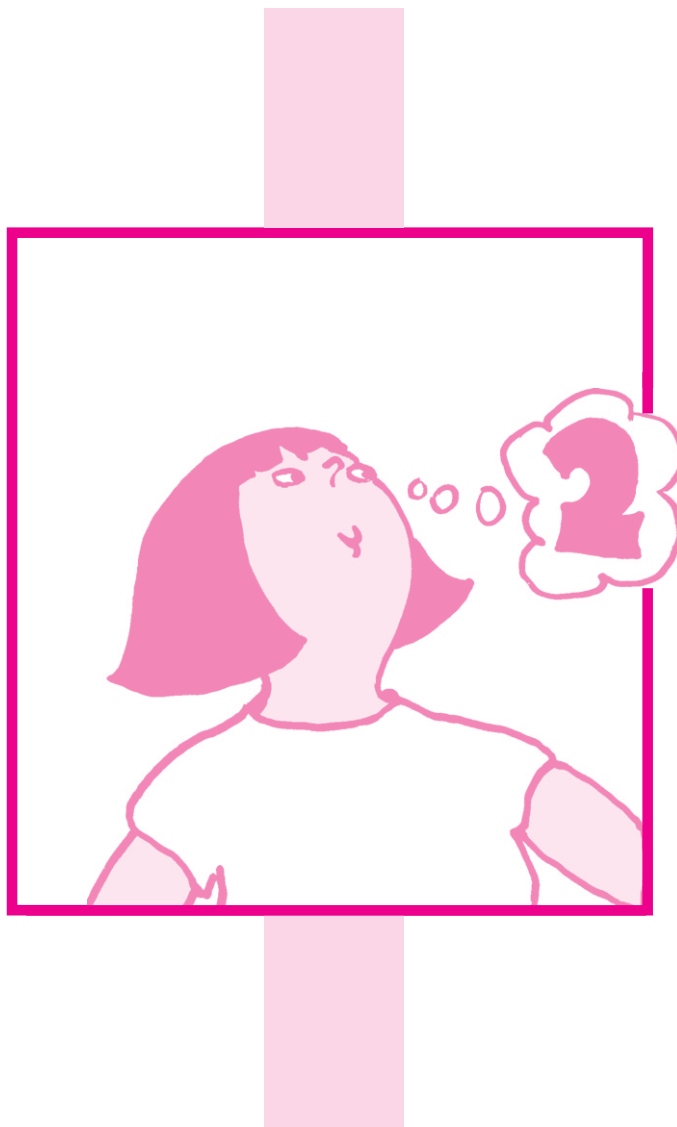


Students at the perceptual counting stage



Students at the perceptual counting stage

The nature of the learner

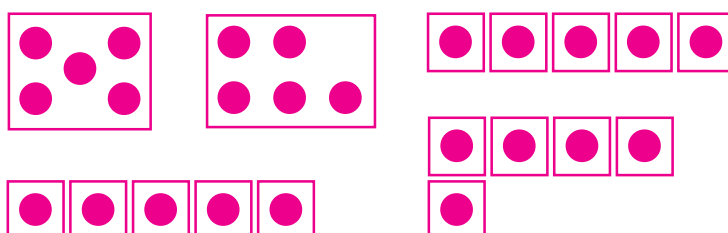
Students working within the perceptual stage of counting are able to count collections of objects that they can see, hear or feel. They rely on concrete representations of numbers.

Students consistently apply the one-to-one principle of matching one number word to each object. They demonstrate their understanding of the numerical value of a collection by counting and labelling collections from zero to ten and beyond. The size of the collection they are able to count will be dependent upon their knowledge of the forward number sequence, that is, how far they can count in sequence.

Students at this stage rely on the strategy of counting by ones and always begin at one when they count. This is the determining factor in how they find the number before or after a specified number. Typically, these students count from one when determining the number before, or the number after, a nominated number. Students confidently produce the forward and backward number sequences in the range zero to ten, but they always begin at one when counting forward.

At the perceptual stage students are able to identify and name numerals from zero to ten, or beyond, but may not necessarily be able to identify and name all the numerals to twenty.

Students at this stage are developing the ability to recognise number patterns and know that numbers can be represented by a variety of combinations. For example, the number “five” can be represented in a variety of ways, including the following diagram:



Students at the perceptual stage are working towards:

- adding two collections of items
- counting without relying on concrete representations of numbers
- visually recognising standard patterns for a collection of up to ten items without counting them
- consistently saying the forward and backward number word sequences correctly.

Teaching considerations

When developing teaching and learning programs for students at the perceptual counting stage, teachers need to consider:

- **Strategy development**

Students working at the perceptual counting stage have limited strategies for solving number problems. Teachers should provide a wide range of activities which encourage students to develop more sophisticated strategies. Short, engaging activities can be used to encourage students to develop visual recognition skills which may lead to automatic recall of facts.

Teachers should ensure that students working at the perceptual counting stage are not hindered in the development of strategies because they have a limited range of understandings in other number areas, such as forward number word sequence, backward number word sequence or numeral identification.
- **Language development**

Students at the perceptual counting stage need to be taught the explicit mathematical language to enable them to describe the activity and the strategy. Additionally the naming of number words in the “teens” can be difficult for all students and particularly for students from non-English speaking backgrounds. For example, number words such as *fourteen* and *forty* sound very alike. As the names for many of the “teen” numbers start with the “units” value, such as *seventeen*, reversals are very common.
- **Numeral identification**

Activities for developing numeral identification can be modified to cater for the student at the perceptual stage by limiting the range of numerals targeted. Explicitly teaching the naming system of the “teen” numbers may help many students.

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Where are they now?

Students say the forward number word sequence and backward number word sequence to ten correctly.

Where to next?

Students say the forward number word sequence and backward number word sequence to twenty or beyond correctly.

Outcomes

These activities provide opportunities for students to demonstrate progress towards the following outcomes: A student

- NES1.1 Counts to 30, and orders, reads and represents numbers in the range 0 to 20
- PAES1.1 Recognises, describes, creates and continues repeating patterns and number patterns that increase or decrease
- WMES1.4 Uses concrete materials and/or pictorial representations to support conclusions.

LFN reference

Backward number word sequence: levels 2-4

Forward number word sequence: levels 2-4

How?



Zap

Arrange students so that they are standing in a circle. Instruct students to count backwards from twenty down to zero. Each student calls out one number in the sequence. When the number sequence reaches zero, the student who should say “zero” calls out “zap!” and sits down. Continue the activity with the students commencing the backward count from twenty again. This process continues until one student remains standing.

Variations

- The students count from one in a forward number word sequence to twenty. When the number sequence reaches twenty, the student who should say “twenty” calls out “zap!”
- Students who are out remain in the circle and continue to say “zap!” whenever it is their turn. The following student continues the count from the number after the number that would have been said instead of “zap”.

Why?

Students need to know the correct forward and backward counting sequences in order to count on or count down from a number to solve addition and subtraction problems.

Where are they?

Students:

- can say the forward number word sequence from one to ten
- can not say the number word just after a given number word in the range of one to ten. Students may be able to count beyond ten.

Where to next?

Students:

- are able to say the number word just after a given number word in the range one to ten
- are able to say the forward number word sequence to twenty or beyond.

Outcomes

These activities provide opportunities for students to demonstrate progress towards the following outcomes: A student

NES1.1 Counts to 30, and orders, reads and represents numbers in the range 0 to 20

WMES1.1 Asks questions that could be explored using mathematics in relation to Early Stage 1 content.

Syllabus reference

Perceptual counting

Forward number word sequence

Backward number word sequence

How?



Maths tipping

Students stand in a space in the room. Ask individual students to say the number before, or after, a given number. The students must answer within a designated time, for example, three seconds. A correct response allows the student to take one step in any direction to attempt to touch another student on the shoulder. If tipped, the student must sit down. If a student states an incorrect answer to the question, he or she must also sit down. Continue the process until one student remains standing.

Why?

Students need to know the correct forward number word sequence in order to state the number after a given number. This is also necessary for counting on strategies.

Where are they now?

Students can identify numerals to ten.

Where to next?

Students can identify numerals to twenty.

Outcomes

These activities provide opportunities for students to demonstrate progress towards the following outcomes: A student

NES1.1 Counts to 30, and orders, reads and represents numbers in the range 0 to 20

WMES1.3 Describes mathematical situations using everyday language, actions, materials and informal recordings.

LFN reference

Numeral identification: level 2

How?

Number flowers

Construct cardboard or paper cut-outs of flowers consisting of a stem and the flower centre. Write a numeral on the centre of each flower. Provide students with a supply of cut-out petal shapes. Students place a number of petals around a flower centre, corresponding to the displayed numeral.

Pairs

Construct pairs of shoe-shaped cards. On one card, write a numeral in the range eleven to twenty. On a matching card, draw a corresponding dot pattern to match each numeral. Display dot patterns as two rows of five to represent ten, and a common dot pattern for the remaining units. Place cards face up and have students match each dot pattern card with the correct numeral card.



Why?

Students need to be familiar with the forward and backward counting sequences in order to count on and count down from any given number.

Where are they now?

Students can identify numerals to ten.

Where to next?

Students can identify numerals to twenty.

Outcomes

These activities provide opportunities for students to demonstrate progress towards the following outcomes: A student

NES1.1 Counts to 30, and orders, reads and represents numbers in the range 0 to 20

WMES1.3 Describes mathematical situations using everyday language, actions, materials and informal recordings.

LFN reference

Numeral identification: level 2

(Pairs)

Variations

- Turn both sets of shoe-cards face down. Students turn over two shoe-shaped cards at a time. If the two cards match, the student keeps the cards. If the cards do not match, the student turns the cards back over. Continue until all cards are matched.
- Turn up either all of the dot shoe-cards or all of the numeral shoe-cards. Place the other set of cards face down. Students turn over one shoe-card at a time to find a matching pair.



Egg flip

Number sections of an egg carton using any numerals in the range of one to twenty. Place a counter inside the carton, close the lid and shake the carton. Instruct the students to open the lid and find which cup the counter has landed in. Provide students with a number chart to match the numerals written inside the egg cartons. Students mark off a numeral on the chart, corresponding to the numeral the counter lands on. Students continue until all numerals have been marked off on the chart.

Variation

Provide the students with a pile of counters. After shaking and opening the egg carton, the students take a corresponding number of counters from the central pile to the number the counter lands on. The winner is the student with the largest total of counters after a specified number of plays.

Why?

Students need to be familiar with the forward and backward counting sequences in order to count on and count down from any given number.

Where are they now?

Students are able to say the forward number word sequence and backward number word sequence to ten.

Where to next?

Students:

- are able to identify numerals to twenty or beyond
- can say the forward number word sequence and backward number word sequence to twenty or beyond.



To simplify this activity use charts where the students have to identify one number before and one number after the given number.

Outcomes

These activities provide opportunities for students to demonstrate progress towards the following outcomes: A student

NES1.1 Counts to 30, and orders, reads and represents numbers in the range 0 to 20

WMES1.4 Uses concrete materials and/or pictorial representations to support conclusions.

LNF reference

Forward number word sequence: level 2, 3

Backward number word sequence: level 2, 3

How?

Teen bingo



Construct bingo cards using numerals in the range eleven to twenty. (The cards may contain a numeral more than once.) Place a set of numeral cards, which correspond to the numerals on the bingo cards, into a container. The teacher, or a nominated student, draws out the numeral cards one at a time and calls out the drawn number. Students cover the corresponding numerals on their bingo cards with counters as the numbers are called. The winner is the first to cover all the numerals on his or her card.



Before and after

Prepare “before and after” charts for each pair of students as shown in the diagram.

Numerals are written down the centre column of the chart. These numerals should be within an appropriate range for the students. Students are given numeral cards to sort and place on the chart in either the “number-before” or “number-after” spaces to form number sequences.

		13		
		17		
		19		
		16		
		14		

Why?

Students need to be familiar with the forward and backward word sequences to count up to or count down from any given number.

Where are they now?

Students are able to say the forward number word sequence and backward number word sequence to ten.

Where to next?

Students:

- are able to identify numerals to twenty or beyond
- can say the forward number word sequence and backward number word sequence to twenty or beyond.

Outcomes

These activities provide opportunities for students to demonstrate progress towards the following outcomes: A student

NES1.1 Counts to 30, and orders, reads and represents numbers in the range 0 to 20.

WMES1.4 Uses concrete materials and/or pictorial representations to support conclusions.

LNF reference

Forward number word sequence: level 2, 3

Backward number word sequence: level 2, 3

How?

Teen memory

Construct two sets of numeral cards for the numbers eleven to twenty. Place the cards face down in rows between two students. Have the students take turns to flip over two cards and say the numbers as they are revealed. If a pair of cards showing the same number is revealed, the student keeps the cards. If the cards do not match, the student places the cards face down again. Continue until all cards have been matched.



Children playing *Before and after* (see p. 87)

Why?

Students need to be familiar with the forward and backward word sequence to count up to or count down from any given number.

Where are they now?

Students:

- can identify numerals one to ten
- are able to say the forward number word sequence and backward number word sequence to ten.

Where to next?

Students:

- are able to identify numerals to twenty or beyond
- are able to say the forward number word sequence and backward number word sequence to twenty or beyond.

Outcomes

These activities provide opportunities for students to demonstrate progress towards the following outcomes: A student

NES1.1 Counts to 30, and orders, reads and represents numbers in the range 0 to 20

WMES1.1 Asks questions that could be explored using mathematics in relation to Early Stage 1 content.

LFN reference

Numeral identification: level 2

Forward number word sequence: level 2, 3

Backward number word sequence: level 4

How?

Numeral cards



Construct large numeral cards suitable for students to wear around their necks. The cards should display numerals in the range of eleven to twenty.

Call out a number within the range. The students then line up in sequence behind the student wearing the numeral card which matches the number called. For example, if “twelve” is called, students with numeral cards thirteen to twenty line up. Count the number sequence aloud from the nominated number.

Variations

- Students step forward, bow, sit or perform an alternative action when their number is called.
- As a number is called all students line up, in random order, behind the student wearing the nominated number.
- Distribute to the students numeral cards which can be worn around the neck. Have the students form a circle. Stand in the centre of the circle, hold a bean bag and call out a number corresponding to one of the numeral cards. As the number is called, throw the bean bag into the air. The student wearing the nominated numeral card runs into the centre of the circle and attempts to catch the beanbag. If successful he or she moves to the centre to become the next caller. This activity may be incorporated into daily fitness or physical education lessons.

Why?

These activities provide opportunities for students to identify numerals.

Students need to recall the forward number word sequence and be able to identify numbers that follow given numbers in order to develop counting on strategies.

Where are they now?

Students:

- can identify numerals to ten
- can say the forward number word sequence and backward number word sequence to ten.

Where to next?

Students:

- can identify numerals to twenty or beyond
- are able to say the forward number word sequence and backward number word sequence to twenty or beyond.

Outcomes

These activities provide opportunities for students to demonstrate progress towards the following outcomes: A student

- NES1.1 Counts to 30, and orders, reads and represents numbers in the range 0 to 20
- PAES1.1 Recognises, describes, creates and continues repeating patterns and number patterns that increase or decrease
- WMES1.2 Uses objects, actions, imagery, technology and/or trial and error to explore mathematical problems
- WMES1.4 Uses concrete materials and/or pictorial representations to support conclusions.

LFN reference

Numeration identification: level 2
Forward number word sequence: level 2, 3
Backward number word sequence: level 2, 3

How?



Numeral flip strip

A flip strip is a hinged cardboard strip. The hinge, formed by tape or plastic spiral binding, joins two cardboard strips together. The top piece of cardboard is cut into vertical strips. Numerals are written on the bottom piece of cardboard so that, as each top strip is lifted, a numeral is revealed. The sequence of numerals used can be varied by replacing the numeral strip between the two cardboard pieces with another strip containing a different range of numerals.

Variations

- Uncover one numeral and ask the student to identify the numeral.
- Ask the students to:
 - state the numbers before and after the revealed numeral
 - state the number two or three spaces from the revealed numeral.
- Uncover all the numerals except one. Ask the students to identify the hidden numeral.
- Hide all numerals except one and ask the students to find a given number.
- Ask students to identify all the odd and all the even numbers along the number line.

Students then use this information to count by twos, starting from an odd or an even number.

Why?

Developing proficient counting strategies will assist students to solve number problems.

Where are they?

Students:

- can say the forward number word sequence from one to ten.
- can not say the number word just after a given number word in the range one to ten. Students may be able to count beyond ten.

Where to next?

Students:

- are able to say the number word just after a given number word in the range one to ten.
- are able to say the forward number word sequence to twenty.

Outcomes

These activities provide opportunities for students to demonstrate progress towards the following outcomes: A student

NES1.1 Counts to 30, and orders, reads and represents numbers in the range 0 to 20

WMES1.4 Uses concrete materials and/or pictorial representations to support conclusions.

Syllabus reference

Perceptual counting

Numeral identification: level 2

Forward number word sequence

Backward number word sequence

How?



Fish chart

Construct a chart in the shape of a fish. Draw large scales on the body of the fish and in each scale draw or paste pictures of collections of items. Construct a matching set of scale-cards which will fit exactly on top of the scales on the chart. Write a numeral on each card to correspond with the collection of items in each “scale”. Students match a numeral card to the correct collection of items. Construct fish charts for numbers one to five, one to ten or ten to twenty.



Why?

Students need to be able to count correctly in a forward number word sequence in order to state the number after a given number. This is necessary for counting on strategies.

Where are they?

Students:

- can say the forward number word sequence from one to ten.
- can not say the number word just after a given number word in the range one to ten. Students may be able to count beyond ten.

Where to next?

Students:

- are able to say the number word just after a given number word in the range one to ten.
- are able to say the forward number word sequence to twenty.

Outcomes

These activities provide opportunities for students to demonstrate progress towards the following outcomes: A student

NES1.1 Counts to 30, and orders, reads and represents numbers in the range 0 to 20

WMES1.4 Uses concrete materials and/or pictorial representations to support conclusions.

LFN reference

Perceptual counting

Numeral identification: level 2

Forward number word sequence

Backward number word sequence

How?

Caterpillars



Construct a chart depicting a caterpillar. Use one circle to represent the head and ten circles to represent the body. Construct a set of ten cardboard circles, the same size as the segments of the caterpillar's body. On each cardboard circle write a numeral from one to ten. Attach one side of a velcro dot to the circles and the other side to each segment of the caterpillar's body. Students sequence the numerals by attaching the numbered circles to the caterpillar. Alternatively students locate numbers before or after a nominated number. As the students become proficient with the numerals one to ten, vary the range to include numerals from eleven to twenty.



Variation

Numerals can be written on the caterpillar's body as well as on the circles. The activity then becomes a simpler matching task for those students at the Emergent counting stage.

Why?

Students need to be able to count correctly in a forward number word sequence in order to state the number after a given number. This is necessary for counting on strategies.

Where are they now?

Students:

- can say the forward number word sequence from one to ten
- can not say the number word just after a given number word in the range one to ten
- may be able to say the forward number word sequence beyond ten.

Where to next?

Students:

- say the number word just after a given number word in the range one to ten, then one to twenty and beyond
- are able to say the forward number word sequence and backward number word sequence to twenty.

Outcomes

These activities provide opportunities for students to demonstrate progress towards the following outcomes: A student

NES1.1 Counts to 30, and orders, reads and represents numbers in the range 0 to 20

WMES1.1 Asks questions that could be explored using mathematics in relation to Early Stage 1 content.

LFN reference

Numeral identification

Perceptual counting

How?



Bingo: The number after

Construct bingo cards for each student using the BLM on p.140. Hold up a numeral card so that all students can see it. Begin with numerals in the range of two to eleven and then progress to numerals in the range of two to twenty-one. Have students check their bingo card, and if it contains a numeral which is one after the number displayed, they cover the numeral with a counter. The winner is the first student to cover all the numerals on the bingo card.

Variations

- Identify the numeral before the one shown, two after or two before.
- Extend the range of numbers.

Why?

For children to progress to using the strategy of counting on, they need a good knowledge of the forward number word sequence. If students are able to automatically state the number after a given number word they will not have to rely on counting from one as a strategy.

Where are they now?

Students:

- can identify numerals to ten
- are able to say correctly the forward number word sequence and backward number word sequence to ten.

Where to next?

Students:

- are able to identify numerals to twenty
- are able to say the forward number word sequence and backward number word sequence to twenty.

Outcomes

These activities provide opportunities for students to demonstrate progress towards the following outcomes: A student

- NES1.1 Counts to 30, and orders, reads and represents numbers in the range 0 to 20
- WMES1.1 Asks questions that could be explored using mathematics in relation to Early Stage 1 content
- WMES1.4 Uses concrete materials and/or pictorial representations to support conclusions.

LFN reference

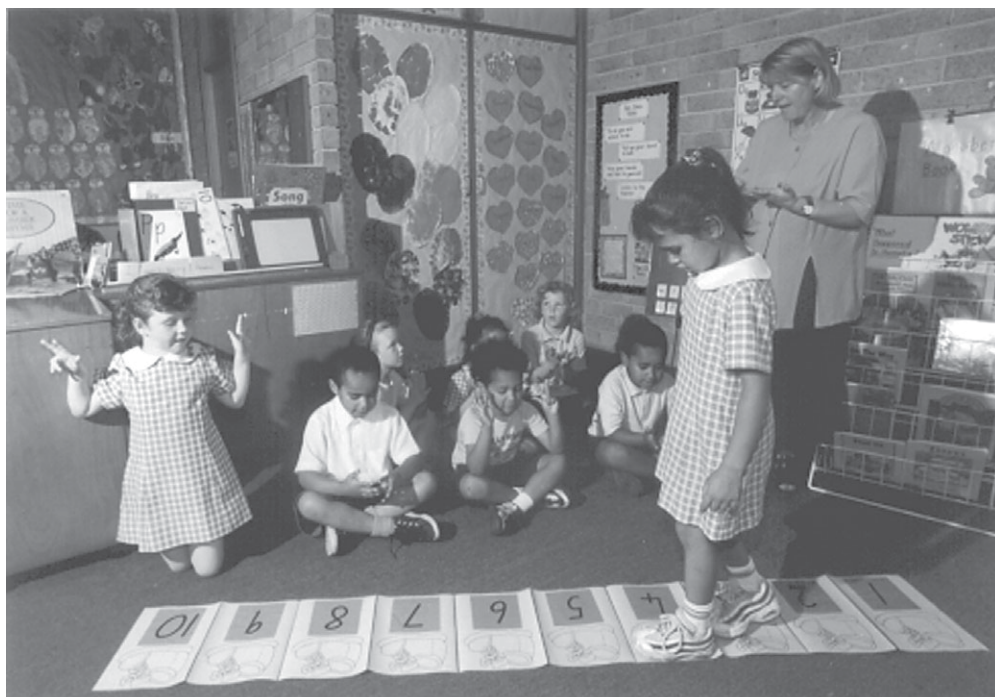
- Numeral identification: level 2
- Forward number word sequence: level 2, 3
- Backward number word sequence: level 2, 3

How?

Floor walking



Draw a large number line, from one to twenty, with chalk on the carpet or asphalt. Direct the students to walk along the number line to a nominated number greater than ten. The students count each step as they land on a numeral.



Why?

Students need to be familiar with the forward and backward counting sequence in order to count down to or down from a number.

Where are they now?

Students:

- can identify numerals to ten
- are able to say correctly the forward number word sequence and backward number word sequence to ten.

Where to next?

Students:

- are able to identify numerals to twenty
- are able to say the forward number word sequence and backward number word sequence to twenty.

Outcomes

These activities provide opportunities for students to demonstrate progress towards the following outcomes: A student

- NES1.1 Counts to 30, and orders, reads and represents numbers in the range 0 to 20
- WMES1.1 Asks questions that could be explored using mathematics in relation to Early Stage 1 content
- WMES1.4 Uses concrete materials and/or pictorial representations to support conclusions.

LFN reference

- Numeral identification: level 2
- Forward number word sequence: level 2, 3
- Backward number word sequence: level 2, 3

(Floor walking)

Variations



- Students walk, and count backwards, from a nominated number along the number line.
- Display the number line as footprints on the floor. Students count as they step on each footprint.
- Place numbered footprints in random order on the floor. Students find the correct path to step along to form a forward counting sequence.
- The numeral line can be replicated on the playground by tracing around students' footprints using chalk on the asphalt. Write a numeral on each foot outline.
- Display a washing line made from nylon rope across the chalkboard or between two chairs. Collect old socks. Write numerals on the socks in the range of one to twenty. Students take turns to sequence the socks in correct numerical order along the washing line.

Why?

Students need to be familiar with the forward and backward counting sequence in order to count down to or down from a number.

Where are they now?

Students:

- can count visible items but not those in concealed collections
- raise their fingers sequentially when asked to show a number from one to ten using their fingers. That is, they need to count each finger as it is raised.

Where to next?

Students:

- are able to count items without relying on visual representations
- automatically raise the correct number of fingers when asked to show a number from one to ten.



As a preliminary activity concentrate on numbers one to five using one hand to demonstrate.

Many students will already have a strong sense of the number five and use their fingers to demonstrate the number five. However, they may not have a true understanding of the number five.

Outcomes

These activities provide opportunities for students to demonstrate progress towards the following outcomes: A student

NES1.2 Combines, separates and compares collections of objects, describes using everyday language and records using informal methods

WMES1.1 Asks questions that could be explored using mathematics in relation to Early Stage 1 content.

LFN reference

Finger patterns

How?

Rabbits' ears



Ask students to put their hands above their head. Then ask them to show various numbers by raising the correct number of fingers. This is best done in random order, first in the range one to five and then six to ten. For example, “Show me the number four,... two,... five,... three.” The aim is for the students to raise their fingers simultaneously rather than sequentially. Students may verify their count by bringing their hands down and counting their fingers.



Teacher: “Show me the number five.”

Why

Developing a strong sense of “five” as a base, and later “ten” as a base, is useful for children as this will reduce their reliance on count-by-one strategies.

Where are they now?

Students:

- can count visible items but not those in concealed collections
- raise their fingers sequentially when asked to show a number from one to ten using their fingers. That is, they need to count each finger as it is raised.

Where to next?

Students:

- are able to count items without relying on visual representations
- automatically raise the correct number of fingers when asked to show a number from one to ten.

Outcomes

These activities provide opportunities for the students to demonstrate progress towards the following outcomes: A student

NES1.2 Combines, separates and compares collections of objects, describes using everyday language and records using informal methods

WMES1.4 Uses concrete materials and/or pictorial representations to support conclusions.

LFN reference

Finger patterns



Teacher: “Now let’s check we are correct.”

Students: “One, two, three, four, five”

Teacher: “Let’s do that again. However, this time start from the number three. Now let’s count on from three to five.”

Student: “Three, four, five”.

Why

When demonstrating numbers in the range six to ten, children are developing concepts of partitioning or part-whole number relationships.

Continued practice with part-whole number relationships provides a basis for learning basic addition and subtraction facts.

Where are they now?

Students:
can count visible items but are not able to visualise the set when the concrete materials are removed.

Where to next?

Students:

- are able to picture items mentally for a given number
- are able to recognise instantly the dot patterns for the numbers one to six.

Outcomes

These activities provide opportunities for students to demonstrate progress towards the following outcomes: A student

NES1.1 Counts to 30, and orders, reads and represents numbers in the range 0 to 20

WMES1.4 Uses concrete materials and/or pictorial representations to support conclusions.

LFN reference

Spatial patterns
Subitising

How?

Dot flash



With the overhead projector light turned off, place counters on the projector in a standard dot pattern. Vary the number of counters from two to ten. Instruct the students to look at the screen carefully while you switch the light on for a brief period of time. Have the students use their own counters to make the pattern shown on the overhead or draw the pattern they saw. Alternatively, use flash cards or paper plates with dot patterns on them. Ask the students to make statements about the patterns they saw as well as combinations of parts for the pattern. For example, for a pattern of five dots the child may see the combination “two and three” or “four and one”.

Variations



- Construct two sets of dot pattern cards for the numbers one to ten. Place one set of cards in a pile and display the other set in a row. Students take turns to select a card from the pile and try to find a dot pattern card from the row which has the same number of dots as the card chosen. Alternatively instruct the students to find a card which has one dot more or one dot less than the card chosen.



- “The process of instantaneous recognition of number patterns without counting is known as *subitising*. Piaget found that children, by the age of four, are capable of instantaneously recognising groups of one, two, three and four objects. Children develop strong mental images of these patterns. Constant exposure to the number names used to describe the arrangements helps children form pattern-name associations. Utilising this natural capacity can provide a basis for developing number relations and devising strategies to learn basic facts”. (Bobis, 1993)

Why?

When students are able to instantly recognise a set of objects, such as a pattern of dots, and are able to associate a number word with the set, the need for the student to count all of the objects from one is eliminated. Students need to be able to recognise that a set can be a set in its own right and, simultaneously, a part of a larger set.

Where are they now?

Students are able to count perceived items but are not able to visualise the group when the concrete material is removed.

Where to next?

Students instantly recall number combinations to ten. They have a visual image of a set of items for a given number.



Luncheon plates are a good size for students to manipulate.

Expose students to a variety of dot patterns for each number so that they do not associate only one pattern with a number.

Outcomes

These activities provide opportunities for students to demonstrate progress towards the following outcomes: A student

- NES1.2 Combines, separates and compares collections of objects, describes using everyday language and records using informal methods
- WMES1.1 Asks questions that could be explored using mathematics in relation to Early Stage 1 content

LFN reference

Spatial patterns
Partitioning and combining

How?

Paper dot plates



Construct several sets of paper dot plates which display random dot patterns for numbers from one to ten, die patterns and various dot combinations to ten.

Flash a paper dot plate and ask the students to make, using counters, a pattern that is one more, or one less, than the pattern shown on the paper plate. Extend this activity to two more or two less than the paper plate pattern.

Variations

- Provide students with two sets of plates with dot patterns. Ask the students to find a pair of plates which combine to have as many dots as another nominated plate. Extend this activity by asking the students to then attach corresponding numeral cards to each paper plate.
- Display a finger pattern for a nominated number to the students. Have the students copy the finger pattern. Encourage instant demonstration rather than students raising their fingers sequentially. If necessary, the students may lower their hands to count and confirm they raised the correct number of fingers. Students then find a plate to correspond with the number. Students may check they have the correct plate by matching their raised fingers with the dots on the plate.
- Flash a plate for one to two seconds to the students. The students call out the number of dots they see.



Why?

Students need to develop instant recognition of small groups of items and associate a number word with the group. This will eliminate the need to count each group from one.

Where are they now?

Students are able to count perceived items but are not able to visualise the set when the concrete material is removed.

Where to next?

Students instantly recall number combinations to ten. They have a visual image of a set of items for a given number.

Outcomes

These activities provide opportunities for students to demonstrate progress towards the following outcomes: A student

- NES1.2 Combines, separates and compares collections of objects, describes using everyday language and records using informal methods
- WMES1.2 Uses objects, actions, imagery, technology and/or trial and error to explore mathematical problems
- WMES1.5 Links mathematical ideas and makes connections with, and generalisations about, existing knowledge and understanding in relation to Early Stage 1 content.

LFN reference

Perceptual counting
Spatial patterns
Combining and partitioning procedures
Quinary based strategies
Base 10

How?

Ten frames



Model the use of *ten frames* on the overhead projector by filling the frame with two different-coloured transparent counters.

Encourage students to discuss the number combinations they see on the ten frame.

Variations



- Provide individual ten frames for students and allow them to make their own patterns. Have students discuss in pairs the combinations they have made on their ten frame. Students could record their combinations by copying the patterns onto a stencil of blank ten frames or by writing the number combinations.



- Ask your students to close their eyes and imagine a number pattern in their mind. Then have students make the pattern with counters on individual ten frames.



- Using an overhead projector, arrange a nominated number of counters into different patterns on the ten frame. Discuss which patterns were the easiest to see.
- Using an overhead projector and counters, display a pattern for a number in the range of one to ten on a ten frame. Remove or add one counter to the ten frame. Flash the ten frame again and ask the students to state how many counters there are now.

Why?

Developing strong visual images of patterns and combinations for numbers will assist students to recall number facts.

Where are they now?

Students are able to count perceived items but are unable to visualise the set when the concrete materials are removed.

Where to next?

Students are able to instantly recall number combinations to ten. They have a visual image of a set of items for a given number.

Outcomes

These activities provide opportunities for students to demonstrate progress towards the following outcomes: A student

- NES1.2 Combines, separates and compares collections of objects, describes using everyday language and records using informal methods
- WMES1.2 Uses objects, actions, imagery, technology and/or trial and error to explore mathematical problems
- WMES1.5 Links mathematical ideas and makes connections with, and generalisations about, existing knowledge and understanding in relation to Early Stage 1 content.

LFN reference

Perceptual counting
Spatial patterns
Partitioning and combining
Quinary based strategies

How?

Dot patterns



Make a dot pattern with up to five counters on the overhead projector. Use random patterns as well as die patterns. Encourage discussion relating to the patterns and combinations of parts to make a whole. Have the students copy the patterns with their own counters or draw the patterns. Allow other students to make a different pattern with counters on the overhead projector. Repeat this activity, using up to ten counters.

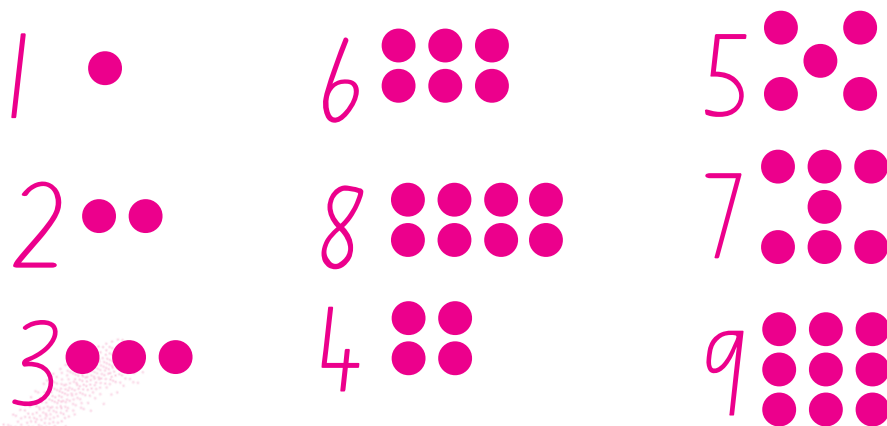
Flash cards



Give flash dot-pattern cards for numbers up to ten to the students. (See BLM on page 141). Provide students with a collection of counters so that they can construct the same pattern as on the dot-pattern card.

Variations

- Show a dot pattern to the students. Cover some dots and ask students to find a dot card to match the hidden dots.
- Flash the dot pattern to the class and then cover some dots. Ask the students how many dots could be seen and how many are hidden if there are ten altogether. This would be more easily done on an overhead projector, using transparent counters.



Why?

Frequent practice with dot patterns, combining groups to form patterns and partitioning collections, leads to visualisation of numbers. This assists the understanding of number relations and the knowledge of basic number facts.

Where are they now?

Students are able to count objects they can see, hear or feel. They are not able to visualise the set when the concrete materials are removed.

Where to next?

Students represent a number in a variety of ways and support their knowledge of number patterns through partitioning and combining.

Outcomes

These activities provide opportunities for students to demonstrate progress towards the following outcomes: A student

- NS1.2 Uses a range of mental strategies and informal recording methods for addition and subtraction involving one- and two-digit numbers
- PAS1.1 Creates, represents and continues a variety of number patterns, supplies missing elements in a pattern and builds number relationships
- WMS1.2 Uses objects, diagrams, imagery and technology to explore mathematical problems
- WMS1.4 Supports conclusions by explaining or demonstrating how answers were obtained.

LFN reference

Perceptual counting
Combining and partitioning

How?

Windows

Construct cardboard window frames covered with cellophane paper.

Show a numeral card and ask the students to make a row using that number of teddy bears. Ask the students to place their window frame after a nominated group of teddies. For example, with ten teddies, ask the students to show three teddies outside the window. (Students place the frame after the third teddy.) Instruct the students to look through the window and state how many teddies are inside the window.



Variations

- Have the students record the number combinations they make, such as $3 + 7$.
- Ask the students to state how many teddies will be on the other side of the window before checking.

Why?

Frequent practice with combining and separating groups to form patterns may lead to strong mental images of numbers. This assists students' understanding of number relations and automatic recall of number facts.

Where are they now?

Students:

- are able to count visible items but are not able to visualise the set when the concrete materials are removed
- demonstrate the meaning of subtraction by taking an object or groups of objects from a group of objects.

Where to next?

Students:

- are able to complete tasks with hidden or screened items
- demonstrate the difference between two groups of objects by using the language of comparison.



Encourage students to discuss their actions when completing the activity.

Outcomes

These activities provide opportunities for students to demonstrate progress towards the following outcomes: A student

- NS1.2 Uses a range of mental strategies and informal recording methods for addition and subtraction involving one- and two-digit numbers
- WMS1.2 Uses objects, diagrams, imagery and technology to explore mathematical problems.

LFN reference

Perceptual counting

How?

Diffy towers



Organise students into pairs and provide each pair with a die and a supply of Unifix blocks. The first student rolls a die, takes a corresponding number of Unifix blocks from a central pile and builds a tower with them. The second student rolls the die and repeats the process. They then compare the two towers to see who has the most blocks and determine the difference between the two towers. The player with the larger number of blocks keeps the difference and all other blocks are returned to the central pile. The activity continues until one student accumulates a total of ten blocks.



Why?

Frequent practice in combining and separating groups may lead to visualisation of numbers and number patterns. Strong visualisation of numbers enables students to solve problems without relying on concrete materials.

Where are they now?

Students:

- are able to count visible items but are not able to visualise the set when the concrete materials are removed
- demonstrate the meaning of subtraction by taking an object or groups of objects from a group of objects.

Where to next?

Students:

- are able to complete hidden tasks with hidden or screened items
- demonstrate the difference between two groups of objects by using the language of comparison.

Outcomes

These activities provide opportunities for students to demonstrate progress towards the following outcomes: A student

- NS1.2 Uses a range of mental strategies and informal recording methods for addition and subtraction involving one- and two-digit numbers
- WMS1.1 Asks questions that could be explored using mathematics in relation to Stage 1 content.

LFN reference

Perceptual counting

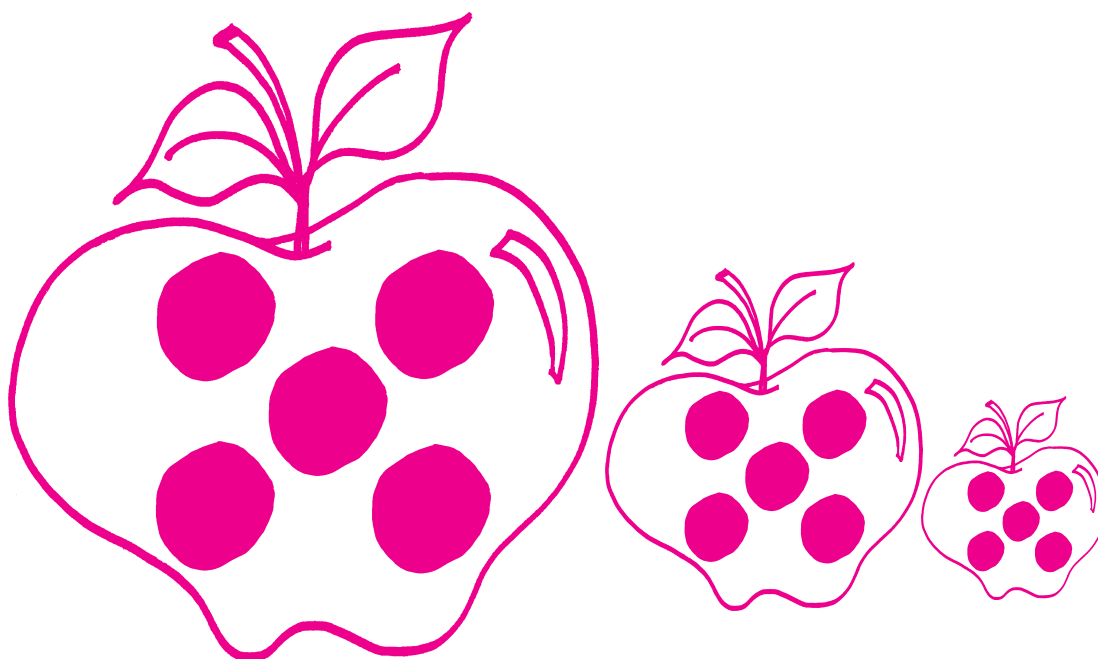
How?

Apple turnovers



Construct four sets of cards with dot patterns for the numerals 1 to 6. Cards could be made in the shape of apples. Give fifty counters to each pair of students. Shuffle the cards and place them face down on the table. Both players take a card from the pile of cards. The players determine the difference between the two numbers on the apple cards. The player with the larger number takes the difference in counters from his or her partner's pile of counters. Continue until all cards have been turned over. The player with the most counters is the winner.

(See BLM on page 139 for dot patterns.)



Variation

The player whose turned-up card shows fewer dots takes the difference in counters from the other player.

Why?

Frequent practice with combining and separating groups develops students' visualisation of numbers and number patterns. Strong visualisation of numbers enables students to solve problems without relying on concrete materials.

Where are they now?

Students need visual or tactile clues to complete arithmetical tasks. They can find the total of groups of objects when completing simple multiplication tasks, but count objects by ones.

Where to next?

Students see a group as a countable unit.

Outcomes

These activities provide opportunities for students to demonstrate progress towards the following outcomes: A student

- NS1.3 Uses a range of mental strategies and concrete materials for multiplication and division
- PAS1.1 Creates, represents and continues a variety of number patterns, supplies missing elements in a pattern and builds number relationships
- WMS1.1 Asks questions that could be explored using mathematics in relation to Stage 1 content.

LFN reference

Early multiplication and division

How?

Find a group



Demonstrate making equal groups of objects from classroom items.

Ask the students the following questions:

- How many objects in each group?
- How many objects are there altogether?

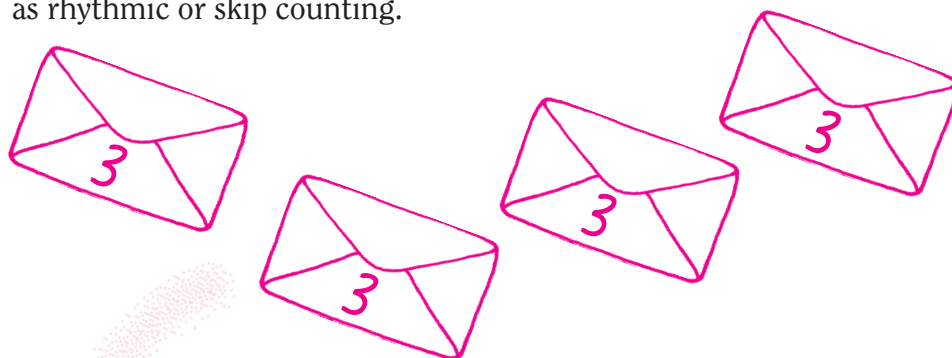
Trains



Construct train carriages from milk cartons or similar materials. Instruct the students to place equal numbers of Lego® people, or similar items, into each of the carriages. Ask questions similar to those outlined in *Find a group*.

Mail sort

Pin a row of four envelopes to a board. Ensure the board allows students easy access as they will need to be able to reach the envelopes to complete this activity. Write a numeral, for example three, on the outside of each envelope in the row. Instruct students to cut out pictures from magazines which they will use to “post” into the envelopes. Students “post” the correct number of items into the envelopes according to the numeral written on the outside. Discuss with the students the number of groups and the total number of items posted. Model methods of counting multiples, such as rhythmic or skip counting.



Why?

Students need to view a group of items as one countable item to develop multiplication and division concepts.

Where are they now?

Students are able to share items into equal groups using one-to-one dealing.

Where to next?

Students demonstrate a knowledge of skip counting as a preliminary use of multiples.

Outcomes

These activities provide opportunities for students to demonstrate progress towards the following outcomes: A student

- NS1.1 Counts, orders, reads and represents two- and three-digit numbers
- NS1.3 Uses a range of mental strategies and concrete materials for multiplication and division
- WMS1.3 Describes mathematical situations and methods using everyday and some mathematical language, actions, materials, diagrams and symbols
- WMS1.4 Supports conclusions by explaining or demonstrating how answers were obtained.

LFN reference

Early multiplication and division

How?



Rhythmic counting

As a class or in small groups, collect items to form a specified number of equal groups. Lead the students in counting the total of the groups. Emphasise the multiple count. For example, when counting groups of three, count 1, 2, **3**, 4, 5, **6**, 7, 8, **9**, stressing each multiple of three.

Body percussion

Using body actions, accentuate the multiple count when finding the total number of specified groups. For example, to stress the count for multiples of three, direct the students to tap their heads for the first count, tap their shoulders for the second count and click their fingers for the third. Then repeat the pattern while counting.

Why?

The development of counting in multiples supports the understanding of the concepts of multiplication and division.

Where are they now?

Students are able to share items into equal groups using one-to-one dealing.

Where to next?

Students demonstrate a knowledge of skip counting as a preliminary use of multiples.

Outcomes

These activities provide opportunities for students to demonstrate progress towards the following outcomes: A student

- NS1.3 Uses a range of mental strategies and concrete materials for multiplication and division
- WMS1.3 Describes mathematical situations and methods using everyday and some mathematical language, actions, materials, diagrams and symbols

LFN reference

Early multiplication and division

Percussion instruments

This activity is similar to *Body percussion*. Use percussion instruments to stress the beat and count.



With the two above activities, begin by demonstrating the procedure using word patterns rather than the number sequence. For example, say the following pattern while completing actions or tapping an instrument: “Soft, soft, loud, soft, soft, loud.”

After the students have practised this procedure with word patterns, model oral counting and then have the class join in the counting sequence.

As the students become competent at rhythmic counting, voice the stressed numbers only in the count. Students could, for example, complete the following pattern. For the first and second count they tap their heads. For the third count they call out “three”. They then continue the pattern, voicing only the numbers which are multiples of three.

Students form a double circle, with both circles facing each other. One circle stands still and chants a number sequence, accenting the numbers which are multiples of a nominated number. The other circle takes sideward steps in one direction to the beat of the count. On the accented count the students who are moving clap hands with the partner opposite at that count.

Why?

The development of counting in multiples supports the understanding of multiplication concepts.

Where are they now?

Students share items into equal-sized groups using one-to-one dealing.

Where to next?

Students can use the structure of groups to find the total number of items.

Outcomes

These activities provide opportunities for students to demonstrate progress towards the following outcomes: A student

- NS1.3 Uses a range of mental strategies and concrete materials for multiplication and division
- WMS1.1 Asks questions that could be explored using mathematics in relation to Stage 1 content.

LFN reference

Early multiplication and division

How?

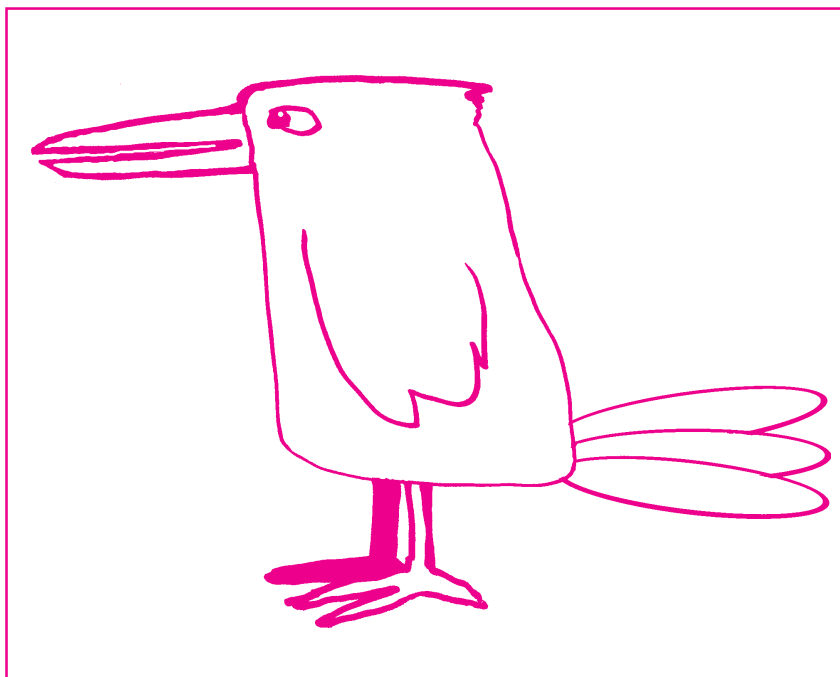
Canisters



Provide the students with a group of objects such as feathers, counters or popsticks. Ask the students to estimate how many items they would put into each canister to make the groups equal. Allow students to check their estimations by using the concrete material to solve the problem.

Kookaburras

Provide a collection of feathers. Instruct the students to place equal groups of feathers onto cardboard outlines of birds. Ask the students to determine the total number of feathers, using rhythmic counting.



Why?

Students need to develop concepts of making and counting equal groups to solve multiplication and division problems.

Where are they now?

Students share items into equal-sized groups using one-to-one dealing.

Where to next?

Students can use the structure of groups to find the total number of items.

Outcomes

These activities provide opportunities for students to demonstrate progress towards the following outcomes: A student

- NS1.1 Counts, orders, reads and represents two- and three-digit numbers
- NS1.3 Uses a range of mental strategies and concrete materials for multiplication and division
- WMS1.1 Asks questions that could be explored using mathematics in relation to Stage 1 content.

LFN reference

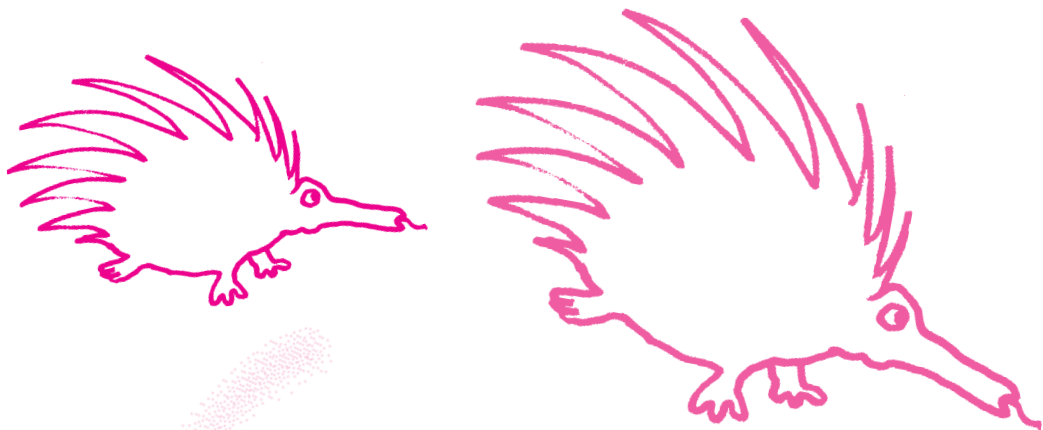
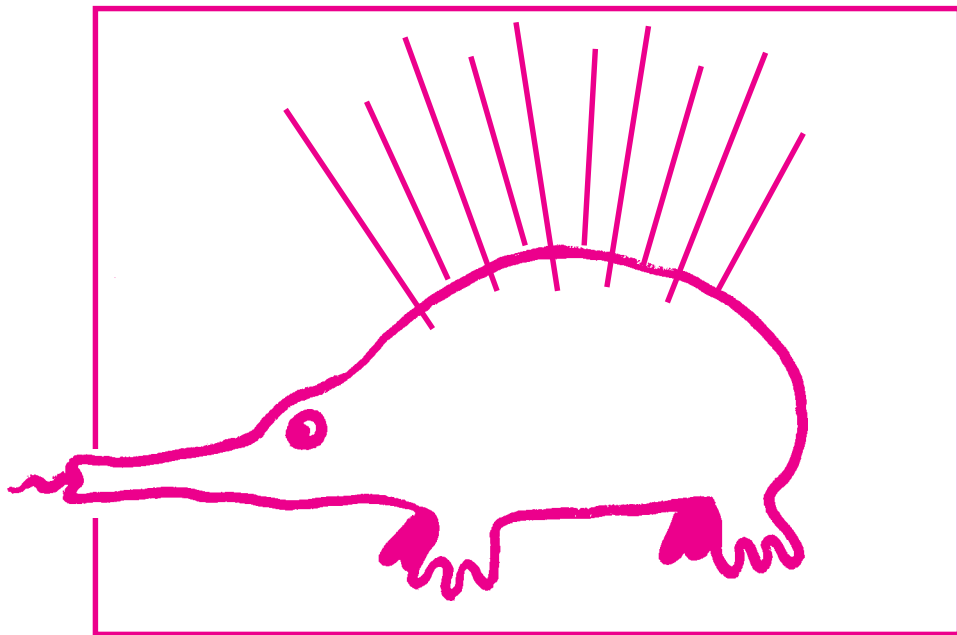
Early multiplication and division

How?

Echidnas



Make three or four echidnas from clay or plasticine. Provide the students with a collection of toothpicks. Have the students place equal groups of toothpicks into each echidna. Ask the students to determine the total number of toothpicks, using rhythmic counting.



Why?

Students need to develop concepts of making and counting equal groups to solve multiplication and division problems.

Where are they now?

Students share items into equal-sized groups using one-to-one dealing.

Where to next?

Students can use the structure of groups to find the total number of items.

Outcomes

These activities provide opportunities for students to demonstrate progress towards the following outcomes: A student

- NS1.1 Counts, orders, reads and represents two- and three-digit numbers
- NS1.3 Uses a range of mental strategies and concrete materials for multiplication and division
- WMS1.2 Uses objects, diagrams, imagery and technology to explore mathematical problems
- WMS1.4 Supports conclusions by explaining or demonstrating how answers were obtained.

LFN reference

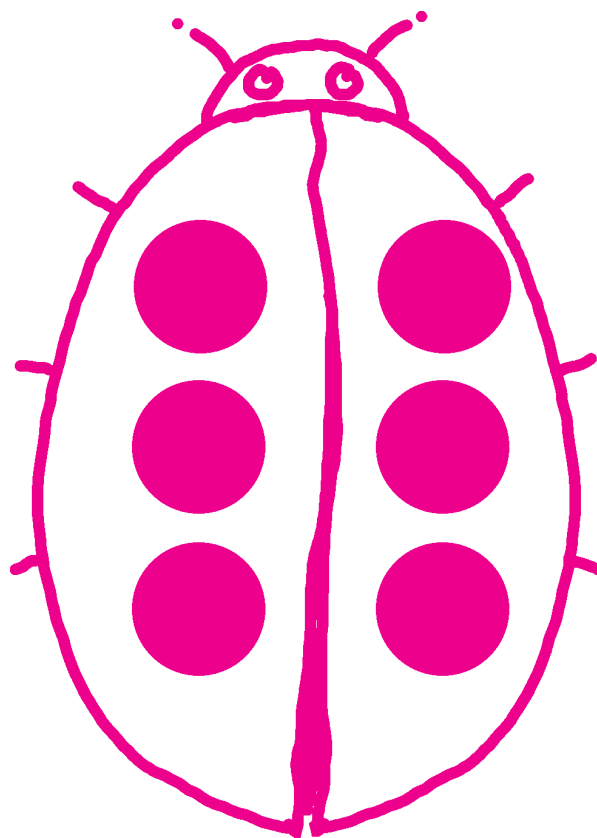
Early multiplication and division

How?

Ladybirds



Provide students with outlines of ladybirds and a supply of dot strips. Ensure there are enough dot strips to provide two for each ladybird. Each dot strip should display the same number of dots. Students place two dot strips onto each ladybird. They then determine the total number of dots.



Model the process of counting by twos. Present a pile of counters to the students. Have the students drag down two counters at a time from the pile. Encourage students to use skip counting by twos to determine the total number of counters.

Why?

Students need to develop concepts of making and counting equal groups to solve multiplication and division problems.

Assessment tasks

Task	Student response	Assessment
T: "Count from one until I tell you when to stop."	S: States the forward number word sequence correctly from one to twenty.	Does the student know the forward number word sequence to 20?
T: "Say the number after..." e.g. 8.	S: Correctly states the number one more than the number given e.g. "The number after 8 is 9."	Did the student count from one to find which number came next?
T: "Count backwards from 23. I'll tell you when to stop." (Say stop when the student reaches 16.)	S: States the backward number word sequence from 23 to 16.	Does the student know the backward number word sequence? Is the student able to count backwards correctly from "twenty" to the "teens"?
T: "Tell me the number before...?" e.g. 8	S: Correctly states the number one less than the number given, e.g. "The number before 8 is 7."	Did the student count up from one?
T: Displays 4 counters and hides 2 counters in palm of hand. "I have 6 counters altogether; 4 are here. How many are hidden in my hand?"	S: Determines the missing addend.	Does the student use a strategy of "counting up from" or "counting down to"?
T: Displays 5 counters: "There are 5 counters here. How many more do I need to make 7?"	S: Determines the missing addend.	Did the student count on from 5?
T: Displays 7 counters: "There are 7 counters here. I am taking some away and there are 4 left. How many are in my hand?"	S: Determines the missing addend.	Does the student count on from 4? Did the student use a forward number word sequence or a backward number word sequence? e.g. 7, 6, 5, 4 or, 4, 5, 6, 7

3-MINUTE



Three-minute lesson breakers



- “Hold your hands up and quickly form finger patterns representing numbers. You may flash a finger pattern for a single-digit number or make a two-digit number by flashing ten fingers as many times as necessary, followed by a pattern representing a single digit.” The students silently add the numbers and call out the answer.



- Display a jar containing a collection of items. Students may either guess the number of objects or record their guesses and submit them for a raffle-style draw at the end of the day. The collection, or number of items, should be changed on a regular basis.



- Call out a number and have the students form groups of that number and sit as a group. Any students left standing nominate the next number.



- Count aloud as classroom equipment is given out or collected.



- A number is nominated during aerobics activities and each exercise must be completed that many times. That is, if the number is 10, each student must complete 10 star jumps, 10 knee bends, 10 toe touches, etc.



