

Numicon 6: Life skill - Preparing for formal testing Part 1



Introduction


This strand is designed to prepare children for formal testing at the end of primary school. There are no defined learning outcomes or assessment opportunities for these activities as the focus is not on new learning.

This activity group focuses on children's self-assessment, to help identify any areas they feel they most need to work on at the beginning of Number, Pattern and Calculating 6. This can be repeated at intervals to show progress.

To link with these activity groups, you will find a bank of Explore More copymasters (20–30) that provide practice for a range of key curriculum topics. These can be used alongside the focus activities at the teacher's discretion to prepare for the tests.

In this sample you will find:

- Numicon 6 Teaching Progressions page 1, Information from the Implementation Guide
- A summary of the week
- One of the activities: How many ways can I explain this?
- An in-class and 'take home' activity to reinforce the teaching and build generalising skills
- An assessment you can use at the end of the week as a record of the children's learning. They have to apply what they have learned in these activities.



| NZC NUMICON TABLE | | | | | | | | |
|---------------------|--|---|---------|--------|---|---|---|---|
| NZC Level | 1 | | 2 | | 3 | | 4 | |
| Year | 0/1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| NP Stages (Approx.) | 0-3 | 4 | Early 5 | Late 5 | 6 | 7 | 8 | |
| Numicon | FF | 1 | 2 | 3 | 4 | 5 | 6 | |
| Intervention | Numicon Intervention Programme | | | | | | | |
| Learning Needs | Breaking Barriers | | | | | | | |
| Acceleration | Big Ideas - Suitable for students in Years 5 – 9 as a catch-up | | | | | | | |

Numicon teaching progression: Number, Pattern and Calculating 6 and Geometry, Measurement and Statistics 6

The Numicon teaching progression chart gives an overview of the expected coverage over the school year and the recommended order for teaching the activity groups. Statistics work has been included within the Geometry and Measurement activity groups through appropriate contexts.

Two new strands have been included to meet the needs of Year 6 – Preparing for Formal Testing and Investigating. The Preparing for Formal Testing strand contains two activity groups designed for use at the start of the year, to inform teaching and learning throughout, as well as three activity groups to prepare children for the specific demands of formal tests. The Investigating activity groups are included at the end of the progression, for use when children have completed their work on the other strands. These allow children to explore key mathematical concepts in real-world contexts and deepen their understanding.

See the long- and medium-term planning documents for Number, Pattern and Calculating 6 and Geometry, Measurement and Statistics 6 for references to assessment milestone statements; a powerful tool for measuring children’s progress.

| Strand and activity group number | Activity group title |
|----------------------------------|---|
| Preparing for Formal Testing 1 | Self-assessment and choosing imagery |
| Preparing for Formal Testing 2 | Problem solving strategies |
| Numbers and the Number System 1 | Working with numbers beyond a million and decimals |
| Calculating 1 | Adding and subtracting negative numbers in context, and large numbers |
| Calculating 2 | Multiplying and dividing |
| Measurement 1 | Statistics, charts and graphs |
| Pattern and Algebra 1 | Multiples, factors and primes |
| Numbers and the Number System 2 | Fractions |
| Calculating 3 | Estimating, rounding and equivalence |
| Calculating 4 | Column methods for adding and subtracting |
| Calculating 5 | Percentages |
| Geometry 1 | 2D shapes and angles |
| Calculating 6 | Exploring calculations: multi-step non-routine problems and order of operations |
| Calculating 7 | Ratio and proportion |
| Measurement 2 | Areas of 2D shapes |
| Calculating 8 | Converting fractions and decimals |
| Pattern and Algebra 2 | Exploring number sequences and relationships |
| Measurement 3 | 3D shapes – nets and surface area |
| Calculating 9 | Written column methods of multiplying |
| Calculating 10 | Introducing long written methods of dividing |

Implementation Guide

Preparation for formal testing

So that children go into test situations confidently, knowing what to expect and how to deal with the challenges they will encounter. These activity groups are designed specifically to prepare children for the experience of doing mathematics in a formal test situation where they will be working alone, in silence, on questions normally posed in formal written mathematical language.

There are two types of tests often given to students: the arithmetic test in which children are asked to complete a number of routine calculations correctly, and mathematical reasoning papers in which children are asked to think through a number of non-routine problem situations, sometimes set within an everyday context, sometimes within purely mathematical contexts, e.g. a problem involving prime numbers.

Preparing for the arithmetic test involves remembering methods, such as column addition and subtraction, and long multiplication and division, and appreciating the need to make a realistic estimate of the answer and to know how to check the answer. Children also need to reason how to work through a calculation when they cannot remember the method.

How do I deal with children who are stuck?

It is important that children know there is nothing wrong with difficulty and that they are not afraid of it. They need to know they are not expected to realize straight away how to start working on a non-routine problem; solving it will perhaps mean that they feel stuck to start with and will need to try different ways of approaching the problem.

Throughout their work with Numicon children are encouraged to communicate mathematically when challenged and to persist through difficulty by self-reflecting and explaining what the difficulty seems to be, using illustrations and actions to express their problems. Encouraging children to express and deal with difficulty will also help them to respond positively if they are stuck during a test, when they will need to explain the problem to themselves silently and visualize any relevant mental imagery.

The activity group Preparing for Formal Testing 2 on non-routine problem solving should be first used near the beginning of the year.

It is designed to build on earlier work to prepare children for non-routine problem solving in test situations by introducing a three-phase approach to problem solving:

- entry – children work out what the problem is about and the challenges it presents, use illustrations and think about how they will go about solving it;
- attack – children decide where to start, what to do next and what to do after that and follow their plan through;
- review – children check that their solution is reasonable, sensible and in the correct units and if necessary, check any calculating in other ways.

Give children plenty of practice of using this approach to nonroutine problem solving and encourage discussion about their experiences to help them build confidence in their ability to persist when the going seems tough.

Preparing for Formal Testing 1: Self-assessment and choosing imagery

Key mathematical ideas Mathematical thinking and reasoning

Children choosing their own imagery

It is important that by the time children are working on Number, Pattern and Calculating 6 they are increasingly encouraged to try out their own preferred imagery for mathematical thinking and communicating. This will encourage independent thought, as well as helping them in their communicating with others, sharing a wide variety of imagery and 'points of view' as they discuss mathematical situations and reasoning with each other.

This will also stand them in good stead when they eventually have to use imagery completely independently while working under test conditions.

Most of the Number, Pattern and Calculating 6 teaching activities include suggested imagery, e.g. introductory imagery suggested by teachers at the beginning of an activity as they communicate mathematically with children. As discussion develops during the course of an activity however, it can often be helpful for children to be encouraged to switch imagery if they like, to try 'looking at a mathematical situation another way' using a different kind of illustration.

Generally, encouraging flexibility of imagery throughout the activities will help children get used to thinking flexibly about mathematical situations, to communicate flexibly with others and, probably most importantly, to feel capable of trying different approaches to mathematical problems when they seem stuck.

As a general rule, children should be encouraged more and more during the activities to think for themselves about mathematical situations and, consequently, to feel able to try several ways of literally 'looking at' a mathematical activity. Activity 1 may be helpful to encourage this explicitly with children.

Children self-assessing

Activity 2 is designed to help children identify where they feel confident in their mathematical abilities, and where they feel they need to do further work. Even though children will sometimes under- or over- estimate their abilities when judging the difficulty of specific mathematical challenges, it is always helpful for teachers to know where children themselves believe their difficulties lie. Children are mostly correct when they sense that they have a difficulty around some aspect of mathematics. In fact, working on mathematics that children believe they find difficult will always result in improved ability and confidence in that area.

In the activity, children are faced with a wide range of mathematical challenges from across Number, Pattern and Calculating 6 and are invited to sort these into various categories, according to their perceived difficulty. You could choose to set this task individually, or encourage children to agree on difficulties in small groups. Either way, it will be helpful to have general discussions after the activities have been sorted.

Of course, discussion about the difficulty of any challenge will often result in children learning how to make that challenge easier. This type of self- assessing activity leads to important learning, simply through children reflecting carefully upon a perceived difficulty.

You can choose when and how often to use this self- assessing activity. Using the activity at the beginning of the school year will allow comparisons with uses later in the year to show progress; using the activity a few weeks before the national test will help direct some last- minute revision.

Explorer Progress Book 6c, pp. 2–3

A few weeks before the national tests, give small focus groups of children their Explorer Progress Books and ask them to work through the challenges on the pages.

As children complete the pages, assess which areas could benefit from some last minute revision. Refer to the medium- term planning chart to help you choose the most appropriate activity groups to revisit.

Opening activities Step 1

Step 1

$$\frac{5}{6} + \frac{1}{3}$$

Write ' $\frac{5}{6} + \frac{1}{3} = ?$ ' on the board.

Invite children to think of as many different ways as possible to illustrate this visually. (This type of calculation is approached in the *Number, Pattern and Calculating 5 Teaching Resource Handbook*, Calculating 15.) Encourage children to see if they can work out a calculation like this using different types of illustration to help the answer 'make sense'.

Discuss children's responses. They could do this in at least five different ways, e.g. with Shapes, with rods, with a number line, with freehand drawings, or with a collection of loose objects.

Step 2

Discuss children's preferences. Invite them to consider whether any one of the types of imagery explored seems to illustrate best how the answer to the calculation makes sense. Children may vary in their preferences; there are usually many possible ways to look at a problem, and everyone has different ways of making sense of one. Something that makes good sense to adults visually might not be clear to children. Emphasize how, over the coming year, children will be encouraged to share different ways of looking at problems with each other, and encouraged to try looking at problems in different ways for themselves.

Step 3

Repeat Steps 1 and 2 using different types of calculations or different types of problems, e.g. using similar types from the *Number, Pattern and Calculating 5 Teaching Resource Handbook*, Calculating 16. Invite children to practise looking at situations generally in as many ways as possible.

There are eleven Explore More Activities to give students practice of answering 'How many ways can I do this?'

Flower Bed is a review of Ratio from Numicon 5

Below this are two assessment activities based on the Explore More Activities.

Flower bed

How this will help your child

- This activity will help your child to practise solving problems that involve ratio.
- It will also help them to recall multiplication facts.

Words and phrases to use

ratio, combination, for every ..., constant, proportion, relationship, multiple

You will need

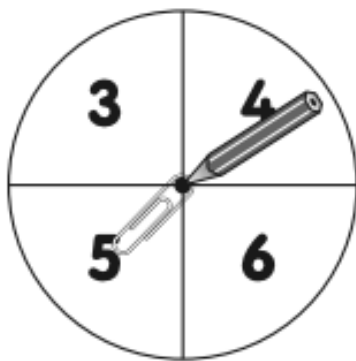
- Scissors
- A pencil
- A paper clip

During the activity, look at what your child can do

- Write a set of objects as a ratio.
- Solve problems by keeping the ratio constant throughout.

What to do

- Cut out the flower cards from the Flower bed sheet. Shuffle them and place them in a pile, face down.
- Say to your child that you are going to plant some flowers in a flower bed and you are going to use a ratio to decide how many flowers to plant.



1

- Make the spinner with the pencil and paper clip and ask your child to spin the paper clip and take that many cards from the face down pile, e.g. 5. **1**
- Ensure your child only picks cards showing two different types of flower. If they pick cards showing three different flowers, they pick again.
- Ask your child to place the cards in a line and rearrange them so that each type of flower is grouped together. Explain that the cards show the ratio of the two flowers to plant, e.g. 2 : 3, 2 roses for every 3 daisies. **2**
- Choose a number that is a multiple of the first number in the ratio, e.g. 20, and say to your child 'If I plant 20 roses, how many daisies will I plant?'
- Ask your child to look at the relationship between 2 and 20. What has the 2 been multiplied by to get 20? (10) Agree that, to keep the ratios the same, they should also multiply the 3 by 10, giving 30 daisies.
- Return the cards to the pack and reshuffle them.
- Repeat the activity using different numbers of cards to find different ratios.
- Cut out the flower bed cards. Choose two of them and ask your child to simplify the ratio using division, e.g. 45 roses and 72 daisies (45 : 72) can be simplified by dividing both numbers by 9 to get 5 : 8.

Next steps ...

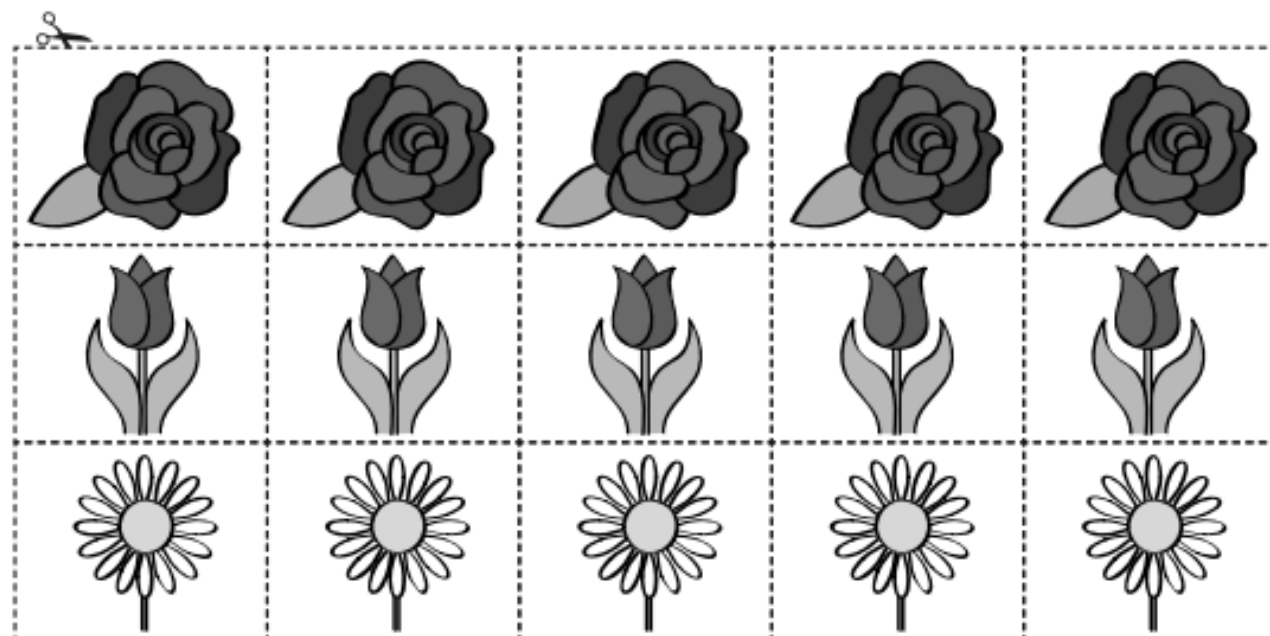
- Shuffle a pack of playing cards and lay down six cards. Ask your child what the ratio is of, e.g. black : red or hearts : diamonds.
- Look out for other ratios when out and about, e.g. colours or shapes of beads on a necklace, amount of blue to white when mixing paint.



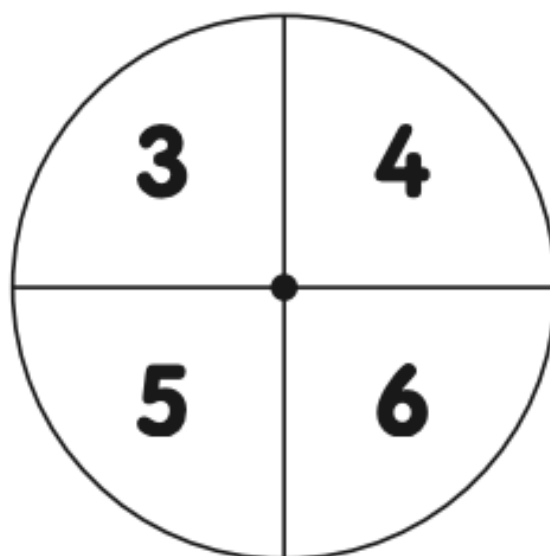
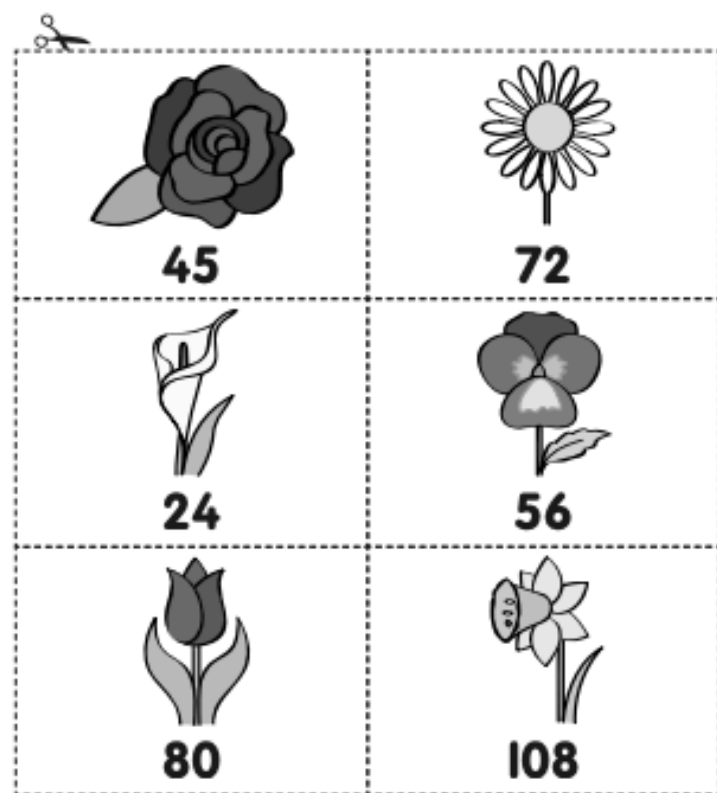
2

Flower bed

Flower cards



Flower bed cards



Date / /

Using Fractions



Using any of these number cards once only, can you make this calculation correct?

$$\left(\square + \square + \square \right) \times \square = 16$$



Teacher notes

Date ____/____/____

Multiplying Decimals

Can you work out which numbers have been left blank in this calculation?

$$\begin{array}{r}
 \square \cdot 73 \\
 \times \quad \quad \quad | \square \\
 \hline
 2 \square \cdot \square 2 \\
 \square \square \cdot \square \square \\
 \hline
 \square \square \cdot \square \square \\
 \hline
 \hline
 \end{array}$$



Teacher notes