Qualitative and Quantitative Data

Name: _____ **Date:** _____

Quick Review

Scientists collect two main types of data when carrying out investigations.

Qualitative data describes qualities or characteristics. It usually uses words rather than numbers.

Examples:

- The liquid is blue.
- The surface feels rough.
- The flower has a strong smell.

Quantitative data describes measurements or numerical amounts.

Examples:

- The temperature is 25°C.
- The plant is 15 cm tall.
- The experiment took 30 seconds.

Both types of data are important. Qualitative data describes **what something is like**, while quantitative data tells us **how much, how many, or how long**.

Scientists should record observations accurately and avoid guesses or personal opinions.

Part A — Multiple Choice

Circle the correct answer.

1. Which of the following is qualitative data?

A. The water temperature is 30°C.
B. The plant is 12 cm tall.
C. The liquid is cloudy.
D. The experiment lasted 20 seconds.

2. Which observation is quantitative?

A. The rock feels rough.
B. The solution turned green.
C. The flower smells sweet.
D. The object has a mass of 50 g.

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3. Which tool would be most useful for collecting quantitative data about temperature?

A. Thermometer
B. Magnifying glass
C. Colour chart
D. Observation checklist

4. Why should scientists record measurements with units?

A. To make observations longer
B. To show what quantity was measured and its scale
C. To make results qualitative
D. To avoid using numbers

5. Why is it useful to collect both qualitative and quantitative data?

A. They always give exactly the same information.
B. Quantitative data is never reliable.
C. Together, they provide a more complete understanding.
D. Qualitative data replaces the need for measurements.

Part B — Classifying Data

Write **Qualitative** or **Quantitative** beside each observation.

1. The metal is shiny. _____
2. The temperature is 45°C. _____
3. The liquid has a strong smell. _____
4. The object has a mass of 200 g. _____
5. The plant has 8 leaves. _____
6. The solution changed from clear to yellow. _____
7. The table is 120 cm long. _____
8. The surface feels smooth. _____

Part C — Recording Observations

A student investigates what happens when a tablet dissolves in water.

The student records the following observations:

- The water begins at 22°C.
- Bubbles appear when the tablet is added.
- The tablet dissolves in 45 seconds.
- The water becomes cloudy.
- The final temperature is 20°C.

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1. Complete the table.

Observation	Type of data. .
Starting temperature: 22°C	
Bubbles appear	
Dissolving time: 45 seconds	
Water becomes cloudy	
Final temperature: 20°C	

2. What instrument could the student use to measure the water temperature?

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3. What instrument could the student use to measure the dissolving time?

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4. Why is "the water became cloudy" a better scientific observation than "the water looked strange"?

Part D — Organizing Data

Students investigate the growth of three plants after two weeks.

Their results are shown below.

Plant	Height	Leaf colour	Number of leaves
A	12 cm	Dark green	6
B	8 cm	Yellow-green	4
C	15 cm	Light green	9

1. Which plant is the tallest? _____

2. Which plant has the fewest leaves? _____

3. Identify two examples of quantitative data in the table.

a) _____

b) _____

4. Identify one example of qualitative data in the table.

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5. Why is a table useful for organizing scientific data?

Part E — Planning an Investigation

You are investigating how different surfaces affect the movement of a toy car.

1. Write two examples of quantitative data you could collect.

a) _____

b) _____

2. Write two examples of qualitative data you could collect.

a) _____

b) _____

3. Name one measuring instrument you would use.

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4. Explain why collecting both types of data would improve your investigation.

Part F — Improving Scientific Observations

Rewrite each statement to make it more accurate and scientific. Add a measurement where possible.

1. "The plant is really tall."

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2. "The water is very hot."

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3. "The reaction happened quickly."

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4. "The rock looks weird."

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Qualitative and Quantitative Data

Exit Ticket

1. What is the difference between qualitative and quantitative data?

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2. Give one example of qualitative data.

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3. Give one example of quantitative data, including units where appropriate.

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4. Why is accurate recording of observations important in science?

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5. Why should scientists collect both qualitative and quantitative data?

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Qualitative and Quantitative Data
Qualitative and Quantitative Data — Answer Key

Part A — Multiple Choice

1. C — The liquid is cloudy.
2. D — The object has a mass of 50 g.
3. A — Thermometer
4. B — To show what quantity was measured and its scale.
5. C — Together, they provide a more complete understanding.

Part B — Classifying Data

1. The metal is shiny. — Qualitative
2. The temperature is 45°C. — Quantitative
3. The liquid has a strong smell. — Qualitative
4. The object has a mass of 200 g. — Quantitative
5. The plant has 8 leaves. — Quantitative
6. The solution changed from clear to yellow. — Qualitative
7. The table is 120 cm long. — Quantitative
8. The surface feels smooth. — Qualitative

Part C — Recording Observations

1. Complete the table.

Observation	Type of data
Starting temperature: 22°C	Quantitative
Bubbles appear	Qualitative
Dissolving time: 45 seconds	Quantitative
Water becomes cloudy	Qualitative
Final temperature: 20°C	Quantitative

2. What instrument could the student use to measure the water temperature?

A thermometer or temperature probe.

3. What instrument could the student use to measure the dissolving time?

A stopwatch or timer.

4. Why is "the water became cloudy" a better scientific observation than "the water looked strange"?

"The water became cloudy" is a specific, observable description. "The water looked strange" is vague and subjective, making it difficult for other scientists to understand or reproduce the observation.

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Part D — Organizing Data

1. Which plant is the tallest?

Plant C — 15 cm.

2. Which plant has the fewest leaves?

Plant B — 4 leaves.

3. Identify two examples of quantitative data in the table.

Possible answers:

- Plant A has a height of 12 cm.
- Plant C has 9 leaves.

Other correct measurements or leaf counts are acceptable.

4. Identify one example of qualitative data in the table.

Plant A has dark green leaves.

Also accept Plant B has yellow-green leaves or Plant C has light green leaves.

5. Why is a table useful for organizing scientific data?

A table organizes observations and measurements clearly, making it easier to compare results, identify patterns, and recognize differences between samples.

Part E — Planning an Investigation

1. Write two examples of quantitative data you could collect.

Possible answers:

- The distance travelled by the toy car in centimetres.
- The time taken for the toy car to travel a set distance in seconds.

Other acceptable answers include the car's speed, stopping distance, or number of trials.

2. Write two examples of qualitative data you could collect.

Possible answers:

- The surface is rough or smooth.
- The car moves smoothly or appears to bounce as it travels.

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Other acceptable answers include descriptions of the surface texture or visible changes in the car's motion.

3. Name one measuring instrument you would use.

A ruler, measuring tape, metre stick, or stopwatch.

4. Explain why collecting both types of data would improve your investigation.

Quantitative data provides measurements that can be compared, such as distance and time. Qualitative data describes characteristics such as surface texture and how the car moves. Together, they provide a more complete understanding of how different surfaces affect motion.

Part F — Improving Scientific Observations

These are sample answers. Accept other scientifically accurate and appropriately specific observations.

1. "The plant is really tall."

The plant is 35 cm tall, measured from the soil surface to the highest point.

2. "The water is very hot."

The water temperature is 75°C.

3. "The reaction happened quickly."

The reaction took 12 seconds to complete.

4. "The rock looks weird."

The rock has a rough, uneven surface with small holes and dark grey patches.

Teaching note: The numerical values in questions 1–3 are examples, not actual measurements. In a real investigation, students must measure and record the observed values rather than inventing them.

Exit Ticket

1. What is the difference between qualitative and quantitative data?

Qualitative data describes characteristics or qualities using words, while quantitative data provides numerical measurements or counts.

2. Give one example of qualitative data.

The solution is blue.

3. Give one example of quantitative data, including units where appropriate.

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Qualitative and Quantitative Data

The solution has a temperature of 25°C.

4. Why is accurate recording of observations important in science?

Accurate observations help scientists make reliable conclusions, compare results, identify patterns, and allow others to repeat investigations.

5. Why should scientists collect both qualitative and quantitative data?

Collecting both types provides a more complete picture of an investigation. Qualitative data describes what happens, while quantitative data measures how much, how many, or how long.

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