**Data and Chance**: Data

**8. Collecting Data**

This unit offers children the opportunity to collect and explore data about the world around them, understanding how this information can be recorded. Data, at its core, involves gathering information about our lives and surroundings to answer questions that aren't immediately obvious through simple observation. When collecting data, children engage in activities such as classifying, sorting, comparing, counting, measuring, representing and interpreting. These tasks develop essential analytical and problem-solving skills. Throughout this unit, children will gain a fundamental understanding of data and its applications. They will learn to pose questions and report their findings using pictograms, block graphs and tally marks.

During child-led play, observe how children interact with and use data. By noticing, exploring and discussing the mathematics inherent in their play, you can help children build a productive and positive disposition towards mathematics. This approach encourages a deeper understanding and appreciation of mathematical concepts in a natural and engaging way.

**Unit Information**

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| **Learning** **Outcome(s)** | **Data**: Explore, interpret and explain data in a variety of ways for a range of purposes. |
| **Mathematical Concept(s)** | * Data is all around us and helps us to interpret the world.
* A data set is a collection of information that can provide answers to questions we ask.
* Data can be collected and represented in many ways.
* Data displays (e.g. tables, picture graphs, block graphs) are a useful way of conveying information.
* Objects and sets can be sorted according to one or more attributes.
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| **Mathematical Language** | Block graphs, Tally marks, Pictogram, ‘How many?’, More, Less, ‘How many more/less?’, Same, Different, ‘What is the same/different?’, Most, Least |
| **Prior** **Knowledge** | * Sorting by colour, shape and size
* Counting 1–10
* Comparing numbers (using words such as: greater, smaller, more, less)
* Recognising numbers on dice
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| **Potential****Misconceptions** | * Children who find comparing numbers difficult might find reading and making sense of data difficult.
* Children might have trouble connecting the results to the display: knowing if X number of people answer A, they must colour X blocks in their graph.
* Children might not record the collected data in a way that can be easily represented.
* Children might not label the data they have collected.
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**Unit Overview**

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|  | **Lesson 1** | **Lesson 2** | **Lesson 3** | **Lesson 4** | **Lesson 5** |
| **Focus of New Learning** | Introduce data collection. | Record data using tally marks.  | Represent data using pictograms. | Represent data using block graphs. | Weekly review. |
| **Slides** | 8.1 | 8.2 | 8.3 | 8.4 | 8.5 |
| **Book** |  |  |  | p. 20 | p. 21 |
| **Concrete****Resources** | Sticky notes, Dice |
| **Digital Resources** | 8. Collecting Data: Game8. Collecting Data: Printables  | 8. Planet Maths: What Can You See?  |

**Lesson 1: Introduce data collection.**

Teaching Slides 8.1

**Learning focus**

In this lesson, children are introduced to the concept of data, what it looks like in real life and the purpose it serves. This is introduced initially through a character asking the question ‘Which is your favourite ice-cream flavour?’. The other characters then provide their answers. The responses are then presented in a table for children to analyse and draw conclusions, such as determining the most popular ice-cream flavour and discussing why this information might be useful.

The slides then present several ‘Which do you prefer…?’ questions and invite children to collect the data in multiple ways (e.g. by counting votes and placing check marks on two sides of the board). Encourage children to come up with other methods to show how many people chose each option, such as standing up versus staying seated or using coloured pencils to represent different choices. As a class, discuss the effectiveness of these different methods of data presentation. Children should begin to observe that, although the data is presented differently, the results are consistent.

In the extension activity, children are tasked with posing their own question and gathering the resulting data. Encourage children to think of reasons why collecting data might be important (e.g. collecting data helps us understand what people like and don’t like, so we can make better decisions, like choosing the preferred activity for a party.)

**Key questions/Maths Talk**

* How did we collect the information?
* What do you notice about the answers?
* Which one has more? Which one has less?
* Are they the same or different? How can you tell?
* What information do we get from the data? Is it useful? How could we use this data?
* How do we use data every day? What can we learn from data?

**Differentiation**

* Support **struggling learners** by helping them with their counting skills. Model good counting skills and encourage children to practise themselves.
* Challenge **advanced learners** by encouraging them to organise data further and express their thoughts. Challenge them to organise the same data in different ways and to come up with different questions they could then find the answers to.

**Hands-on activities and station teaching**

* **Would you rather…?:** Ask the class various ‘Would you rather…?’ questions, pairing each option with a specific movement they must mimic if they prefer that choice. For example, ‘Would you rather be able to fly (spread your arms wide and pretend to fly) or be able to read minds (put your index fingers to your temples)?’ Play a few rounds to familiarise the children with the format, then allow them to ask their own questions and lead the class.
* **\*Sorting:** Have children work in pairs or small groups. Provide items for sorting, such as coloured bears or cubes, sweets or various sized manipulatives. Encourage them to describe and record their findings by answering questions like: ‘How many of each colour are there?’, ‘Which colour has the most?’, ‘Which has the least?’, ‘Are any colours the same or different?’
* **Shoe comparison:** Ask children to observe and compare the types of shoes they are wearing. Encourage them to form groups and collect data on the different shoe types. Allow them to decide how to categorise the shoes and discuss their findings together.

*\*Suitable for station teaching*

**Lesson 2: Record data using tally marks.**

Teaching Slides 8.2

**Learning focus**

In this lesson, children learn how to record data using tally marks, corresponding to the second step in the data cycle: collecting and recording answers. Begin by introducing tally marks as a method to record responses to questions. Use the slides to present an example where a teacher wants to know how many children are on the blue team and how many are on the orange team. Encourage children to suggest ways to record the data before introducing the tally chart.

The slides demonstrate how to write tally marks from 1 to 5. Model the writing of tally marks and encourage children to practise by tracing in the air or on their whiteboards. Allow ample time for them to practise before using tally marks to collect data. Discuss what tally marks look like beyond 5 and demonstrate this for the children.

Follow the activities on the slides and explore why tally marks might be useful compared to other methods of representing data. For example, if they needed to record each instance they saw blue but couldn’t see all the splashes together, tally marks helped them keep track. Listen to the rhyme ‘Humpty Dumpty’ and to the song ‘Mr. Golden Sun’. Ask the class to use tally marks to record the times they hear the word ‘Humpty.’ They can do this in groups first, discuss their answers and then compare the results on the board. Repeat this for the word ‘sun’ in ‘Mr. Golden Sun’.

**Key questions/Maths Talk**

* How do you count tally marks?
* What do you notice when counting them?
* Why are they useful?
* How many are there? How do you know?

**Differentiation**

* Support **struggling learners** by scaffolding counting skills. Provide cubes or other concrete manipulatives if children find recording with tally marks tricky. Ask them to take one object every time they hear the word. After the activity, they can take their time using the counters to help make tally marks.
* Challenge **advanced learners** by encouraging them to count the tally marks in 5s. ‘Can you show 10 in tally marks? 15? 20?’

**Hands-on activities and station teaching**

* **Heads or tails:** Children play in pairs. Each child chooses either heads or tails. They take turns flipping the coin and tallying their own scores. They can either flip the coin 10 times or play within a set time limit.
* **Book explorers**: Children can work individually or in small groups. Ask them to pick a book and choose a word or image from the front cover. Encourage them to go through the book and tally how many times the word/image appears. If multiple children select the same book, ask them to compare their results once they’re done.
* **Tally subitising**: Children play in pairs. They take turns writing a number from 1 to 10 in tally marks on their whiteboards or on pieces of paper. They quickly show the tally marks to their partner before covering them again. The partner then has to state the number they saw.
* **Number cards**: Provide children with number cards from 1 to 10, placing the cards face down on the table. Children pick a card and write the corresponding number in tally marks.

*\*Suitable for station teaching*

**Lesson 3: Represent data using pictograms.**

Teaching Slides 8.2

**Resources**

Sticky notes, counters, cubes or bears, Printable 1

**Learning focus**

In this lesson, children learn to display data using objects and pictures, which corresponds to the third step in the data cycle. They are encouraged to explore, devise questions and make statements based on data displays.

Provide children with an assortment of manipulatives such as counters, cubes or bears. Ask them to sort and display the objects on their tables. Encourage exploration by asking: ‘Can you sort them differently? What happens if you line them up? Do you have more cubes or bears? Which one do you have the most/least of?’

Next, use the slides to introduce the concept of a ‘pictogram’ to display data. Emphasise how a pictogram is a way to show a lot of data at a glance. Go through the questions in the slides and encourage children to ‘read’ the answers in the pictogram. Ask the class how they came to school that day (e.g. car, cycling, walking, bus, etc.). Create the outline of a pictogram on the board (or use the one in the slides). Provide children with sticky notes or small sheets of paper to draw their answer, then, encourage them to come to the front of the class or the whiteboard to create a pictogram with them. Discuss the pictogram as it is being constructed: Point out how you are sorting the answers, then counting and comparing them. Encourage children to draw conclusions from the displayed results.

**Key questions/Maths Talk**

* In what ways did you display your data?
* How could you explain the data you collected?
* What do you notice?
* What information can you get from this? / How is this data useful?
* How did you sort the information?

**Differentiation**

* Support **struggling learners** by helping them with their counting skills. Scaffold their data load and how they display their results, allowing enough time for them to go through each step of the process.
* Challenge **advanced learners** by encouraging them to examine their results more closely. Ask them how many more/less there are between data sources and if they can think of a different way to display their results.

**Hands-on activities and station teaching**

* **Class survey:** Provide children with sticky notes or small pieces of paper. Repeat the activity they did during class but ask them a different question: ‘What is your favourite dinner?’ or ‘What is your favourite animal?’, etc. Gather the results and place them on a table. Ask a small group of children to help you to organise and display them. Keep scrambling the results and asking a different group until the entire class has a chance to create a pictogram with the survey results.
* **\*Sort concrete materials:** Provide children with an assortment of concrete materials. Working in pairs or small groups, children must sort and display the materials. Encourage them to explain how and why they organised them the way they did. Then, ask them what conclusions they can gather from the presented data. Encourage them to record their work by drawing in their copybooks.
* **Outdoor collection:** Take the class outside and ask them to collect a certain number of small objects such as leaves, sticks, rocks and acorns (you can provide an amount, such as 10, or let them decide how many they want to pick). Once they have their assortment, ask them to record their findings by drawing a pictogram. They can use the printable template (Printable 1). Who collected the most sticks? Who has the fewest rocks? Who has the most/least variety?

*\*Suitable for station teaching*

**Lesson 4: Represent data using block graphs.**

Teaching Slides 8.3 | Student Book p. 20

**Resources**

Dice, Printable 2

**Learning focus**

In this lesson, children are introduced to block graphs as an alternative way to display the results of the data collection. The slides demonstrate this by presenting data on zoo animals first in tally marks and then in a block graph. Ensure that children understand that the information in the tally marks is identical to that in the block graph. Take some time to go over the characteristics of a block graph: we place the options for the data at the bottom, and there are numbers on the left so we can keep track of our results. Discuss the zoo animal block graph with the children and encourage them to come up with different reasons why this data might be useful. For example, zookeepers might need to know how much food to buy for each animal.

Make sure you allow time to model and explain how to record the results: ‘We colour one block for every animal. If the zoo had 3 giraffes, how many blocks would we have to colour?’ Next, ask children to complete the activity on page 20 of their student books. Since they are collecting information about the number they roll on a dice, each of the children’s block graph will be different. Discuss why each block graph is different, highlighting that the differences are due to the varied outcomes of their dice rolls.

**Key questions/Maths Talk**

* What is the same/different about block graphs and pictograms?
* Which one do you prefer?
* What information can we tell from a block graph?
* How many more/less are there?
* What do you notice?
* How can you sort this?

**Differentiation**

* Support **struggling learners** by scaffolding them when using the dice. Some children may have difficulty understanding that they need to colour one block for each roll of the dice, rather than colouring a block corresponding to the number rolled. To clarify this concept, you can model this common mistake by pretending the teacher makes it. Demonstrate the correct method and guide the children through the process to ensure they understand that each dice roll represents a single data point, regardless of the number rolled.
* Challenge **advanced learners** by encouraging them to make their own block graph using a larger amount of data. Ask them to be specific and precise in their descriptions of their graphs: *There are \_\_\_ more/less. The most/least common is…*

**Hands-on activities and station teaching**

* **\*Concrete sorting:** Provide children with an assortment of concrete materials. Ask them to sort them and then record their results in a block graph. They can do this multiple times with different kinds of objects or different sorting criteria: pencils by colour, writing utensils by type, leaves by size, etc. Encourage them to provide conclusions from their graphs.
* **\*Ask your class:** Children work in pairs or small groups. Ask them to think about a question to ask the class: ‘What is your eye colour?’, ‘How many siblings do you have?’, ‘How old are you?’, etc. Encourage them to come with a few possible answers before starting their survey and marking them in their block graph template (Printable 2). Then, allow them to gather and display the data and then ask them to share the results with the class. What did they learn about their classmates?

*\*Suitable for station teaching*

**Lesson 5: Weekly review.**

Teaching Slides 8.5 | Student Book p. 21

**Learning focus**

In this lesson, children will collect data using the methods they explored earlier in the week. This lesson in an opportunity to take some time to go over anything that your class might have found challenging during the week. Use the slides to remind the children of each step and to provide visual reinforcement.

When working on the Student Book activity on page 21, remind children that their block graph may differ from the previous page since they already know the total amount. Encourage them to avoid rushing and colouring all the blocks at once, as this can lead to errors.

When addressing questions posed by children, each group can collect different information to answer their own question, or they can work as a class with each group collecting information only from their teammates and then reporting it to the class. Encourage children to think carefully about how they will record and display the data they collect. If you’re concerned about managing the volume of data, have children work within their groups only. Emphasise discussing the insights they can gain from the data collected

**Key questions/Maths Talk**

* What do you notice? What do you wonder?
* What are the differences between pictograms and block graphs?
* What can you learn from this graph/pictogram?
* How could you display this?
* How could you record the answers?
* Why is data collection useful?

**Differentiation**

* Support **struggling learners** by scaffolding the amount of data sources they need to collect data from. Keep an image of what they’re struggling with on the board so they can reference it. Allow enough time for them to process the data.
* Challenge **advanced learners** by encouraging them to find large volumes of data to collect and represent. Ask them to find as many ways as possible to display their data.

**Hands-on activities and station teaching**

* **\*Ask your class:** Children work in pairs or small groups. Ask them to think about a question to ask the class: ‘What is your eye colour?’, ‘How many siblings do you have?’, ‘How old are you?’, etc. Encourage them to come with a few possible answers before starting their survey. Ask them to go through every step of the data cycle. They should record the answers with tally marks and then choose a way to display them. Then, allow them to gather and display the data and then ask them to share the results with the class. What did they learn about their classmates?
* **\*Brainstorm:** Children work in pairs or small groups. Provide them with loose pieces of paper or ask them to use their whiteboards. Encourage them to draw pictures that come to mind when we say the word ‘data’ or when they think about what they learned this week.

*\*Suitable for station teaching*