JUNIOR CYCLE MATHS · FREE REVISION SHEET

Statistics: questions, data & tables

↗ Léim

Learning outcomes (2018 specification): SP.3a, SP.3b, SP.3c. Play the game: **leim.ie/data-detective.html**

1. Four types of data

	no order / counted	order / measured
Categorical words	**Nominal** favourite sport, eye colour, county	**Ordinal** S, M, L · mild, medium, hot · star ratings
Numerical numbers	**Discrete** (counted) siblings, goals, texts	**Continuous** (measured) height, mass, time, temperature

Ask: **words or numbers?** Then: words in an **order**? Numbers **counted** or **measured**? Counted answers can't be in between (2.5 brothers); measured ones can (1.555 m).

2. A statistical question

One where the answers **vary**, so you need data: "How long do students in my class sleep?" Not: "How tall am I?" (one fixed answer).

3. Population, sample, census

- **Population:** everyone you want to know about (all 650 students).
- **Sample:** the group you actually ask (40 of them).
- **Census:** data from **every** member of the population.
- **Random sample:** everyone has the same chance of being picked (names from a hat, a random number generator).

4. Keep it fair (no bias)

- **Biased sample:** asks only one kind of person (the gym, your friends, the choir).
- **Leading question:** pushes an answer: "Don't you agree...?", "Surely...", "How much do you love...?"
- **Answer boxes:** no overlaps, no gaps, a box for every answer: 0–2 · 3–5 · 6–8 · 9 or more.

5. Collecting the data

Primary data: you collect it. **Secondary data:** someone else did (Met Éireann, the CSO, a website).

Survey (ask people) · **observation** (watch and count) · **experiment** (change one thing, measure what happens) · **existing data** (look it up).

The four stages of an investigation (CBA 2):
1. Pose a question → 2. Collect the data → 3. Analyse the data → 4. Interpret the results.

6. Tally marks and frequency tables

Go through the data once, one tally mark per answer. Every 5th mark crosses the other four. The **frequency** is how many times an answer comes up; the frequencies add up to the number asked.

Travel	Tally	Frequency
Walk	𝍸 ||	7
Bus	𝍸 𝍸 |	11
Car	||||	4
Total		**22**

7. Grouped data

Lots of different numbers? Use classes of equal width: 0–9, 10–19, 20–29... Every value goes in exactly one class: 27 goes in 20–29, 30 goes in 30–39.

Exam tip: name the type of data with **both words** (numerical discrete, not just "numerical"), and when you say a sample is biased, say **who is left out**.

PRACTICE · 34 QUESTIONS

Have a go

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A. What type of data? (nominal, ordinal, discrete or continuous)

1. the number of pets each student has _____
2. each student's favourite type of film _____
3. the height of each player on a basketball team _____
4. the size of jumper each student wears (S, M, L, XL) _____
5. the time each student takes to walk to school _____
6. the county each student's mother was born in _____
7. the number of goals scored in each camogie match _____
8. how much each student agrees with "Phones should be banned in school" (strongly agree to strongly disagree) _____

B. Questions, samples and bias

9. Is this a statistical question? "How long do students in my class sleep on a school night?" _____
10. Is this a statistical question? "What time does the school bus leave?" _____
11. Liam asks 30 of the 520 students in his school how they get to school. What is the population? _____
12. In question 11, what is the sample? _____
13. To find out how much sport 1st years play, Ella asks the 1st-year hurling panel. Why is this sample biased? _____
14. Rewrite this question so it is fair: "Don't you agree that the school day is too long?" _____
15. Is rainfall data downloaded from Met Éireann primary or secondary data? _____
16. What is it called when you collect data from EVERY member of the population? _____

C. Tally and frequency tables

Travel data for 24 students (W = walk, B = bus, C = car, Bi = bike): W, B, B, C, W, B, Bi, W, B, C, B, W, B, Bi, B, W, C, B, W, B, W, B, C, W

Homework times (minutes) for 20 students: 12, 27, 5, 34, 18, 22, 9, 41, 15, 26, 30, 8, 19, 23, 37, 14, 28, 3, 21, 16

17. Make a frequency table (with a tally column) for the travel data above. How many walk? _____
18. How many students take the bus? _____
19. How many students were asked altogether? _____
20. How many more students take the bus than come by car? _____
21. What fraction of the students cycle (Bi)? Give it in its simplest form. _____
22. What fraction of the students walk? Simplest form. _____
23. Group the homework times in classes 0–9, 10–19, 20–29, 30–39, 40–49. How many are in 10–19? _____
24. How many homework times are 30 minutes or more? _____

D. Plan an investigation

25. Put in order: analyse the data, pose a question, interpret the results, collect the data. _____
26. Which stage is this? "Cian draws a bar chart of his results." _____
27. Best way to collect data on how many cars pass the school gate between 8:30 and 9:00? _____
28. Best way to collect data on whether a paper plane flies further with bigger wings? _____
29. What is wrong with these answer boxes for "How many books did you read last year?" 0–2 · 2–4 · 4–6 _____
30. Write better answer boxes for question 29. _____

Questions 31–34 are on the next page.

EXAM-STYLE · THEN CHECK

Exam corner + answers

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E. Exam-style questions (show your work)

31. The number of pets owned by 25 students: 0, 1, 2, 1, 0, 3, 1, 2, 0, 1, 4, 1, 2, 0, 1, 1, 3, 0, 2, 1, 1, 0, 2, 1, 5. (a) Make a frequency table. (b) What type of data is this? (c) How many students have 2 or more pets? (d) What fraction have no pets?

32. A café asks: "How much did you love our new menu?" with the boxes ☐ A lot ☐ Loads. (a) Why is this question biased? (b) Rewrite the question and the boxes so they are fair.

33. Niamh wants to know how long 1st years in her school spend on their phones each day. She asks the 15 members of the computer club. (a) Give two reasons why her results may not be reliable. (b) How could she improve her sample?

34. Aoife wants to find out if 3rd years spend longer on homework than 1st years. (a) Write a statistical question. (b) Name the two pieces of data she needs and their types. (c) After collecting the data, what are the next two stages?

Answers

A	1. numerical discrete · 2. categorical nominal · 3. numerical continuous · 4. categorical ordinal · 5. numerical continuous · 6. categorical nominal · 7. numerical discrete · 8. categorical ordinal
B	9. Yes: the answers will vary · 10. No: it has one fixed answer · 11. All 520 students in the school · 12. The 30 students Liam asked · 13. Hurlers play more sport than most: other 1st years are left out · 14. e.g. "What do you think of the length of the school day?" · 15. Secondary · 16. A census
C	Table: walk 8, bus 10, car 4, bike 2 (total 24) · 17. 8 · 18. 10 · 19. 24 · 20. 6 · 21. 1/12 · 22. 1/3 · 23. 6 · 24. 4
D	25. Pose a question, collect the data, analyse the data, interpret the results · 26. Analyse the data · 27. Observation (watch and count) · 28. An experiment · 29. They overlap (2 and 4 fit two boxes) and there's no box above 6 · 30. e.g. 0–2 · 3–5 · 6–8 · 9 or more
E	31. (a) 0: 6, 1: 10, 2: 5, 3: 2, 4: 1, 5: 1 (total 25) (b) **numerical discrete** (c) **9** (d) **6/25** · 32. (a) "Love" assumes they liked it, and every box is positive. (b) e.g. "How would you rate our new menu?" ☐ Very good ☐ Good ☐ OK ☐ Poor ☐ Very poor · 33. (a) The computer club may use screens more than other 1st years (biased), and 15 is a small sample. (b) Pick a bigger **random** sample from the full list of 1st years. · 34. (a) e.g. "Do 3rd years in my school spend longer on homework each night than 1st years?" (b) year group (**categorical ordinal**) and time spent (**numerical continuous**) (c) **analyse the data**, then **interpret the results**

Got one wrong? Check: did you ask "counted or measured?" Did you say who the sample leaves out? Do your frequencies add up to the total? Then play **Data Detective** at leim.ie/data-detective.html: the "Go back over these" list at the end shows the rule for each mistake.

All questions written by Léim. Léim is independent and not connected with the State Examinations Commission or the NCCA.