Collecting and presenting data

Lesson plan and teacher's notes · Form 1 Mathematics · 1 period of 40 minutes

School	(write school name)	**Teacher**	(write name)
Date	(date)	**Class**	Form 1
Subject	Mathematics	**Enrolment**	Boys ___ Girls ___ Total ___
Time	40 minutes	**Topic**	Collecting and presenting data

Learners collect data by observation, interviews and measurement, tell qualitative from quantitative data, tell discrete from continuous data, and organise data with tally marks in a frequency table. Examples come from a school shop, learners travelling to school and a snack survey near Feira.

Specific outcomes

By the end of the lesson, learners should be able to:

1. Collect data by observation, interviews and measurement
2. Tell qualitative from quantitative data
3. Tell discrete from continuous data
4. Organise data using tally marks
5. Make a frequency table and check that the frequencies add up to the total

Prior knowledge

- Counting and adding whole numbers
- Measuring length with a ruler
- Reading simple tables

Teaching and learning materials

- chalk and board
- rulers
- pencils and exercise books
- a list of answers prepared on the board

References

Ministry of Education (CDC) Form 1 Mathematics syllabus and module; 25Schools learners' note: Collecting and presenting data.

Lesson development

Stage and time	Teacher activities	Learner activities
Introduction 5 min	Tell learners that a shop owner in town decides what to stock by counting what customers buy and a school decides how many desks to make by counting learners. Ask what the word data means and write the title and key words.	Suggest examples of information that can be counted and copy the title and key words.
Development: collecting and kinds of data 10 min	Explain the three ways of collecting data: observation, interviews and measurement. Define qualitative, quantitative, discrete and continuous data with the examples of colours, heights, leaves on a plant and the height of the plant.	Copy the definitions and give one example of each kind of data from the classroom.
Development: tally marks and frequency 10 min	Show how to count with tally marks bundled in groups of five and explain that the count for each item is its frequency. Work the example of 20 learners travelling to school.	Count the answers with tally marks and complete the frequency table.
Practice 10 min	Give the snack survey and the data-collection scenarios. Move around and check that learners add the frequencies to find the total.	Work the scenarios alone, then compare with a partner.
Conclusion 5 min	Ask which method of collecting data suits each kind of information. Set the homework.	Answer orally and copy the homework.

Teacher's content notes

Read these before the lesson. They are what you need to know, not what to copy onto the board.

Why data matters

Statistics deals with collecting, organising, analysing, interpreting and presenting data. A shop owner in town decides what to stock by counting what customers buy, and a school decides how many desks to make by counting learners.

Choosing the method

The method depends on the kind of information you need: numbers, opinions, behaviour or facts. The favourite food of teachers is found by interviewing them, the colours teachers wear by observing, and the length of desks by measuring.

Qualitative and quantitative

Qualitative data only describes qualities or features, such as colours. Quantitative data deals with numbers or amounts, such as the heights of learners in your class.

Discrete and continuous

Quantitative data is discrete or continuous. Discrete data can only take specific values, such as the number of leaves on a plant. Continuous data can take any value in an interval, such as the height of the plant.

Tally marks

Use tally marks while counting and bundle them in groups of five. The count for each item is its frequency.

Checking the table

A frequency table has the items, the tally and the frequency. Always add the frequencies and check that they match the total number of items counted.

Questions to ask during the lesson

Question	Expected answer
A shop owner in town wants to know what to stock and counts what customers buy, while a school wants to know how many desks to make and counts learners. (a) What branch of mathematics deals with this work. (b) Name two things it deals with. (c) Say why the counting is useful to the shop owner.	(a) Statistics. (b) Any two of collecting, organising, analysing, interpreting and presenting data. (c) It helps the owner decide what to stock.
A teacher at a school near Feira asks learners to record the colours of the bicycles parked at the gate, the number of goals in a match and the time of a race. (a) Say which data is qualitative. (b) Say which is discrete. (c) Say which is continuous.	(a) The colours of the bicycles. (b) The number of goals. (c) The time of the race.
A class counts the answers of learners on how they travel to school and gets 12 who walk, 5 who go by bus and 3 who cycle. (a) What is the frequency of walking. (b) How many learners were asked. (c) How do you check the total.	(a) 12. (b) 12 + 5 + 3 = 20 learners. (c) Add the frequencies and compare with the number of learners asked.

Worked examples for the board

Frequency table for how learners travel to school

20 learners were asked how they travel to school: walk (W), bus (B) or cycle (C). The answers were W, B, W, C, W, B, W, W, B, W, C, W, B, W, W, W, B, C, W, W. Count the learners who walk: 12. Count the learners who go by bus: 5. Count the learners who cycle: 3. Check the total: 12 + 5 + 3 = 20, which matches the 20 learners. Walk has a tally of two groups of five and 2 more, bus has one group of five, and cycle has 3 strokes.

Kinds of data in a snack survey

A class near Feira did a snack survey with frequencies vanilla biscuit 4, bread 7, lollipops 5, juice 8 and popcorn 15. The snacks are described by name, so the data is qualitative. The frequencies are counts, so they are quantitative and discrete. Total learners: 4 + 7 + 5 + 8 + 15 = 39. Most popular: popcorn. Popcorn minus bread: 15 - 7 = 8 learners.

Board plan

Write the title and key words. Left: the three ways of collecting data. Centre: the kinds of data with examples. Right: the frequency table of how 20 learners travel to school.

Kind of data	What it is	Example in the note
Qualitative	Describes qualities or features	The colours worn by teachers
Quantitative	Deals with numbers or amounts	The heights of learners in your class
Discrete	Can only take specific values	The number of leaves on a plant
Continuous	Can take any value in an interval	The height of the plant

Kinds of data with examples

Mistakes to expect

Learners often think	Put it right
All data is numbers.	Data that only describes qualities or features, such as colours, is qualitative. Quantitative data deals with numbers or amounts.
The number of goals in a football match is continuous.	It is discrete, because it can only be a whole number.
The time taken to run a race is discrete.	It is continuous, because it can take any value in an interval.
Frequency means the total of all the items.	Frequency is the number of times a value or item appears. The frequencies of all items are added to find the total.

Differentiation

Learners who struggle

Give learners a short list of answers and a table with the items already written, so they only count with tally marks and write the frequency, then add the frequencies to check the total.

Learners who finish early

Ask learners who finish early to make up a short survey in their class, choose the method of collecting data, and say whether the data is qualitative or quantitative and discrete or continuous.

Hearing or visual impairment

For learners with visual impairment, read the list of answers aloud slowly and let them count with small stones, then give the frequency orally. For learners with hearing impairment, write each key word on the board and show the groups of five tally marks.

No projector, no printing

Write the list of answers and the table on the board. Use pencil strokes in exercise books for the tally marks and learners in the class for the survey.

If time is short

Skip the extension and do only the travel-to-school frequency table and the snack survey; set the rest as homework.

Evaluation

Question or task	A correct answer shows
A group of learners at a school near Feira want to find the favourite food of the teachers, the colours the teachers wear and the length of the staff-room desks. (a) Name the method of collecting data best for each. (b) Say which of the three kinds of information is qualitative. (c) Say which is quantitative.	(a) Interviews for favourite food, observation for colours, measurement for length of desks. (b) The colours the teachers wear. (c) The length of the desks.
A learner is asked to record the number of leaves on a plant and the height of the plant at the school garden. (a) Say whether the number of leaves is discrete or continuous. (b) Say whether the height of the plant is discrete or continuous. (c) Give a reason for each answer.	(a) Discrete. (b) Continuous. (c) The number of leaves can only be a specific value, while height can take any value in an interval.
A class near Feira did a snack survey with these frequencies: vanilla biscuit 4, bread 7, lollipops 5, juice 8, popcorn 15. (a) How many learners were surveyed. (b) Which snack was most popular. (c) How many more learners chose popcorn than bread.	(a) 4 + 7 + 5 + 8 + 15 = 39 learners. (b) Popcorn. (c) 15 - 7 = 8 learners.

Homework

A learner at your school wants to study the number of goals scored in a football match, the time taken to run a race and the colour of a bicycle. (a) Say whether each is qualitative or quantitative. (b) For the quantitative ones, say whether each is discrete or continuous. (c) Give a reason for each answer.

Extra practice with answers

Question	Answer
1. A learner at a school near Feira wants to find out the favourite football club of the teachers, the colours of their shirts and the length of the staff-room desks. (a) Give the best method of collecting data for each. (b) Say which kind is qualitative. (c) Say which kind is quantitative.	(a) Interviews for the favourite club, observation for shirt colours, measurement for the desks. (b) The colours of the shirts. (c) The length of the desks.
2. A class near Feira did a snack survey with frequencies vanilla biscuit 4, bread 7, lollipops 5, juice 8 and popcorn 15. (a) How many learners were surveyed. (b) Which snack was most popular. (c) How many more learners chose popcorn than bread.	(a) 4 + 7 + 5 + 8 + 15 = 39 learners. (b) Popcorn. (c) 15 - 7 = 8 learners.

3. A group of learners records the number of goals in a football match and the time taken to run a race at the school sports day. (a) Say whether the goals are discrete or continuous. (b) Say whether the time is discrete or continuous. (c) Give a reason for each answer.	(a) Discrete. (b) Continuous. (c) Goals can only be whole numbers, while time can take any value in an interval.
4. A learner asks 20 classmates how they travel to school and counts 12 who walk, 5 who go by bus and 3 who cycle using tally marks in groups of five. (a) How many groups of five are in the tally for walking. (b) How many extra strokes remain. (c) Show that the frequencies match the 20 learners.	(a) Two groups of five. (b) 2 more strokes. (c) 12 + 5 + 3 = 20.

Answers to the learners' check-yourself questions

1. Name three ways of collecting data.
   Observation, interviews and measurement.
2. Is the colour of a bicycle qualitative or quantitative data?
   Qualitative.
3. Is the number of goals in a football match discrete or continuous?
   Discrete, because it can only be a whole number.
4. Is the time taken to run a race discrete or continuous?
   Continuous, because it can take any value in an interval.
5. What does frequency mean?
   The number of times an item or value appears.
6. A class at a school near Feira did a snack survey with these frequencies: vanilla biscuit 4, bread 7, lollipops 5, juice 8, popcorn 15. (a) How many learners were surveyed? (b) Which snack was most popular? (c) How many more learners chose popcorn than bread?
   (a) 4 + 7 + 5 + 8 + 15 = 39 learners. (b) Popcorn. (c) 15 - 7 = 8 learners.
7. A group wants to find out the favourite football club of the teachers, the colours of their shirts, and the length of the staff-room desks. (a) Which method of collecting data is best for each? (b) Which of the three kinds of data is quantitative? (c) Say whether the desk length is discrete or conti
   (a) Interview for the favourite club, observation for the colours, measurement for the desk length. (b) The desk length. (c) Continuous, because it can take any value in an interval.

Teacher's reflection

What went well:

What I will change next time:

Learners who need follow-up: