



EduTrend Contents

W4C · WATER SPORTS · MIDDLE SCHOOL

Sailing Science

How sails use the wind and the points of sail

Ages 12–14

Level: Intermediate

60 minutes

Groups of 3–4 · 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

Sailing Science

Students investigate how a sail works like a wing, learn the points of sail from close-hauled to running and the no-go zone, and test paper or card model boats with a fan. They plan a zigzag route to sail upwind, explaining tacking.

Learning outcomes

By the end of the session students can:

- explain how a sail produces a force;
- name the points of sail;
- explain why boats cannot sail directly into the wind;
- plan an upwind route using tacking.

KEY WORDS

wind direction · lift · points of sail · close-hauled · beam reach · broad reach · running · no-go zone · tacking

CURRICULUM LINKS

Science: forces, air pressure and vectors. Maths: angles and bearings. Geography: wind and weather.

1

PREPARE

Kit, rules and checks

2

LEARN

Skill or idea

3

PRACTISE

Try it safely

4

APPLY

Game or challenge

5

REFLECT

What did we learn?

6

STAY SAFE

Rules to remember

Materials (per group)

- Card, paper, straws and tape for model sails
- A shallow water tray or smooth floor
- Electric fan
- Protractors
- Worksheets 1, 2 and 3

Before the session

- Prepare a fan station.
- Print a points of sail diagram.
- Make an example model.
- Plan where to show a video of dinghy sailing.

SAFETY

Keep water trays away from sockets and fan cables. Wipe spills at once. Keep fingers clear of fan blades.

ACTIVITY 04 · SESSION PLAN

Step by step

Draw the wind as an arrow on the board and turn a model boat around it: the points of sail become visual quickly.

Time	What happens	Say or ask
0–10 min Hook	Video of a dinghy sailing upwind.	<i>"How can a boat go towards the wind?"</i>
10–22 min Sails as wings	Explain lift with paper and blowing.	<i>"Where is the pressure lower?"</i>
22–32 min Points of sail	Label the diagram; mark the no-go zone.	<i>"Which point is fastest?"</i>
32–50 min Model test	Test sail angles with a fan; record results.	<i>"Which sail angle worked best?"</i>
50–60 min Plan a route	Plan tacks to reach an upwind mark.	<i>"Why zigzag?"</i>

CHALLENGE CARD (print or copy onto the board)

Plan and explain a route that reaches a mark directly upwind, labelling each point of sail and each tack.

ACTIVITY 04 · FACILITATOR NOTES

The water know-how in brief

When wind flows around a curved sail, it creates a pressure difference that produces lift, much like a wing. Together with the keel or centreboard, which resists sideways slipping, this lets a boat sail across and even towards the wind.

The points of sail are close-hauled, close reach, beam reach, broad reach and running. Boats cannot sail directly into the wind: there is a no-go zone of roughly 45 degrees either side of it. To go upwind, sailors tack in a zigzag, turning the bow through the wind.

Common ideas to listen for

- “Sails only work when the wind is behind.” Sails also produce lift across the wind.
- “Boats can sail straight into the wind.” They must tack.
- “Running downwind is always fastest.” Reaching is often faster.

Adapting the activity

Support

Give a partly labelled points of sail diagram.

Stretch

Explain the role of the centreboard using a force diagram.

WORKSHEET 1

Points of sail

Name: _____

Class: _____ Date: _____

Label the diagram.

Diagram



Draw the wind arrow, the no-go zone and each point of sail.

WORKSHEET 2

Model test

Record your results.

Results

Sail angle	Distance moved	Notes
0 degrees		
30 degrees		
45 degrees		
60 degrees		
90 degrees		

WORKSHEET 3

Upwind route

Plan your route.

Route sketch



Show tacks and label points of sail.

Why we tack

FOR THE TEACHER

Assessment checklist

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

Student	Explains lift	Names points of sail	Plans tacking

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

ABOUT THIS ACTIVITY

Sailing Science is a sample activity from the EduTrend Contents W4C Water Sports 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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