer) AU\$4.50 (Mobile)

Important note about Game Classification

As classifications can change, teachers are responsible for checking the latest videogame classification and suitability for their class age group. Please visit <https://www.classification.gov.au/> and <https://www.common sense.org/education/> to guide you.

How are games used by students in the lesson?

- ☒ **Watchers** – observing, analysing and evaluating. Learning about the world and ourselves through understanding the impact of games culture and industry.
- ☒ **Players** - learning by playing videogames - learning things applicable to life outside of (and in) the game e.g. flight simulators, esports, etc.
- ☐ **Makers** - learning through making games (coding, creative production, teamwork, leadership)
- ☐ **Explorers** (Minecraft) – imaginative, self-directed, exploratory/sandbox learning.

eSafety Considerations

None

Technical Notes

The game needs to be purchased and downloaded prior to playing. It is available on a range of devices - itch.io, [Apple app store](https://apps.apple.com), [Google Play](https://play.google.com)

You do not need one copy of the game per student. Students can play together on one device, or students can take turns sharing the device (it is easy to go back and replay previous levels).



Alternatively you can play together as a class on a projector/digital whiteboard with just one copy of the game.

Prior knowledge/skills (Required/Recommended/References)	
No prior knowledge or skills needed.	
Student outcomes	
Examples of student work	• Student's designed <i>InBento</i> puzzle level.
Learning goals	KNOW: • Definitions of: ○ Translation ○ Rotation ○ Reflection • Understand that translations, rotations and reflections can change the position and orientation of an object, but not shape or size
	BE ABLE TO: • Identify and describe different types of mathematical transformation – reflection, translation, rotation • Design a puzzle that can be solved by using a sequence of mathematical transformations
	IMPROVE: • Ability to predict the effect of a transformation, by picturing the outcome in their mind
LESSON SEQUENCE	
Prep & introduction activities	

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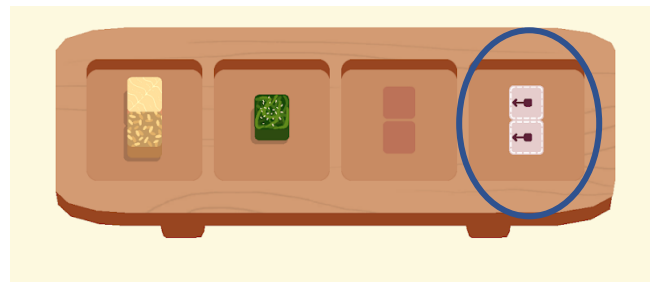
Main lesson activities

Lesson 1 – Play and notice

This first lesson is about giving students time to experience puzzles that use transformations. Students do not need to know the correct mathematical terminology just yet.

Allow students to play through the first few levels of *InBento*. This is a single-player game, but students can take turns playing if there are limited devices. The class (or small groups) could play together on a projector screen if there are limited copies of the game available.

Ideally, allow students to play until they complete some of the levels that introduce ‘translation’ (see image below). The icons look like little boxes with arrows, indicating the direction of the translation.



While students are playing engage them in discussions. Ask students questions to encourage them to verbalise their understanding of what is happening on the screen such as:

- What is happening here?
- What are you trying to do?
- What sort of patterns can you see?
- What do the arrow blocks do?

Additional cross-curriculum links:

This game is about creating Bento lunch boxes, traditionally from Japan. The food depicted in the game (e.g. rice, seaweed, fish, egg) may be very different (or not) from the food your students usually eat for lunch.

It provides a great opportunity to link to:

- HASS curriculum - discuss different food/lunches from around the world and how this compares to the lunch you typically eat
- Health curriculum – healthy lunches, reflecting *The Australian Guide to Healthy Eating*.



Lesson 2 – Designing your own Bento puzzle

Link back to students' previous experience playing *InBento*, ask them specifically about what the arrows in the levels did. Introduce the mathematical terminology used to describe this type of movement (e.g. translation) and show other examples of translation.

Introduce other key words/definitions for mathematical transformations:

- Translation – moving a shape around (without changing its size/shape)
- Rotation – turning a shape around
- Reflection – flipping shape over

Ask students to look back through the levels they have completed to find any examples that use any of these transformations. Have students share their examples and explain what type of transformation they think it is and why. Were there any transformation types they couldn't find?

In this Lesson the students are tasked with designing their own *InBento* style puzzle using paper (see below for ideas on doing this activity digitally).

Students can work in groups or individually.

- Using grid paper and the templates provided students will need to make a puzzle that includes at least one transformation (reflection, translation, rotation).
- Think about the start and end points of the puzzle. What steps will people need to do to solve the puzzle. Think through the steps a person needs to do to get to the solution, work backwards from there to design the puzzle. (Keep it simple at 1-2 steps if students are struggling).
- You can encourage students to include their favourite lunch foods (link into healthy eating, or different cultures here).
- By drawing their own pictures of food (and making them asymmetrical) students can use 'reflection' as one of the transformations.
- Test the puzzle with friends, to see if it works. Can people get to the solution without help? You can add 1-3 tips (hidden under flaps) if needed.

Students will need to test their level works and has a solution before sharing. Students can then share their levels with classmates.

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Reflection activity	You could have a friendly competition to see who can solve the levels the quickest, or have students vote/rate their favourite puzzles.
Differentiation: modification, extension and inclusion notes	Differentiation: For students who have limited understanding, stay on the introductory levels and replay levels if needed. Limit the amount of mathematical terminology introduced. Stick to mastering 'translation' before introducing rotation and reflection. For students who need an extra challenge <i>InBento</i> has 100+ levels that become increasingly difficult to solve. Extend students by introducing all of the different types of mathematical transformation (reflection, rotation, translation). Inclusion: This game uses simple controls and is readily available on mobile/touch devices. For students who are Deaf or hard of hearing the game can be successfully played without sound. Extension: To explore these mathematical ideas further: • Mangahigh – TranStar – Reflect, rotate and enlarge the TranStar to journey through the perilous voids of space in search of a new home. Extending with Digital Technologies: In Lesson 2 - instead of having students create their own levels on paper, create them in a program like Scratch or Gamefroot. This would require significantly more time to complete depending on students' existing skill level with Scratch. However, this will allow you to also meet many of the Digital Technologies curriculum requirements for Year 5/6 (e.g. ACTDIP018, ACTDIP019, ACTDIP020).
Student Homework/Further Work	
Continue playing more levels of <i>InBento</i> to further develop understanding of rotation and translation.	
Assessment	



Student understanding can be assessed by looking at their designed puzzle.

You can test student understanding with a quiz.

- [Math Transformations - Kahoot](#)
- [Transformations - Quizizz](#)

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