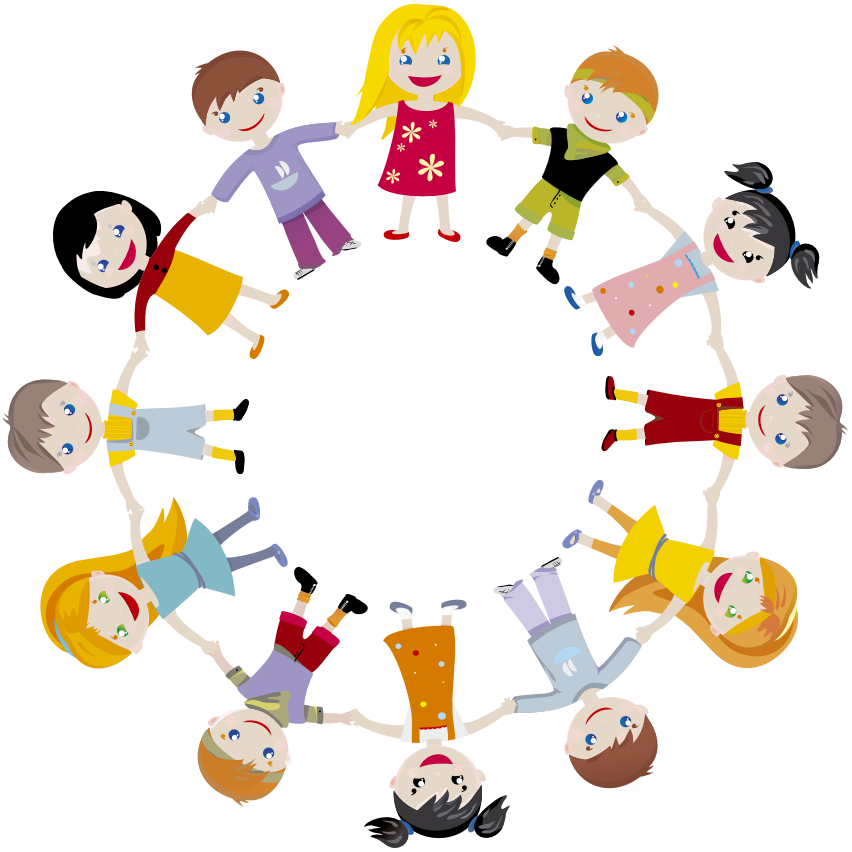
Reasoning in the classroom

Circle of people

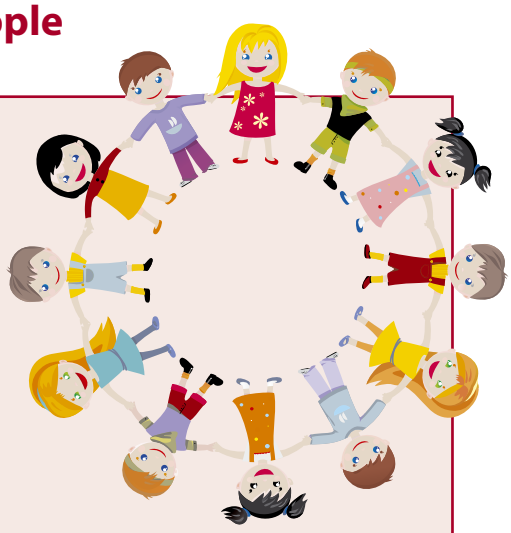


Support materials for teachers

Year 4

Llywodraeth Cymru
Welsh Government

Year 4 Reasoning in the classroom – Circle of people



These Year 4 activities start with an item that was included in the 2014 National Numeracy Tests (Reasoning). A further linked activity is also provided.

Activity 1

Circle of people

Learners use their numerical reasoning to work out the positioning of numbers within a circle.

Includes:

- Circle of people questions
- Markscheme

Activity 2

Making shapes

Learners make shapes with their bodies.

Includes:

- Explain and question – instructions for teachers
- Teachers' sheet – Shapes

Reasoning skills required

Identify	Communicate	Review
They choose their own methods and work out how to create shapes.	They work together to create their shapes, and also communicate non-verbally.	They review one another's work and give feedback.

Procedural skills

- **Simple fractions (half, quarters)**
- **Properties of shapes (triangle, pentagon, hexagon, octagon)**

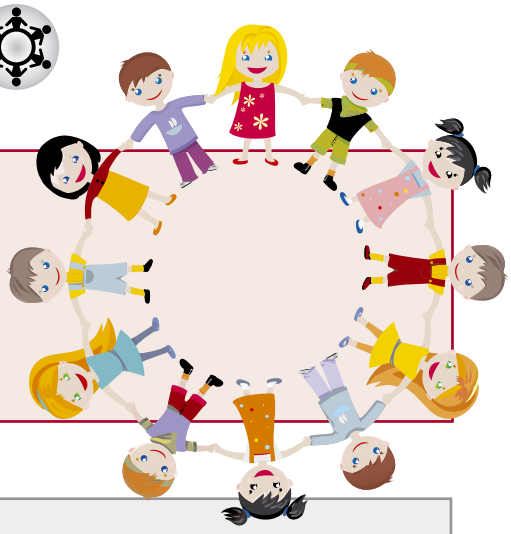
Numerical language

- **Opposite**
- **Circle/square/rectangle**
- **Triangle, right-angled triangle**
- **Pentagon**
- **Hexagon**
- **Octagon**

Activity 1

Circle of people

Activity 1 – Circle of people



Outline

This Year 4 activity requires learners to use their understanding of number and shape. They progress from identifying opposite numbers in a circle, to working out opposites in a much larger circle that is not shown.

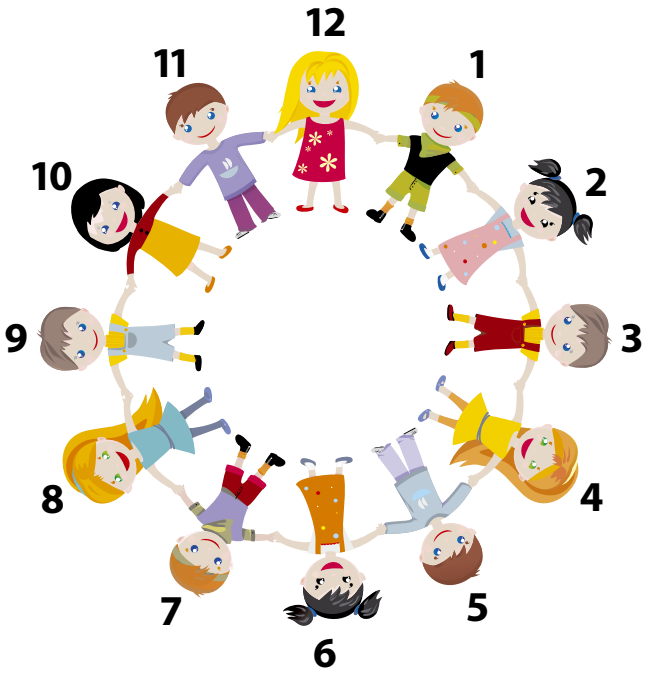
You will need

Circle of people questions

Markscheme

12 children are in a circle.

They are numbered 1 to 12



3 is opposite **9**

12 is opposite ☐ 1m

100 children are in a circle.

They are numbered 1 to 100

100 is opposite ☐ 1m

25 is opposite ☐ 1m

Activity 1 – Circle of people – Markscheme

Q	Marks	Answer
i	1m	**6**
ii	1m	**50**
iii	1m	**75**

Note: as these questions are straightforward to mark, no exemplars are given.

Activity 2

Making shapes

Activity 2 – Making shapes

Outline

This Year 4 activity continues the theme of children making shapes. It requires learners to make shapes with their bodies and would sit well within a physical education lesson.

You will need

A large space (e.g. hall or gym)

Teachers' sheet – Shapes

Activity 2 – Making shapes

Explain

Ask learners to draw a circle in the air with their fingers. Now ask if they can make a circle using their whole body *(not just their arms)*. Discuss their attempts and ask learners' opinions as to whether it is possible to make a circle with just one person.

Ask how many people they think would be needed to make a circle, then ask them to get into groups of the numbers chosen. Review some of the shapes again and discuss as a class, focusing on a circle as being perfectly round.

Next, split the class into groups of five *(or six)*. Go through the list provided on the teachers' sheet **Shapes** asking them to make the shape. However, on each turn, one of their group plays no part in making the shape and instead becomes the 'shape checker' whose role is to observe the process, then check the shape at the end and report back to you whether it is correct or not and why, focusing on the properties of the shape. *(This encourages learners to review and communicate their reasoning.)* Each learner takes a turn at being the 'shape checker'.

End the activity by asking learners to make the biggest circle they can, using every learner in the class, and their whole bodies *(so not just holding hands)* – but they must do so in complete silence and the circle must be as perfect as they can make it. Then a triangle, then . . . *(This requires non-verbal communication and is fun to do!)*

Or

Speed up the activity by imposing a time limit each time.

Question

Note: questions are also included in the teachers' sheet **Shapes**.

- Why can't you make a circle on your own? *(Think of what your legs would need to do.)* What shape have you made – does it have a name? What would be a good name for it?
- What shapes could you make on your own? *(Straight line – but learners may well identify shapes such as a cross.)*
- *(In groups)* How did you decide how to make your shape? Did you listen to each other? Did you try out different ways?
- *(To the shape checker)* Why is the shape correct/not correct? Convince me you are right.
- How did it feel to be the shape checker during/after the activity? Was it difficult? What did you see/learn?
- *(At the end, following the whole-class activity)* How easy was it to create the shape? How easy was it to make the shape in total silence? How did you communicate with each other?
- What do you know about squares and rectangles in real life? So why is a square or rectangle really difficult to make with our bodies? *(The need for sides to be exactly the same length and the need for right angles)*

Allow learners to choose how many of their group to use to make a shape, unless the instructions say otherwise. Use in conjunction with the questions in the 'Question' box.

	Instructions – make a . . .	Question/commentary
1	Square with just two people	Learners are likely to believe they have made a square. Ask the shape checker to check and explain why (almost certainly) they haven't. Ask what shape they have made (likely to be closer to a rectangle).
2	Rectangle with the whole group (other than the shape checker)	Ask how they decided who went where on their rectangle – did it matter? (The best strategy might be to find the pairs who are closest in height.)
3	Triangle with the whole group (other than the shape checker)	
4	Triangle with one less person than previously	Allows for discussion on the many different ways triangles can be formed.
5	Hexagon	Many learners believe that all hexagons should be regular (all sides the same length, all angles the same). Challenge this during the discussion.
6	Hexagon with the lowest number of people possible	Two people needed. Each person has three 'parts' to their body – arms, torso and legs.
7	Pentagon	Three people with straight bodies, one bent at the waist
8	Octagon with four people	All four bent at the waist
9	Octagon with fewer than four people	Three people needed – two learners using legs, arms and torso, and one bent at the waist
10	Right-angled triangle	
11	A different right-angled triangle	
12	Rectangle with three people	Difficult! Could possibly be achieved by two people making the outside of the rectangle, with the third being the interior.