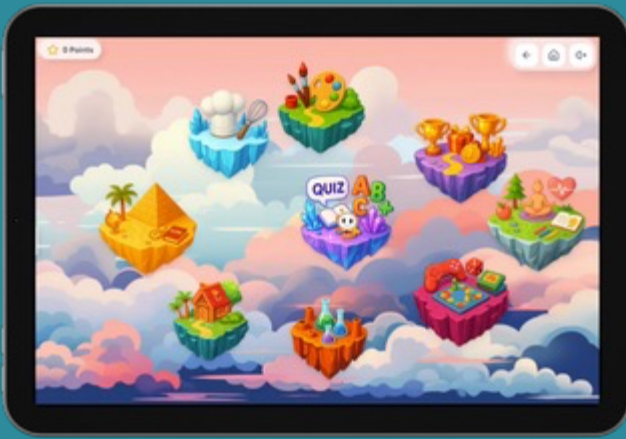


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Statistical Investigations - Year 6

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STATISTICAL INVESTIGATION CYCLE



QUESTION → DATA → EVIDENCE → CONCLUSION

FOUR TYPES OF DATA



CATEGORICAL DATA

labels or groups

NOMINAL

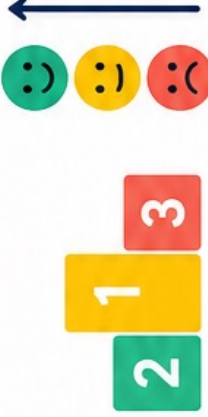
no natural order



Examples: transport mode, eye colour

ORDINAL

meaningful order



Examples: finish position, satisfaction level

NUMERICAL DATA

numbers

DISCRETE

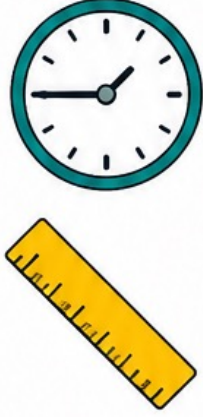
counted values



Examples: number of siblings, number of children

CONTINUOUS

measured values



Examples: height, time



Ask: Is it a label, a count or a measurement?

CATEGORICAL DATA

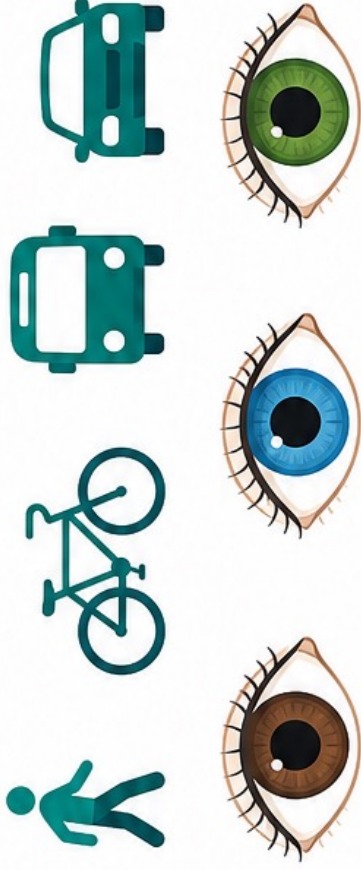
Groups labels or groups

NOMINAL

Categories have no natural order

Examples

- travel mode: walk, bike, bus, car
- eye colour: brown, blue, green

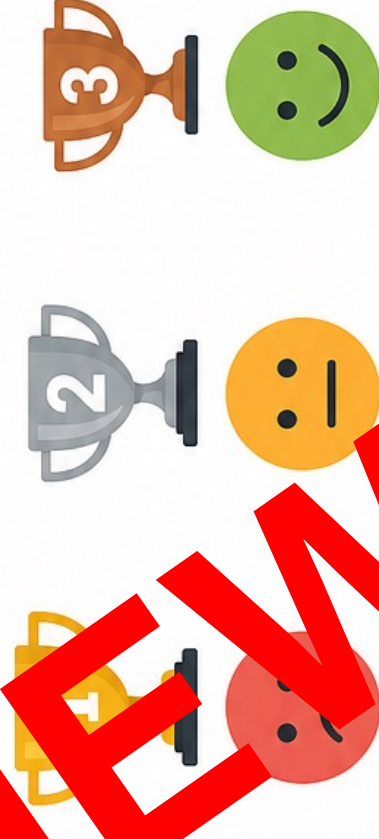


ORDINAL

Categories have a meaningful order.

Examples

- finish position: 1st, 2nd, 3rd
- satisfaction: low, medium, high



The order matters for ordinal data, but not for nominal data.

NUMERICAL DATA

used numbers

DISCRETE

counted values

Examples:

- number of siblings: 0, 1, 2, 3



- goals scored: 0, 1, 2, 3, 4



CONTINUOUS

measured on a scale

Examples:

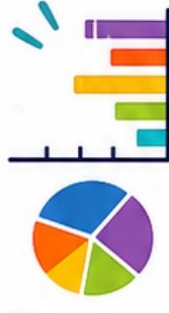
- height: 148.6 cm



Discrete data is counted. Continuous data is measured.



RESEARCH QUESTION SORT



Cut out the cards and point to each one. Decide whether it expects varied answers from a group.

STATISTICAL

NOT YET STATISTICAL



1. How many minutes do Year 6 students spend reading each evening?



2. What is the school library opening time?



5. How many reusable drink bottles do students bring each day?



6. What is 8×7 ?



3. Which lunchtime activity do Year 6 students prefer?



7. How many times do students travel to school each day?



4. How tall is the school flagpole?



8. Is the canteen open on Friday?



REFINEMENT CHALLENGE

Choose one "not yet statistical" question. Rewrite it so it names a group and expects varied answers.

COLLECTION METHOD MATCH

Match each investigation area to the most suitable collection method. Be ready to justify your choice.



SURVEY



OBSERVATION / COUNT



MEASUREMENT



Favourite
school sport of
Year 6 students



Number of
birds visiting
the oval in
20 minutes



Hand spans of
Year 6 students
in centimetres



How students
travel to
school



Pieces of
litter in each
playground
area



Time taken
to complete
a puzzle



Could more than one method work? Explain which method would produce the fairest and most useful data.





DATA DETECTIVE TRAIL

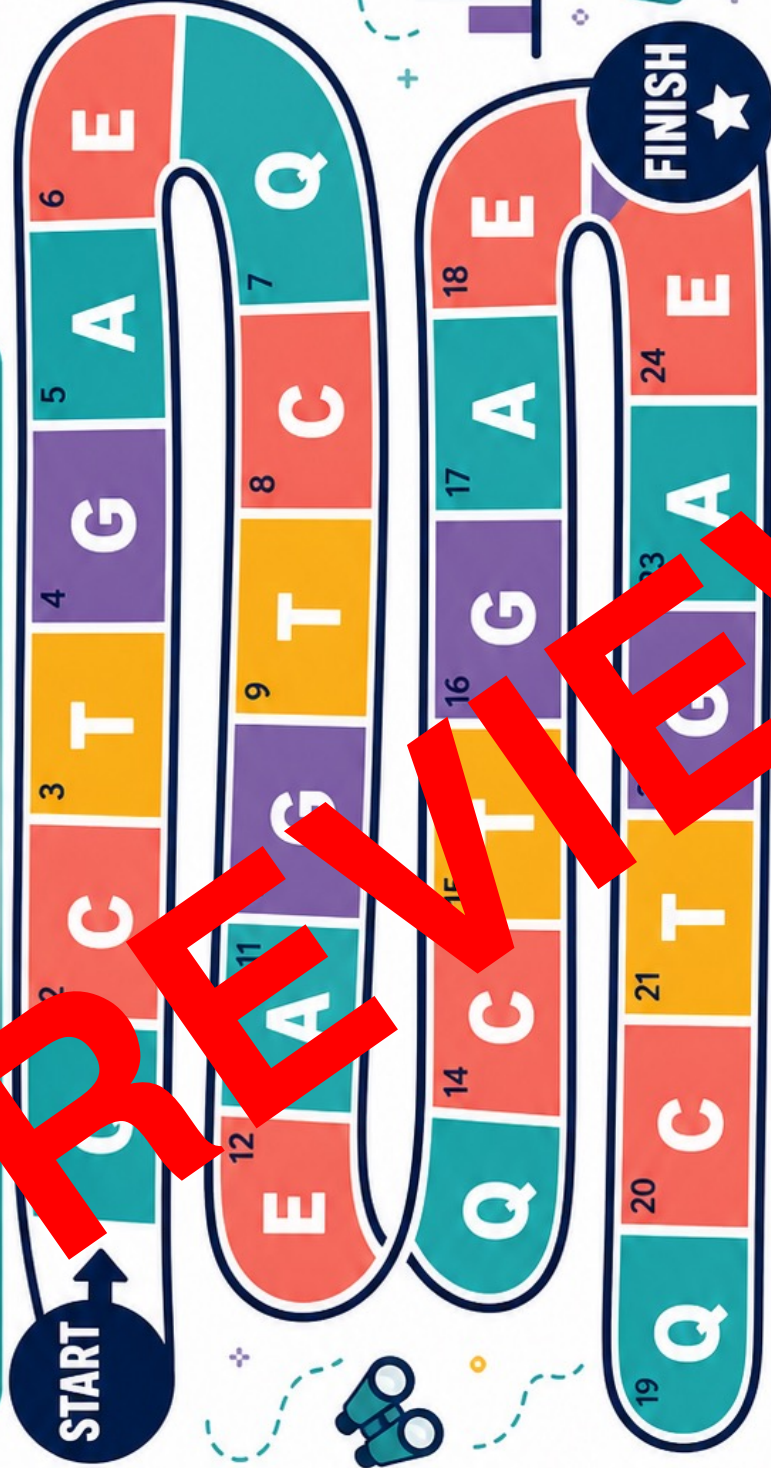


With a partner. Roll a die, move along the trail and respond to the question on the symbol where you land. Explain your thinking before the next turn.

LEGEND

- Q** — improve a question
- C** — choose a collection method
- T** — name the data type
- G** — choose a graph
- A** — analyse a pattern
- E** — evaluate a limitation

START



Q: Rewrite "Do you like sport?" as a statistical question.



C: How could we find the most popular lunch activity?



T: Is height categorical or numerical? Be specific.



G: Which graph suits your favourite book genre?



A: What does an unusually high value make you wonder?



E: Why might surveying only your friends be unfair?

Name: _____

Date: _____

STATISTICAL INVESTIGATION STEPS

A. Put the investigation cycle in order

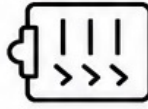
Write 1, 2, 3 and 4 in the boxes.



Ask and refine



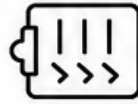
Represent and analyse



Plan and collect



Interpret and communicate



Does your plan collect relevant data that can answer the question?

B. Plan an investigation

A Year 6 class wants to investigate how much time students spend on homework on a typical school night.

1. Write a statistical research question that names the group and expects varied answers.

2. Identify the population.

3. Identify the variable.

4. Is the variable categorical or numerical? Be specific.

5. Choose a fair method of selection and explain why it suits the question.

6. Name a useful graph or display for the data and explain your choice.

STATISTICAL INVESTIGATION STEPS

A. Put the investigation cycle in order

Write 1, 2, 3 and 4 in the boxes.

1

Ask and refine

3

Represent and analyse

2

Plan and collect

4

Interpret and communicate



Does your plan collect relevant data that can answer the question?

B. Plan an investigation

A Year 6 class wants to investigate how much time students spend on homework on a typical school night.

- Write a statistical research question that names the group and expects varied answers.
How many minutes do students in this Year 6 class spend on homework on a typical school night?
- Identify the population.
Students in the Year 6 class.
- Identify the variable.
Work time in minutes on a typical school night.
- Is the variable categorical or numerical? Be specific.
Continuous numerical data because time is measured.
- Choose a fair method of collection and explain why it suits the question.
Use an anonymous survey of the whole class; it is relevant and avoids observer judgement.
- Name a useful graph or display for the data and explain your choice.
A dot plot, because it shows each numerical value and the distribution.

RESEARCH QUESTION CLINIC – PAGE 1

Name: _____ Date: _____

Decide whether each question is statistical. Tick Yes or No, then explain how you know.

QUESTION	YES	NO	REASON
1. What is the temperature at noon today?	☐	☐	_____
2. How many minutes do Year 6 students read each evening?	☐	☐	_____
3. What is $250 + 75$?	☐	☐	_____
4. Which book genres are borrowed most often from our library?	☐	☐	_____
5. How tall is the tallest tree in the courtyard?	☐	☐	_____
6. How many water-bottle refills are recorded on each weekday?	☐	☐	_____

CHALLENGE: Choose one “No” question. Rewrite it so it names a group and expects varied answers.

RESEARCH QUESTION CLINIC – PAGE 1

Name: _____ **ANSWERS** Date: _____

Decide whether each question is statistical. Tick Yes or No, then explain how you know.

QUESTION	YES	NO	REASON
1. What is the temperature at noon today?	☒	☒	One fixed measurement; no group variation.
2. How many minutes do Year 6 students read each evening?	☒	☐	A group is named and reading times will vary.
3. What is $250 + 75$?	☐	☐	One fixed calculation.
4. Which book genres are borrowed most often from our library?	☒	☐	Some categories can vary across loans.
5. How tall is the tallest tree in the courtyard?	☐	☒	Asks for one fixed maximum.
6. How many water-bottle refills are recorded on each weekday?	☒	☐	Counts can vary across weekdays.

CHALLENGE: Choose one “No” question. Rewrite it so it names a group and expects varied answers.

How does the noon temperature vary across five school days?

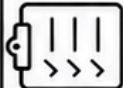
RESEARCH QUESTION CLINIC – PAGE 2

Name: _____ Date: _____



Diagnose each weak question. Explain the problem, then rewrite it as a fair statistical question.

1 Don't you agree our school should build the best new playground? 	WHAT NEEDS IMPROVING?	FAIR STATISTICAL QUESTION _____ _____ _____ _____
2 What is your favourite thing?   	WHAT NEEDS IMPROVING?	FAIR STATISTICAL QUESTION _____ _____ _____ _____
3 How many hours do people use screens?   	WHAT NEEDS IMPROVING?	FAIR STATISTICAL QUESTION _____ _____ _____ _____
4 Isn't walking to school healthier than driving?  	WHAT NEEDS IMPROVING?	FAIR STATISTICAL QUESTION _____ _____ _____ _____



QUALITY CHECK

For one rewritten question, underline the population and circle the variable.



Diagnose each weak question. Explain the problem, then rewrite it as a fair statistical question.

1 Don't you agree our school should build the best new playground? 	WHAT NEEDS IMPROVING? Biased and leading question. The question is subjective.	FAIR STATISTICAL QUESTION Which playground feature do students in Years 3–6 prefer? _____ _____ _____
2 What is your favourite thing?   	WHAT NEEDS IMPROVING? Too vague; no population or variable.	FAIR STATISTICAL QUESTION Which school subject do Year 6 students prefer? _____ _____ _____
3 How many hours do people use screens?   	WHAT NEEDS IMPROVING? Population and time frame are unclear.	FAIR STATISTICAL QUESTION How many hours of recreational screen time do Year 5 students use on a typical weekend day? _____ _____ _____
4 Isn't walking to school healthier than driving?  	WHAT NEEDS IMPROVING? Leading and asks about health, not varied travel data.	FAIR STATISTICAL QUESTION How do Year 5 students usually travel to school? _____ _____ _____



QUALITY CHECK

For one rewritten question, underline the population and circle the variable.

Which playground feature do students in Years 3–6 prefer?

Name: _____ Date: _____

DATA TYPE DECISIONS

Is the data categorical or numerical? Name the specific type.

VARIABLE	NOMINAL	ORDINAL	DISCRETE	CONTINUOUS	WHY?
1. Home language	☐	☐	☐	☐	_____
2. Satisfaction rating: low, medium or high	☐	☐	☐	☐	_____
3. Number of books read last month	☐	☐	☐	☐	_____
4. Arm span in centimetres	☐	☐	☐	☐	_____
5. Travel method to school	☐	☐	☐	☐	_____
6. Finish position in a race	☐	☐	☐	☐	_____
7. Number of siblings	☐	☐	☐	☐	_____
8. Rainfall in millimetres	☐	☐	☐	☐	_____

CHALLENGE: Write one new example of each data type.

Nominal: _____

Ordinal: _____

Discrete: _____

Continuous: _____

Name: **ANSWERS**

Date: _____

DATA TYPE DECISIONS

Is the variable categorical or numerical? Name the specific type.

VARIABLE	NOMINAL	ORDINAL	DISCRETE	CONTINUOUS	WHY?
1. Home language	☒	☐	☐	☐	labels with no natural order
2. Satisfaction rating: low, medium or high	☐	☐	☐	☐	ordered categories
3. Number of books read last month	☐	☐	☐	☐	counted whole numbers
4. Arm span in centimetres	☐	☐	☒	☒	measured on a scale
5. Travel method to school	☒	☐	☐	☐	labels with no natural order
6. Finish position in a race	☐	☒	☐	☐	rank has a meaningful order
7. Number of siblings	☐	☐	☒	☐	counted whole numbers
8. Rainfall in millimetres	☐	☐	☐	☒	measured on a scale

CHALLENGE: Write one new example of each data type.

Nominal: favourite sport

Ordinal: agreement rating

Discrete: goals scored

Continuous: running time

SURVEY DESIGN STUDIO

Name: _____

Date: _____

Scenario: The school canteen wants to use data to help them decide on a new lunch menu.

A REPAIR THE QUESTIONS

Identify the problem with each question, then rewrite it so it is neutral, clear and suitable for a group.

Question	Diagnosis: Is the problem the question?	Rewrite the question so it is neutral, clear and suitable for a group.
1. Don't you think the healthy wrap is the best choice?	Diagnosis: _____ _____	_____ _____ _____
2. What food do you like?	Diagnosis: _____ _____	_____ _____ _____
3. How often do you buy lunch?	Diagnosis: _____ _____	_____ _____ _____

B CHOOSE A FAIR SAMPLE

The school has 620 students across Foundation to Year 6.
Describe a sample that would represent the whole school.

Why would asking only Year 6 students be a limitation?

C RESPONSE CHECK

☐	neutral wording
☐	one clear question
☐	use of response options
☐	relevant to the research question

SURVEY DESIGN STUDIO

Name: **ANSWERS** _____ Date: _____

Scenario: The school canteen wants to use data to help them decide on more trialling a new lunch menu.

A REPAIR THE QUESTIONS

Identify the problem with each question, then rewrite it so it is neutral, clear and suitable for a group.

Question	Diagnosis: What is the problem?	Rewrite the question so it is neutral, clear and suitable for a group.
1. Don't you think the healthy wrap is the best choice?	Diagnosis: Biased and leading "pushes one response"	Which new lunch item would students prefer: a wrap, salad, roll or another option?
2. What food do you like?	Diagnosis: Too vague; the population and lunch context are missing.	Which canteen lunch item do Year 6 students choose most often?
3. How often do you buy lunch?	Diagnosis: No population or time frame.	How many days per school week do students buy lunch?

B CHOOSE A FAIR SAMPLE

The school has 620 students across Foundation to Year 6. Describe a sample that would represent the whole school.

Select students randomly from every year level, in proportion to each year level's size.

Why would asking only Year 6 students be a limitation?

Asking only Year 6 would not represent younger students, whose preferences may differ.

C RESPONSE CHECK

- ☐ Is the question neutral wording?
- ☒ Is the question clear?
- ☒ Do the response options use neutral wording?
- ☒ Is the question relevant to the research question?

SCHOOL ENERGY INVESTIGATION — PAGE 1

Name: _____

Date: _____

Context: A Year 6 team counted how many lights were left on at 3:30 pm before and after an energy-saving reminder.

DAY	MON	TUE	WED	THU	FRI
WEEK 1	6	4	7	5	8
WEEK 2	5		6	4	7

1. Identify the variable being investigated.

Find the mean for each week.

Week 1 mean: _____

Week 2 mean: _____

2. Classify the data as nominal, ordinal, discrete or continuous. Explain.

3. Find the median and range for each week.

Week 1 median: _____

Week 1 range: _____

Week 2 median: _____

Week 2 range: _____

6. Compare the two weeks. Use at least two numbers as evidence.

3. Find the total for each week.

Week 1 total: _____

Week 2 total: _____



Reminder:

Show calculations and include units or context in your conclusion.

SCHOOL ENERGY INVESTIGATION — PAGE 1

Name: **ANSWERS**

Date: _____

Context: A Year 6 team counted how many lights were left on at 3:30 pm before and after an energy-saving reminder.

DAY	MON	TUE	WED	THU	FRI
WEEK 1	6	4	7	5	8
WEEK 2	5		6	4	7

1. Identify the variable being investigated.

Number of classroom lights left on at 3:30 pm.

Find the mean for each week.

Week 1 mean: **$30 \div 5 = 6$**

Week 2 mean: **$25 \div 5 = 5$**

2. Classify the data as nominal, ordinal, discrete or continuous.
Explain.

Discrete numerical data; lights are counted in whole numbers.

3. Find the median and range for each week.

Week 1 median: **6**

Week 1 range: **$8 - 4 = 4$**

Week 2 median: **5**

Week 2 range: **$7 - 3 = 4$**

6. Complete the two-way table. Use at least two numbers as evidence.

3. Find the total for each week.

Week 1 total: **$6 + 4 + 7 + 5 + 8 = 30$**

Week 2 total: **$5 + 3 + 6 + 4 + 7 = 25$**

Week 2 had one fewer light left on every day. The total fell from

30 to 25 and the mean fell from 6 to 5; both ranges were 4.



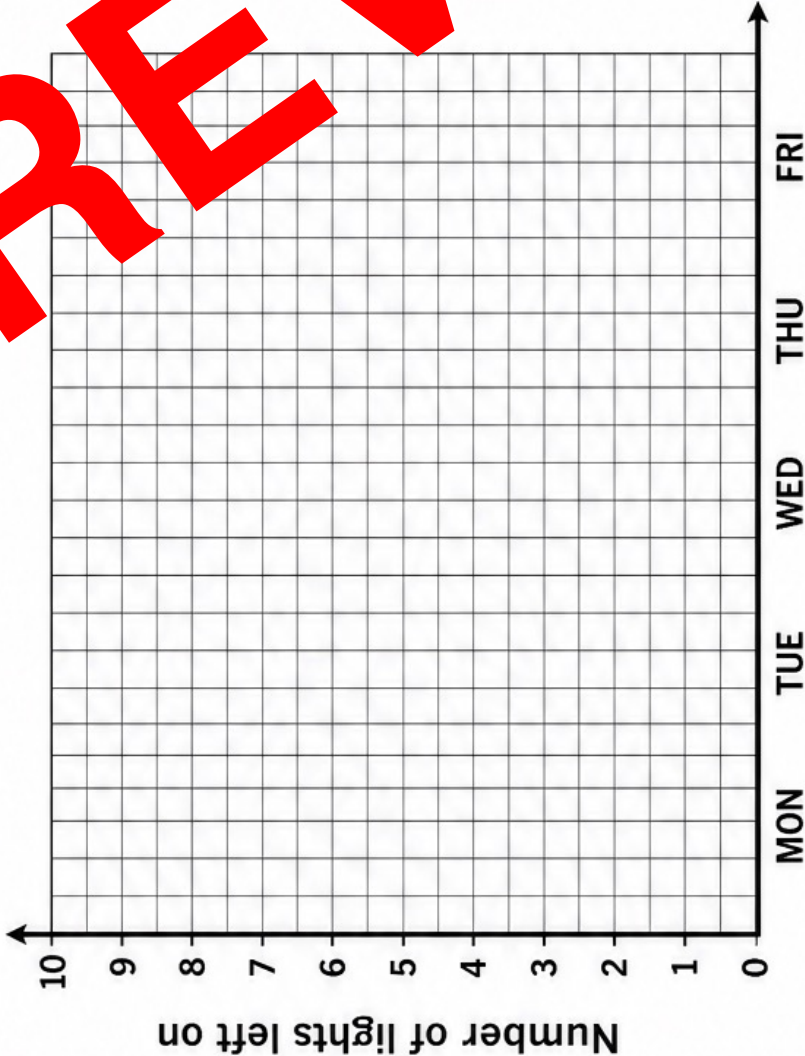
Reminder:

Show calculations and include units or context in your conclusion.

SCHOOL ENERGY INVESTIGATION — PAGE 2

Name: _____ Represent, interpret and evaluate Date: _____

DAY	MON	TUE	WED	THU	FRI
WEEK 1	6	4	7	5	8
WEEK 2	5	3	6	4	7



- 1. Describe one pattern shown by the data.
- 2. Write a supported finding that answers whether the reminder helped.
- 3. State one limitation of this investigation.
- 4. Suggest one real-world improvement to the collection plan.

WEEK 1

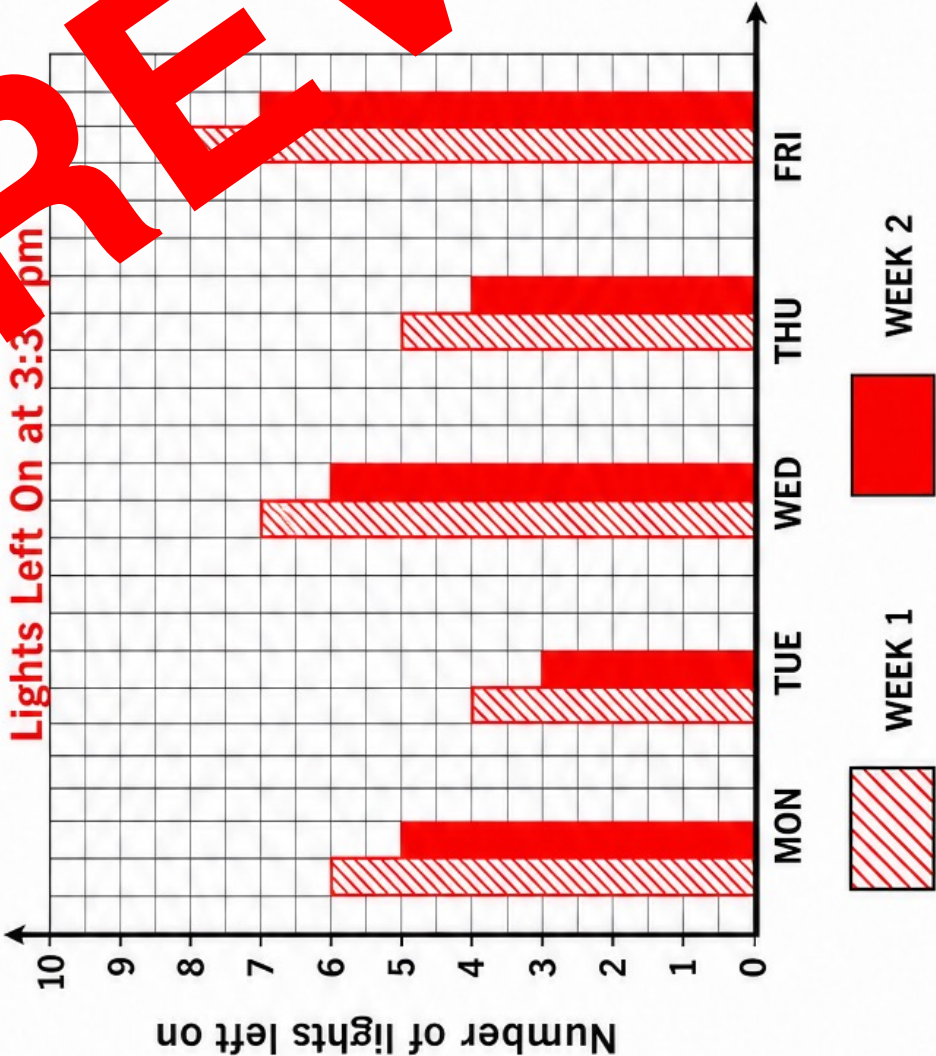
WEEK 2

CHECK: Does every claim include evidence from the table or graph?

SCHOOL ENERGY INVESTIGATION — PAGE 2

Name: ANSWERS Represent, interpret and evaluate Date: _____

DAY	MON	TUE	WED	THU	FRI
WEEK 1	6	4	7	5	8
WEEK 2	5	3	6	4	7



1. Describe one pattern shown by the data.

Week 2 is exactly one light lower than Week 1 on every day.

2. Write a supported finding that answers whether the reminder helped.

The reminder helped: the total fell from 30 to 25 and the daily mean fell from 6 to 5.

3. State one limitation of this investigation.

Only two weeks were compared, so other factors may explain the change.

4. Suggest one real-world improvement to the collection plan.

Collect data for several weeks before and after, using the same classrooms and time.

CHECK: Does every claim include evidence from the table or graph?

Name: _____

Date: _____

DIGITISE AND GRAPH — RECYCLING AUDIT

Context: A class counted recyclable items collected in different school areas.

AREA	PAPER	PLASTIC	METAL	TOTAL
Library	18	7	2	_____
Canteen	11	24	9	_____
Courtyard	8	15	4	_____
Year 6 block	21		6	_____

A. SPREADSHEET PLAN

1. Enter the data using clear row and column headings.

2. Write a spreadsheet formula for the Library total.

3. Write a formula that could be filled down for all area totals.

4. Explain one advantage of digitising this table.

B. REPRESENT AND INTERPRET

Choose a suitable graph for comparing material types across areas. Justify.

6. Which area collected the most plastic? Use evidence.

7. Find the total number of items collected in the Year 6 block.

8. Write one suggestion for improvement about the audit.

A graph needs a title, labelled axes, an even scale and a key when required.

DIGITISE AND GRAPH — RECYCLING AUDIT

Context: A class counted recyclable items collected in different school areas.

AREA	PAPER	PLASTIC	METAL	TOTAL
Library	18	7	2	27
Canteen	11	24	9	44
Courtyard	8	15	4	27
Year 6 block	21		6	39

A. SPREADSHEET PLAN

1. Enter the data using clear row and column headings.

Use headings in row 1 and enter one area per row.

2. Write a spreadsheet formula for the Library total.

=SUM(B2:D2)

3. Write a formula that could be filled down for all area totals.

Enter =SUM(B2:D2), then fill the formula down the Total column.

4. Explain one advantage of digitising this table.

A spreadsheet recalculates totals and graphs automatically when data changes.

B. REPRESENT AND INTERPRET

- Choose a suitable graph for comparing material types across areas. Justify.

Use a bar chart. It is a grouped column graph; it compares three material types across four areas.

6. Which area collected the most plastic? Use evidence.

Canteen with 24 plastic items.

7. Find the total number of items collected in the Year 6 block.

21 + 12 + 6 = 39 items

8. Write one summary conclusion about the audit.

The canteen collected the most items overall (44), mainly because it had 24 plastic items.

A graph needs a title, labelled axes, an even scale and a key when required.

Name: _____

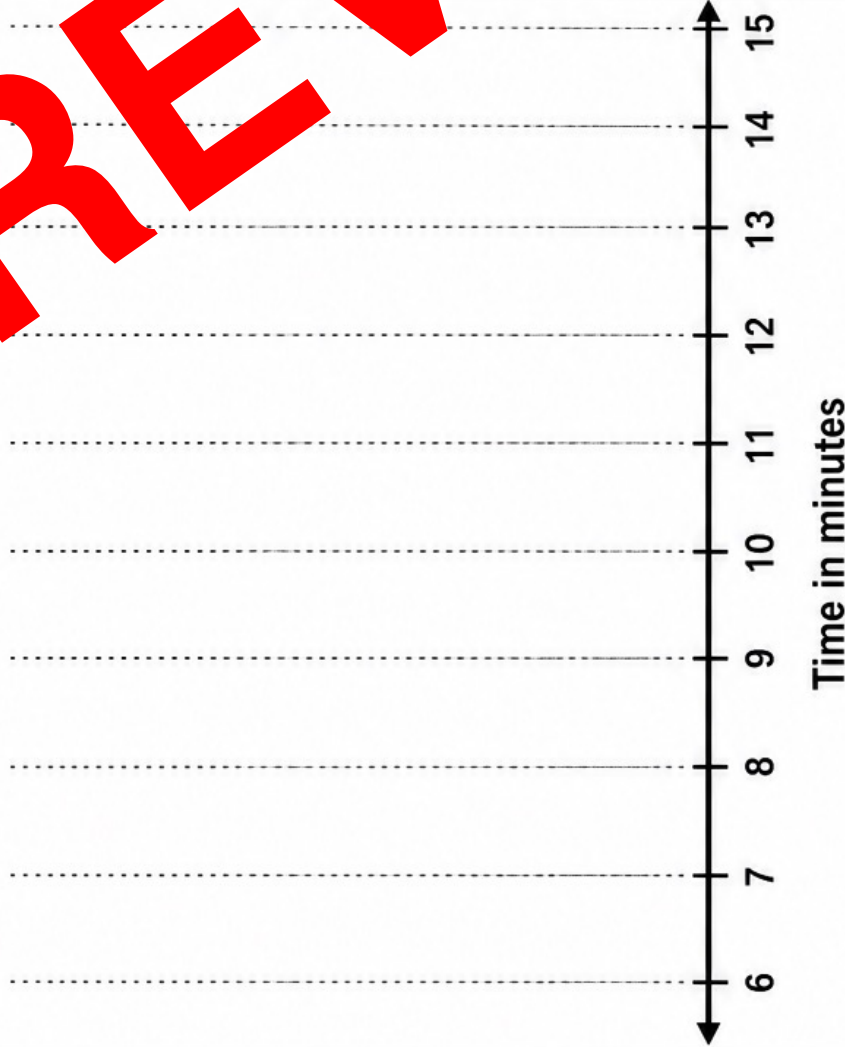
Date: _____

ANALYSE AND COMMUNICATE — PUZZLE TIMES

Context: Twelve students recorded the time, in minutes, taken to complete the same logic puzzle.

Data: 6, 7, 7, 8, 8, 8, 9, 9, 10, 11, 12, 15

DOT PLOT



1. Complete the dot plot.
2. Find the median.
3. Find the mode.
- Find the range.
5. Is 15 minutes an unusual value? Explain using the distribution.
- Describe the centre and spread in one clear sentence.
7. Write a conclusion about a typical completion time, then state one limitation using only this group.

COMMUNICATION CHECK:

☐ claim

☐ numerical evidence

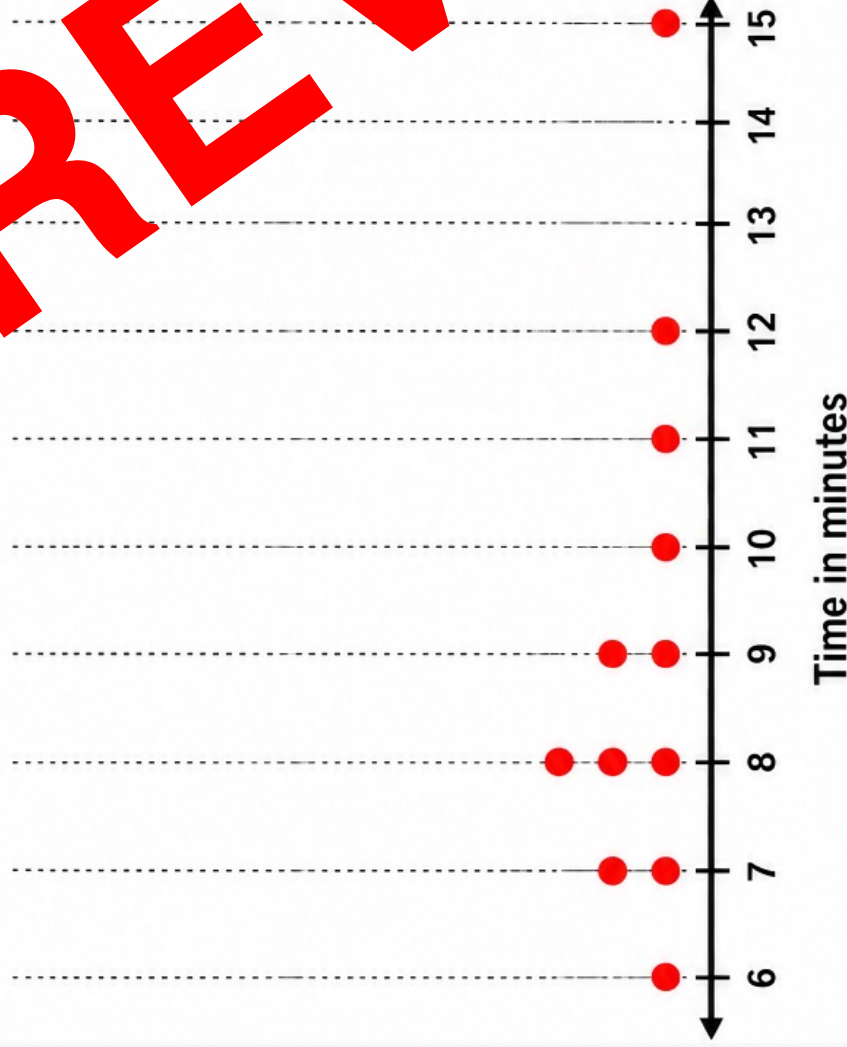
☐ context

ANALYSE AND COMMUNICATE — PUZZLE TIMES

Context: Twelve students recorded the time, in minutes, taken to complete the same logic puzzle.

Data: 6, 7, 7, 8, 8, 8, 9, 9, 10, 11, 12, 15

DOT PLOT



1. Complete the dot plot.

2. Find the median. **Median = $(8 + 9) \div 2 = 8.5$ minutes**

3. Find the mode. **Mode = 8 minutes**

Find the range. **Range = $15 - 6 = 9$ minutes**

5. Is 15 minutes an unusual value? Explain using the distribution.
Yes. It is separated from the cluster and is 3 minutes above the next value.

Describe the centre and spread in one clear sentence.

The centre is 8.5 minutes and the values span 9 minutes.

7. Write a conclusion about a typical completion time, then state one limitation using only this group.

A typical student takes about 8–9 minutes; only 12 students completed one puzzle. The result may not generalise.

COMMUNICATION CHECK:

☒ claim

☒ numerical evidence

☒ context

ASSESSMENT – SCHOOL TRAVEL INVESTIGATION

PAGE 1 – Question, data and method

Name: _____ Date: _____ Score: _____ / 12

A sample of 30 Year 6 students answered the question, “How do students in our Year 6 cohort usually travel to school?”

TRAVEL METHOD	WALK	BICYCLE	CAR	BUS
NUMBER OF STUDENTS		5	11	6

1. Explain why the research question is statistical. [2]

2. Name the population and the variable. [2]

3. Classify the variable as nominal, ordinal, discrete or continuous. Explain. [2]

4. Describe one fair way the sample of 30 students could have been selected. [2]

5. Find the total frequency and explain how it checks the dataset. [2]

6. State one limitation if all 30 students came from the same class. [2]

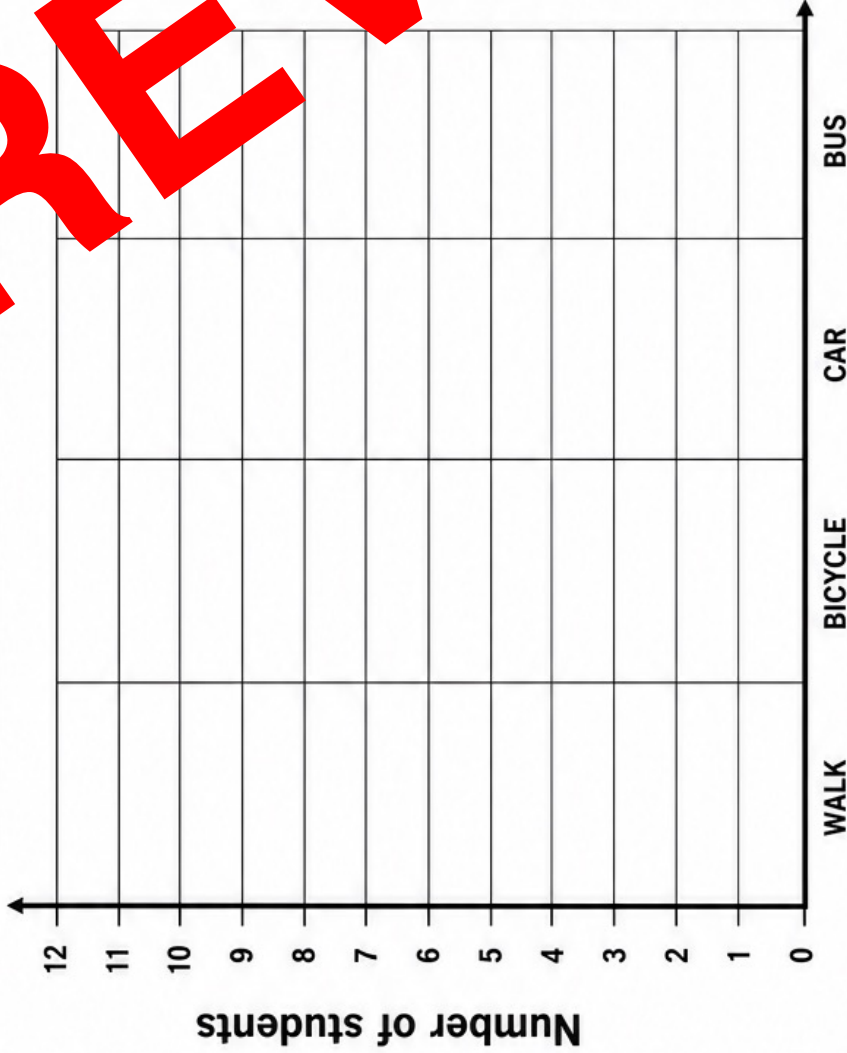
Use statistical vocabulary and support explanations with evidence.

ASSESSMENT – SCHOOL TRAVEL INVESTIGATION

PAGE 2 – Represent, analyse and evaluate

Name: _____ Date: _____ Score: _____ / 16

TRAVEL METHOD	WALK	BICYCLE	BUS
NUMBER OF STUDENTS	8	5	11
			6



7. Complete the column graph with a title, labels and an even scale. [4]
8. Identify the most common travel method and give its frequency. [2]
9. Compare the number travelling by car with the number cycling. [2]
10. Write a conclusion that answers the research question using two pieces of numerical evidence. [3]
11. Suggest one realistic improvement to the investigation. Explain how you could improve the evidence. [3]
12. Write one new statistical question that could extend this investigation. [2]

A strong conclusion includes a claim, evidence and context.

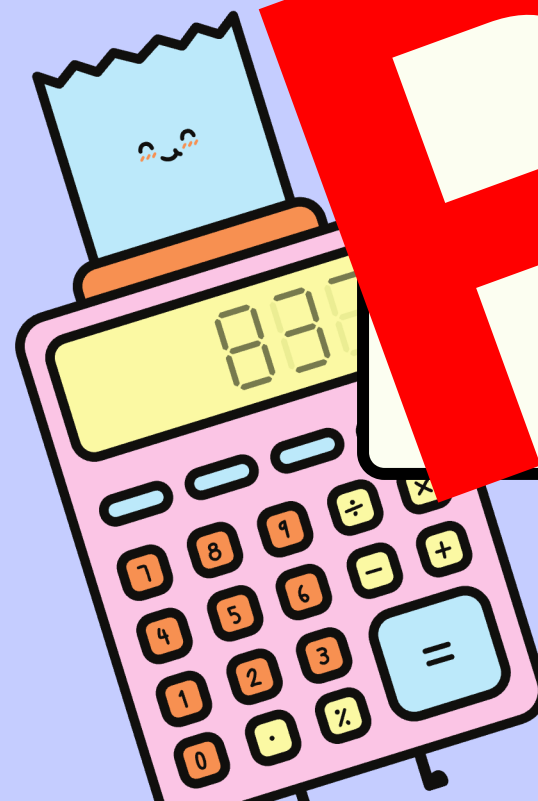
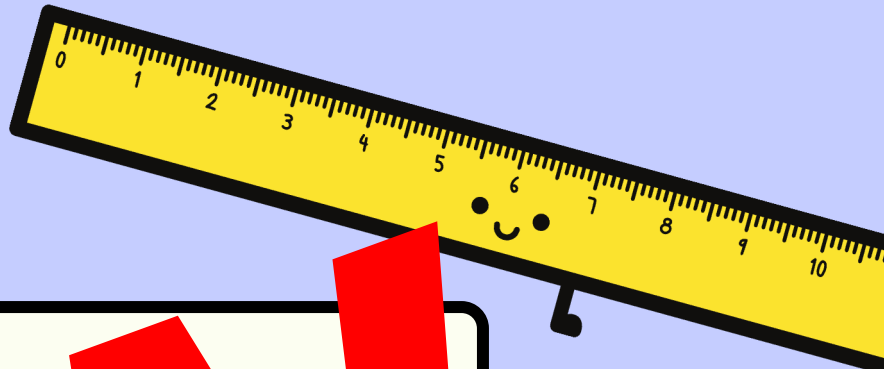
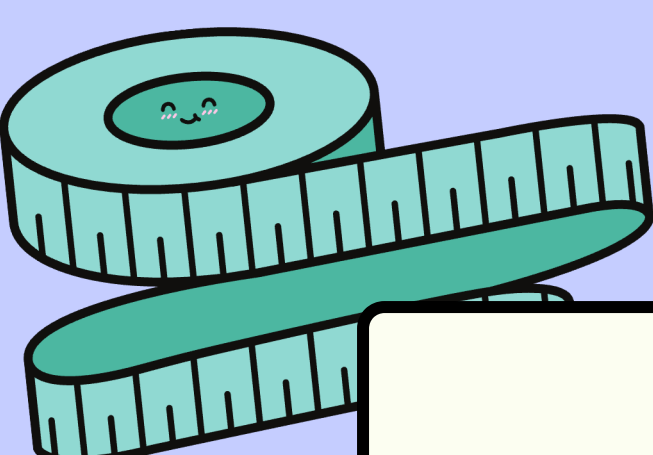
STATISTICAL INVESTIGATION ASSESSMENT RUBRIC

Year 6 Mathematics

Student: _____ Date: _____ Overall level: _____

CRITERION	BEGINNING	DEVELOPING	ACHIEVING	CONFIDENT	EXCEEDING
1. Statistical question and variables	fixed-answer question or elements missing	partial statistical question; elements unclear	suitable question; most elements identified	clear question; population and variable identified	precise question; population and variable fully identified
2. Collection method and sample	method missing or unsuitable	method partially missing or sample unclear	workable method; some sampling awareness	suitable method and fair sample explained	fair, efficient method; representative sample justified
3. Data accuracy and organisation	data unreliable or missing	incomplete or inconsistently organised data	mostly accurate data with minor errors	accurate, clearly organised data	complete, accurate records; checks are evident
4. Representation	graph unsuitable or incomplete	graph contains errors or missing conventions	readable graph with some conventions	accurate graph with title, labels and even scale	graph choice and conventions enhance comparison
5. Analysis and evidence	unsupported or incorrect finding	limited analysis or weak evidence	reasonable finding with some evidence	valid findings supported by numerical evidence	insightful patterns, centre/spread and anomalies supported
6. Communication and evaluation	conclusion missing or unrelated	vague conclusion or partial evaluation	conclusion linked to data; basic evaluation	clear conclusion; justification and improvement explained	precise conclusion; limitations and improvements evaluated

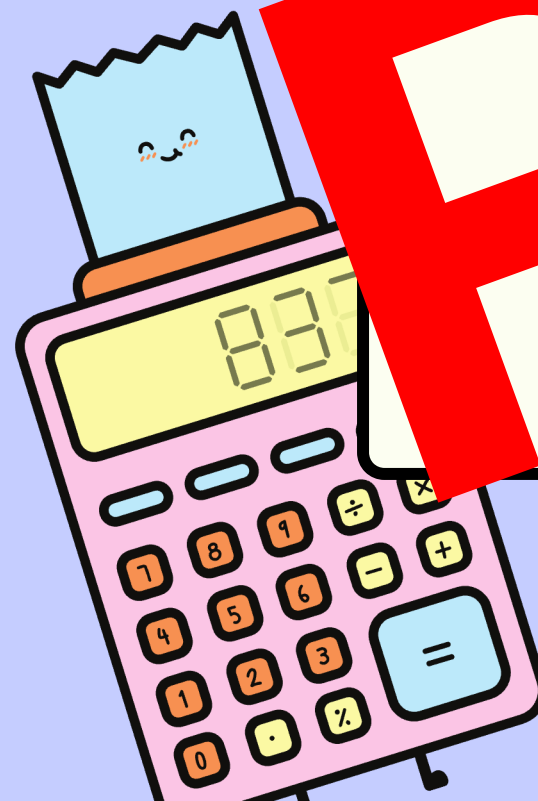
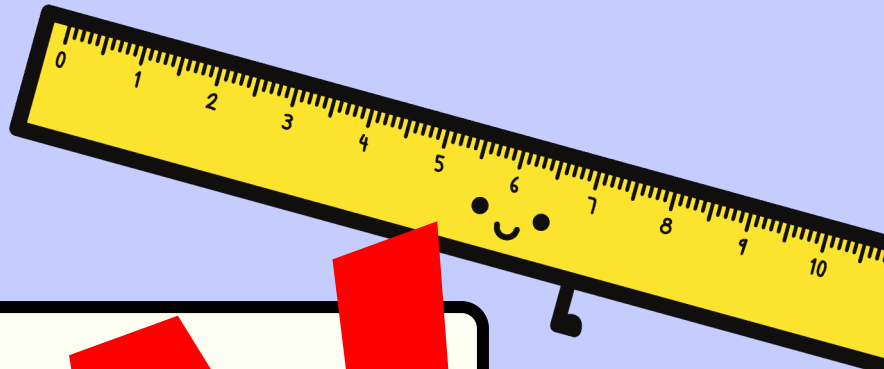
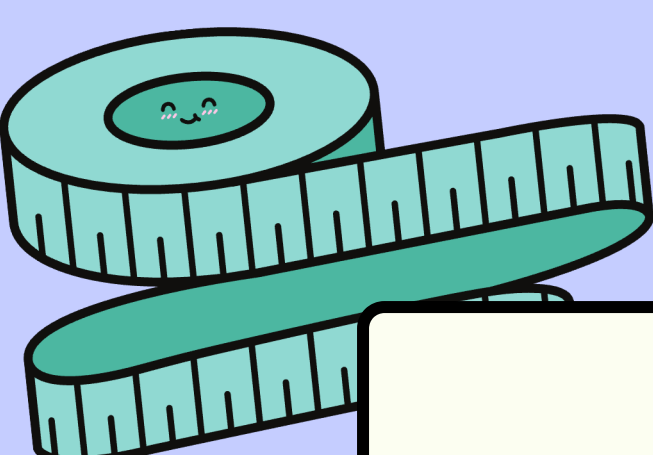
Teacher feedback:	Student next steps:
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PREVIEW

Statistical
Investigations





PREVIEW

Statistics
Investigations
Quiz

