2040 - Girls for the Planet

Name _____ Class _____

Teaching Sequence

Work through this resource material in the following sequence:

20 minutes – Part A: Activating Prior Knowledge
10 minutes – Part B: Facts and Figures About Educating Girls
20 minutes – Part C: Worked example 1: Back-to-Back Stem and Leaf Plot
20 minutes – Part D: Worked Example 2: Histogram
45 minutes – Part E: Statistics of Girls' Education Around The World
15 minutes – Part F: Take Action
10 minutes – Reflection

Part A: Activating Prior Knowledge

Note: This lesson looks at how the empowerment and education of women and girls' has a positive impact on climate change. Before conducting this lesson, it is a good idea to get an understanding of your class' understanding of climate change as they will need to be able to draw links (which may be immediately difficult to imagine) between girls' education and climate change.

If you find that your class is unsure about the causes of climate change, consider showing them this clip from the 2040 Documentary: **2040 - Global Challenges** **Password 2040_EDU**

Step 1.

Lead the whole class in this 'Think, Puzzle, Explore' activity.

THINK - PUZZLE - EXPLORE

This activity will help students connect to prior knowledge, stimulate curiosity and lay the groundwork for further inquiry:

THINK - What do you THINK you know about this topic?
PUZZLE - What questions or PUZZLES do you have?
EXPLORE - How can you EXPLORE this topic?

Pose the following three questions, allowing students to make notes:

- What do you think you know about climate change and how to manage it?
- What questions or puzzles do you have?
- How can we explore this topic?

Invite students to share their ideas and note these on the board. Inform the class that they will revisit their responses at the end of the lesson.

Step 2.

Continue by asking students:

- Have you ever considered that education might be an effective way of combating climate change?
- What do you think about this idea?

Lead a brief class discussion to explore these questions.

Step 3.

Show this 2040 clip:

2040 - Empowering Women and Girls Password: 2040_EDU

Step 4.

Give the students a chance to watch the clip again, and this time, ask them to record key points and write down any unfamiliar terms.

Step 5.

Invite students to form (or assign) groups of 3 to 4. Ask students to:

- ... share their key points from the clip and form a summary
- ... collate the recorded unfamiliar terms and define them using a (print or online) dictionary

Invite some of the groups to share their responses with the class.

Step 6.

Distribute the Student Worksheet and inform students that they will be investigating statistics through the topic of climate change and, in particular, the role of educating girls in combating climate change. Let the class know that later in the lesson, they will be choosing an action that they can undertake to inform the community about what they have learned or how they can support the empowerment and education of women and girls. Students will be using mathematical information to help convince people to take action on this issue, so invite the class to take notes on the back of their Student Worksheet throughout the class when they hear something that they feel is a powerful piece of information that they might be able to use.

Explain that you will not be pointing these pieces of information out during the class because you would like students to use their own judgement about what they think is powerful and persuasive mathematical information.

Part B: Facts and Figures About Educating Girls

Step 1.

Say to students, *“Everyone make a fist and place it at their belly.”*

Then say, *“I’m going to write some statements on the board. For each one, if you know anything about the topic or have something to say, put your thumb up, like this (demonstrate the action).”*

Step 2.

Write the following on the board and read it aloud:

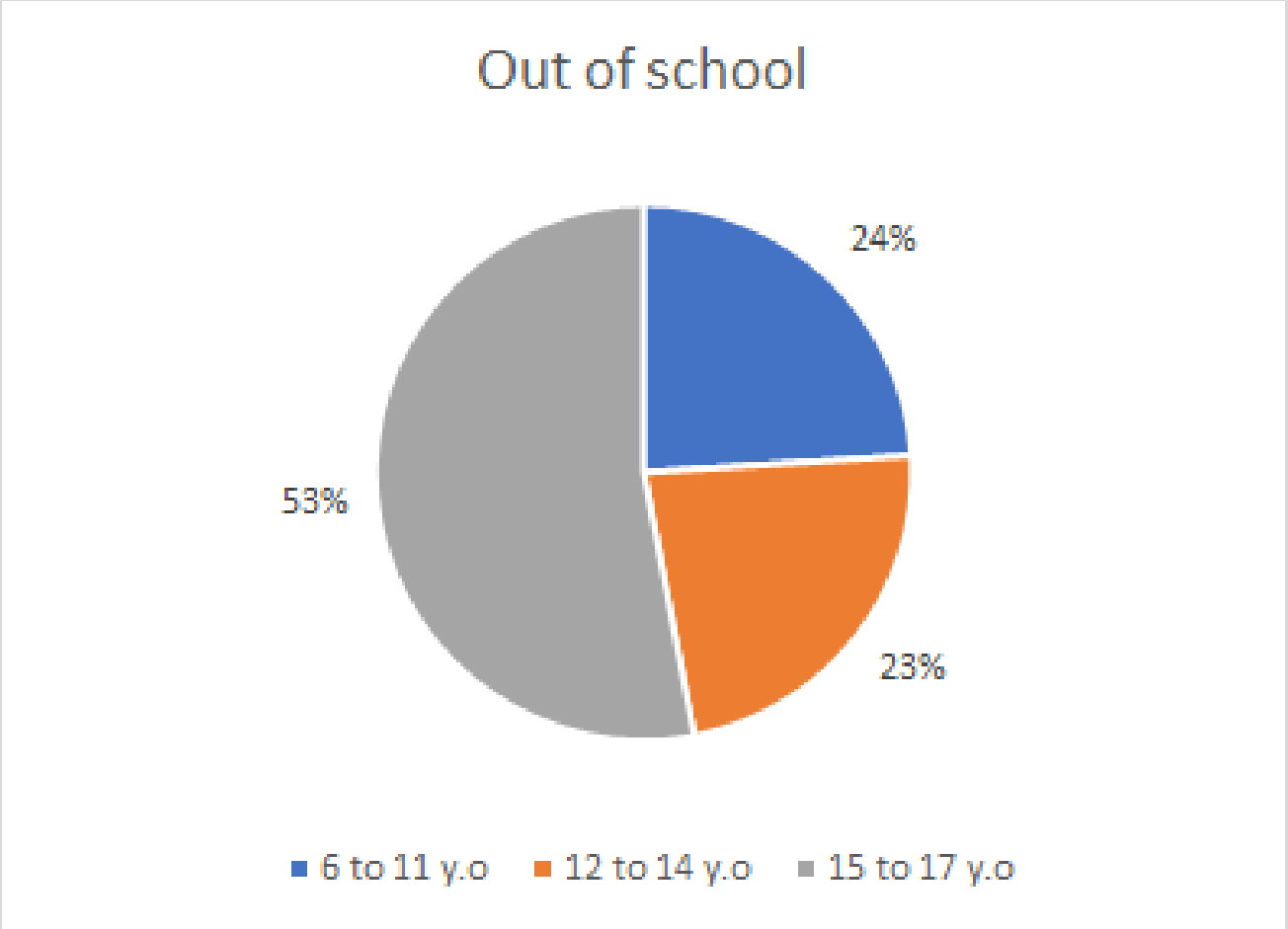
- *"In 2016, 263 million children, adolescents, and youths were out of school, representing nearly one-fifth of the global population of this age group."*

Look for raised thumbs, and invite any student with their thumb up to respond. Invite students to put their fist to their belly and once again to raise their thumb if they have something to say or ask about the following.

Display the following on the board, reading each aloud and allowing time for responses in-between:

- *"Some 63 million, or 24% of the total, are children of primary school age (about 6 to 11 years old)."*
- *"61 million, or 23% of the total, are adolescents of lower secondary school age (about 12 to 14 years old)."*
- *"139 million, or 53% of the total, are youth of upper secondary school age (about 15 to 17 years old)."*

You could also draw this **pie chart**:



Ask students what they think about these statistics. Are they surprised? What do they think are some of the barriers to education? Lead a brief class discussion on the topic.

Part C: Worked example 1: Back-to-Back Stem and Leaf Plot

In this part of the lesson, students will look at rates and numbers of out-of-school young people from the UNESCO Institute for Statistics (UIS) and develop a back-to-back stem and leaf plot to compare statistics for males and females.

Note: If you, or your students, need a refresher on stem and leaf plots, check out either of these great clips: **Grouped Data** and **Statistics - How to make a stem and leaf plot**.

Step 1.

Explain to the class that soon they will now be looking at rates and numbers of out-of-school young people in 2016, from the UNESCO Institute for Statistics (UIS) and develop a back-to-back stem and leaf plot to help them compare statistics for males and females. But before students create their own data representations, you will be working as a class to make a stem and leaf plot using some very interesting data.

Step 2.

Recreate the table below on your whiteboard leaving space to draw a stem and leaf plot beside it or project it for all students to see. Explain to the class that this table shows the number of male and female children, adolescents and youth of primary, lower secondary and upper secondary age who are out of school:

	Out of school number (millions)	
Region	**Male**	**Female**
Europe and Northern America	3.4	2.8
Latin America and the Caribbean	6.8	5.9
Central Asia	0.5	0.6
Southern Asia	49.2	46.5
Eastern and South-Eastern Asia	17.2	13.4
Northern Africa and Western Asia	8.6	10.0
Sub-Saharan Africa	44.7	52.2
Oceania	0.5	0.4

Source: **https://uis.unesco.org/sites/default/files/documents/fs48-one-five-children-adolescents-youth-out-school-2018-en.pdf**

Step 3.

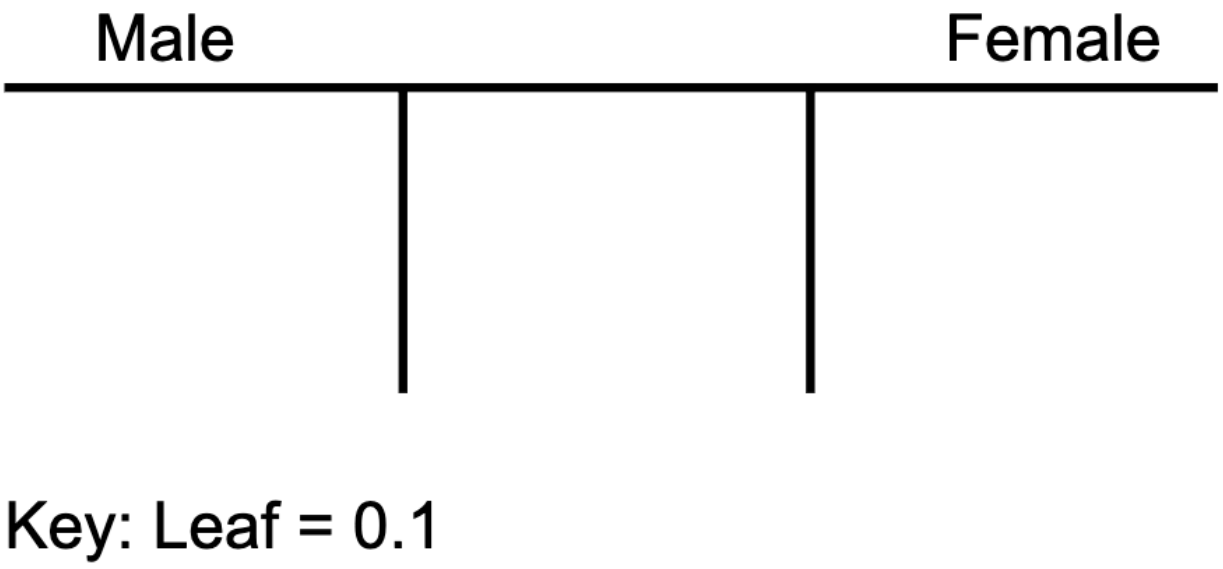
Work with the class to reorder the numbers for male and female children from smallest to largest, recording this on the board:

- Male: 0.5, 0.5, 3.4, 6.8, 6.8, 8.6, 17.6, 44.7, 49.2
- Female: 0.4, 0.6, 2.8, 5.9, 10.0, 13.4, 46.5, 52.2

Note: In this example, the stem will be the whole numbers (the numbers before the decimal point) and the leaves will be the numbers following the decimal point. (Hint: see the 'Key' - below)

Step 4.

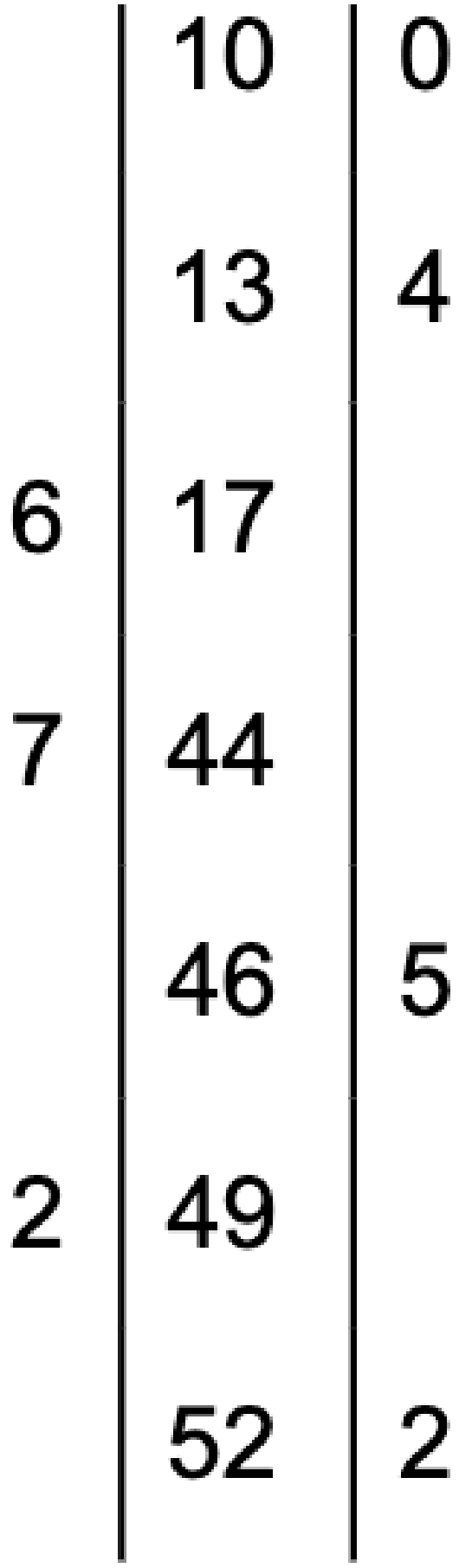
Draw a T-type shape and label the columns on the board. Don't forget to include a 'Key'. For this stem and leaf plot, we will be placing the numerals that come *before* the decimal point in the stem, and the numerals that are after the decimal point in the leaves. This makes the Key: Leaf = 0.1



Step 5.

Now, starting with either the male or female data, invite students to help you write the stems and leaves (in numerical order) as below:

Male		Female
5 5	0	4 6
	2	8
4	3	
	5	9
8 8	6	
6	8	



Step 6.

Ask students to turn to the person next to them and discuss what they notice from the back-to-back stem and leaf plot you have worked together to create. Invite students to share their observations, which may include the following:

- The highest number is female at 52.2 million.
- The numbers vary widely indicating the great differences in various parts of the world.

Step 7.

Conclude this part of the lessons by explaining that in the next part of the lesson, the class will look at a great asset to education, internet access, to see what this can add to the picture that the data is showing us.

Part D: Worked Example 2: Histogram

Step 1.

Explain to the class that they will now look at statistics of internet use in 2017, then develop and describe two histograms to compare the statistics for males and females. Now either recreate or project the data in the table below:

Region	Female Internet users as % of total female population 2017	Male Internet users as % of total male population 2017
Australia and NZ	53.7	56.9
Central and Southern Asia	41.5	44.6
Eastern and South-eastern Asia	27.8	42.0
Europe and Northern America	75.2	82.0
Latin America and the Caribbean	66.7	65.2
Northern Africa and Western Asia	55.3	59.5

Oceania (excluding Aust. and NZ)	53.7	56.7
Sub-Saharan Africa	44.7	50.6

Source: **https://www.unwomen.org/-/media/headquarters/attachments/sections/library/publications/2018/sdg-report-fact-sheet-global-en.pdf?la=en&vs=3554**

Step 2.

Work with the class to re-order the numbers for males and females.

- Female: 27.8, 41.5, 44.7, 53.7, 53.7, 55.3, 66.7, 75.2
- Male: 42.0, 44.6, 50.6, 56.7, 56.9, 59.5, 65.2, 82.8

Step 3.

Explain to the class that they will now be creating a frequency table using this data. If the class has not used a frequency table before explaining that it is a record of how often numbers in a set of data appears between a set range for example

Challenge students to think about the usefulness of a frequency table. You might want to invite students to pair up to discuss for a minute or two. Your class may be able to identify that a frequency table will show where data clumps

Step 4.

Now, construct a frequency table as below but hold off on entering that data in the first column for now. Explain to the class that first they need to determine a range (bin) for the set of numbers. We will choose the frequency range to be 10, starting at 20, so our frequency table will look like the following. Now fill out the first column as below.

Range	Frequency (females)	Frequency (males)
20-30		
30-40		
40-50		
50-60		
60-70		
70-80		
80-90		

Step 5.

Next, begin filling out the first column with the class. You may ask students 'how many times does a number between 20-30 appear in the female data?' (*Answer - 1*.) Then continue down the column inviting students to help you out as you go. The finished column should look as below:

Range	Frequency (females)	Frequency (males)
20-30	1	
30-40	0	
40-50	2	
50-60	3	
60-70	1	
70-80	1	
80-90	0	

Step 6.

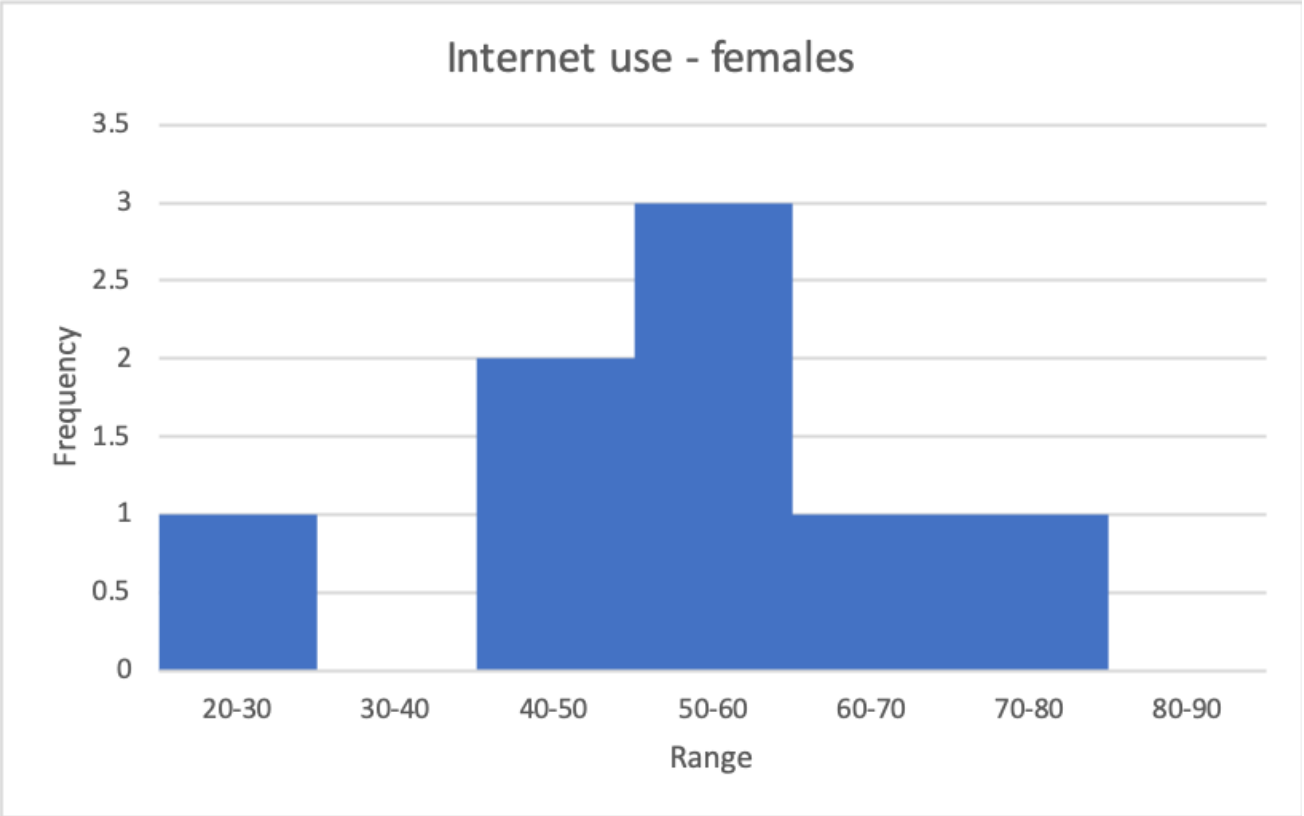
Repeat the same process in Step 5 in the male column to create this finished frequency table:

Range	Frequency (females)	Frequency (males)
20-30	1	0
30-40	0	0
40-50	2	2
50-60	3	4
60-70	1	1
70-80	1	0
80-90	0	1

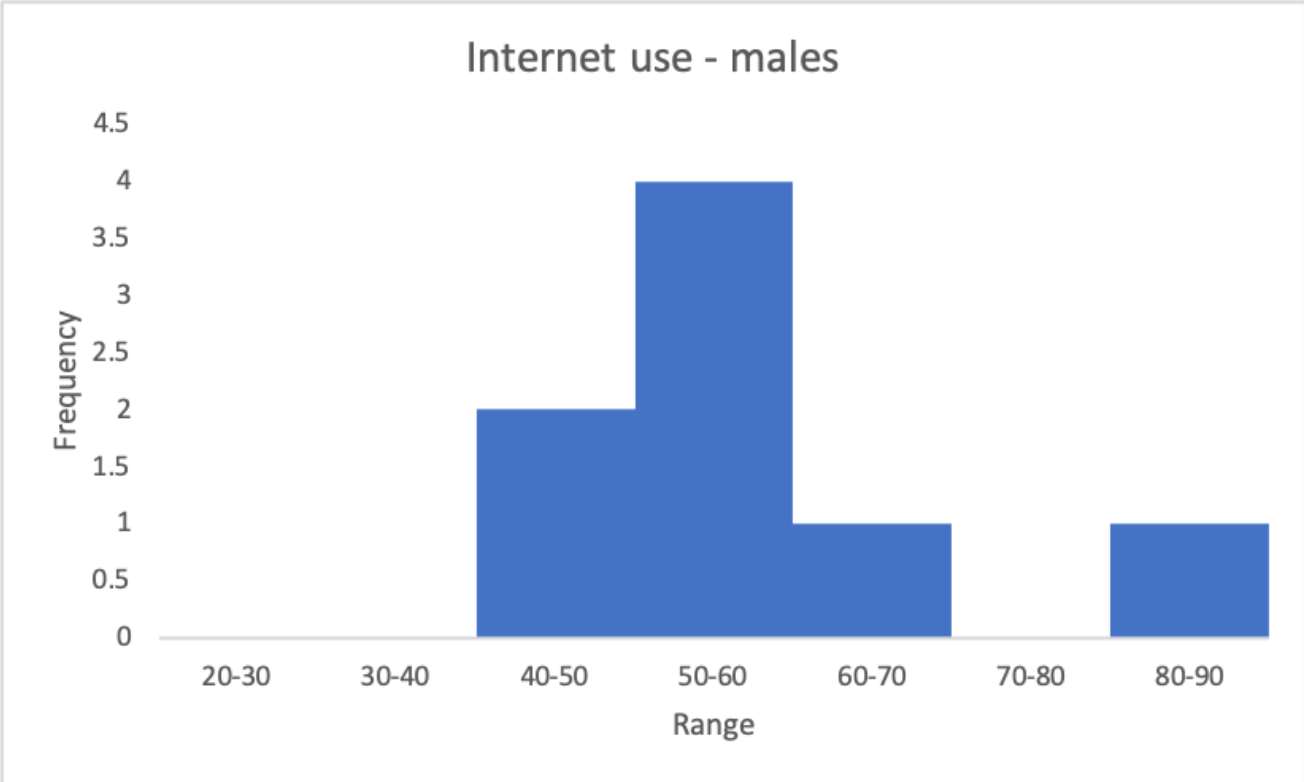
Step 7:

Now, challenge students to work on either their graph paper or Excell to create a graph for male and another for female internet usage.

The histogram for females will look like this:



The histogram for males will look like this:



Note: if you would like the spreadsheet that the above histograms were made from you can download it here, **2040_HistogramEgs**.

Step 8.

As students are working on their histograms either project or write the following information about data distribution in a histogram on the board:

Things to consider if the histograms are skewed, symmetrical or bi-modal:

- A histogram is **skewed right** if the bars towards the left are taller, and there is a tail to the right.
- A histogram is **skewed left** if the bars towards the right are taller, and there is a tail to the left.
- A histogram is **symmetrical** if it is similar (doesn't need to be exact) on both sides.
- A histogram is **bi-modal** if it has two 'peaks' - that means: two values occur more frequently than others.

Step 9.

Invite the class to discuss what the histograms are showing them. Answers may include the following:

- The histograms above are symmetrical with both clearly showing that in most regions of the world, 50-60% of the female and male populations respectively, use the Internet.
- However, it is also clear, that in some regions, only 20-30% of the female population uses the Internet, whilst the lowest percentage of males using the Internet is between 40% and 50%.
- Similarly, in one region of the world, 80-90% of the male population use the Internet, whilst the highest for women, also in one region of the world, is 70-80%.

Make sure that in all the excitement of this data visualisation that students have remembered to continue adding to their list of impactful mathematical information. By the end of this part of the lesson, they should hopefully have a few ideas.

Part E: Statistics of Girls' Education Around the World

Step 1.

Inform students that they will now be working in groups to explore information and statistics about the education of girls, then creating stem and leaf plots and histograms to display the data. Remind them that they will need to consider what action they will take to share and present their learning.

Step 2.

Divide students into groups of 3.

NOTE: The data to be accessed consists of 189 countries. In groups, students will be assigned a set of countries to investigate. Depending on the number of students in your class, ensure that you assign groups and group numbers to investigate all of the countries.

In this example, groups of 3 can be used for a class size of 27, which means that each group will manipulate data for 21 countries.

Step 3.

Assign groups a set of countries to investigate. In this example, groups would be assigned as follows:

- Group 1 - Countries 1 to 21
- Group 2 - Countries 22 to 42
- Group 3 - Countries 43 to 63
- Group 4 - Countries 64 to 84
- Group 5 - Countries 85 to 105
- Group 6 - Countries 106 to 126
- Group 7 - Countries 127 to 147
- Group 8 - Countries 148 to 168
- Group 9 - Countries 169 to 189

Step 4.

Ask students to complete the 'Group Activity' on the Student Worksheet where they will access The **Gender Development Index (GDI)**. Before students begin this activity, you might want to inform students that:

- "*The GDI measures gender gaps in human development achievements by accounting for disparities between women and men in three basic dimensions of human development - health, knowledge and living standards... The GDI shows how much women are lagging behind their male counterparts and how much women need to catch up within each dimension of human development."* (**UNDP**)

The GDI shows the information in order of countries who have the 'best' gender development.

Education is measured using two indicators:

1. Female and male expected years of schooling for children (number of years of schooling that a child of school entrance age can expect to receive)
2. Female and male mean years of schooling (average number of years of education received by people ages 25 and older).

Step 5.

Explain that, in groups, students will investigate a subset of the data and construct back-to-back stem-and-leaf plots and histograms to compare statistics of men and women. The first two steps will help students create both representations of the data (1. the back-to-back stem and leaf plot *and* 2. the histogram/s). Now that you have demonstrated all the skills need to make a stem and leaf plot and a histogram, this activity has been designed is that groups can independently work through the steps at their own pace, asking for your assistance when needed.

Here are the instructions for this activity:

- Step 1. Copy the data from the GDI for 'Expected years of schooling' (for your set of countries only) into a table.
- Step 2. Re-order the numbers for males and females.

Making a back-to-back stem and leaf plot

- Step 3. Draw a T-type shape and label the columns. Don't forget to include a 'Key'.
- Step 4. Now write the stems and leaves (in numerical order).
- Step 5. Describe what you notice from the back-to-back stem and leaf plot.

Making a histogram

- Step 1. Construct a frequency table for your data.
- Step 2: Construct the histograms (one for male and another for female).
- Step 3. Now consider if the histograms are skewed, symmetrical or bi-modal:
- Step 4. Describe the histograms in writing:

Ask student: *"What other observations do you have about the data?"* and lead a brief class discussion on this question.

Part F: Take Action

Optional extension - Ask students to read the following article and summarise the main points. They can also define any unfamiliar terms: **https://www.newsecuritybeat.org/2017/09/fight-climate-change-educate-empower-girls/**

Step 1.

Explain to the class that they will now be taking action on the issues they have been exploring. By using the impactful mathematical information that they have been collecting and/or the data visualisations that they have created students will pick a method to share the information they have found and work toward getting this learning out into your school community.

Below are a number of options that students can select (in groups). Invite students to select an option from each column and complete the activities. Students should consult with you for feedback before getting started on their action. Discuss each group's ideas with them and provide any necessary guidance.

Share your learning	Make a stand
Develop a brief presentation that provides information about your findings from the subset of GDI data that you investigated and the connection between climate change and the education of girls.	**Provide the ticket to education: clean water**. Did you know girls in poor communities often miss school because of a lack of clean water in their village? Instead of attending class, millions of girls and women around the world spend 200 million hours each day (**UNICEF** https://www.unicef.org/esaro/54402016_collecting-water.html) fetching water that is often dirty and dangerous to their health. Check out these great organisations: **Water Aid** - providing clean water, sanitation and hygiene. (https://www.wateraid.org/au/) **Human Appeal** - building water wells. (https://www.humanappeal.org.au/clean-water-wells/)
Write an article for the school newsletter (or other appropriate school communication channel) that discusses information about your findings from the subset of GDI data that you investigated and the connection between climate change and the education of girls.	**Donate, raise money, or invest in micro-loans** Invite family, friends and members of your community to support you in donating to (or raising money for) charities that support the empowerment of women and girls. Check out these great organisations: - **Room to Read** - providing literacy education for girls. (https://www.roomtoread.org/literacy-girls-education/) - **One Girl** - educating girls. (https://www.onegirl.org.au/) - **Kiva** - you can provide a small loan directly to a woman who is running or starting up her own business. (https://www.kiva.org/lend/women)

Share your learning	Make a stand
Develop an infographic that presents information about your findings from the subset of GDI data that you investigated and the connection between climate change and the education of girls.	**Become a Change Maker** Attend a **World Vision Youth Conference** (https://www.worldvision.com.au/get-involved/learn/world-vision-youth-conference) and meet thousands of other students from around Australia to build your social awareness and learn how your actions can help put a stop to global injustice.
Write a letter to your local Member of Parliament to help strengthen the voice for climate change action in Australia. Find out how to do this here.	**Join an organisation, become an ambassador or volunteer** Join **1 Million Women** and help fight climate change. (https://www.1millionwomen.com.au/) Volunteer or become an activist with **Amnesty International** to stand up for women and girls. (https://www.amnesty.org.au/become-an-activist/) Become an ambassador for the One Girl, **Do it in a Dress** campaign. (https://www.onegirl.org.au/get-involved-2/ambassador)
Develop a social media or GetUp! campaign to raise public awareness about the connection between climate change and the education of girls.	**Make a pledge** Visit **https://www.malala.org/** and make a pledge to support the empowerment of women and girls. (https://www.malala.org/donate/2040)

Reflection

Ask students to answer the following three questions as a Think, Pair, Share activity:

- Look back at your answer to this question at the beginning of this lesson. What has changed? What has stayed the same?
- What is the most interesting thing that you have learned in this lesson?

Think Pair Share
Think pair share is a collaborative learning strategy in which students work together to solve a problem or answer a question.
Think - students independently think about an issue or question and record their thoughts.
Pair - students work in pairs to discuss their ideas and record new thoughts.
Share - students share their thoughts with the whole group or with other pairs to reach consensus.

Differentiated Learning

Extension -

- Students may explore additional data from the **GDI** to conduct further statistical analysis.
- Students can select additional options from the Take Action table or take on a whole school fundraising project.
- Some students might like to complete the 'Group Activity' individually.

Provisions for Learning Support -

- Some students may require further support in constructing back-to-back stem-and-leaf plots and histograms. You can refer to the worked examples and supervise them more closely during the group task.
- The information on climate change and women and girl's education contains new and unfamiliar terms to students. Encourage students to maintain a glossary of new terms discovered during the lesson. There are opportunities for this provided through the lesson already. This will benefit students of all literacy levels and improve their understanding of the topic overall.

Teacher Reflection

Take this opportunity to reflect on your own teaching:

- What did you learn about your teaching today?
- What worked well?
- What didn't work so well?
- What would you share?
- Where to next?
- How are you going to get there?

What's Your 2040?

Record your students' work in their communities with the hashtag #whatsyour2040 and share their visions in the '2040: **The Regeneration' Facebook Group**.

The 2040 crew would love to see your class's work.

These lessons have been created in partnership with

2040, Good Thing Productions