Students at the counting on stage

Students at the counting on stage

The nature of the learner

Students working within the counting on stage are able to use their knowledge of both the forward and backward sequences of number words to solve addition and subtraction questions. The strategies of counting on from a given number and counting down from a given number are confidently used.

The strategies typically used include:

Counting up from

Students count forward from the larger number when finding the total of two numbers. For example, when adding 6 and 3, the student would count from six, and say "seven, eight, nine,... nine!"

Counting up to

Students sometimes use the strategy of "counting up to" in an effort to find the difference between two numbers. For example, when solving the problem $6 + (?) = 9$, a student could count from six, knowing he is counting forward to the number nine, and say, " seven, eight, nine." This is often combined with the student holding up fingers to keep track of the count. The answer is obtained from the number of fingers held up after counting.

Counting down from

Counting down from the larger number is another way of finding the difference between two numbers. For example, when solving $9 - 3$, a student could count backwards from nine saying, "eight, seven, six...six!"

Counting down to

When counting down to the smaller number to solve subtraction problems, students count backward from the larger number. For example, when solving $9 - (?) = 6$, a student could count backwards from nine knowing he or she is counting to the number six, and say, "eight, seven, six". In

this procedure students would often hold up fingers as they count and read the answer from the number of fingers visible at the end.

The distinguishing feature of students at the counting on stage is their use of the number sequence. Students recognise the number sequence as a chain that can be broken. The number six, for example, is the sixth number in this chain. Consequently, to add 6 and 3, it is not necessary to go back to 1 and count up to 6. Instead, the sequence can build on from 6.

Students at this stage are also developing automatic recall of basic addition and subtraction facts. They are able to produce forward and backward number word sequences up to and beyond 100. They can also use their understanding of the base ten number system to solve number tasks, using concrete materials to visually represent the numbers involved.

Students at the counting on stage are working towards:

- applying a variety of strategies other than counting by ones to solve arithmetical tasks

- forming equal groups and finding the total, using skip counting

- developing a concept of ten as a unit.

Teaching considerations

- ### Strategy development

    As students develop a wider range of arithmetical strategies, teachers need to model and explain the appropriate use of these procedures in problem solving. Students need to become competent in selecting and using the most effective strategy.

- ### Language development

    Students working at the counting on stage are developing a wide range of arithmetical strategies. Teachers need to model the mathematical language when explaining classroom activities. Vocalising the procedures used enables students to clarify their thinking and to reinforce the concepts they are developing.

- ### Numeral identification

    Whilst using the arithmetical strategies associated with the counting on stage, students may be working at various levels within the numeral identification aspect of the learning framework in Number.

Index of activities

Where are they now?

Students:

- know the forward number word sequence and backward number word sequence to 30 or beyond

- understand the use of both cardinal (how many) and ordinal (what comes before or after) numbers.

Where to next?

Students are able to:

- identify numerals to 100 and beyond

- sequence multiples, for example, know that 60 comes after 50

- recognise ten as a unit composed of ten ones.

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

WMS1.1   Asks questions that could be explored using mathematics in relation to Stage 1 content.

LFN reference

Numeral identification
Forward number word sequence
Backward number word sequence

COUNTING ON

How?

Celebrity head

Display a number line showing numbers from 1 to 100 so that all the students in the class can see it. Place movable marker tabs at either end of the strip. One student wears a headpiece to which a numeral card is attached. Ensure that the student does not see the number on the numeral card. Ask the student to have the class help to identify the "secret number". The class, however, can respond only with a yes or no reply to each question. In response to the answers, the selected student then moves the tabs along the number line to indicate the range within which the "secret number" lies. Continue the process until the student is able to identify the number.

Why?

This activity provides practice in recognising and sequencing numbers up to 100.

This will assist students' counting skills.

Where are they now?

Students:

- know the forward number word sequence and backward number word sequence to 30 or beyond
- understand the use of both cardinal (how many) and ordinal (what comes before or after) numbers.

Where to next?

Students are able to:

- identify numerals to 100 and beyond
- sequence multiples, for example, know that 60 comes after 50
- recognise ten as a unit composed of ten ones.

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

WMS1.1   Asks questions that could be explored using mathematics in relation to Stage 1 content.

LFN reference

Numeral identification
Forward number word sequence
Backward number word sequence

Variations

The price is right

Display a vertical numeral strip to the students. Ask one student to think of a number on the numeral strip. The remainder of the class take turns to guess the number. After each guess, allow the student to point to the nominated number on the number line. The student then states if the guess is higher or lower than the number being thought of. Encourage the students to use the responses from previous guesses when making the next guess.

Guess my number

Provide a calculator for each pair of students. Ask one student to enter a number into the calculator and hide the screen. Instruct the partner to ask questions which will enable him or her to guess the hidden number on the calculator.

Why?

This activity provides practice in recognising and sequencing numbers up to 100.

This will assist students' counting skills.

Where are they now?

Students are able to identify numerals to 100.

Where to next?

Students are able to identify and sequence numerals beyond 100.

Outcomes

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

MS1.3   Estimates, measures, compares and records volumes and capacities using informal units

NS1.1   Counts, orders, reads and represents two- and three-digit numbers

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

Strategies other than counting by one
Numeral identification

How?

Grocery grab

Display a collection of grocery packages of varying weight up to 1 kilogram. Allow the students to compare the weight of each item according to the number of grams indicated on each package. Have the students record the weight of each item in grams. Instruct the students to then sequence the items from lightest to heaviest.

Variation

Collect from catalogues pictures of items costing less than $1000 . Ensure the price of each item is clearly indicated. Present the catalogue items to the students and ask them to sequence the items in terms of cost.

Wipe out

Provide each student with a calculator. Ask the students to enter a specific three-digit number into their calculators. Choose one of the digits from the number entered and ask the students to use an arithmetical method to change the nominated digit to zero. For example, have the students enter the numeral 268 in their calculator. Follow this by asking, "How can you change the 6 to 0?"

Why?

These activities provide opportunities for students to further develop concepts of place value.

Where are they now?

Students:

- are able to count on from the larger of two groups to solve addition tasks

- are able to say correctly the forward number word sequence up to 100

- have an understanding of composite units, for example, that one five is composed of five ones.

Where to next?

Students:

- are able to use ten as a countable unit to solve tasks

- have automatic recall of number combinations for use with addition, subtraction and early multiplication tasks.

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

PAS1.1   Creates, represents and continues a variety of number patterns, supplies missing elements in a pattern and builds number relationships

WMS1.4   Supports conclusions by explaining or demonstrating how answers were obtained.

LFN reference

Forward number word sequence
Backward number word sequence
Numeral identification: level 3

COUNTING ON

How?

Skip counting

Lead the students in oral counting in unison by tens, up to 100, and then backwards from 100. Support the oral counting by pointing to the location of these numbers on the one hundred chart. Cover the multiples of ten on the hundred chart and have a student point to the position of each number as the class counts forwards or backwards by ten. Vary the activity by using other counting patterns, such as counting by twos or counting by fives.

Why?

- Knowing number patterns and counting sequences for multiples will assist students' mental computations.

Where are they now?

Students know that each ten is composed of ten "ones".

Where to next?

Students are able to use the structure of "ten" as a countable unit.

They are able to solve addition and subtraction tasks involving tens and ones without using concrete materials.

It is easier for students to count the groups of ten if each tower is a different colour.

Outcomes

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

MS1.1   Estimates, measures, compares and records lengths and distances using informal units, metres and centimetres

NS1.1   Counts, orders, reads and represents two- and three-digit numbers

WMS1.2 Uses objects, diagrams, imagery and technology to explore mathematical problems.

LNF reference

Base ten: level 2
Forward number word sequence
Numeral identification

How?

Straw javelin

Place masking tape on the floor to indicate a starting point. Organise the students into a line behind the starting point. Have the students take turns to throw a straw as far as they can. Provide the students with Unifix blocks which have been assembled into towers of ten, as well as single blocks. The students then measure the distance the straw travelled by placing the Unifix blocks along the floor from the starting point to the straw.

Why?

This activity may develop the idea that ten, made up of ten ones, can be used as a countable unit.

Where are they now?

Students know that each ten is composed of ten "ones".

Where to next?

Students are able to use the structure of "ten" as a countable unit.

They are able to solve addition and subtraction tasks involving tens and ones without using concrete materials.

It is easier for students to count the groups of ten if each tower is a different colour.

Outcomes

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

MS1.1   Estimates, measures, compares and records lengths and distances using informal units, metres and centimetres

NS1.1   Counts, orders, reads and represents two- and three-digit numbers

WMS1.2   Uses objects, diagrams, imagery and technology to explore mathematical problems.

LNF reference

Base ten: level 2
Forward number word sequence
Numeral identification

COUNTING ON

(Straw javelin)

Variations

- Change the activity from throwing a straw to other actions, such as taking a giant step from the starting point and then measuring the distance of the steps using the Unifix blocks.

- Organise the students into pairs. Provide each pair of students with lengths of string and ask them to use the string to measure their arm span and their height. After the students have completed measuring with the string, they place the string on the floor. Have the students use the towers of ten Unifix blocks to record the length of the string.

Why?

This activity may develop the idea that ten, made up of ten ones, can be used as a countable unit.

Where are they now?

Students rely on the strategy of counting by ones to solve addition tasks.

Where to next?

Students are able to use a range of strategies other than counting by one to solve addition tasks.

Model various strategies for adding three dice.

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

WMS1.3 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

Facile counting

How?

Three-dice game

Prepare a set of numeral cards for the numbers three to eighteen. Lay the cards face up in a line on the desk or floor. Have the students take turns to roll three dice and add together the numbers rolled, then take a corresponding numeral card. The game continues until all cards have been taken. If the numeral card has already been taken, the player's turn is forfeited.

Variations

- Use a variety of dice, such as dot and numeral dice.

- Provide each student with a set of numeral cards for the numbers three to eighteen. Have the students take turns to roll three dice and find the total. Each time a student states the total of the three dice, all students place a counter on the corresponding numeral card in their set. The game continues until all numerals have been covered.

Why?

These activities provide an opportunity for students to develop strategies other than counting by ones to solve number problems. These strategies may include applying knowledge of doubles, doubles plus one more, number combinations to five and ten, and known addition facts.

Where are they now?

Students automatically recall number combinations to ten.

Where to next?

Students automatically recall number combinations to twenty.

Encourage students to use strategies other than counting by ones to determine the answers.

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

WMS1.4   Supports conclusions by explaining or demonstrating how answers were obtained.

LFN reference

Counting on
Facile counting
Forward number word sequence
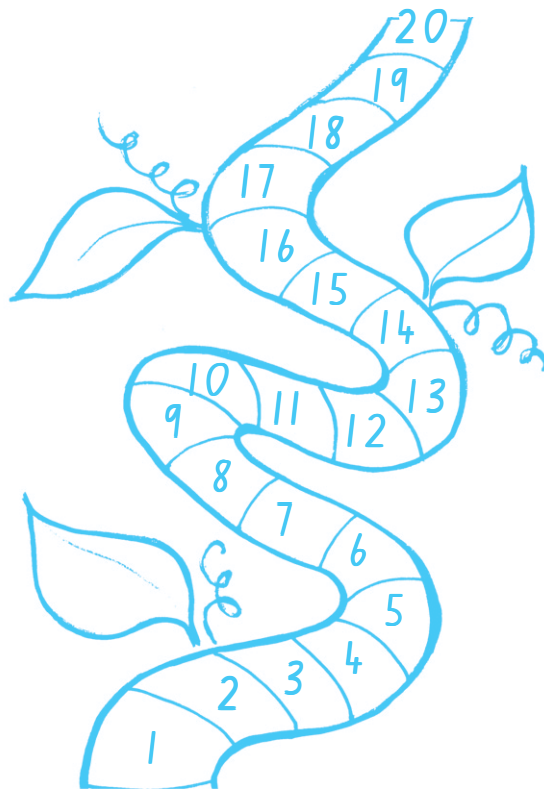Backward number word sequence

COUNTING ON

How?

The beanstalk

This activity is best completed with a maximum of five students.

Prepare Beanstalk base board using the BLM on page 291 and a pack of instruction cards. The instruction cards should state the direction in which the student moves along the beanstalk, either up or down, and the number of spaces to move, for example, "go up three spaces."

Commence the activity by instructing each student to place a marker at position 10 on the beanstalk. In turns students take an instruction card, follow the directions and move their marker accordingly along the beanstalk. The winner is the first person to reach the castle at the top of the beanstalk. An option is to have the students record the number sentences.

Why?

Students need to be able to recall number facts automatically. This will allow them to focus on other aspects of problem solving.

Where are they now?

Students automatically recall number combinations to ten.

Where to next?

Students automatically recall number combinations to twenty.

Encourage students to use strategies other than counting by ones to determine the answers.

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

Counting on
Facile counting
Forward number word sequence
Backward number word sequence

COUNTING ON

Put in, take out

Prepare a set of "start with" cards displaying the numerals from eleven to twenty on coloured card, and a set of "put in" cards displaying the numerals from zero to nine on a different coloured card. Students will also require a large container and a supply of items, such as counters or beads, and writing material. Alternatively, if the students are able to read "start with" and "put in", both sets of cards can be on the same coloured cardboard with the instructions written on them.

Ask the first student to take a "start with" card from the pack, read the numeral and put a corresponding number of items into the container. The student then takes a "put in" card from the other pack, reads the numeral and collects the corresponding number of additional items to add to the container. Encourage the students to say what the total will be before they check by counting on from the first group as each additional item is dropped into the container. Have the students record their actions as number sentences.

Why?

Students need to be able to recall number facts automatically. This will allow them to focus on other aspects of problem solving.

Where are they now?

Students automatically recall number combinations to ten.

Where to next?

Students automatically recall number combinations to twenty.

Encourage students to use strategies other than counting by ones to determine the answers.

Outcomes

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

WMS1.2   Uses objects, diagrams, imagery and technology to explore mathematical problems

WMS1.2   Uses objects, diagrams, imagery and technology to explore mathematical problems

LFN reference

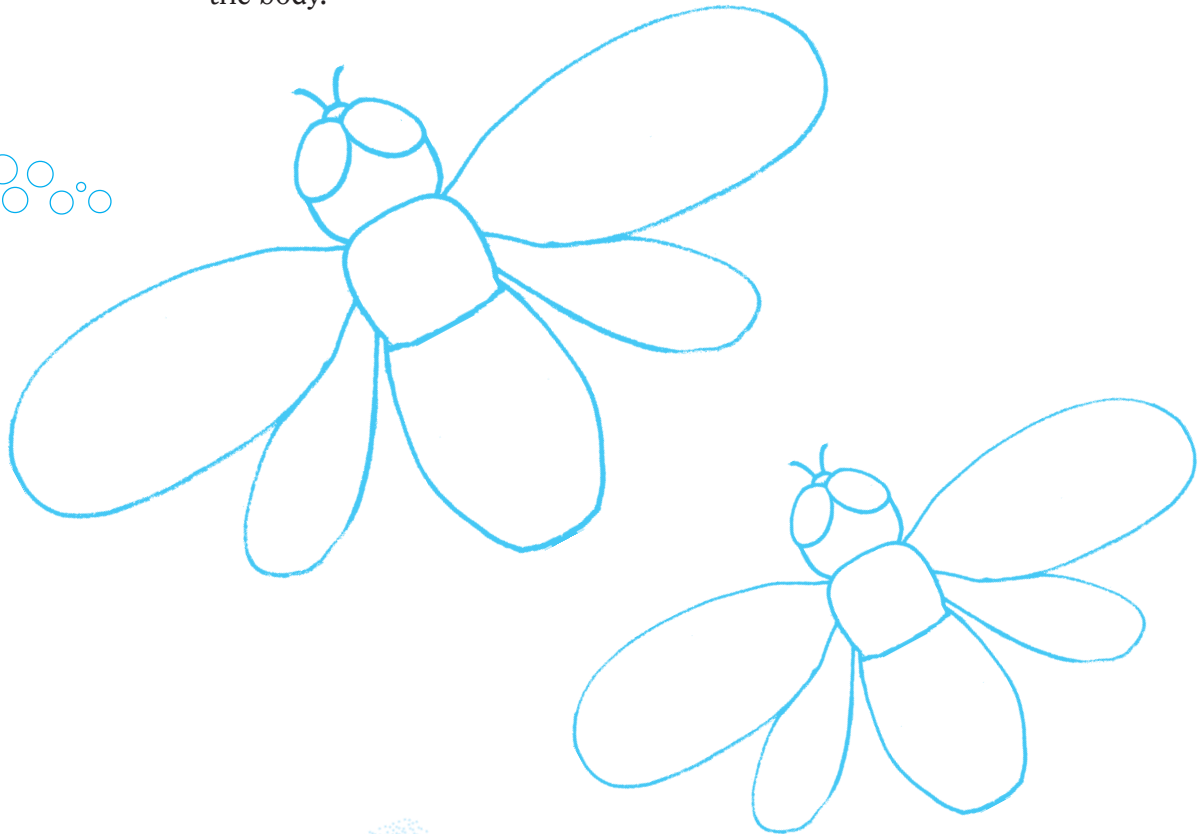Counting on
Facile counting

COUNTING ON

How?

Bees

Construct cardboard bees using the BLM on page 283. Write numerals, selected from the range 11 to 20, on the middle section of each bee. On the wings, display dot patterns which, when added together, equal the numeral displayed on the body. The stencil will need to be cut so that the wings and body are in separate pieces. Place the wings and body parts down on the floor in a random arrangement. Ask the students to select one of the bee bodies and to find the correct pair of wings which, when the dot patterns are added together, will equal the numeral written on the body.

Why?

Students need to be able to recall number facts automatically. This will allow them to focus on other aspects of problem solving.

Where are they now?

Students automatically recall number combinations to ten.

Where to next?

Students automatically recall number combinations to twenty.

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

WMS1.4   Supports conclusions by explaining or demonstrating how answers were obtained.

LFN reference

Facile counting strategies

COUNTING ON

How?

Combination trains

Prepare a collection of toy trains and carriages. If toy trains are unavailable, construct trains from Lego®, milk cartons or other suitable material. Attach a numeral card to each engine and carriage. Ask the students to select two carriages and find the total by adding the numerals written on the cards. The students then match the two carriages to an engine displaying the numeral corresponding to the total.

Why?

Students need to be able to recall number facts automatically. This will allow them to focus on other aspects of problem solving.

Where are they now?

Students automatically recall number combinations to ten.

Where to next?

Students automatically recall number combinations to twenty.

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

WMS1.2   Uses objects, diagrams, imagery and technology to explore mathematical problems.

LFN reference

Facile counting strategies

How?

Unit squares

Provide the students with thirteen squares of paper. Each square should have one side coloured green and the other side red. Place the cards in a line in front of the students, with the red side face up. Indicate to the students that the squares represent the number sentence: $13 + 0 = 13$. Turn one card over to reveal a green side and discuss the number sentence that is now represented by the green and red squares, that is, $12 + 1 = 13$. Continue turning over additional cards to reveal the green side. Encourage the students to state the number combinations represented by the red and green squares. Vary the number of coloured squares used.

Dice toss

Provide the students with two dice. Use dice which display a range of numerals other than those on a traditional die. Ask the students to take turns to roll the two dice and add them together to find the total. Provide material for students to record the number sentences.

Combination flip

Construct a number strip displaying numerals in the range 4 to 18. Prepare numeral cards for the numbers 2 to 9 and an additional card with the numeral 9 written on it. Place the cards in order from 2 to 9, face down. Have the students take turns to turn over two cards and add the total. The students then place a counter on the corresponding numeral on the number strip.

Why?

Students need to be able to recall number facts automatically. This will allow them to focus on other aspects of problem solving.

Where are they now?

Students automatically recall number combinations to ten.

Where to next?

Students automatically recall number combinations to twenty.

Encourage the students to verify each other's calculations before completing another problem.

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

WMS1.3   Describes mathematical situations and methods using everyday and some mathematical language, actions, materials, diagrams and symbols.

LFN reference

Facile counting strategies

How?

Number balances

Prepare a stencil displaying a balance. The stencil should show one box resting on the left-hand side of the balance and two boxes stacked on the right-hand side of the balance. Prepare two sets of numeral cards, each set on a different coloured cardboard. The first set should contain the numerals 2 to 20 and the second set contain two cards for each numeral from 1 to 10. Have the students select a card from the first set and place it onto the left-hand side of the balance. Students then find two numeral cards from the second set which, when added together, total the numeral on the left side. The students then place the cards on the right side of the balance.

Domino addition

Prepare domino cards which resemble commercially produced dominoes, or use traditional dominoes for this activity. Provide the students with a supply of the domino cards, or dominoes, and writing material. Deal five dominoes to each student in the group. Ask the students to record both dot patterns displayed on the dominoes as addition number sentences.

Why?

Students need strategies other than counting by ones to solve number problems. These strategies may include applying knowledge of doubles, tens and ones and recall of number combinations.

Where are they now?

Students automatically recall number combinations to ten.

Where to next?

Students automatically recall number combinations to twenty.

Encourage the students to verify each other's calculations before completing another problem.

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

DS1.1   Gathers and organises data, displays data using column and picture graphs and interprets the results

WMS1.2   Uses objects, diagrams, imagery and technology to explore mathematical problems.

LFN reference

Facile counting strategies

COUNTING ON

How?

Addition lotto

Prepare lotto cards displaying numerals in the range eleven to twenty. Select a student to act as a caller. This student calls out any two numbers in the range one to ten and records the total, out of view of the class. The remaining students add the two numbers that have been called and, if the total corresponds to a numeral on their lotto card, they cover the numeral with a counter. The game continues until one student covers all the numerals on the lotto card.

Five dice

Provide the students with five dice. Have the students take turns rolling the dice and finding the total of all five dice rolled. The first student to roll numbers that add up to twenty is the winner. Students can record their totals for each roll.

Variation

Have the students see if they can get a total of twenty within five turns. The results for each student for the five rolls can be recorded. The data could be used to generate a class graph of the results for the five dice.

Why?

Students need strategies other than counting by ones to solve number problems. These strategies may include applying knowledge of doubles, tens and ones and recall of number combinations.

Where are they now?

Students automatically recall number combinations to ten.

Where to next?

Students automatically recall number combinations to twenty.

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

WMS1.4   Supports conclusions by explaining or demonstrating how answers were obtained.

LFN reference

Facile counting strategies

How?

Build a tower

Organise the students into pairs. Provide each student with ten Unifix blocks as well as an additional pile of blocks, such as twenty, for each pair of students. Prepare "direction cards" showing either addition or subtraction tasks, for example: + 3. Have the students take turns to draw a "direction card" and follow the instruction by adding or subtracting the correct number of blocks to their tower. The winner is the first to make a tower of twenty blocks.

Ask the students to explain their strategies for solving the problems to their partners.

Why?

Students need strategies other than counting by ones to solve number problems. These strategies may include applying knowledge of doubles, tens and ones and recall of number combinations.

Where are they now?

Students automatically recall number facts to ten.

Where to next?

Students are able to use strategies other than counting by ones to solve number problems. They are able to automatically recall addition facts to twenty.

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

Facile counting strategies

COUNTING ON

How?

Race to the pool

Prepare an adequate supply of base boards using the BLM on page 284. Organise students into pairs and provide them with two dice and two markers. Have the students place their markers at the starting position on the base board. Ask the students to take turns to roll the dice and add both numbers rolled. The student then moves the marker to the first corresponding numeral on the base board. The first player to reach the "pool" at the centre of the board wins.

Why?

This activity provides opportunities for students to develop a range of strategies for solving addition tasks.

Where are they now?

Students automatically recall number facts to ten.

Where to next?

Students are able to use strategies other than counting by ones to solve number problems. They are able to automatically recall addition facts to twenty.

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

Facile counting strategies

How?

Sentence maker

Provide each student with a collection of numeral cards from zero to ten and a calculator. Call out a number between eleven and twenty. Allow two or three minutes for students to select number cards which add to the nominated number. Encourage the students to find all the possible number combinations for the nominated number. The students should record each number combination. After the allotted time, have the students verify the additions with the use of the calculator.

Addition wheel
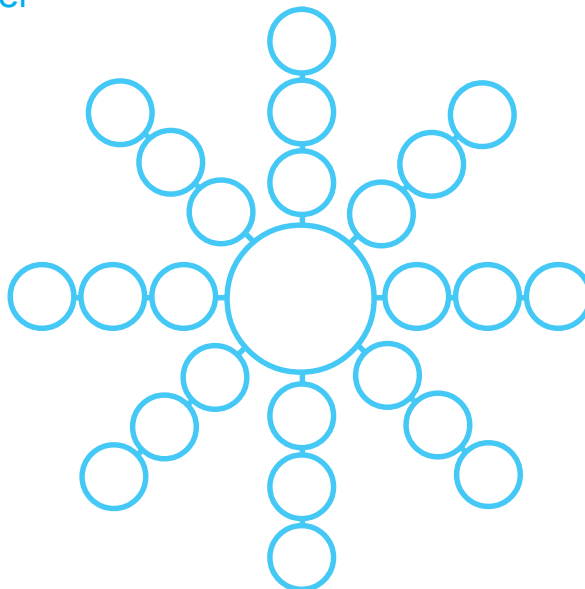
Provide students with a copy of the addition wheel stencil. (See the BLM on page 285.) Ask the students to write a number between eleven and twenty on the centre of the wheel. The students then need to determine the number combinations which would equal the number at the centre of the wheel. Have the students record the number combinations within the "spokes" of the addition wheel, radiating out from the centre. Provide the students with calculators to verify their calculations.

Why?

This activity provides opportunities for students to develop a range of strategies for solving addition tasks.

Where are they now?

Students automatically recall number facts to ten.

Where to next?

Students are able to use strategies other than counting by ones to solve number problems. They are able to automatically recall addition facts to twenty.

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

WMS1.4   Supports conclusions by explaining or demonstrating how answers were obtained.

LFN reference

Facile counting strategies

How?

Balancing numbers

Construct number sentence cards where the addends are selected from numbers between 11 and 20. Prepare a chart with a balance beam drawn on it, as shown in the diagram.


Organise the students into pairs. Ask the students to take turns to place a number sentence card on each side of the balance so that the sum of each card is equal. Allow students to confirm their partner's answer.

Return to mother ship

Construct large "mother" spaceships from cardboard. Write a numeral from ten to twenty on each "mother ship". Construct small cardboard spaceships which display addition and subtraction facts resulting in answers from 10 to 20. Ask the students to solve the number problems on each small spaceship and match them to a "mother ship" displaying a corresponding numeral.
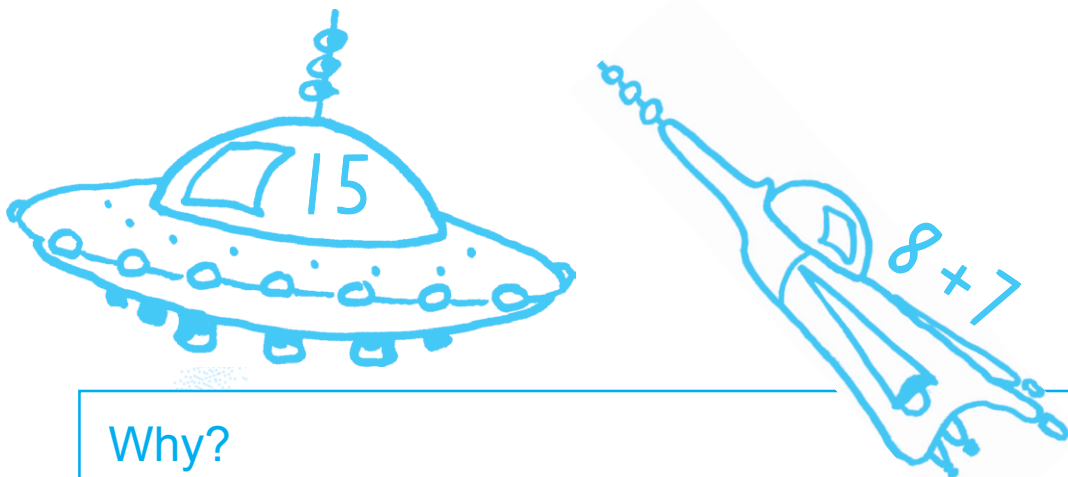
Why?

These activities provide opportunities for students to develop a range of strategies for solving addition tasks.

Where are they now?

Students:

- use advanced count-by-one strategies to solve addition tasks
- automatically recall number facts to ten.

Where to next?

Students:

- use a range of strategies other than counting by one
- automatically recall number facts to twenty.

Provide opportunities for oral counting by 5s.

If the students are not competent in counting by 5s use tally marks to record scores.

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

WMS1.4 Supports conclusions by explaining or demonstrating how answers were obtained.

LFN reference

Strategies other than counting by one
Quinary strategies

How?

Fact matching

Construct two sets of cards. The first set consists of the "sum cards" and should contain one card for each numeral from 0 to 18. The second set consists of the "digit cards" and should contain four cards for each numeral from 0 to 9. Also provide cards displaying subtraction and addition symbols.

Shuffle the "digit cards" and deal four cards to each student, placing them face up before the student. Shuffle the "sum cards" and place them in a pile, face up.

Ask the students to use their digit cards to make a number fact which will equal the numeral shown on the top "sum card" displayed. For every number combination made, students score five points. After the students have made all possible combinations, ask the students to hand in their cards, shuffle all digit cards and deal four new cards to each player. Turn over a new "sum card" and repeat the process. The winner is the student with the highest score.

Variation

Deal six digit cards to each player. The student gains five points for combining two numbers which equal the "sum card" and ten points for correctly combining three digit cards which equal the "sum card".

Why?

Students need to develop a range of strategies for solving arithmetic problems. Automatic recall of number combinations is an efficient strategy.

Where are they now?

Students are able to solve tasks involving tens and ones but require concrete materials to visually represent the numbers.

Where to next?

Students solve addition and subtraction tasks involving tens and ones without the use of concrete materials.

Provide many opportunities for oral counting by 10s using the hundred chart before playing these games. As students become more proficient, remove the counting materials.

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

NS1.2 Uses a range of mental strategies and informal recording methods for addition and subtraction involving one- and two-digit numbers

WMS1.4 Supports conclusions by explaining or demonstrating how answers were obtained.

LFN reference

Base ten

How?

Ghost busters

Prepare "Ghost buster" base boards using the BLM on page 288. Write the numerals 0, 10, 20, 30, 40, 50, 60, 70, 80, 90 and 100 on the outlines of the ghosts on the base board. Prepare two dice, one displaying 10, 20, 30, 40, 50, 60 and the other displaying 0, 10, 20, 30, 40. If the second dice has 6 sides, double-up on one of the displayed numerals or add an appropriate variation to the game. Give each student fifteen counters and bundles of ten items, such as ten strips or towers of ten Unifix cubes.

Ask the students to take turns to roll the two dice. Students then add the dice together using the materials to support them with their counting. They then place a counter onto a ghost displaying the corresponding numeral. The winner is the first to cover all the ghosts.
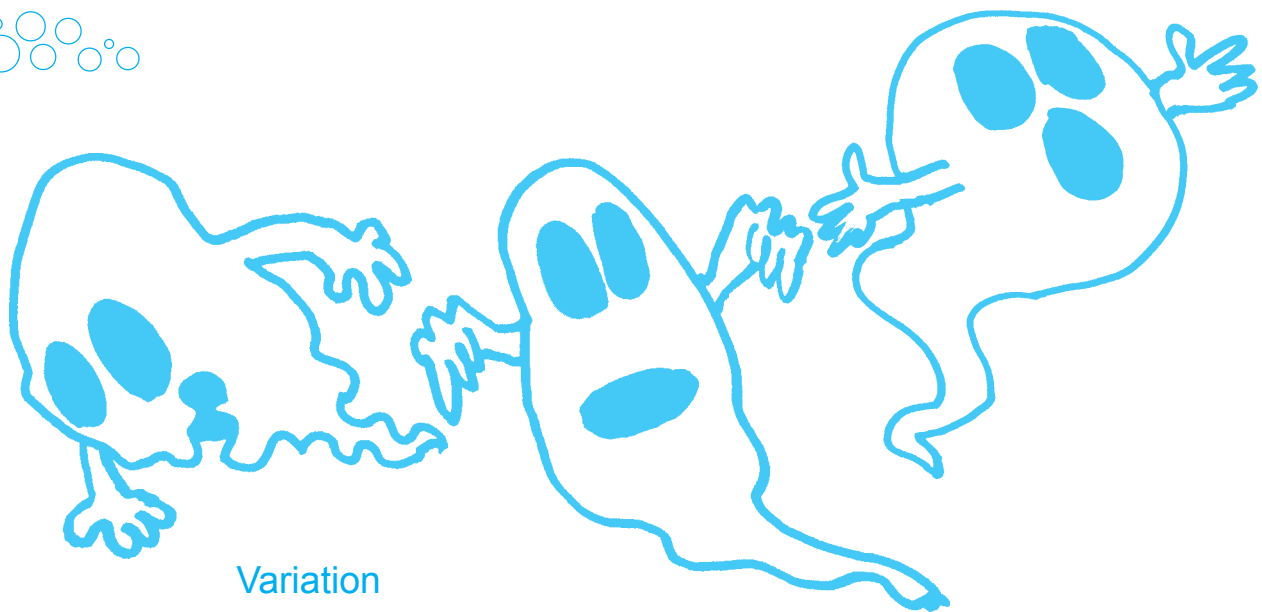
Variation

Change the task to a subtraction one.

Note: The numerals on the base board will need to be changed to 60, 50, 40, 30, 20, 10, 0.

Why?

Developing knowledge of multiples of ten allows students to complete 2-digit addition and subtraction tasks efficiently.

Where are they now?

Students are able to solve tasks involving tens and ones but require concrete materials to visually represent the numbers.

Where to next?

Students solve addition and subtraction tasks involving tens and ones without the use of concrete materials.

Provide many opportunities for oral counting by 10s using the hundred chart before playing this game. As students become more proficient, remove the counting materials.

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

NS1.2   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

Base ten

How?

Outdoor bean bag target

Draw a large target on the asphalt with chalk. Write a number which is a multiple of ten on each segment of the target. Organise the students into teams and provide each team with two bean bags. Have the students take turns to throw the bean bags onto the target. Students call out the number that the bean bags land on and then find the total. Organise a "recorder" for each team to keep a record of the team's score. It may be necessary to provide the scorer with a calculator.

20

30

Why?

Developing knowledge of multiples of ten allows students to complete 2-digit addition and subtraction tasks efficiently.

Where are they now?

Students use the strategy of counting on to solve addition tasks.

Where to next?

Students use a range of strategies other than counting by ones to solve addition tasks.

Provide opportunities for students to practise doubles through such activities as Rabbits' ears and Ten frames.

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

WMS1.2 Uses objects, diagrams, imagery and technology to explore mathematical problems

WMS1.3 Describes mathematical situations and methods using everyday and some mathematical language, actions, materials, diagrams and symbols.

LFN reference

Facile counting strategies

COUNTING ON

How?

Doubles plus one

Demonstrate the following procedure to the students.

Join two equal groups of Unifix blocks to show a double fact, such as 5 + 5. Display a number sentence to the students to describe the action of joining the two groups. Add one block to the second group of blocks. Ask the students to state the total and record the new number sentence. In the above example the new number sentence would be: 5 + 5 + 1 = 11. Separate the two groups again and remove the block just joined. Place it above the second group. Discuss the number combination now formed and its link to the previous combination of numbers, for example:

5 + 5 + 1 = 5 + 6. Explore other doubles plus one combinations.

Doubles plus one bingo

Provide the students with a bingo board displaying a 4x4 grid. Ask the students to place the numbers 5, 7, 9, 11, 13, 15, 17 and 19 randomly into the squares of the grid. Each number will need to be written twice. Call out doubles plus one facts, for example 6 + 7, 9 + 10, in random order. The students determine the answer and place a counter onto the bingo board if they are able to match a numeral to the answer. The first player to complete a line of four counters in any direction is the winner.

Near doubles

Provide the students with a supply of Unifix cubes. Call out an addition sum, such as 5 + 7, where the addends differ by two. Instruct the students to make the two numbers called using the Unifix cubes and to record the number sentence. Ask the students to move one block from the second group (in this example, 7) and place it with the first group (the group of 5). Have the students record the two groups now. Discuss how 6 + 6 = 5 + 7.

Why?

Knowing doubles and near doubles is an effective method for solving some arithmetical tasks and building knowledge of number combinations.

Where are they now?

Students confidently use advanced count-by-one strategies.

Where to next?

Students are able to solve addition and subtraction tasks involving tens and ones.

After setting an addition task, follow up with associated subtraction tasks. For example, ask the question 10 + 3 = (?) followed by: 13 remove 10, and 13 remove 3.

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

NS1.2   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.
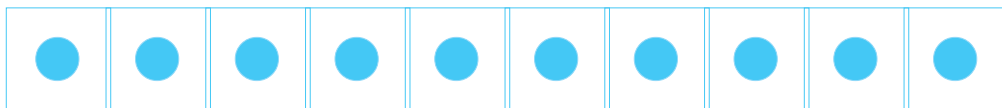
LFN reference

Base ten
Combining and partitioning
Quinary strategies

How?

Ten strips and hundred charts

A ten strip is a line of ten boxes with a dot in each box.

Organise an overhead projector, a supply of ten strips and a strip of four dots all on transparencies. You will also need a large hundred chart.

Display the strip of four dots on the overhead projector. Ask the students: "How many dots?". Place a ten strip below the four dots and repeat the question. After the students determine the answer, indicate the corresponding numeral on the hundred chart. Continue by adding one ten strip at a time and locating the total on the hundred chart.

Variations

- Ask the students to predict the next number if 10 more dots are added, 20 more, and so on.

- Substitute a ten frame for the dot strips.

Double-decker bus

The **"Double-decker bus"** (see BLM on page 214) is made up of ten frames. It can be viewed as two ten frames, two ten strips or four groups of five for reinforcing quinary strategies. Pose problems using the "Double-decker bus", such as, "Eleven passengers were already on the bus, three more got on at the next stop. How many passengers are now on the bus?"

Model both subtraction and addition tasks on the overhead projector. Ask the students to complete the tasks, working in pairs with their own Double-decker bus base boards.

Why?

Students need to develop a variety of related strategies to use when solving number problems. These strategies may include applying base 5 knowledge, their knowledge of tens and ones and recall of number combinations.

Where are they now?

Students confidently use advanced count-by-one strategies.

Where to next?

Students are able to solve addition and subtraction tasks involving tens and ones.

Discuss various strategies that could be used to determine the answers to the subtraction problems, such as "counting down to", "counting down from" or using known addition facts.

Outcomes

This activity provides 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

WMS1.3   Describes mathematical situations and methods using everyday and some mathematical language, actions, materials, diagrams and symbols.

LFN reference

Partitioning

How?

Orange tree

Provide each pair of students with an outline of an orange tree (see BLMs on pages 286-287) and 20 counters. Instruct the students to place the counters onto the tree. The students then "pick" the oranges from the tree by moving nominated numbers of counters away. Ask the students to determine how many "oranges" are left on the tree and to record the number combinations.

Why?

Students need to develop a variety of strategies to use when solving number problems. Knowing the relationship between addition and subtraction can help students solve number problems.

Where are they now?

Students find the total of a given number of groups by counting by ones.

Where to next?

Students model equal-sized groups and count groups of items to find the totals, using skip counting as a strategy.

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

WMS1.4   Supports conclusions by explaining or demonstrating how answers were obtained.
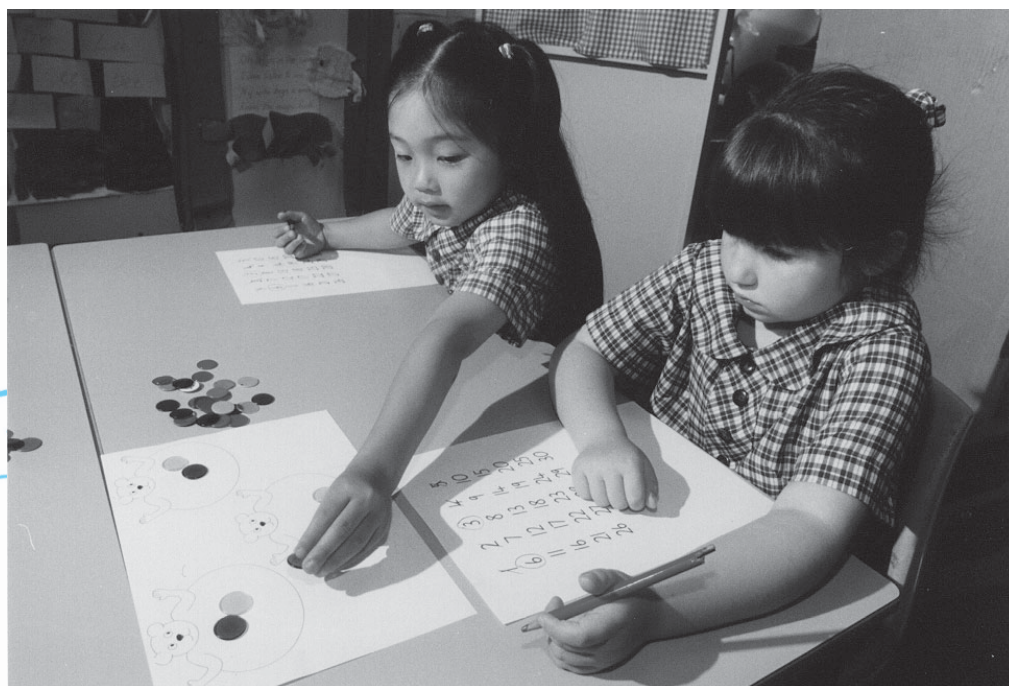
LFN reference

Early multiplication and division

How?

Teddy tummies

Provide pairs of students with a base board of three teddies (see BLM on page 289), 30 counters and a stencil displaying the numerals 1 to 30, which they can write on. Ask the students to place the counters, one at a time, onto each of the teddy tummies. As the students place a counter onto a teddy, ask them to mark the next numeral on the chart with a cross. When the students are able to form equal groups, on each of the teddies, have them circle the next number on the number chart instead of marking it with a cross.

Why?

The strategies students use to solve multiplication and division problems will be dependent upon their knowledge of counting sequences of multiples.

Where are they now?

Students find the total of a given number of groups by counting by ones.

Where to next?

Students model equal-sized groups and count groups of items to find the totals, using skip counting as a strategy.

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

WMS1.2   Uses objects, diagrams, imagery and technology to explore mathematical problems.

LFN reference

Early multiplication and division

Trucking teddies

Complete this activity as for "Teddy tummies". For the Teddy baseboard substitute the BLM on page 290 displaying four trucks. If available, use plastic teddies instead of counters. For this activity the students will require 40 teddies. Instruct the students to place the teddies onto the trucks, one at a time. As the students place a teddy onto a truck, have them cross off the next numeral on the chart. When the students form equal groups on the trucks, tell them to circle the following number on the chart, instead of marking it with a cross.

Why?

The strategies students use to solve multiplication and division problems will be dependent upon their knowledge of counting sequences of multiples.

Where are they now?

Students find the total number of items in a given number of groups by counting by ones.

Where to next?

Students model equal-sized groups and count groups of items to find the totals, using skip counting as a strategy.

Ask the students to begin with a two-part pattern. Then move to a five-part pattern before trying three- or four-part patterns. The students will probably have a better knowledge of the number sequence after counting by twos and fives.

Outcomes

This activity provides an opportunity for students to demonstrate progress towards the following outcomes: A student

NS1.1　　Counts, orders, reads and represents two- and three-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.

LFN reference

Early multiplication and division

How?

Tagging

Organise students into pairs. Provide each pair of students with an ice-cream lid and a supply of coloured cubes. The students will also need a supply of small numeral cards displaying the numbers 2, 3, 4 and 5. Instruct the students to make a 2-, 3-, 4- or 5-part pattern using the coloured cubes and to repeat the pattern around the outside of the lid. Have the students place a numeral card, indicating how many parts to the pattern, above each group of cubes. Ensure all the groups are exactly the same. Have the students calculate how many groups were formed and the total number of cubes.

Hundred chart

Using a hundred chart on an overhead projector, ask the students to determine the multiples of a nominated number. This can be achieved through saying the forward sequences of number words, using a stressed count for the nominated multiple. Colour in the numerals on the overhead transparency as the students call them out. Once the sequence of multiples has been identified, have the class repeat the multiples.

Why?

Frequent opportunities to practise computing, reciting and recording number sequences will assist students to become competent with using multiples in abstract form.

Where are they now?

Students can find the total for a given number of equal groups by counting by ones.

Where to next?

Students can recall, or easily derive, multiplication and division facts to twenty.

Provide ample opportunities for repeating patterns from the hundred chart, such as counting by fives or tens.

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

WMS1.3 Describes mathematical situations and methods using everyday and some mathematical language, actions, materials, diagrams and symbols.

LFN reference

Early multiplication and division
Forward number word sequence
Backward number word sequence

How?

Buzz game

Organise the students in a circle. Have the students begin counting by ones, each taking turns to call out the next number in the sequence. Each time students arrive at a number which is a multiple of five they call out "buzz" instead of the number. A student who makes an error in counting sits down.

Why?

The strategies students use to solve multiplication and division problems will be dependent upon their knowledge of counting sequences of multiples.

Where are they now?

Students find the total for a given number of equal groups by counting by ones.

Where to next?

Students model equal-sized groups and count groups of items to find the total, using skip counting as a strategy.

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

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.

LFN reference

Early multiplication and division

COUNTING ON

How?

Kangaroos

Organise the students into pairs and provide a calculator for each pair of students. Ask the students to calculate the multiples for a nominated number on the calculator. On most calculators this can be determined by entering a numeral, pressing the + sign twice and then repeatedly pressing the equals sign.

Provide each student with a number line equal to ten times the multiple being used. For example, present a number line up to 30 if dealing with multiples of three. Place a movable tab at the beginning of the number line. The tab will represent a kangaroo and should also indicate the number the students will be working with.

Have the students use the calculator to determine the next multiple. The students then move the tab along the number line, landing on each multiple. Have the students circle the multiples on the number line.

The number line can then be used for skip counting practice on later occasions.

Rolling groups

Provide the students with one numeral die showing the numbers 1, 2, 3, 4, 5 and 6 and another die showing dot patterns for 2, 5 and 10. The students will also need a supply of counters. Instruct the students to roll the two dice and construct groups of counters as indicated by the roll of the dice. The numeral die indicates the number of groups and the dot die indicates the number in each group. Encourage rhythmic or skip counting to find the total number of items.

Variation

Replace the dice with a pack of numeral cards and a pack of dot cards. Arrange the students into pairs. Instruct one student to choose two cards as instructions for a partner. The partner then constructs the groups and uses rhythmic or skip counting to find the total.

Why?

These activities provide opportunities for students to recall multiplication facts.

Assessment tasks

Task	Student response	Assessment
T: Displays a card showing 12 + 3. "Can you work this out?" Follows up the student's answer with: "How did you do that?" If the student responds correctly: "Can you tell me another two numbers that can be added together to equal 15?"	S: Completes the sum mentally and states the total.	Did the student use the strategy of compensation for addition or subtraction?
T: Displays a card showing 9 + 3. "Can you work this out?" If the student responds correctly, writes = 12, and asks: "Can you use that answer to work this out?" Displays 9 + 4. If the student responds correctly, writes = 13, and asks: "Can you use that answer to work this out?" Displays 9 + 5. Continues to 9 + 6.	S: Quickly states the answer by using knowledge of known number facts. If unsure as to how the student determined the answer, ask the student to explain the strategy used.	Did the student: • know the initial number fact? • count on to solve the subsequent problem? • recognise the "add one more" pattern to solve the problem?
T: Displays a card: 7 - 5 and asks: "Can you work this out?" If the student responds correctly, writes = 2, and asks: "Can you use that answer to work this out?" Displays 27 - 5.	S: Quickly states the answer by using number facts. S: Identifies the relationship between the two questions and uses his or her knowledge of tens and ones to answer.	Did the student: • know the initial number fact? • count on or count down to solve the problem? • recognise the use of "tens" to solve the problem?

Assessment tasks

Task	Student response	Assessment
continued from p. 278, If the student responds correctly, write = 22, and ask: " Can you use that answer to work this out?" Displays 47 - 5. Continue.		
T: Displays a card: 51 + 24. "Can you read and answer this problem?"	S: Correctly reads and answers the sum. The student explains the strategy used to solve the task.	Did the student use a knowledge of base ten strategies to solve the problem?
T: Displays some numeral cards in the range from 100 to 1000, and asks the student to name the cards as they are displayed.	S: Correctly names the numeral cards.	Did the student know any or all of the numerals that were shown?
T: Displays a strip of 6 dots arranged horizontally. "How many dots are there?" Places a ten-dot strip underneath the six dots. "How many dots now?" Continues placing ten strips and repeats the question: "How many dots now?" (6,16,26,36 ...76)	S: Says the total number of dots each time ten are added without having to add by ones.	Did the student count by tens to determine the total each time or automatically add on ten?

Three-minute lesson breakers

- Organise the students into a circle with all of the students facing into the centre. Lead the group in oral counting chants, for example, counting by 2s, 5s, 10s or odds and evens. Ask a student to nominate a body action which the group can perform with each count.

- Count the total number of body parts in the class by the appropriate number of multiples. For example, count the number of heads by ones, the number of feet by twos.

- Lead the class in counting to reinforce multiples of three. On the first number in the sequence, instruct the students to touch their heads and think of the number, that is, not verbalise the number. Repeat the process for the second number in the sequence. On the third number in the sequence, ask the students to touch their knees and say the number out loud.

- Think of a "secret number". Allow the students ten questions in which they have to guess the "secret" number. Respond to the questions by answering yes or no.

- Display a dot pattern card, for example a pattern to represent the number 8, and say: "I wish I had 12 . How many more do I need?" The students are to use mental strategies to solve the problem.