

# The bicycle

Primary: (ages 7 – 11)

Interdisciplinary

The bicycle is at the centre of this interdisciplinary project which allows students to pedal from language and literacy to mathematics, passing through science and art education and improving their physical ability. The goal is to learn while having fun and to do this we plan a bicycle ride, record a radio programme, calculate distances and times to design our own bike circuits, upgrade our bicycle with paint, become mechanics, and make sculptures with bike parts.

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**Time allocation** About 11 lesson periods

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**Subject content** This is an interdisciplinary activity that has been designed to foster knowledge and skills in physical education, mathematics, language and literacy, art, and road safety

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**Creative and critical thinking** This unit has a **creativity** and **critical thinking** focus

- Explore, generate and play with unusual ideas and explain their strengths and limitations
- Make connections between concepts in a variety of disciplines
- Consider different perspectives and reflect on steps taken

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**Other skills** Collaboration, Communication, Persistence/Perseverance

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**Key words** Road safety; transport; bike; wheels; circumference; sculpture; debate; repairs; agility; circuits; school trip; radio; distance; time

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## Products and processes to assess

Students produce a number of different outputs, including a proposed trip and route, a radio programme and a sculpture. At the highest levels of achievement, their products are imaginative, with a high level of personal features as well as, where appropriate, taking specific personal positions on carefully formulated problems. Their work process demonstrates a willingness to explore a variety of ideas, see connections with other domains, and challenge ideas to their limits before making final choices. They show a clear understanding of the strengths and limitations of their positions and are open to the ideas and feedback of others.

## Teaching and Learning plan

This plan suggests potential steps for implementing the activity. Teachers can introduce as many modifications as they see fit to adapt the activity to their teaching context.

Step	Duration	Teacher and student roles	Subject content	Creativity and critical thinking
1	Lesson period 1	<p><b>BIKE RIDE</b></p> <p>The teacher suggests a bike trip from the school to a place of interest to the students. The class will be divided into groups and they will need to find information and propose a place to visit on the condition that it is an appropriate journey and safe to travel by bicycle. They can be encouraged to think of some unusual and interesting destinations</p> <p>Students should plan the route on a map, indicate distances and create a small paper guide, providing information on the place to visit and other points of interest on the journey.</p> <p>Each group presents their proposal verbally being careful to point out its strengths and any limitations it has: the one with most class votes and teacher approval will be the one that takes place.</p>	<p>Researching the local area and proposing a place to visit</p> <p>Planning routes, calculating distance</p> <p>Road safety</p> <p>Creating a guide</p> <p>Pitching their plan</p>	<p>Generating and playing with unusual ideas for a destination</p> <p>Explaining the strengths and limitations of a solution</p> <p>Appraising the plans of others according to different criteria</p>
2	Lesson periods 2 and 3	<p><b>DEBATE</b></p> <p>The teacher explains that students are going to take part in a debate over the use of bicycles. If time is available, these debates can be recorded as if they were a radio programme. The students research, select information, summarise, and are reminded to both respect the opinions of others and argue one's own opinion.</p> <p>The class is split into groups and each student takes on a different segment of the debate/programme (e.g. introduction, debate, announcements, interview, closing). They can be asked to address the positives and negatives of the bike as a means of transport according to differing criteria (e.g. environmental, speed, safety, convenience). They should prepare it in a group and present it verbally to the teacher before recording for correction</p> <p>Once the details are finalised this can be recorded (this may need to take place on another day after a short rehearsal) and after editing it could be broadcasted, for example, via a link on the school's website.</p>	<p>Researching and selecting relevant information</p> <p>Writing and reviewing persuasive texts</p> <p>Recording and editing a debate</p>	<p>Considering several perspectives on a problem</p> <p>Explaining the strengths and limitations of the bike as a means of transport on the basis of different criteria</p> <p>Producing a meaningful output that is personally novel</p>
3	Lesson periods 4 and 5	<p><b>BICYCLE COMPONENTS AND REPAIR</b></p> <p>The teacher explains that we are going to learn more about how to take care of and repair bikes. The class is divided into four groups which will move around four different tables, each one dealing with a different component of the bicycle and how to repair it</p>	<p>Learning about the components of bikes and how to repair them</p>	<p>Inquiring into bike repair</p> <p>Observing relevant experience and</p>

		<p>(punctured tyre, brakes, chain with a crank set and sprocket and gear assemblies).</p> <p>The teacher: leads the activity, introduces the different components and encourages practical handling. It may be helpful to make contact with one of the organisations that work for free with schools on such issues if that is available in the local area.</p> <p>Students engage in experimentation and inquiry to investigate how to care for and repair the components. Ideally, the students should be given some information but not too much because the goal is for them to discover. However, this can be managed according to the level and interest of the class and local conditions.</p>		making connections to discover principles of bike repair
4	Lesson periods 6 and 7	<p><b>DESIGNING BIKE CIRCUITS</b></p> <p>The teacher explains that the students will now design their own bike circuits. They generate and write some conditions that the circuit must meet on the blackboard: A straight line, bends, roundabout, acceleration lane, braking zone and stop sign, left and right turn.</p> <p>In groups they create their own design, draw it, gather the materials and put it together to create their circuit. Finally, if space is available, the students test the different circuits, discuss their strengths and limitations according to different criteria (the safest, the one that requires the most skill, the simplest, the most complicated etc.) and share the experiences and opinions that have arisen.</p>	<p>Designing and drawing circuit routes</p> <p>Motor skills and developing physical agility</p>	<p>Generating ideas for relevant criteria and designs</p> <p>Explaining the strengths and limitations of the circuits on the basis of different criteria</p> <p>Considering alternative perspectives on strengths and limitations</p>
5	Lesson period 8	<p><b>MATHEMATICAL GYMKHANA</b></p> <p>Two speed and two agility tests will take place. One of each will involve a bicycle and one of each will involve running.</p> <p>Students work in teams, takes the tests, calculates distances, records them and makes calculations. They calculate:</p> <ul style="list-style-type: none"> <li>• Partial and total distances.</li> <li>• Times.</li> <li>• Percentages and vary their form of expression.</li> </ul> <p>The teacher may decide to ask them to assess the difference in times and hypothesise about the reasons for these differences and generating some unusual or interesting ideas for how they could be improved.</p>	<p>Calculating distances, recording time, calculating percentages</p>	<p>Generating unusual ideas for improving times</p>
6	Lesson period 9	<p><b>ART IN MOTION</b></p> <p>The class is divided into small groups (with a bicycle for each group) and are asked to calculate the area of the circumference of the two bicycle wheels. They then create a circle of the same size on cardboard that will later be attached to the spokes. They then freely decorate the cardboard wheel taking into account that depending on the design it</p>	<p>Painting, using colour and creating moving effects</p>	<p>Producing an output that is personally novel</p>

will create a type of visual effect in motion.  
 Once the paint is dry, the circles are cut out, and attached with brackets to the spokes, bearing in mind that there must be clearance between the card and the brake pads.  
 The visual effect can be recorded.  
 Alternative: plastic can be placed on the wheels to produce different sounds when the wheels turn around.

7	Lesson period 10 and 11	<p><b>WE ARE SCULPTORS</b></p> <p>The teacher explains that the students are going to work together to make a class sculpture from old bicycle components (it will be necessary to first secure these components which are usually available from bicycle repair shops). Students can look at images on the internet to provide ideas, but copying them is not permitted. The class is split into groups to brainstorm and present unusual or radical ideas for the class sculpture. Out of the ideas contributed one or more are selected after some discussion and debate about the relative merits of each proposal. Students must then select (and possibly clean) the components to be used and assemble the parts. It may be useful to invite a parent or other teacher to help with the assembly process.</p> <p>As a closing activity, students can be asked to present the different work they have done on the theme of the bicycle , what they have learned about, and how they have had to use critical or creative thinking to learn about it</p>	Designing and constructing a sculpture	<p>Generating radical and unusual ideas for a sculpture</p> <p>Explaining both strengths and limitations of ideas for potential sculptures</p> <p>Appraising the ideas of others and considering multiple perspectives</p> <p>Reflecting on steps taken and possible consequences</p>
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## Resources and examples for inspiration

### Web and print

- YouTube video <https://www.youtube.com/watch?v=EgejS-Zk1h0>, Google Maps.
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### Other

- Second-hand bikes, helmets, recycled bicycle components, vests, cones, spades, traffic signs,
- Computer, interactive whiteboard, etc. Recycled paper, paints, glue and other materials, etc. Kits loaned from the Council (radio and bicycle repair), mobile exhibitions from the STARS project, etc.xx

### Opportunities to adapt, extend, and enrich

- Through teaching and encouraging the use of the bicycle, in an active, meaningful way the students can learn content related to all fields (machines, geography, periods in history and inventions, calculus, dimensions and geometry, oral and written expression, motor skills, road safety, artistic techniques, etc.). This could also be expanded by working in another language or including musical activities.

**Creativity and  
critical thinking rubric**

- Mapping of the different steps of the lesson plan against the OECD rubric to identify the creative and/or critical thinking skills the different parts of the lesson aim to develop

	<b>CREATIVITY</b> Coming up with new ideas and solutions	<b>Steps</b>	<b>CRITICAL THINKING</b> Questioning and evaluating ideas and solutions	<b>Steps</b>
<b>INQUIRING</b>	Make connections to other concepts and knowledge from the same or from other disciplines	3	Identify and question assumptions and generally accepted ideas or practices	
<b>IMAGINING</b>	Generate and play with unusual and radical ideas	1,4,5,6	Consider several perspectives on a problem based on different assumptions	2,4
<b>DOING</b>	Produce, perform or envision a meaningful output that is personally novel	2,5	Explain both strengths and limitations of a product, a solution or a theory justified on logical, ethical or aesthetic criteria	1,2,4,6
<b>REFLECTING</b>	Reflect on the novelty of solution and of its possible consequences	6	Reflect on the chosen solution/position relative to possible alternatives	6