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 Lesson 1 • Jumping

**Lesson 1**

**(Y3)**

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# Lesson overview

Students establish the problem for investigation—How far can students in our class jump?—and determine the data to be collected.

## Learning goals

The question defines the problem and shapes what data is collected.

## Resources

**Whole class**

* **How far can we jump PowerPoint**
* Open space to jump
* Various measurement tools, including metre rulers, tape measures. Also include some unhelpful tools in this context such as protractors, trundle wheels, scales, and measuring jugs.

**Each group**

* Sheet of A4 paper

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| Lesson phase | Estimated time | Lesson type |
| **Problem | Jumping** | 20 minutes | Whole class |
| **Problem | Jumping far** | 10 minutes | Whole class |
| **Problem | Brainstorm ideas** | 20 minutes | Small group |

# Teach this lesson

## Problem | Jumping

Move to an open space with enough room for all students to jump, such as the playground or school hall.

**Pose the initial question:** *Who likes to jump? Who is a good jumper? Let’s see!*

Divide the class into small groups of 3-4 students. Students will work in these groups throughout the course of the investigation.

Explain that in their groups, students are going to jump to see who is a good jumper. Allow students time to show off their jumping skills!

Students may jump in different ways, for example high, long, on the spot, or even with a jump rope. Collect examples of different jumps which you can draw on in the class discussion.

## Problem | Jumping far

**Discuss as a class:**

* *What is a good jump? How could we decide this?*
	+ You might share some ‘good’ jumps that you saw.
	+ Allow students to share what they think ‘good’ might mean in this context. Student suggestions might include jumps that are high, long or fast.
* *How will we know one jump is better than another jump?*
	+ ‘Good’ is generic and has no meaning until it is qualified alongside an attribute of a jump, such as height, speed, or length. In order to compare jumps, students will need to measure jumps using a common attribute. This may not be obvious to students.
	+ Discuss the type of jumps (high, long, fast etc.) students might do and decide what type of jump is possible to measure using what is available in the school.

Show students slide 4 of **How far can we jump PowerPoint** which shows the [PPDAC investigation process](https://resolve.edu.au/pedagogical-tools/learning-through-inquiry-tools/instructional-models?tabIndex=2). Explain to the students that we now have our problem to investigate: *How far can students in our class jump?*

Discuss how far students predict they can jump and why they think this.

## Problem | Brainstorm ideas

Ask students to return to their groups and brainstorm how they will find out how far students in our class can jump. Students should consider:

* What do we already know from our own experience about how far students in our class can jump?
* What do we not yet know about that we still need to find out?

Provide each group with a sheet of paper and coloured markers and/or pencils. Ask students to record their ideas on the paper which will be shared with the class. Make a note of any student ideas that indicate some use of measuring, keeping track, or being accurate.

Conduct a class discussion and invite students to share their ideas. Focus on ideas that include measuring in some way, keeping track of measurements and being accurate with measurements.

Introduce students to the selection of various measuring tools and ask what they might use to measure. Discuss with students what they will need to measure, which measuring tools would be useful and which tools would not.

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 Lesson 2 • Developing jumping protocols

**Lesson 2**

**(Y3)**

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# Lesson overview

Students establish protocols to control some variables, so that the data they collect on jump distance is reliable.

## Learning goals

Variation is central to statistics. Some sources of variability can be identified and reduced to ensure our data is reliable.

## Resources

**Whole class**

* **How far can we jump PowerPoint**
* Open space to jump
* Various measurement tools, including metre rulers, tape measures. Also include some unhelpful tools in this context such as protractors, trundle wheels, scales, and measuring jugs.

**Each group**

* Metre rulers and tape measures
* Sheet of A3 paper
* Sticky notes

**Each student**

* **Planning our data collection Student sheet**

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| Lesson phase | Estimated time | Lesson type |
| **Plan | Making a plan** | 15 minutes | Whole class |
| **Plan | Pilot the plan** | 25 minutes | Small group |
| **Plan | Developing protocols** | 10 minutes | Whole class |

# Teach this lesson

## Plan | Making a plan

Revise the problem the class is investigating—*How far can students in our class jump?* Show students slide 6 of **How far can we jump PowerPoint** which shows the [PPDAC investigation process.](https://resolve.edu.au/pedagogical-tools/learning-through-inquiry-tools/instructional-models?tabIndex=2)

**Explain:** *We now need to* ***plan*** *how we will find this out.*

Explain to students that they will work in groups, and that each group will collect data from three jumps each.

Ask students to get into their groups of 3-4 students and provide each student with **Planning our data collection Student sheet** and ask them to plan to collect the required data. This sheet provides the following list of prompts to help groups plan their investigation:

* What data do we need to collect?
* How will we collect our data?
* What equipment do we need?
* How will we record our data?

Students use these prompts to plan their data collection.

## Plan | Pilot the plan

Explain to the students that they will pilot their data collection plan—this means doing a small test run to see if the plan works, and noticing problems and opportunities. Provide students with access to a selection of measuring tools. Allow students to select the tool/s that they plan to use.

Convene the whole class in an open space with enough room for all students to jump, such as the playground or the school hall.

Allow students time to pilot their data collection plan.

The purpose of piloting data collection is to help students to become aware of some of the problems and opportunities that may arise as they collect data on their jumps.

Take note of some of the inconsistencies that you notice across the groups in how students are taking their jumps and how they are measuring them. The following Checkpoint focuses on the need to agree on some measurement protocols for all students to use.

### Checkpoint: Fair test

**Ask:** *Did you notice any problems or inconsistencies as you tested your data collection plan?*

Allow students to share their noticings, and discuss why they think these inconsistencies might impact the data collected. Add any of your own noticings that are not raised by students. Two possible sources of variability that should be discussed include how students are taking their jumps and how they are measuring them. You might also suggest one that doesn’t matter (for example, shoelaces vs Velcro on shoes) to highlight that some differences aren’t an issue, so they have to consider what matters “enough”.

Discuss the differences and how they may impact the outcome. Ask students if they noticed other inconsistencies. They may also bring up inconsequential factors, such as breezes.

## Plan | Developing protocols

**Ask:** *How should we jump and measure, so we are consistent?*

Develop class jumping and measuring protocols. For example:

*All jumps must be standing jumps, taking off and landing with two feet together. Jumps will be taken from a jumping line. People must start with their feet behind the line. We will use a measuring tape to measure jumps and we will measure from the jumping line to the back of the foot where the jumper lands.*

Record the class jumping and measuring protocols on slide 7 of **How far can we jump PowerPoint** for later reference.

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 Lesson 3 • How far

**Lesson 3**

**(Y3)**

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# Lesson overview

Students collect data from three jumps, following the jumping and measuring protocols established in the previous lesson. They focus on collecting consistent, reliable data.

## Learning goals

We collect data to answer questions that we are investigating.

## Resources

**Whole class**

* **How far can we jump PowerPoint**

**Each group**

* Measuring tapes
* Sheet of A4 paper

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| Lesson phase | Estimated time | Lesson type |
| **Data | Collecting jumping data**  | 50 minutes | Whole class |

# Teach this lesson

## Data | Collecting jumping data

Show students slide 9 of **How far can we jump PowerPoint.**

**Revise**: *We have a* ***problem*** *to investigate: How far can our class jump? We have a* ***plan*** *of how to find this out. Now we need to collect* ***data****.*

Use slide 7 to review the class’s jumping and measuring protocols.

Ask students to get into their groups of 3-4 students. Provide each group with a sheet of A4 paper for recording their jumps and measuring tools. Remind students that each student needs to collect data from three jumps.

Allow students time to collect their data using the established protocols.

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 Lesson 4 • Our jump data

**Lesson #**

**(Y3)**

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# Lesson overview

Students represent their jump data, and to use the data as evidence for predictions.

## Learning goals

Representing data allows us to make sense of the data, and to use the data as evidence for predictions.

## Resources

**Whole class**

* **How far can we jump PowerPoint**
* Sticky notes to create a class data display

**Each student**

* **Making predictions Student sheet**

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| Lesson phase | Estimated time | Lesson type |
| **Data | Collate data** | 20 minutes | Whole class |
| **Analyse | What is typical?** | 10 minutes | Whole class |
| **Data | Making predictions** | 20 minutes | Small group |

# Teach this lesson

## Data | Collate data

Show students slide 11 of **How far can we jump PowerPoint.**

**Revise**: *We have a* ***problem*** *to investigate: How far can our class jump? We have a* ***plan*** *of how to find this out. We have collected our* ***data*** *and now we need to represent our data*.

Provide the students with a sticky note and ask them to record the length of their longest jump on the sticky note. Ask students to put their sticky notes randomly on the board.

**Discuss**: *We have collected so much data! But it is hard to see what the data is telling us. How could we organise the data to make sense of what the data is telling us?*

Allow students to offer suggestions on how the data could be organised.

As a class, reach a consensus and select a way to represent the whole class’s jump data on the board. For example, you might decide to order the sticky notes along a number line to indicate how far students jumped.

## Analyse | What is typical?

Show students slide 11 of **How far can we jump PowerPoint.**

**Explain**: *We have collected and represented our* ***data*** *and now we need to* ***analyse*** *our data*.

**Discuss**:

* *Typically, how far did most students jump?*
	+ The term ‘typically’ introduces the idea of central tendency. To do this, students need to look at the whole dataset, not just the individual data points. Encourage students to think about what is ‘typical’ as a range, rather than a single measurement. Make sure students use evidence from the data.
* *Which jumps were not typical?*
	+ Those jumps that lie outside of the ‘typical’ range. There may be some distinct outliers as well.
* *If a new student came into our class, how far do you think they might jump?*
	+ Students can think about what is typical to predict how far someone else might jump. Conditional language is important as we do not know how far this hypothetical student will jump. Make sure students use evidence from the data.

**Pose the question**: *How far do you predict a different class might jump?*

## Data | Making predictions

Provide each student with a copy of **Making predictions Student sheet**. This sheet poses the following questions:

* *How far do you predict another Year 3 class might jump? What makes you say that?*
* *How far do you predict a Year 1 class might jump? What makes you say that?*
* *How far do you predict a Year 5 class might jump? What makes you say that?*
* *How far do you predict the teachers might jump? What makes you say that?*

Ask students to get into their groups of 3-4 students. In these groups students need to discuss the questions on the sheet and record their predictions.

Conduct a whole class discussion.

Invite students to share their predictions; they may have made inferences about a number of different classes. They should share the reasoning they used in making these, express them through language of uncertainty, and use evidence to support them.

Save the class data display or take a photo for use in the following lesson.

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 Lesson 5 • How far we can jump

**Lesson 5**

**(Y3)**

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# Lesson overview

Students use the data to answer the question "How far can we jump?".

## Learning goals

We use data as evidence to answer questions.

## Resources

**Whole class**

* **How far can we jump PowerPoint**
* Class data display from Lesson 4, or a photo of the data display

**Each student**

* **Our data story Student sheet**

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| Lesson phase | Estimated time | Lesson type |
| **Data | Data as evidence** | 10 minutes | Whole class |
| **Conclusion | How far we can jump** | 30 minutes | Whole class/individual |
| **Conclusion | Review** | 10 minutes | Whole class |

# Teach this lesson

## Data | Data as evidence

Use the **How far can we jump PowerPoint** to show students where they are in the statistical inquiry process.

**Revise:** *We have a* ***problem****. We have a* ***plan****. We have* ***data****. We have* ***analysed*** *our data. Now we can make a* ***conclusion*** *about the investigation by answering our question.*

Show students the class sticky note data display that was collected last lesson.

Review with students what they have noticed in the data, and some of their predictions from last session.

**Pose the question**: *How far can students in our class jump?*

## Conclusion | How far we can jump

Provide students with **Our data story Student sheet**. Ask students to use the sticky note data display to write a story with the data. Their story should answer the question *“How far can students in our class jump?”*. Explain that they should include evidence to support their noticings, inferences and predictions. They can represent the story of the data in any way they choose, so that it is clear to see the story.

## Conclusion | Review

Invite some students to share their story with the class.

Revise the PPDAC process in the **How far can we jump PowerPoint.** Review some of the challenges that arose at the different stages of the investigation process and how the students managed them.

Here it is important to normalise challenges as part of the process of statistical inquiry. The more students engage in statistical inquiry, the more they will recognise the patterns in the process. PPDAC has been introduced informally as a model to support students to engage in the inquiry process.

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