



EduTrend Contents

EDUTECH · SCIENCE · MIDDLE SCHOOL

When Results Disagree

Measure reaction times and learn how scientists handle messy data

Ages 12–14

Level: Intermediate

60 minutes

Pairs · up to 30

Activity 04

Inside: activity at a glance · step-by-step session plan · facilitator notes · 3 student worksheets · assessment checklist

ACTIVITY 04 · AT A GLANCE

When Results Disagree

Pairs use the ruler-drop test to measure reaction times: one partner drops a ruler and the other catches it. They take ten readings each, find the range and mean, identify anomalies and compare class results. The discussion focuses on why results differ and how scientists decide what to trust.

Learning outcomes

By the end of the session students can:

- collect repeated data;
- calculate mean and range;
- identify anomalies;
- explain sources of variation.

KEY WORDS

reaction time · mean · range · anomaly · variation · reliability

CURRICULUM LINKS

Maths: mean and range. PE: reaction and sport. Biology: nervous system.

1**OBSERVE**

Look closely

2**QUESTION**

What do we want to know?

3**PREDICT**

What do we think?

4**TEST**

Fair and repeated

5**ANALYSE**

What does the evidence show?

6**SHARE**

Explain and discuss

Materials (per pair)

- 30 cm ruler
- Conversion chart (distance to time)
- Worksheets 1, 2 and 3

Before the session

- Prepare a conversion chart.
- Demonstrate the drop.
- Print worksheets.
- Plan pairs.

SAFETY

Drop the ruler from a low height and keep fingers clear. No throwing equipment.

ACTIVITY 04 · SESSION PLAN

Step by step

Varying the timing of the drop stops the catcher from anticipating.

Time	What happens	Say or ask
0–8 min Hook	Demonstrate the ruler drop.	<i>“Who is fastest?”</i>
8–25 min Collect	Ten readings each.	<i>“Are all readings similar?”</i>
25–38 min Analyse	Mean, range, anomalies.	<i>“Which readings look odd?”</i>
38–52 min Compare	Class data discussion.	<i>“Why do results differ?”</i>
52–60 min Reflect	How to make it more reliable.	<i>“What would you change?”</i>

CHALLENGE CARD (print or copy onto the board)

Collect ten reaction time readings, calculate mean and range, identify anomalies and explain why results vary.

ACTIVITY 04 · FACILITATOR NOTES

The science know-how in brief

Repeated measurements rarely match exactly. The spread shows variation from the person, the method and the equipment. The mean summarises the data and the range shows how spread out it is.

An anomaly is a result that does not fit the pattern. Scientists check for a cause before deciding whether to leave it out, and they report what they did.

Common ideas to listen for

- “Different results mean someone is wrong.” Variation is normal.
- “Delete results you do not like.” Only exclude with a reason.
- “The mean tells you everything.” Check the range too.

Adapting the activity

Support

Provide a calculation frame for the mean.

Stretch

Test whether practice or distraction changes reaction time.

WORKSHEET 1

Readings

Name: _____

Class: _____ Date: _____

Record catch distance.

Readings

Trial	Distance (cm)	Time (s)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

WORKSHEET 2

Analysis

Summarise the data.

Analysis

Measure	Value
Mean	
Range	
Anomalies	
Possible causes	

WORKSHEET 3

Improving reliability

Suggest improvements.

How we could make the data more reliable

FOR THE TEACHER

Assessment checklist

Use during the session. One sheet covers up to eight students; copy as needed.

Student	Calculates correctly	Identifies anomalies	Explains variation

Suggested codes: W = working towards · E = expected · G = greater depth

ABOUT THIS ACTIVITY

When Results Disagree is a sample activity from the EduTrend Contents Edutech Science programme (middle school, level: intermediate). Every activity in the programme follows the same format: a practical challenge, a clear session plan, facilitator notes and ready-to-print worksheets, so that teachers, club leaders and parents can run it without extra preparation.

Full 15-, 20- and 32-week programmes are available from EduStore at edutrend.org.

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