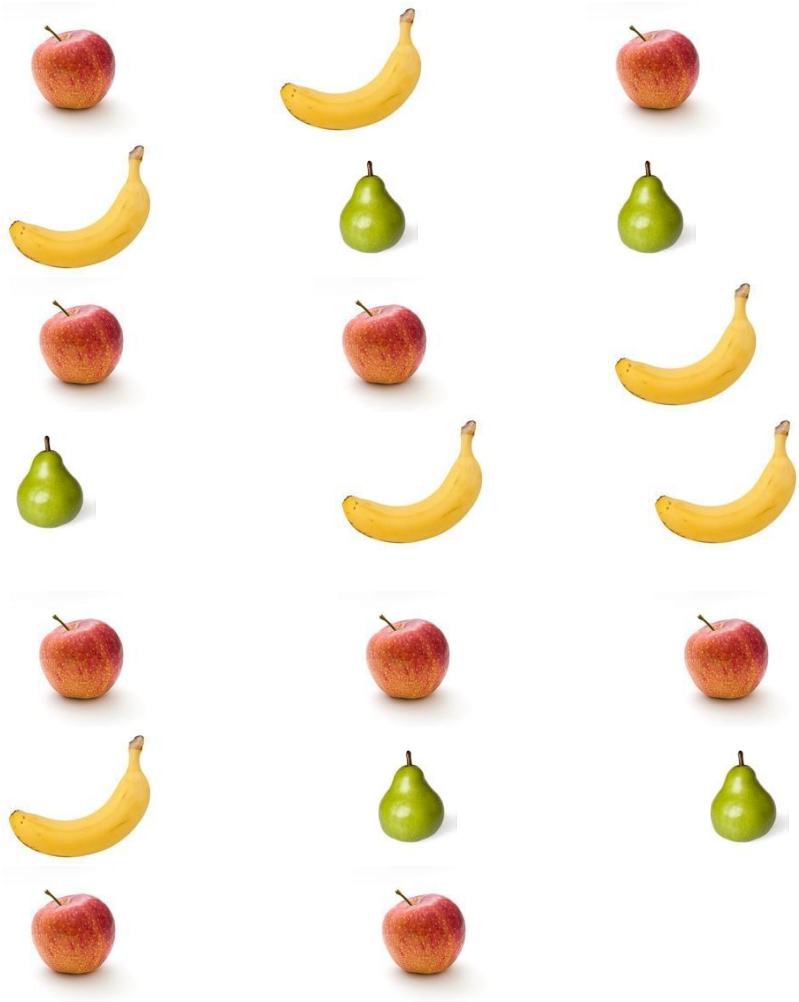
DEVELOPING MATHEMATICAL INQUIRY COMMUNITIES

Number: Statistics

Level 1 (NE / Year 0)

Teacher Booklet

Task 1	How do we all get to school in the morning? Represent your thinking.
Big ideas	Ideas and questions about a specific topic can be investigated through collecting data and using it to answer the questions. Data can vary in different ways (e.g., an object can be different sizes and colours) and it can be organised in different ways and by different characteristics (categorical, numerical). Data can be represented and communicated in multiple ways including data visualisations.
Curriculum links	S1-1: Conduct investigations using the statistical enquiry cycle: ▪ posing and answering questions. ▪ gathering, sorting, and counting, and displaying category data. ▪ discussing the results. NA1-1: Use a range of counting, grouping, and equal-sharing strategies with whole numbers and fractions. NA1-4: Communicate and explain counting, grouping, and equal-sharing strategies, using words, numbers, and pictures.
Learning Outcomes: Students will be able to:	• Collect, sort, and count data. • Display category data using different representations.
Mathematical language	Statistics, data, organise, display, sort, classify, represent.
Sharing back/Connect	Select students to share who use a variety of ways of representing indicating different levels of sophistication including grouping, drawing representations in a line, using numbers and drawing, or words and numbers. If students do not use words or numbers, then model this for the class. Draw a table and ask students to suggest what headings could be used and what to put in each column to make it clear. Record the data in a tabular form. **Connect:** How can the total number of students be found from the recordings? [Ask students to find the total number of students from their own recording and from the table and check these are the same].
Teacher Notes	• Choose a topic of interest to your students and class (this could be linked to your inquiry topic). For example, this could be ways to get to school, pets, favourite playground equipment, breakfast food. • Begin with your whole class by asking the students a question about the topic (e.g., How do you get to school?) that will generate category data and find out the 3 – 4 most common categories by taking a count.

	• Each student then shows which category relates to them by drawing a picture on a large sheet of paper or the whiteboard. • Launch the task by re-wording the question (e.g., What is the most common way students come to school in our class?). Ask the students to draw or write something that would show everyone what they found out in response to the question. • Notice student solution strategies that may include differing levels of organisation from drawing all the responses, grouping and ordering these, using numbers to represent. • During the large group sharing back, support students to notice how the responses can be grouped and how the number in each category can be found.
Independent Tasks	This is the favourite fruit of children in Room 1.  How many children have each fruit as their favourite? Represent what you have found using two different recordings.

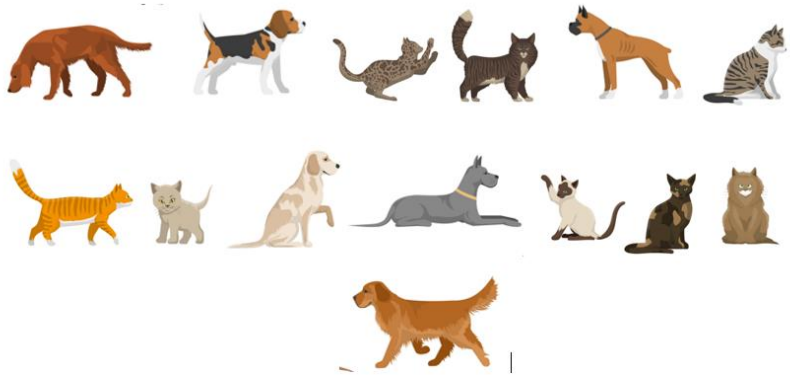
Anticipations	

Task 2	In our classroom, how many students have the same favourite activity on the playground? Represent what you have found.
Big ideas	Ideas and questions about a specific topic can be investigated through collecting data and using it to answer the questions. Data can be represented and communicated in multiple ways including data visualisations.
Curriculum links	S1-1: Conduct investigations using the statistical enquiry cycle: ▪ posing and answering questions. ▪ gathering, sorting, and counting, and displaying category data. ▪ discussing the results. NA1-1: Use a range of counting, grouping, and equal-sharing strategies with whole numbers.
Learning Outcomes: Students will be able to:	• Collect, sort, and count data. • Display category data using different representations. • Using grouping strategies to count and sort.
Mathematical language	Statistics, data, organise, display, sort, classify, represent.
Sharing back/Connect	Select students to share who use a variety of ways of representing indicating different levels of sophistication including grouping, drawing representations in a line, using numbers and drawing, words and numbers, or tables of data. **Connect:** How are your representations the same? How are your representations different? Which ones most clearly show the number of children for each activity at the playground? What statements can you make about favourite playground equipment?
Teacher Notes	• Choose a topic of interest to your students and class (this could be linked to your inquiry topic). For example, this could be favourite playground equipment, games, pets, breakfast food. • Begin with your whole class by asking the students a question about the topic (e.g., What is your favourite activity at the playground?) that will generate category data and find out the 3 – 4 most common categories by taking a count. • Each student then shows which category (of the 3 - 4) relates to them by representing their response (picture, word, letters) on a large sheet of paper or the whiteboard.

	• Launch the task by re-wording the question (e.g., How many students in this class have each activity at the playground as their favourite?). Ask the students to draw or write something that would show everyone what they found out in response to the question. • Notice student solution strategies that may include differing levels of organisation from drawing all the responses, grouping and ordering these, using numbers to represent. • During the large group sharing back, support students to notice how the responses can be grouped and how the number in each category can be found.
Independent Tasks	Oliana is finding out which tiare members of her dance group like for their ‘ei katu. These are the colours they have chosen:  How many children have each flower as their favourite? Represent what you have found using two different recordings.
Anticipations	

Task 3	What did the children in this class have for breakfast today? How can you collect data to answer this question? Record your results to present to the class. Can you represent this in different ways?
Big ideas	Ideas and questions about a specific topic can be investigated through collecting data and using it to answer the questions. Data can vary in different ways (e.g., an object can be different sizes and colours) and it can be organised in different ways and by different characteristics (categorical, numerical). Data can be represented and communicated in multiple ways including data visualisations.
Curriculum links	S1-1: Conduct investigations using the statistical enquiry cycle: ▪ posing and answering questions. ▪ gathering, sorting, and counting, and displaying category data. ▪ discussing the results. NA1-1: Use a range of counting, grouping, and equal-sharing strategies with whole numbers.
Learning Outcomes: Students will be able to:	• Collect data to answer a question. • Record, sort, count, and display the data collected. • Communicate the results of the investigation. • Using grouping strategies to count and sort.
Mathematical language	Statistics, data, organise, display, sort, classify, represent.
Sharing back/Connect	For the first aspect of the task, select students to share who use different ways of representing each breakfast food, drawings/icons, symbols or words. For the second aspect of the task, select students to share who have used a variety of ways of representing including grouping, drawing representations in a line, using numbers and drawing, words and numbers, or tables of data. **Connect:** What parts of the representation make it easy to see the results? Redraw your representation so that it is easier to see the results.
Teacher Notes	• Choose a topic of interest to your students and class (this could be linked to your inquiry topic). For example, this could be breakfast food, sports, toys. • Before you launch the task, ask students to make a drawing from memory that shows how many students in this class had each activity at the playground as their favourite [previous task].

	• Launch the task by asking students to suggest ways to collect the data and then allowing each student to collect and record the data in the way they have suggested. • Support students to find a way to represent each type of breakfast food. Facilitate them to notice the advantages and disadvantages of different ways of representing. • Notice whether students recognise that it is easier to use small, simple symbols and have them organised in a line for each different category, so it is easier to compare them. For the independent task, collect food wrappers or ask children to draw a picture of their morning tea.
Independent Tasks	What did the children in this class have for morning tea yesterday? How can you use the data to answer this question? Record your results to present to the class. Can you represent this in different ways?
Anticipations	

<table>
<tr><td>Task 4</td><td>These are the pets that children from Tui class have at home.
 
Complete the table:
<table><tr><td>Dogs</td><td></td></tr><tr><td>Cats</td><td></td></tr></table>
Draw a representation to show this data.

Picture credit: 'https://www.freepik.com/vectors/pet-icon'>Pet icon vector created by macrovector - www.freepik.com</td></tr>
<tr><td>Big ideas</td><td>Ideas and questions about a specific topic can be investigated through collecting data and using it to answer the questions.
Data can vary in different ways (e.g., an object can be different sizes and colours) and it can be organised in different ways and by different characteristics (categorical, numerical).
Data can be represented and communicated in multiple ways including data visualisations.
Patterns can be noticed, described, and analysed in sets of data and by using data visualisations.
Predictions can be made through using sets of data.
Outcomes can have different likelihoods, and these can vary.</td></tr>
<tr><td>Curriculum links</td><td>S1-1: Conduct investigations using the statistical enquiry cycle:
▪ posing and answering questions.
▪ gathering, sorting, and counting, and displaying category data.
▪ discussing the results.
NA1-1: Use a range of counting, grouping, and equal-sharing strategies with whole numbers and fractions</td></tr>
<tr><td>Learning Outcomes: Students will be able to:</td><td>• Record, sort, count, and display the data collected.
• Communicate the results of the investigation.
• Using grouping strategies to count and sort.</td></tr>
<tr><td>Mathematical language</td><td>Statistics, data, organise, display, sort, classify, represent, table, most, least.</td></tr>
</table>

<table>
<tr><td>Sharing back/Connect</td><td>Select students to share who have used the same symbol or icon to represent all the cats and a different one for all the dogs and a student whose picture shows that there are more cats than dogs without having to count or read the number. If no students have developed a representation that shows this, model how it could be recorded.

Connect:

Remove data and representations and ask students to make a drawing from memory to report the results of the investigation. Ask the students to compare their representation to their classmates and discuss which shows data most clearly. Have students repeat the drawing until the data is shown clearly.</td></tr>
<tr><td>Teacher Notes</td><td>• Notice students who might draw each animal separately and differently or those who realise that the same icon/symbol can be used to represent each cat and the same icon/symbol can be used to represent each dog.</td></tr>
<tr><td>Independent Tasks</td><td>Hamuera wanted to see how many bees and birds were in his garden. This is what he saw:
 
Complete the table:
<table><tr><td>Bee</td><td></td></tr><tr><td>Birds</td><td></td></tr></table>
Draw a representation to show this data.</td></tr>
<tr><td>Anticipations</td><td></td></tr>
</table>

<table>
<tr><td>Task 5</td><td>What food do you have for lunch?

Record the results in a table and make a representation to show the data.</td></tr>
<tr><td>Big ideas</td><td>Ideas and questions about a specific topic can be investigated through collecting data and using it to answer the questions.
Data can be represented and communicated in multiple ways including data visualisations.</td></tr>
<tr><td>Curriculum links</td><td>S1-1: Conduct investigations using the statistical enquiry cycle:
posing and answering questions.
gathering, sorting, and counting, and displaying category data.
discussing the results.
NA1-1: Use a range of counting, grouping, and equal-sharing strategies with whole numbers and fractions.
NA1-4: Communicate and explain counting, grouping, and equal-sharing strategies, using words, numbers, and pictures.</td></tr>
<tr><td>Learning Outcomes: Students will be able to:</td><td>Collect data to answer a question.
Record, sort, count, and display the data collected.
Use tally-marks and picture graphs to represent data.
Use groupings of five to add numbers.
Using grouping strategies to count and sort.</td></tr>
<tr><td>Mathematical language</td><td>Statistics, data, organise, display, sort, classify, represent, table, most, least, tally-marks, picture graphs.</td></tr>
<tr><td>Sharing back/Connect</td><td>Select students to share who have used different representations and presentations but focus on students who have used a symbol or drawing that is quick to make and the clearest to read.

Connect:

How many items of food do we have altogether?</td></tr>
<tr><td>Teacher Notes</td><td>Choose a topic of interest to your students and class (this could be linked to your inquiry topic). For example, this could be food in their lunchbox, pets at home, or sports they play. It should be a topic where students will give multiple answers.
During the launch, ask the students what food they have in their lunchbox and make a list on the board of all the different food types. Ask students for suggestions of how to record this quickly and model the use of tally marks. Record on a table with the type of food, tally marks and number [support students to count in fives]<table><tr><td>Type of food</td><td>Tally</td><td>Number</td></tr><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr></table></td></tr>
</table>

<table>
<tr><td></td><td>

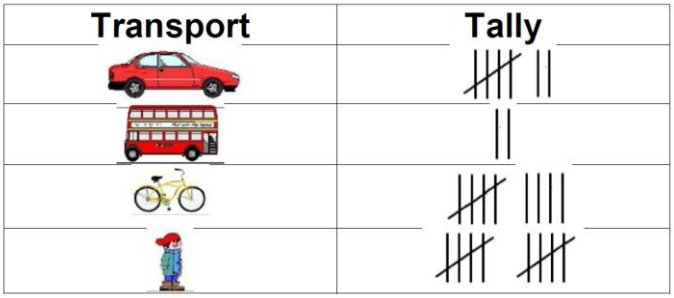
- Notice students who use a quick simple symbol and also notice how they align the symbols to make it easier to read.
- During the connect, support students to notice that they need to use a simple symbol, draw the correct number, and have them in rows and lined up vertically.
- For the independent task, provide students with a set of three or four objects (types of toys, different coloured blocks, shapes).

</td></tr>
<tr><td>Independent Tasks</td><td>Record the different sets on the table using tally marks and numbers.

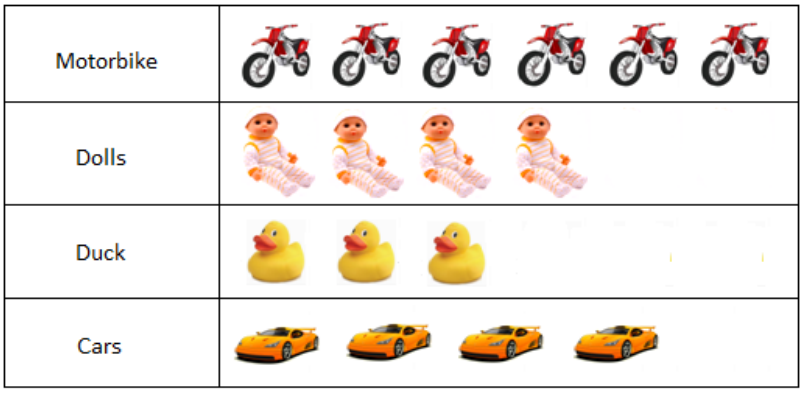
<table>
<tr><td>Types of toys</td><td>Tally</td><td>Number</td></tr>
<tr><td>Cars</td><td></td><td></td></tr>
<tr><td>Blocks</td><td></td><td></td></tr>
<tr><td>Teddies</td><td></td><td></td></tr>
</table>

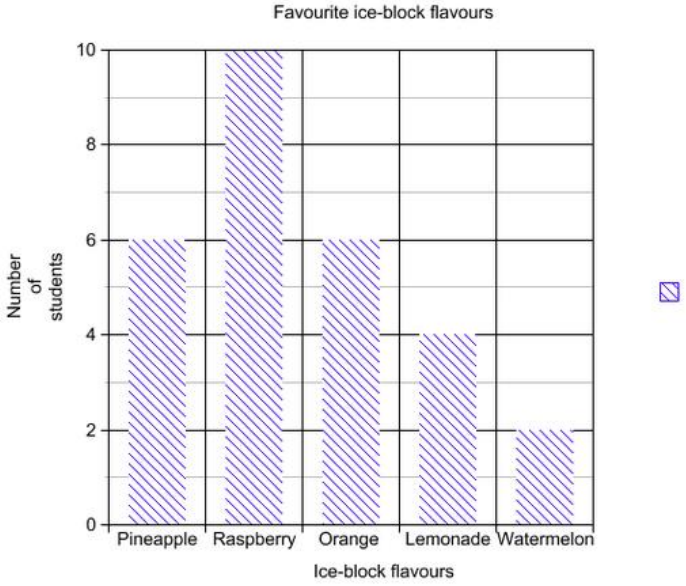
Make a representation to show the data as clearly as possible.</td></tr>
<tr><td>Anticipations</td><td></td></tr>
</table>

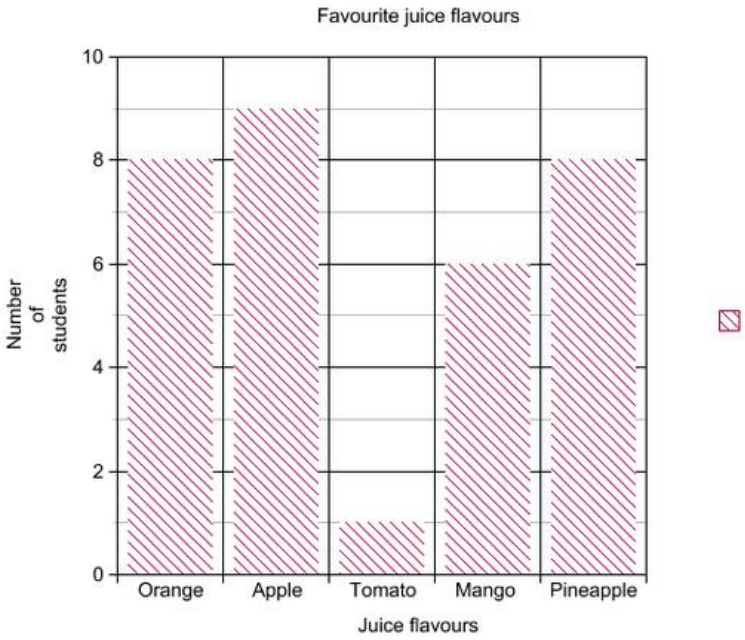
Task 6	Draw a picture graph that shows the data of the food in lunchboxes. Draw another picture graph that only uses one symbol. What statements make you make about that data?
Big ideas	Ideas and questions about a specific topic can be investigated through collecting data and using it to answer the questions. Data can vary in different ways (e.g., an object can be different sizes and colours) and it can be organised in different ways and by different characteristics (categorical, numerical). Data can be represented and communicated in multiple ways including data visualisations.
Curriculum links	S1-1: Conduct investigations using the statistical enquiry cycle: ▪ posing and answering questions. ▪ gathering, sorting, and counting, and displaying category data. ▪ discussing the results. NA1-1: Use a range of counting, grouping, and equal-sharing strategies with whole numbers and fractions. NA1-4: Communicate and explain counting, grouping, and equal-sharing strategies, using words, numbers, and pictures.
Learning Outcomes: Students will be able to:	• Record, sort, count, and display the data collected. • Use picture graphs and grid paper graphs to represent data. • Make statements about data that has been collected to answer a question. • Use groupings of five to add numbers. • Count in groups.
Mathematical language	Statistics, data, organise, display, sort, classify, represent, table, most, least, same, picture graphs.
Sharing back/Connect	Select students to share who develop representations that show the data clearly. This should include a simple symbol that is uniform and has similar spacing and alignment. **Connect:** Use the grid paper to make a representation of the data.
Teacher Notes	• During the launch, re-visit the previous task with the students and let them look at the picture graphs that were developed. Ask them to discuss what helps to make the picture graph clear and easy to see. Challenge them to develop a picture graph that is better than what they developed yesterday. • Have grid paper available for the connect. • Facilitate the students to notice that using a uniform simple symbol and using similar spacing and alignment makes the graph easier to read.

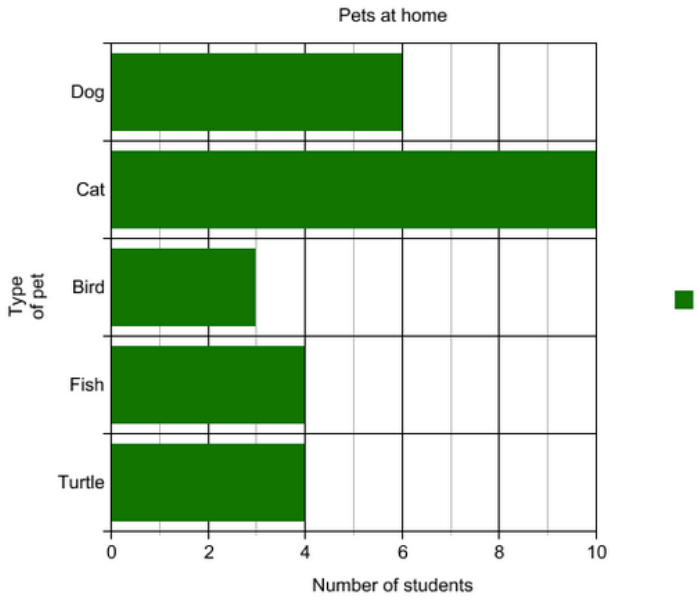
Independent Tasks	The chart below shows how students in Room One get to school.  How many students are in Room One? Draw a picture graph that shows how students in Room One get to school. What statements can you make about how students in Room One get to school?
Anticipations	

Task 7	What sports do you play? Record the results in a table. Make two representations to show the data.
Big ideas	Ideas and questions about a specific topic can be investigated through collecting data and using it to answer the questions. Data can vary in different ways (e.g., an object can be different sizes and colours) and it can be organised in different ways and by different characteristics (categorical, numerical). Data can be represented and communicated in multiple ways including data visualisations.
Curriculum links	S1-1: Conduct investigations using the statistical enquiry cycle: ▪ posing and answering questions. ▪ gathering, sorting, and counting, and displaying category data. ▪ discussing the results. NA1-1: Use a range of counting, grouping, and equal-sharing strategies with whole numbers and fractions.
Learning Outcomes: Students will be able to:	• Collect data to answer a question. • Record, sort, count, and display the data collected. • Use tally-marks to represent data. • Use groupings of five to add numbers. • Use picture graphs to represent data. • Use grid paper to represent data. • Make statements about data that has been collected to answer a question. • Count in groups.
Mathematical language	Statistics, data, organise, display, sort, classify, represent, table, most, least, same, picture graphs.
Sharing back/Connect	Select students to share who develop representations that show the data clearly. This should include a simple symbol that is uniform and has similar spacing and alignment. **Connect:** Use the grid paper to make a vertical representation of the data.
Teacher Notes	• Choose a topic of interest to your students and class (this could be linked to your inquiry topic). For example, this could be sports they play, pets at home, favourite games. It should be a topic where students will give multiple answers. • During the launch, ask the students sports they play and make a list on the board of all the different types of sports. Ask students to record the results using tally marks. Record on a table with the type of sport, tally marks and number:

	<table><tr><td>Type of sport</td><td>Tally</td><td>Number</td></tr><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr></table> • Notice students who use a uniform simple symbol with similar spacing and alignment. • Expect students to develop at least two representations. • Have grid paper available.
Independent Tasks	The chart below how many different toys were sold from 2Cheap in one day. Toys sold in a day  Record the data on a table: <table><tr><td>Type of toy</td><td>Tally</td><td>Number</td></tr><tr><td>Motorbike</td><td></td><td></td></tr><tr><td>Doll</td><td></td><td></td></tr><tr><td>Duck</td><td></td><td></td></tr><tr><td>Car</td><td></td><td></td></tr></table> Make a picture graph of the data. What statements can you make about the data?
Anticipations	

Task 8	Central soccer club wants to buy ice blocks for the players for an end of season treat. They have taken a survey of two teams to find out their favourite flavours.  Make statements using 'I notice' about the data showing favourite ice-block flavours. Make statements using 'I wonder' about the data showing favourite ice-block flavours.
Big ideas	Data can vary in different ways (e.g., an object can be different sizes and colours) and it can be organised in different ways and by different characteristics (categorical, numerical). Data can be represented and communicated in multiple ways including data visualisations. Patterns can be noticed, described, and analysed in sets of data and by using data visualisations.
Curriculum links	S1-1: Conduct investigations using the statistical enquiry cycle: ▪ posing and answering questions. ▪ gathering, sorting, and counting, and displaying category data. ▪ discussing the results. NA1-1: Use a range of counting, grouping, and equal-sharing strategies with whole numbers and fractions. NA1-4: Communicate and explain counting, grouping, and equal-sharing strategies, using words.
Learning Outcomes: Students will be able to:	• Make a statement about data displayed on a graph. • Agree or disagree with statements about data displayed on a graph. • Compare sets and the size of numbers to make statements.

Mathematical language	Statistics, data, most, least, same, more, less.
Sharing back/Connect	Select students to share who are able to provide justification and evidence for the statements that they make. **Connect:** Look at the graph showing favourite juice flavours.  Here are some statements about the data. Do you agree or disagree with the statement? Make sure you explain why. 1) Apple juice is the most popular. 2) The same number of people like mango juice and pineapple juice. 3) Lots of people like tomato juice. 4) One more person choose apple juice than orange juice.
Teacher Notes	• Ask students to make statements about the graph. If needed, model a statement for the students or use questioning. • Record student statements on pieces of paper and when you have 3-4 statements, ask students to choose a statement and say whether they agree or disagree with a reason. • Notice students who provide reasons for their statements.
Independent Tasks	These are the pets that one class of children have at home:

	 Make "I notice" and "I wonder" statements about the data about pets. Check the statements that a classmate has made and see whether you agree or disagree and give a reason why.
Anticipations	

<table>
<tr><td></td><td></td></tr>
<tr><td>Task 9 (optional task)</td><td>Sophie Pascoe is an inspirational athlete. She has won a lot of medals for swimming at the Paralympics.

<u>2008</u>
3 Gold
1 Silver

<u>2012</u>
3 Gold
3 Silver

<u>2018</u>
3 Gold
2 Silver

<u>2020</u>
2 Gold
1 Silver
1 Bronze

Record the different medals that Sophie Pascal has won on the table using tally marks and numbers.

<table><tr><td>Medal</td><td>Tally</td><td>Number</td></tr><tr><td>Gold</td><td></td><td></td></tr><tr><td>Silver</td><td></td><td></td></tr><tr><td>Bronze</td><td></td><td></td></tr></table>
Make a representation to show the data as clearly as possible.

What statements can you make about the data?</td></tr>
<tr><td>Big ideas</td><td>Data can vary in different ways (e.g., an object can be different sizes and colours) and it can be organised in different ways and by different characteristics (categorical, numerical).
Data can be represented and communicated in multiple ways including data visualisations.</td></tr>
<tr><td>Curriculum links</td><td>S1-1: Conduct investigations using the statistical enquiry cycle:
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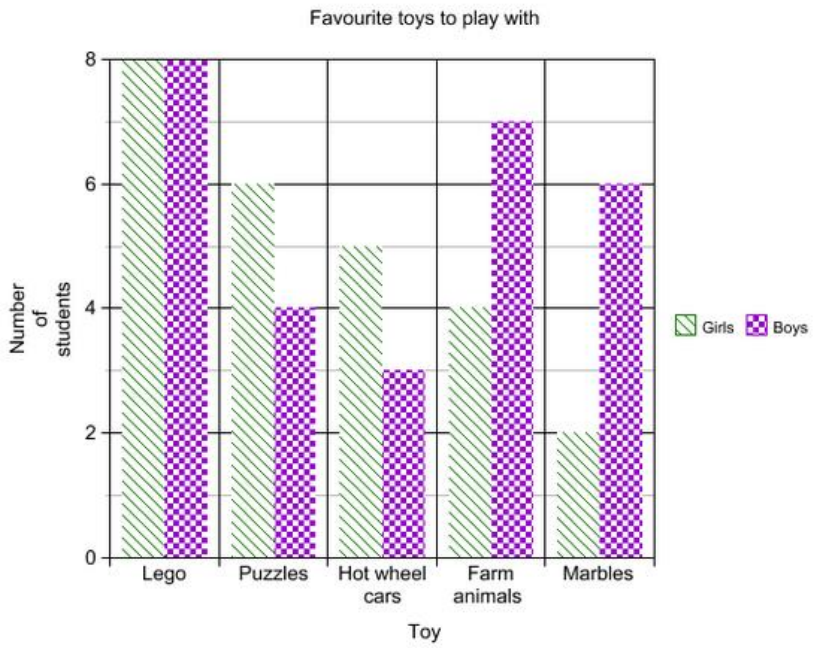
NA1-1: Use a range of counting, grouping, and equal-sharing strategies with whole numbers and fractions.
NA1-4: Communicate and explain counting, grouping, and equal-sharing strategies, using words.</td></tr>
<tr><td>Learning Outcomes: Students will be able to:</td><td>• Record, sort, count, and display the data collected.
• Use tally-marks to represent data.
• Use groupings of five to add numbers.
• Use picture graphs to represent data.
• Use grid paper to represent data.
• Make statements about data that has been collected to answer a question.
• Compare sets.</td></tr>
</table>

Mathematical language	Statistics, data, organise, display, sort, classify, represent, table, most, least, same, picture graphs.
Sharing back/Connect	Select students to share who develop representations that show the data clearly. This should include a simple symbol that is uniform and has similar spacing and alignment. **Connect:** Share statements that students have made about the data and ask the rest of the class to agree or disagree with a reason.
Teacher Notes	• Notice students who use a uniform simple symbol with similar spacing and alignment. • Expect students to develop at least two representations. • Have grid paper available. • For the independent task, use the picture or grid paper graphs created for previous tasks.
Independent Tasks	Make "I notice" and "I wonder" statements about the data on the graphs. Check the statements that a classmate has made and see whether you agree or disagree and give a reason why.
Anticipations	

Task 10 (optional task)	Here is a graph about the favourite toys of boys and girls in Tui hub.  Make statements using 'I notice' about the data showing favourite toys. Make statements using 'I wonder' about the data showing favourite toys.
Big ideas	Data can vary in different ways (e.g., an object can be different sizes and colours) and it can be organised in different ways and by different characteristics (categorical, numerical). Data can be represented and communicated in multiple ways including data visualisations. Patterns can be noticed, described, and analysed in sets of data and by using data visualisations.
Curriculum links	S1-1: Conduct investigations using the statistical enquiry cycle: ▪ posing and answering questions. ▪ gathering, sorting, and counting, and displaying category data. ▪ discussing the results. NA1-1: Use a range of counting, grouping, and equal-sharing strategies with whole numbers and fractions. NA1-4: Communicate and explain counting, grouping, and equal-sharing strategies, using words.

Learning Outcomes: Students will be able to:	• Make a statement about data displayed on a graph. • Agree or disagree with statements about data displayed on a graph.
Mathematical language	Statistics, data, most, least, same, more, less.
Sharing back/Connect	Select students to share who are able to provide justification and evidence for the statements that they make. **Connect:** Here are some statements about the data. Do you agree or disagree with the statement? Make sure you explain why. 1) Boys like hot wheel cars more than girls. 2) Lego is the most popular. 3) Two more girls like puzzles than boys. 4) Marbles are the least popular toy.
Teacher Notes	• Ask students to make statements about the graph. If needed, model a statement for the students or use questioning. • Record student statements on pieces of paper and when you have 3-4 statements, ask students to choose a statement and say whether they agree or disagree with a reason. • Notice students who provide reasons for their statements.
Independent Tasks	Select the following assessment tasks (attached at the end of the document) as the independent activity: S1B: Statistics: Graph of books read. S2: Statistics: Desserts sold from a food truck.
Anticipations	

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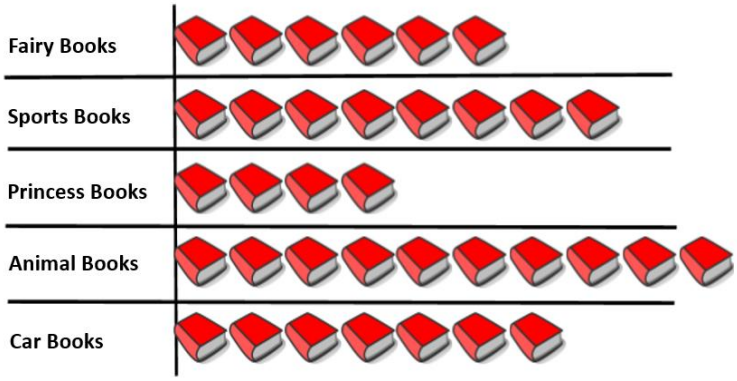
DEVELOPING MATHEMATICAL INQUIRY COMMUNITIES
ASSESSMENT TASK

STATISTICS - LITERACY: LEVEL 1 Task S1B

This graph shows how many books some children have read.



What questions can you ask about the graph?

Can you represent the data differently?

Make statements about what you notice about the books they have read based on the data in the graph.

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DEVELOPING MATHEMATICAL INQUIRY COMMUNITIES
ASSESSMENT TASK

STATISTICS - INVESTIGATION: LEVEL 1 Task S2

These are the desserts (ice-cream cone, shaved ice, sundae, fruit salad) that were sold from a food truck. What questions could you ask about this?

Can you display what desserts they sold?

What statements can you make about the desserts that were sold?