

EduTrend Contents

W4C · BIOLOGY & LIFE SCIENCES · MIDDLE SCHOOL

Heart Rate Lab

How does exercise change your heart rate?

Ages 12–14 | Level: Intermediate | 60 minutes | Groups of 3 · 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

Heart Rate Lab

Students investigate how exercise affects heart rate and breathing. They measure resting pulse, carry out two levels of exercise, record heart rate each minute during recovery and plot recovery curves. They then explain their data using the need for oxygen and glucose in respiring muscles.

Learning outcomes

By the end of the session students can:

- measure pulse rate accurately;
- plan a safe investigation with a controlled exercise;
- plot and interpret a recovery graph;
- explain changes using respiration and circulation.

KEY WORDS

pulse · heart rate · respiration · oxygen · recovery · circulatory system

CURRICULUM LINKS

Science: circulation, respiration, health. PE: fitness and training. Maths: line graphs and means.

1	2	3	4	5	6
QUESTION	**PREDICT**	**PLAN**	**OBSERVE**	**RECORD**	**EXPLAIN**
What do we want to know?	What will happen?	Keep it fair	Look closely	Measure and note	What does it show?

Materials (per group)

- Stopwatch or timer
- Space for stepping or jogging on the spot
- Step or low bench (optional)
- Graph paper
- Worksheets 1, 2 and 3

Before the session

- Check for any student with a medical reason not to exercise; offer a recorder role.
- Practise finding the pulse at the wrist and neck.
- Clear space and check floors.
- Prepare the results table on the board.

SAFETY

Students choose their own effort level. Anyone who feels unwell stops at once. Students with heart or breathing conditions act as timers and recorders.

ACTIVITY 04 · SESSION PLAN

Step by step

Timings are for 60 minutes. Use a well-ventilated room or the hall.

Time	What happens	Say or ask
0–5 min **Hook**	Ask students to feel their pulse. What is it doing and why?	*"Why does your heart beat faster when you run?"*
5–15 min **Practise**	Students find their pulse and count for 15 seconds, then multiply by 4. Repeat three times.	*"Why repeat and take a mean?"*
15–20 min **Plan**	Groups agree two exercise levels: gentle stepping and fast jogging on the spot, each for 2 minutes.	*"What must stay the same?"*
20–40 min **Test**	Measure resting rate, exercise, then measure each minute for 5 minutes of recovery. Repeat with the second level after full recovery.	*"How long until you are back to resting?"*
40–52 min **Graph**	Students plot heart rate against time for both levels.	*"What does a fitter person's graph look like?"*
52–60 min **Explain**	Link to oxygen and glucose delivery to muscles.	*"Why does breathing also speed up?"*

CHALLENGE CARD (print or copy onto the board)

Predict and then find out how long it takes your heart rate to return to resting after gentle and vigorous exercise. Explain the difference.

ACTIVITY 04 · FACILITATOR NOTES

The biology in brief

Muscles need energy to contract. They release it through respiration, which uses glucose and oxygen and produces carbon dioxide. During exercise muscles respire faster, so the heart beats faster and harder to deliver more blood, and breathing gets faster and deeper to take in oxygen and remove carbon dioxide.

After exercise the heart rate falls gradually. Recovery time is a useful measure of fitness: regular training strengthens the heart so it pumps more blood with each beat and recovers faster. During hard exercise muscles may also respire anaerobically, which is one reason breathing stays fast after stopping.

Common ideas to listen for

- "The heart speeds up to pump more air." The heart pumps blood; the lungs take in air.
- "Heart rate returns to normal instantly." Recovery takes minutes.
- "Only muscles use oxygen." All living cells respire.

Adapting the activity

Support

Use one exercise level and a pre-drawn graph with axes.

Stretch

Compare recovery times across the group and discuss factors such as regular exercise, without ranking individuals.

WORKSHEET 1

Measuring my pulse

Name: _____ Class: _____ Date: _____

Count for 15 seconds and multiply by 4.

Resting heart rate

Reading	Count in 15 s	Beats per minute
1		
2		
3		
Mean		

WORKSHEET 2

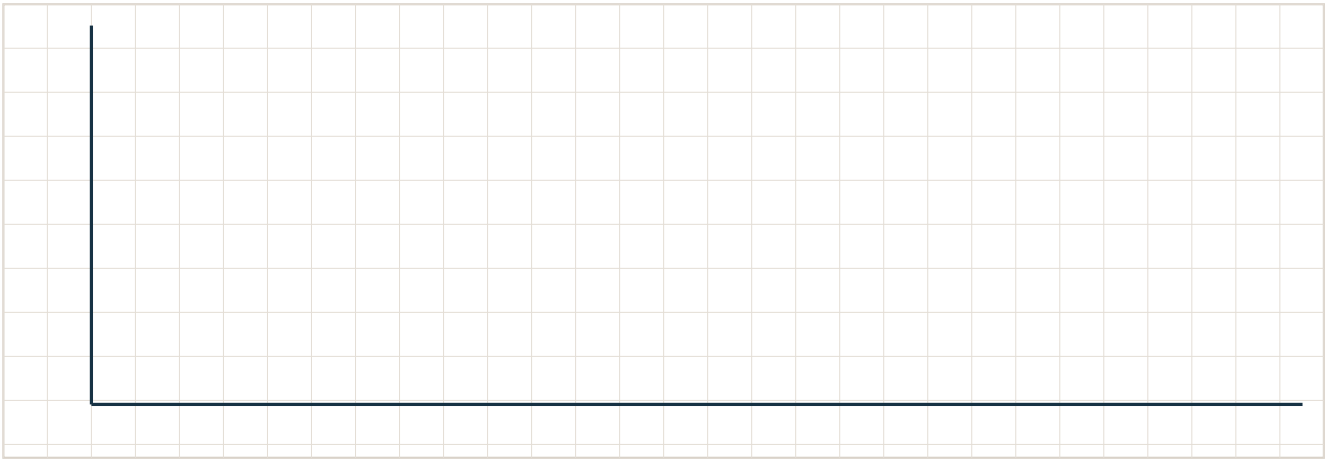
Exercise and recovery

Record your heart rate each minute after exercise.

Results

Time after exercise (min)	Gentle (bpm)	Vigorous (bpm)
0		
1		
2		
3		
4		
5		

Recovery graph



y-axis: heart rate (bpm)

x-axis: time after exercise (min)

WORKSHEET 3

Explain it

Use the words oxygen, glucose, respiration and blood.

Why does heart rate increase during exercise?

Self-check

I can...	Not yet	Partly	Confidently
measure my pulse			
plot a recovery graph			
explain with respiration			
evaluate my method			

FOR THE TEACHER

Assessment checklist

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

Student	Measures accurately	Plots and reads graphs	Explains with respiration

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

ABOUT THIS ACTIVITY

Heart Rate Lab is a sample activity from the EduTrend Contents W4C Biology & Life Sciences 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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