This page is for

Teachers

DT Applied: Data Analytics
Unplugged activities for students

This activity is for: Years 7-8

Lexi's coffee business

This activity teaches:

Students develop an understanding of how data is used by businesses to improve customer service and increase their profit margin. Students will examine collected data, work out totals, explore min, max, mean, medium and mode to answer key questions. This activity aims to support students to understand the process of survey development, plan and create a survey, collect and analyse user data.

This activity is targeted towards students in years 7 & 8. The activity is expected to be ran in pairs across two 45-minute lessons.

Learning Intentions:

- Be able to review data concepts outlined in the course
- Be able to test student knowledge and understanding of concepts
- Be able to recall meaning of data concepts and check for misconceptions.
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You will need:

- pen/pencil
- Lexi's coffee business data sheet (1 per pair)
- ***Survey planning*** worksheet (1 per pair).

Getting started:

- Divide the class in pairs.
- Provide handouts (1 per pair) of Lexi's coffee business data sheet and the Survey planning worksheet.
- Each pair will analyse the data from Lexi's coffee business to find the mean, median and mode. They will then use this data to make some decisions about Lexi's coffee business.
- Each pair will brainstorm their own question and plan and conduct a survey to collect data.

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Step by step:

1. As a class read the information to set the scene for Lexi's coffee business:
   - Lexi has decided to open a permanent coffee stand at school. She's excited to build up this business into something she can be proud of. Her pop-up cafe usually has a queue of teachers waiting for a morning mocha or double-shot espresso.
   - Lexi has gathered some great data from her customers. Now she needs to analyse it so that she can decide how to use it to improve her business model. Help Lexi analyse her data.

2. Refer students to the Lexi's coffee business data sheet and total the first answer together as an example. Leave students to complete the others.

3. Discuss with the class what a *minimum, maximum, mode, mean* and *median* are and how they would go about finding each of them in the coffee data.

4. Ask students to complete tasks 1-4.

5. Discuss why graphs are used to represent data, show *Graph 1 Lexi's coffee orders Term 1.*

6. Students answers questions 5 and 6 on their worksheets.

7. Students share and go through answers as a class.

8. In the second lesson, as a class read the information to set the scene for Lexi's coffee business: Lexi is losing business! Sometimes she doesn't have enough milk or the right type of milk for her customers. Other times they need to go to class and cannot wait in line to get their coffee! Help Lexi design a survey to gather some data about her customer needs.

9. Discuss the difference between an open and closed question.
10. Brainstorm on the board what questions Lexi may be wondering about her customers.
11. Students complete the beginning, middle and end survey planning sheets.
12. Students share back with class their survey question.

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Students

Lexi's coffee business

Lexi has decided to open a permanent coffee stand at school. She's excited to build up this business into something she can be proud of. Her pop-up cafe usually has a queue of teachers waiting for a morning mocha or double-shot espresso.

Lexi has gathered some great data from her customers. Now she needs to analyse it so that she can decide how to use it to improve her business model.

Help Lexi analyse her data. First, she needs to work out the total number of coffees each week of the term. Please complete the final column and final row of the below table.

Coffee orders Term 1

Week	Cow's milk	Almond milk	Soy milk	Lactose free milk	Total Coffees
1	44	4	10	6	
2	48	4	10	5	
3	45	5	8	6	
4	52	4	10	4	
5	51	5	10	5	
6	3	6	10	6	
7		6	12	4	
8	58	8	13	6	
9	61	8	13	6	
10	77	12	16	9	
Total					

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Students

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Lexi's coffee business
T1 data A

Using the **Coffee Orders Term 1** data calculate the following.

1a) What is the **minimum value** for the column titled *Cow's milk*? _____

1b) What is the **maximum value** for the column titled *Cow's milk*? _____

1c) What is the **range (max - min)** for the column titled *Cow's milk*? _____

2a) What is the **mode number** of coffees on **cow's milk**? _____

2b) What is the **mode number** of coffees on **almond milk**? _____

2c) What is the **mode number** of coffees on **soy milk**? _____

2d) What is the **mode number** of coffees on **lactose free milk**? _____

2e) Did you get the **mode** you were expecting for each column? (Circle one) *Yes* or *No*

2f) Why or why not?

Hint

Mode
The value that appears with the greatest frequency in a set of data

Mean
The sum of the data values divdied by the number of numbers in the list

Median
The "middle value" in a set of ordered data that divides the data into two parts

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3a) What is the average (or **mean**) number of coffees on ***cow's milk***? _____

3b) What is the average (or **mean**) number of coffees on **almond milk**? _____

3c) What is the average (or **mean**) number of coffees on **soy milk**? _____

3d) What is the average (or **mean**) number of coffees on **lactose free milk**? _____

3e) Did you get the averages (or **means**) you were expecting for each column? (Circle one) *Yes* or *No*

3f) Why or why not?

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Students

Lexi's coffee business
T1 data B

Using the **Coffee Orders Term 1** data calculate the following.

4a) What is the **median number** of coffees **on cow's milk**? _____

4b) What is the **median number** of coffees on **almond milk**? _____

4c) What is the **median number** of coffees on **soy milk**? _____

4d) What is the **median number** of coffees **on lactose free milk**? _____

4e) Did you get the **medians** you were expecting for each column? (Circle one) *Yes* or *No*

4f) Why or why not?

_____

_____

5a) It can be helpful to view our data as a graph or visualisation. Look at Graph 1. What do you notice?

_____

_____

6a) Can you see any possible errors or flaws in Lexi's data? (Circle one) *Yes* or *No*

6b) If yes, what could be a possible error?

_____

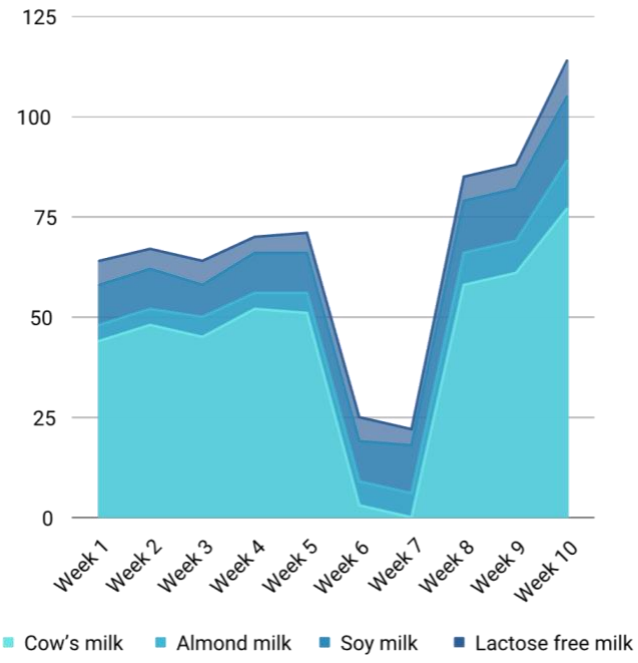
_____

7a) What can you conclude from this data?

_____

_____

Graph 1: Lexi's Coffee Orders Term 1



Lexi's coffee business

Lexi is losing business! Sometimes she doesn't have enough milk or the right type of milk for her customers. Other times they need to go to class and cannot wait in line to get their coffee.

Help Lexi design a survey to gather some data about her customer needs.

Tips for creating a survey

1. Identify the questions you are trying to answer.

2. What problems are you trying to identify?

3. Keep your questionnaire short.
Either 8 -12 questions or able to be completed in 5 minutes.

4. Keep text brief and focused.

5. Write clear questions. ONE question should ask ONE thing.

6. If a question is multiple choice, make sure you include an "I prefer not to answer" or "I'm not sure" option.

7. For a ranked question use a vertical format for responses, for example:
- Strongly agree
- Slightly agree
- Neither agree nor disagree
- Slightly disagree
- Strongly disagree.

Hint

Brainstorm what questions Lexi is trying to answer!

What does she want to know about her customers?

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Lexi's coffee business

ANSWERS

Lexi has decided to open a permanent coffee stand at school. She's excited to build up this business into something she can be proud of. Her pop-up cafe usually has a queue of teachers waiting for a morning mocha or double-shot espresso.

Lexi has gathered some great data from her customers. Now she needs to analyse it so that she can decide how to use it to improve her business model.

Help Lexi analyse her data. First, she needs to work out the total number of coffees each week of the term. Please complete the final column and final row of the below table.

Coffee orders Term 1

Week	Cow's milk	Almond milk	Soy milk	Lactose free milk	Total Coffees
1	44	4	10	6	**64**
2	48	4	10	5	**67**
3	45	5	8	6	**64**
4	52	4	10	4	**70**
5	51	5	10	5	**71**
6	3	6	10	6	**25**
7		6	12	4	**22**
8	58	8	13	6	**85**
9	61	8	13	6	**88**
10	77	12	16	9	**114**
Total	**439**	**62**	**112**	**57**	**670**

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Lexi's coffee business T1 data A ANSWERS

Hint

Mode
The value that appears with the greatest frequency in a set of data

Mean
The sum of the data values divdied by the number of numbers in the list

Median
The "middle value" in a set of ordered data that divides the data into two parts

Using the **Coffee Orders Term 1** data calculate the following.

1a) What is the **minimum value** for the column titled *Cow's milk*? **0**

1b) What is the **maximum value** for the column titled *Cow's milk*? **77**

1c) What is the **range (max - min)** for the column titled *Cow's milk*? **77 - 0 = 77**

2a) What is the **mode number** of coffees on **cow's milk**? **There isn't a mode.**

2b) What is the **mode number** of coffees on **almond milk**? **4**

2c) What is the **mode number** of coffees on **soy milk**? **10**

2d) What is the **mode number** of coffees on **lactose free milk**? **6**

2e) Did you get the **mode** you were expecting for each column? (Circle one) *Yes* or *No* **Answers will vary.**

2f) Why or why not?

Yes, the mode is similar to the medians and the average or mean for the almond milk. The mode and median are the same for the soy milk and lactose free milk column. There is no mode for the first column on cow's milk.

3a) What is the average (or **mean**) number of coffees on ***cow's milk***? **43.9**

3b) What is the average (or **mean**) number of coffees on **almond milk**? **6.2**

3c) What is the average (or **mean**) number of coffees on **soy milk**? **11.2**

3d) What is the average (or **mean**) number of coffees on **lactose free milk**? **5.7**

3e) Did you get the averages (or **means**) you were expecting for each column? (Circle one) *Yes* or *No*

Answers will vary.

3f) Why or why not?

No, I was expecting the average number of coffees on cow's milk to be higher as half of the weeks of Term 1 had higher than 50 coffees a week. The other 3 columns were what I expected.

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Lexi's coffee business
T1 data B ANSWERS

Using the **Coffee Orders Term 1** data calculate the following.

4a) What is the **median number** of coffees **on cow's milk**? **49.5**

4b) What is the **median number** of coffees on **almond milk**? **5.5**

4c) What is the **median number** of coffees on **soy milk**? **10**

4d) What is the **median number** of coffees **on lactose free milk**? **6**

4e) Did you get the **medians** you were expecting for each column? (Circle one)

Yes or *No* **Answers will vary.**

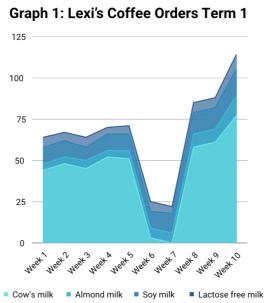
4f) Why or why not?
Yes, the medians are similar to the average or mean, except for the first column on cow's milk. The median is higher (by 6 coffees) than the mean or average.

5a) It can be helpful to view our data as a graph or visualisation. Look at Graph 1. What do you notice?
Answers will vary. There is a noticeable drop in numbers for Week 6 and 7 of the data for the cow's milk orders. There is not a drop for the other coffees (on almond milk, soy milk and lactose free milk).

6a) Can you see any possible errors or flaws in Lexi's data? (Circle one) *Yes* or *No* **Answers will vary.**

6b) If yes, what could be a possible error? **Answers will vary. It is possible that there is missing data for Week 6 and Week 7 for the cow's milk order data. There is a huge drop in numbers (0 in Week 7) for these 2 weeks but there is not a drop in the other types of milk orders.**

7a) What can you conclude from this data? **The column that was inconsistent or different for mean, median and mode was the first column, recorded data for how many coffees on cow's milk. When I observe both the table of data and the below graph, I notice that there are only 3 coffees on cow's milk in week 6 and no coffees on cow's milk for week 7. This is very different to the other weeks, and so I suspect there is an error in this data. This is supported by the calculation of average which is lower than expected for number of cow's milk coffees overall for the term. There is also a significant different range for the first column (77), supporting this conclusion.**



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Want more?

Here are some further activities, online resources, extension ideas and curriculum references.

Adapting this activity

- Students can create their own data visualisations using Lexi's coffee business data.
- Students can create a survey relevant to their school community, convert it into an online survey and collect their own data.

Keep the conversation going

- Ask students to think of other ways that Lexi could increase her profit from her pop-up coffee business.
- Students in pairs to explain to another group of students what could be the reasons that Lexi's coffee data shows an increase in coffee sales from Week 1 to Week 10 of the term.
- Students identify the best way to survey or interview customers of a pop-up coffee business.

Keep learning

- Create an alternative survey using the survey worksheet templates provided.
- Use the persona template to answer the survey as one of Lexi's customers. The persona template can be found at https://groklearning.com/dt-applied/.

For teachers creating a portfolio of learning or considering this task for assessment

Ask students to create a question, plan a survey and conduct their survey and then show their results as a graph. Write a sentence or two about what information their graph can tell them in relation to their initial question.

Linking it back to the Australian Curriculum: Digital Technologies

Digital Technologies (AC9TDI8P01)

- store and validate data
- draw conclusions
- make predictions.

Mathematics (AC9M7ST01)

- acquire datasets for summary statistics
- investigate data collection techniques.