Which one doesn't belong?

Factsheet

What is a 'Which one doesn't belong?' routine?

A 'Which one doesn't belong?' routine can be used as a warm up or as a 'tuning-in' task for introducing or reinforcing numerical, spatial and statistical concepts while building students' reasoning skills. Groups of four objects or images are used as a stimulus. Each of the images can be a correct answer to the question, 'Which one doesn't belong?' and there are many different, correct reasons why each item doesn't belong. Students are asked to compare the images and identify at least one reason for each image. The teacher then facilitates a class discussion where students share their ideas on why each image doesn't belong.

Why it matters

The aim of engaging students in 'Which one doesn't belong?' is to build their capacity to reason mathematically and logically communicate their reasoning. This learning activity also provides a context in which:

- attention is focused on mathematical attributes, properties and relationships

- key mathematical vocabulary is introduced and/or reinforced

- mathematical definitions are developed after identifying similarities and differences between items in the stimulus materials

- flexible thinking is fostered.

Conducting a 'Which one doesn't belong?' routine

Stimulus sets used in 'Which one doesn't belong?' are drawn from a range of mathematical concepts across number, geometry and statistics. Image groups are designed to be interpreted in a variety of ways to allow access for all learners.

Introducing the routine

Prior to introducing 'Which one doesn't belong?' for the first time, establish class norms for these sessions, including:

- there can be more than one reason why one image, shape or object doesn't belong — the focus is on explaining the reasoning

- all answers are accepted as long as the reasoning is true.

With younger students, and when first introducing 'Which one doesn't belong?', you could begin with just two images as a stimulus (see Example 1 on page 3). Students are asked, 'What is the same?' 'What is different?' Teachers take students through the general sequence presented in the next section.

This routine can then be built on by including four images and asking students, 'Which one doesn't belong?'. Begin with simple everyday shapes or objects that everyone can relate to, such as the food images used in Example 2.

Sequencing the routine

1. Present a group of four objects or images arranged in a quadrant

Remind students that their task is to compare the images and consider reasons why each one doesn't belong with the other three images in the group.

2. Students individually consider the stimulus set

Provide time for students to individually study the images, comparing them and considering reasons why each one doesn't belong with the other three images in the group.

3. Small group discussion

Students may be given time to test, refine and build their ideas in a small group before participating in a whole-class discussion.
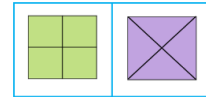
4. Whole-class discussion

Facilitate a whole-class discussion, inviting students to present their reasoning. Students may not always have the precise vocabulary to express their reasoning and this becomes an ideal time to introduce vocabulary and develop a definition with context-specific examples. Ask questions regularly to ensure that students understand the differences or similarities specific to the context being discussed.
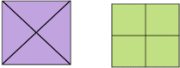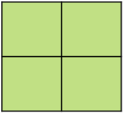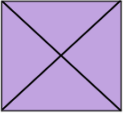
5. Summarise discussion

Summarise and record the key mathematical attributes, properties and relationships discussed along with any vocabulary and definitions that were introduced or reinforced during the session.

A series of 'Which one doesn't belong?' stimulus sets may be used over several days to concentrate on a particular concept and build sophistication of understanding and reasoning. Alternatively, work through three or four groups of images in a single extended session, sequencing them so that they build on each other and focus on more subtle differences.

Example 1: What is the same? What is different?

Possible focus areas: shape, symmetry, fractions.

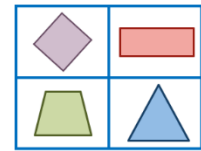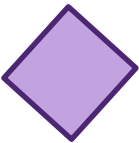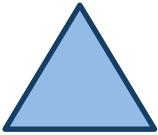| Focus quadrant	Possible reasoning
	What is the same? They both: • have an outside shape that is a square • are broken into four pieces or quarters • have inside shapes with sides that are all straight • have inside shapes that are each one quarter of the outside shape • have inside shapes that are symmetrical.
	What is different? This is the only one that: • is green • has been broken into shapes that are squares • has inside shapes that have four sides and vertices • has inside pieces with more than one line of symmetry.
	What is different? This is the only one that: • is purple • has been broken into shapes that are triangles • has inside shapes that have three corners or vertices • has inside pieces with only one line of symmetry.

Example 2: Which one doesn't belong?

Possible focus areas: shape, symmetry, curved and straight edges, vertices.

Focus quadrant	Possible reasoning
	This is the only one that: • is purple • is in a bunch.
	This is the only one that: • is orange • is symmetrical • is organised in a pattern around the centre.
	This is the only one that: • is yellow • has both curved and straight sides or edges • has three corners or vertices.
	This is the only one that: • is green • has a hole in the middle.

Example 3: Which one doesn't belong?

Possible focus areas: shape, right angle, acute angle, obtuse angle, vertices, symmetry.

Focus quadrant	Possible reasoning
	This is the only one that: • is purple • has four equal sides • is a square • isn't sitting on a flat side — it is sitting on a vertex.
	This is the only one that: • is red • has two long sides that are the same length and two short sides that are the same length.
	This is the only one that: • is green • has two obtuse angles (bigger than a right angle) and two acute angles (smaller than a right angle) • has only one line of symmetry.
	This is the only one that: • has three sides • has three vertices • has three acute angles • has three lines of symmetry.

Example 4: Which one doesn't belong?

Possible focus areas: place value, number order and magnitude, odd and even, prime and composite numbers, addition.

3 + 10	2 + 4 + 6
22	7

Focus quadrant	Possible reasoning
3 + 10	This is the only one that: • includes a set of two numbers • adds to make 13 • includes one odd number and one even number • includes a prime number and an even number • is a number bigger than 12 and smaller than 22.
2 + 4 + 6	This is the only one that: • includes a set of three numbers • adds to make 12 • has the numbers arranged in a pattern — each number being added has increased by two.
22	This is the only one that: • has the same digit in the tens and in the ones — 2 tens and 2 ones • has 2 tens • is a multiple of 11 • is bigger than 13.
7	This is the only one that: • is a number less than 10 • is just one odd number • is a single prime number • has seven ones.

References

Danielson, C 2016, *Which One Doesn't Belong? A shapes book*, Stenhouse Publishers, Portland, NH, USA.

Danielson, C, 2016, *Which One Doesn't Belong? A teacher's guide*, Stenhouse Publishers, Portland, NH, USA.

Further information and example images can be found at:

Bushart, B n.d., *Same or different? Supporting mathematical argument in the elementary grades*, https://samedifferentimages.wordpress.com.

Looney Math Consulting 2017, *Same but different math*, www.samebutdifferentmath.com.

Stenhouse Publishing 2021, *Which one doesn't belong?*, http://sites.stenhouse.com/wodb.

Bourassa, M 2013, *Which one doesn't belong?*, http://wodb.ca/index.html.