

# MAKING DECISIONS WITH DATA

## Lesson 1: Unlabelled Graphs

### Australian Curriculum: Mathematics - Year 5

ACMSP120: Describe and interpret different data sets in context.

### Lesson abstract

Students are presented with column graphs that are unlabelled. They have no scale, no title and no labels. They use the unlabelled graphs to construct their own stories to interpret the information in the graphs. This highlights the importance of context for understanding data.

### Mathematical purpose (for students)

To make sense of the story told by a graph.

### Mathematical purpose (for teachers)

The unlabelled graphs highlight the need for graphs to be appropriately associated with titles, labelled axes, legends and keys, and numerical scales, in order to convey a message to readers.

At the end of this lesson, students will be able to:

- Use data presented in a graph to tell a story.
- Make mathematical statements about data presented in graphs.
- Identify the essential features of a graph.

Lesson Length 60 minutes approximately

#### Vocabulary Encountered

- axis
- scale
- tick marks
- label
- title

#### Lesson Materials

- [Student Sheet 1 - The Unlabelled Graph](#) (1 per student)
- [Student Sheet 2 - Data Tells a Story](#) (1 per student)
- [Teacher Sheet 1 - The Unlabelled Graph](#)
- [Teacher Sheet 2 - Data Tells a Story](#)

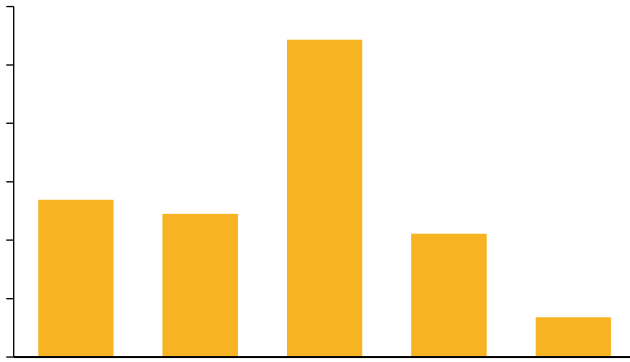
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We value your feedback after this lesson via <http://tiny.cc/lesson-feedback>

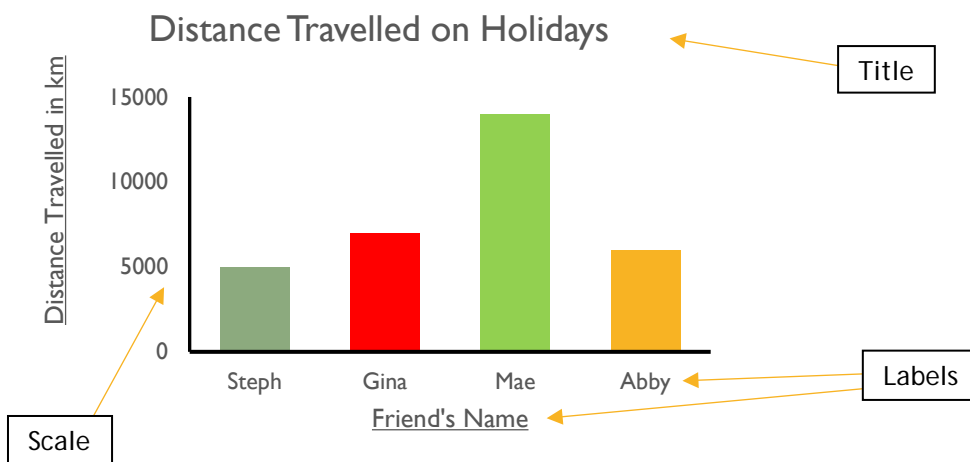


# Identifying the Essential Elements of a Graph



## The unlabelled graph

- Present students with [Student Sheet 1 - The Unlabelled Graph](#), showing the graph above.
- What might this graph be showing? What might be the story behind the data being represented?
- Students complete the worksheet, adding the missing elements to the graph to give it a context that they can explain and discuss with the class.
- A good graph like the example below will need to have a title, labels, scale and possibly coding/colour key but this will be revealed by the students themselves as the lesson progresses.



## Enabling Prompt

- On the vertical scale, number each of the given tick marks as going up by 5. Now divide each section into 5 smaller parts. There might not be enough space to number each of these but the marks will be an indicator.

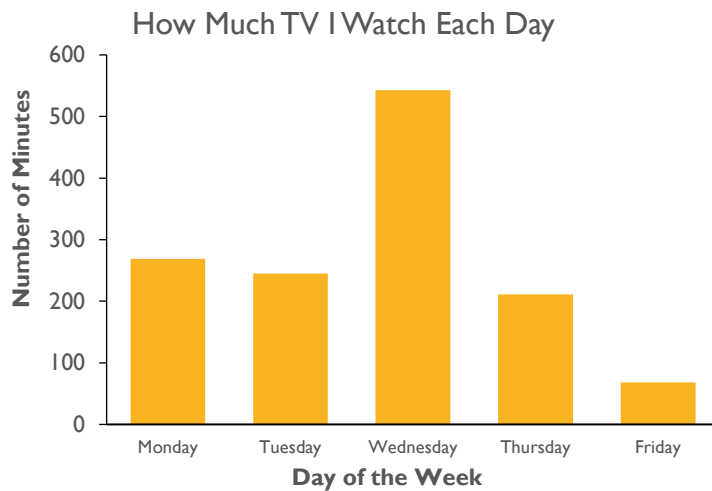
## Extending Prompt

- Use a larger vertical scale, for example 100-to-1 or 2000-to-1. In the "How Much TV I Watch Each Day" example on the next page, the student has chosen a 100-to-1 vertical scale.

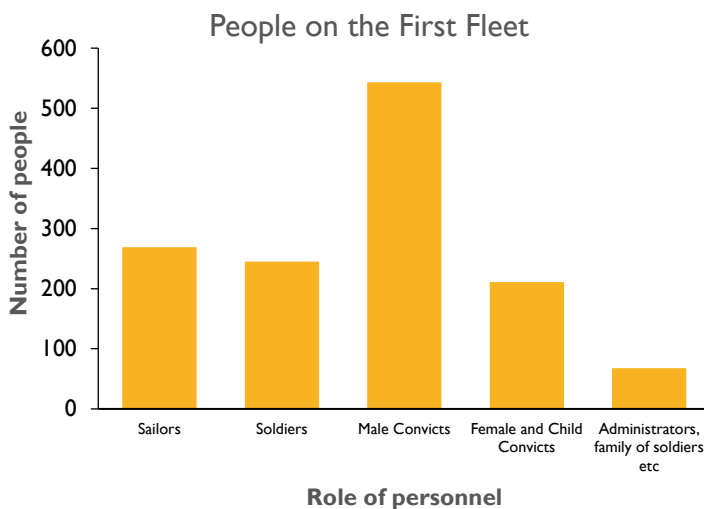
## Teacher Notes

- Students will need to think carefully about scale on the vertical axis. If they choose each tick mark to be 1 unit, they will need to use fractions or decimals to describe the height of the columns as none of them line up very neatly with the tick marks.

- It will be easier for students to use a vertical scale with a 5-to-1 relationship, as in the enabling prompt, so that they can include minor divisions between 0-5, 5-10 etc. A 10-to-1 scale will also be quite easy.
- The data from this graph could have been taken from many sources - it is intended to be open to interpretation so that students can bring their own stories and context to explain what they see. For example, the unlabelled graph might become:



- The original graph represents the people who came to Australia on the First Fleet but the students do not necessarily need to know this. The idea of not knowing the context helps them to identify the fact that labels and titles add significantly to understanding a graph.



## Engaging with the data

- Present your explanation of the data to the class.
- Explain why you chose that particular context to explain what the data meant.
- Also explain the 4 mathematical statements you have made about the data.
- Explain and justify your choice of scale.
- Explain what other features you thought were essential to include on the graph.

## Reflecting on the data

Some important questions to reflect on:

- Was the choice of context appropriate for this type of data display?
- Was the graph labelled correctly for this context?
- What scale was used? Did it relate purposefully to the data?
- Does the explanation go beyond the superficial, to bring in deeper questions of analysis and interpretation?

- Were the mathematical statements simple comparisons (this one is bigger than that one) or were they more complex (predicting trends, analysing fictional populations etc.)
- What are the essential elements of a column graph? What do we lose if some of these elements are left out?

## Bringing Meaning to the Data

### Data tells a story

- Two more graphs are presented in [Student Sheet 2 - Data Tells a Story](#).
- The first graph has the horizontal axis labelled; the second has the vertical axis labelled.
- Ask students to create stories for these graphs.
- What mathematical statements can we make with confidence about each of the data sets presented in these graphs?

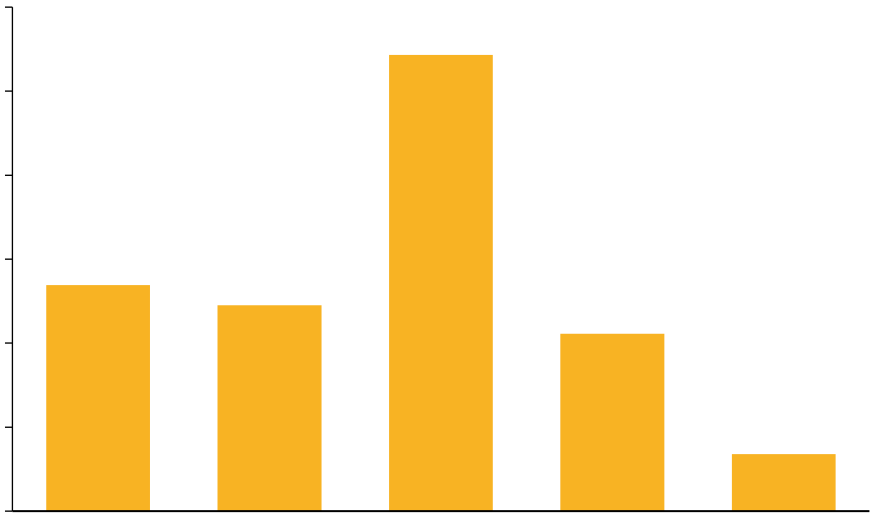
### Discussion

- Listen to the stories and contexts that different students create about the data presented in the various unlabelled graphs.
- Has each student added essential features to the graph to make it understandable to the audience?

## Possible Class Project: Finding Examples in the Media

### Data in the media

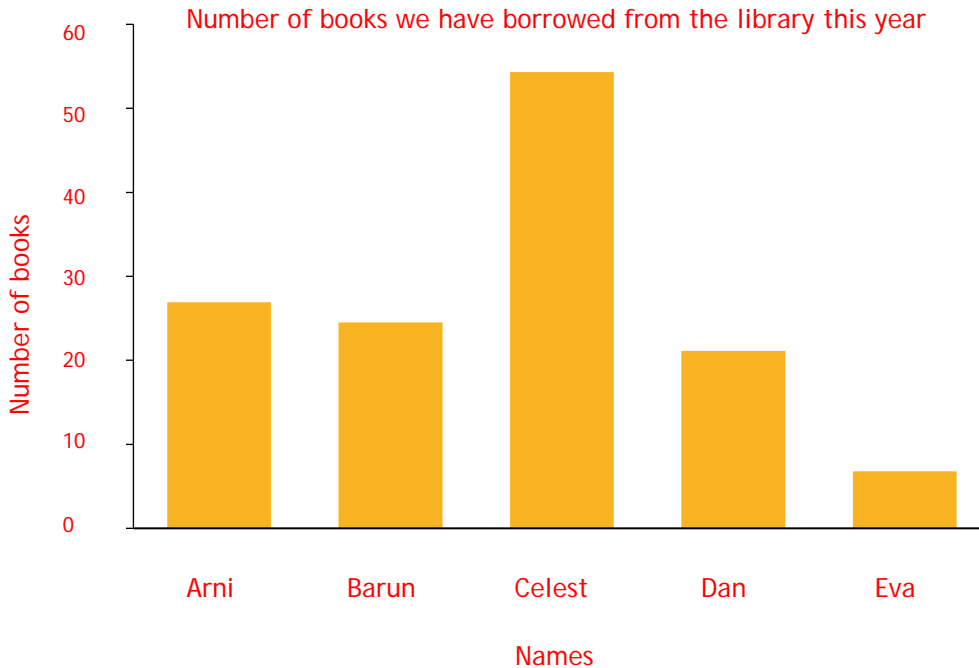
- You will find graphs of data in most newspapers and magazines, and on the internet. See if you can find examples that do not include all the elements of a graph, such as:
  - Title
  - Labels
  - Scale
  - Key or legend if required
- Sort the graphs that you find into groups, such as:
  - Type of graphs - column graphs, line graphs, pie charts, picture graphs.
  - Topic of graph - financial information, population data, opinion poll, etc.
  - Purpose of graphs - to inform, to influence opinion, to sell a product.
- Analyse the graphs that you find, looking for:
  - Clear headings and titles
  - Accurate scale
  - Missing elements
  - Misleading or confusing representation of data
  - Other elements of interest
- Present your analysis to the class using digital technology.



1. What do you think this graph could be about? Make up a story that fits the graph.
  
2. Label the graph so that anyone looking at it will understand what it means.
3. Make four mathematical statements about the data in the graph.
  - i)
  - ii)
  - iii)
  - iv)

# Teacher Sheet 1 - The Unlabelled Graph

## Expected Student Response



1. What do you think this graph could be about? Make up a story that fits the graph.

I think this is a graph about how many library books five friends have borrowed this year. The first person is called Arni. The second person is Barun. Arni and Barun like to read the same books so they can chat about them. The third person is Celest. She is a very keen reader and has borrowed 54 books so far this year. Dan is the fourth person in the group. He has borrowed 21 books. The fifth person is Eva. She does not like reading much and does not borrow from the library very often.

2. Label the graph so that anyone looking at it will understand what it means.

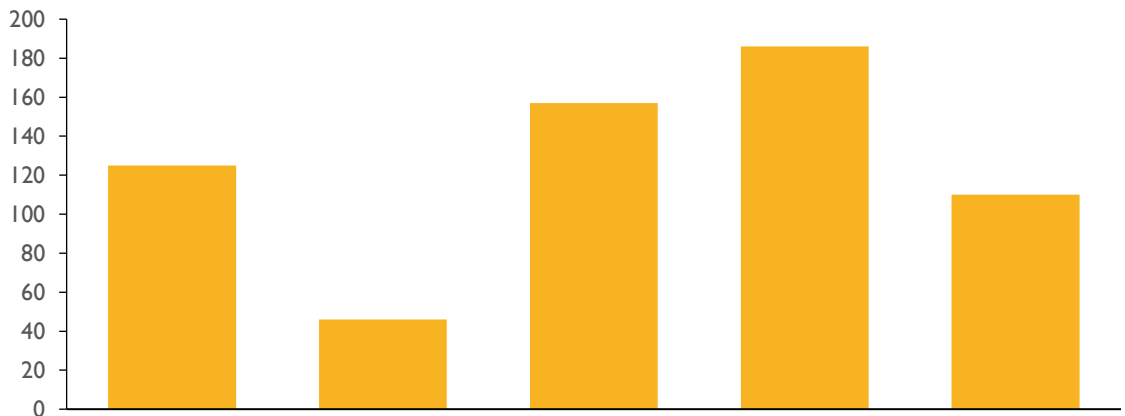
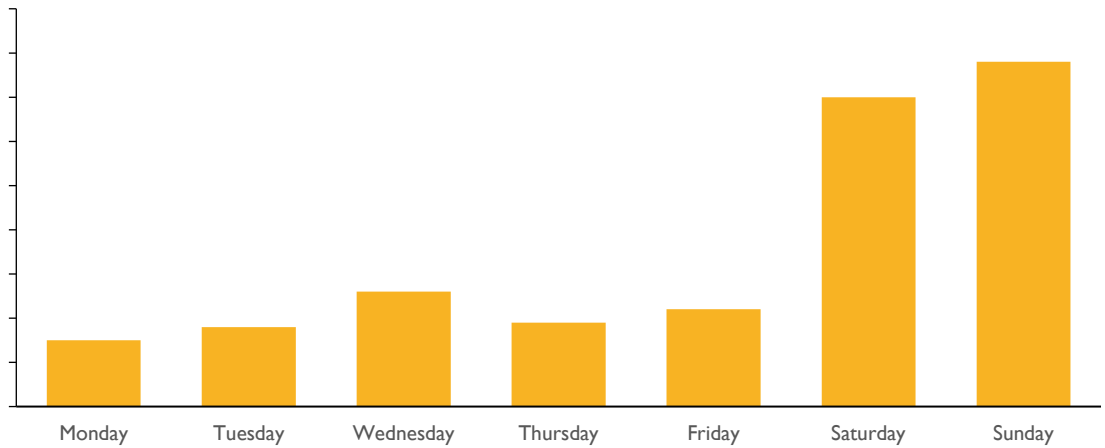
3. Make four mathematical statements about the data in the graph.

- i) Arni has borrowed 27 books. Barun has borrowed 24 books.
- ii) Celest has borrowed close to 8 times as many books as Eva, who has borrowed 7 books.
- iii) Celest has borrowed more books than the next two highest borrowers put together.
- iv) Dan, Arni and Barun have borrowed similar numbers of books.

# Data Tells a Story

Name: \_\_\_\_\_

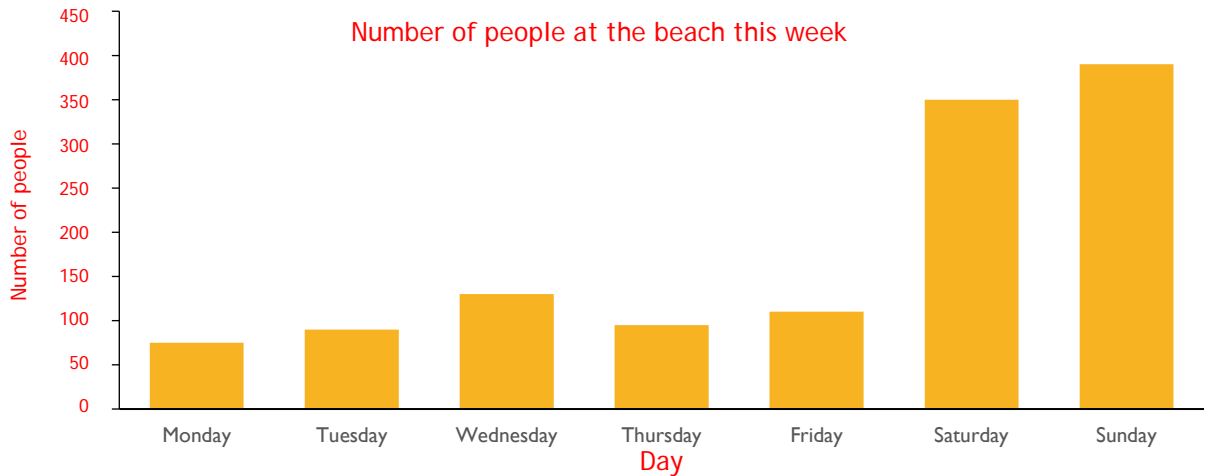
Make up stories that fit these graphs. Include some mathematical statements in your story, and remember to add titles, scale and labels if they are missing.



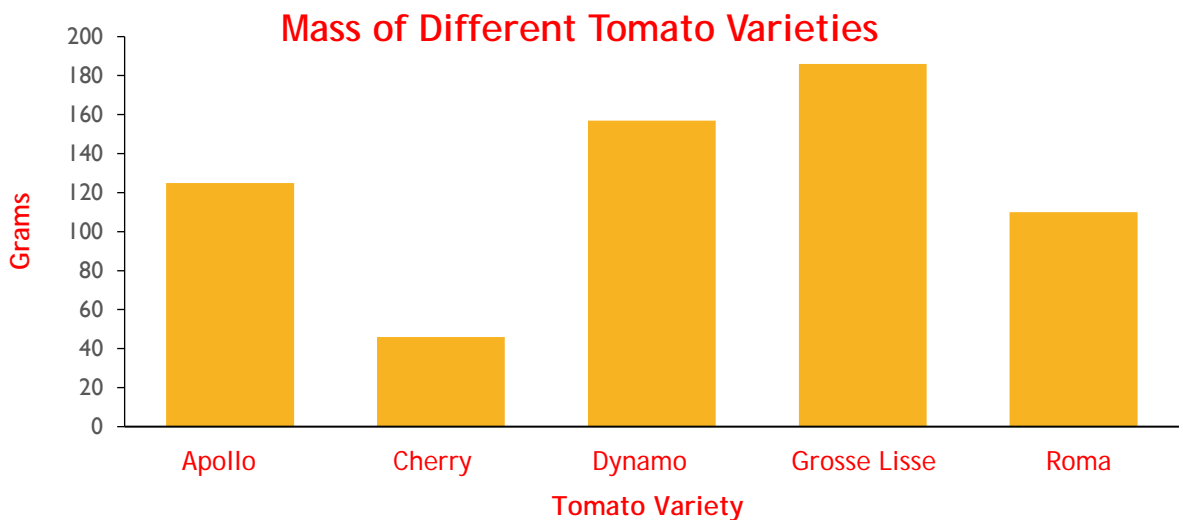
# Teacher Sheet 2 - Data Tells a Story

## Expected Student Response

Make up stories that fit these graphs. Include some mathematical statements in your story, and remember to add titles, scale and labels if they are missing.



We counted how many people went to the beach this week. On Monday and Tuesday it was cloudy and there were not many people. Wednesday was sunny so more people went to the beach. It rained on Thursday morning but it cleared up later and was sunny so people went swimming. Friday was also sunny and there almost 100 people at the beach. On the weekend it was really nice weather and lots of people went to the beach. Most people who have jobs cannot go to the beach during the week but they can go on weekends if the weather is nice.



My family grows lots of tomatoes. We like to experiment with different varieties. I wanted to know which variety had the biggest fruit so I weighed five different types of tomatoes. The cherry tomatoes were obviously the smallest but I expected that. Even though our Romas are quite large, they were still the second smallest compared to the other varieties. The Apollos have not grown very well this year and they are still a bit small. The Dynamo tomatoes have done well and are our second biggest tomatoes. The biggest tomatoes that I measured were the Grosse Lisse variety. They are absolutely huge this season and they taste great too.