

LESSON CARD

Animal, Vegetable, Mineral

An activity suitable for Australian years 2–12

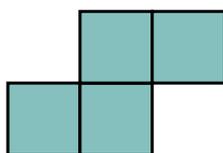
Learning areas: Shape, geometric reasoning, congruence, symmetry, transformations, logic and enumeration, patterns and algebra.

Resources: Lots of square tiles of the same size (plus triangles, hexagons or cubes for further challenges).

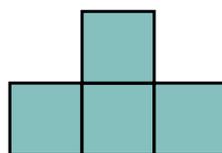
Visit www.amt.edu.au/resources-for-the-classroom for the links to the Australian Curriculum content descriptors, full solutions and additional resources for this and other activities.

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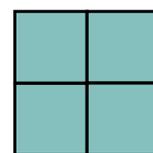
Place 4 identical squares side by side so that they share entire edges. There are many different shapes (called *polyominoes*) that can be made, such as:



shape 1



shape 2



shape 3

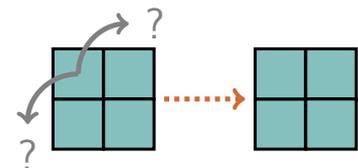
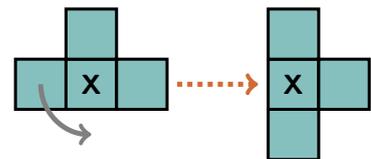
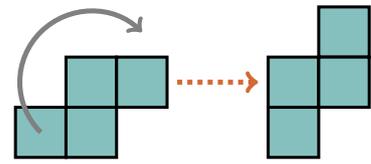
Some shapes are *animals* because they can move around. Some shapes are *vegetables* (plants) because they can flap around in the breeze, but never actually go anywhere. And some shapes are *minerals* (rocks) because they cannot move at all.

Rules

- Squares are not allowed to overlap.
- Squares must share an entire edge, so being joined only at a corner is not allowed.
- You can only move a shape if it is possible to pick up *one* square and place it somewhere else so that the new shape formed is exactly the same as the one you started with.
- Flipping the shape over is allowed, as seen in the first example.

Examples

- Shape 1 is an **animal**: moving the square at the bottom-left as shown results in a new shape of the same type. Even though it has been flipped over and rotated, we count it as being the same shape. Repeating this step, the shape is able to move to different places.
- Shape 2 is a **vegetable**: moving the square at the bottom-left as shown results in a new shape of the same type. However, the square marked 'X' can never be moved so the shape always stays anchored to the same spot.
- Shape 3 is a **mineral**: there is no way to move one square at a time without changing the shape of the 2×2 block.



Challenges

- Find the other two shapes made from 4 squares and decide whether they are animals, vegetables or minerals.
- Find all of the shapes made from 5 squares and decide whether they are animals, vegetables or minerals.
- Some animals are snakes (1D): they can travel any distance but only forwards or backwards along a fixed line. Other animals are mice (2D): they can travel anywhere in the plane. Decide whether the animals found so far are snakes or mice.
- Repeat (b) and (c) with 6 squares.
- How many different snakes can you make from 7, 8, 9, ... squares?
- Explore what happens when you use equilateral triangles or regular hexagons instead of squares, or different combinations of regular shapes.
- Explore what happens in 3D when you use cubes or other regular solids. In addition to snakes (1D) and mice (2D), we now also have birds (3D).