

The Leonardo da Vinci Machines at Waterfront City Wings and Parachutes

Wings and Parachutes

PRIMARY Level 3-4 **Design Creativity Technology / Science**

WINGS and PARACHUTES

Time Frame: 10 hours (6 activities) + LdV Exhibition visit

Suitable VELS outcomes

Communication

LEVEL 3

Students explore a range of aural, written and visual communication forms such as the Internet, film, texts and music that illustrate a variety of perspectives on a range of topics and ideas. They learn how to identify the main message, develop their own interpretation, and provide evidence to support it. They explore reasons for other interpretations not being the same as theirs and learn to respect the right of others to express opinions.

Design Creativity and Technology

LEVEL 3: Investigating and Designing, Producing and Analysing and Evaluating.

Investigating and Designing

Students, individually and in teams, generate ideas based on a design brief, demonstrating understanding that designs may need to meet a range of different requirements. They use words, labelled sketches and models to communicate the details of their designs, and clarify ideas when asked. They identify simple systems components and common materials/ingredients and explain the characteristics and properties that make them suitable for use in products. Students think ahead about the order of their work and list basic steps to make the product or system they have designed.

Producing

Students use their list of steps and are able to choose appropriate tools, equipment and techniques to alter and combine materials/ingredients and assemble systems components. They use a variety of simple techniques/processes and a range of materials/ingredients to safely and hygienically alter and combine materials/ingredients and put together components to make products and simple systems that have moving parts.

Analysing and evaluating

Students test, evaluate and revise their designs, products or simple systems in light of feedback they have gained from others. They identify what has led to improvements and describe what they consider to be the strengths and drawbacks of their design, product or simple system. They consider how well a product or simple system functions and/or how well it meet the intended purpose.



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Science

LEVEL 3 for Science, Knowledge and Understanding

Students identify the actions of forces in everyday situations. They use the words *push* and *pull* in discussing how things can be moved and stopped. They identify forms of energy and energy transformations in the everyday world. They use appropriate scientific vocabulary to describe and explain their observations and investigations.

Students identify and describe the structural features of living things, including plants and animals. They explain how scientific knowledge is used, or could be used, to solve a social issue or problem.

LEVEL 4 : Science, Knowledge and Understanding

Students describe the purpose of experiments they undertake, including a statement of ethical considerations, and relate this purpose to the nature of the data that is collected. They design and build simple models and write an account of the science that is central to explanation of the model. They use diagrams and symbols to explain procedures used when reporting on their investigations.

Thinking Processes

LEVEL 3 : Reasoning, processing and inquiry, Creativity and Reflection, evaluation and metacognition

Reasoning, processing and inquiry

At Level 3, students collect information from a range of sources to answer their own and others' questions. They question the validity of sources when appropriate. They apply thinking strategies to organise information and concepts in a variety of contexts, including problem solving activities. They provide reasons for their conclusions.

Creativity

At Level 3, students apply creative ideas in practical ways and test the possibilities of ideas they generate. They use open-ended questioning and integrate available information to explore ideas.

Reflection, evaluation and metacognition

At Level 3, students identify strategies they use to organise their ideas, and use appropriate language to explain their thinking. They identify and provide reasons for their point of view, and justify changes in their thinking.

[For Leonardo teaching resources: refer to School Programs Resource list](#)



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Suggested material resources :

- bin bag liners (assorted strengths)
- range of circular objects to draw shape around
- scotch tape and masking tape
- scissors
- sponge
- hole punch
- cotton string
- paper clips
- box of ¼ inch washers
- several dozen eggs and fridge
- tape measure
- metre stick
- stop watch
- digital camera/ video camera
- safe parachutes award certificate

Context

Throughout his life Leonardo studied the mechanics of flight and dreamed of applying his research of the natural world to designing flying devices for humankind. He meticulously studied dragonflies, bird wings, bat wings, flying fish. From these studies he created a sequence of mechanical wings that imitated his drawings of wings from the natural world. He created a working model of an aerial screw (seen suspended from roof of Leonardo da Vinci's Machines exhibition) this was one of the earliest known helicopter designs. He is the first person in recorded history to have designed a parachute and a hang glider.

He also designed an astonishing range of 'ornithopters' (flapping- wing aircraft). He experimented a lot with designs based on a premise that was unfortunately, practically unfeasible. He imagined that man had sufficient muscle power to emulate the birds. He also concluded, mistakenly, that birds flew by beating their wings downwards and backwards. On the downstroke, birds' wing-feathers twist into mini propellers to give thrust, with the inner wing providing lift. When he was an older man he envisaged a more rational approach, integrating fixed-wing structures.

Following a visit to the exhibition of his machines students can learn about the history of parachute design and make their own, to take part in an egg carrying contest.



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Student Challenge

Learn about principles of bird flight. Learn about Leonardo's study and his flying machines. Make a sketch of his parachute and understand its key elements. Learn about the history of parachute design. Design, make and test your own parachute.

Teacher Overview

Leonardo's experiments with flight provide a fascinating platform to provoke enquiry into the principles of flight. Parachute drops are a fun and engaging design task to run as hands-on learning experience. This unit of work can be varied in content, length and structure according to the age of class you are working with. Grade 3 or 4 students will respond and engage with design task if it is carefully structured (and you have a well briefed help-team!). There is a BBC programme about Leonardo da Vinci's life and inventions that will be played at the exhibition. Episode 1 includes a successful test flight of Leonardo's parachute design (with one modification).

[Download Student Activity sheets on flight to accompany Exhibition visit.](#)

Pre Exhibition

Activity 1

Introduce Leonardo's life to class. Introduce his experiments with flight.

How do birds fly? Learn the principles of bird flight.

Suggested options:

- Bird specialist invited to talk to class.
- Visit to bird sanctuary.
- Wildlife video excerpts
- Collect bird feathers and conduct group research

Activity 2

Present findings in a poster to class.



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Activity 3

Visit Leonardo da Vinci Machines Exhibition

Activity 4

Find out history of parachutes

Create a series of questions for students to find out.

Teachers' notes:

The word parachute comes from the French words para, protect or shield, and chute, to fall. Therefore parachute actually means, "fall protection".

- Sketch of parachute by Leonardo da Vinci: 1495
- first practical parachute frequently goes to Sebastien Lenormand who demonstrated the parachute principle in 1783.
- Croatian Faust Vrancic who constructed a device based on Da Vinci's drawing and jumped from a Venice tower in 1617.
- Jean Pierre Blanchard (1753-1809) a Frenchman was probably the first person to actually use a parachute for an emergency. In 1785, he dropped a dog in a basket, to which a parachute was attached, from a balloon high in the air. In 1793, Blanchard claims to have escaped from an exploded hot air balloon with a parachute.
- In 1797 (October 22), Andrew Garnerin was the first person recorded to jump with a parachute without a rigid frame. Garnerin jumped from hot air balloons as high as 8,000 feet in the air. Garnerin also designed the first air vent in a parachute intended to reduce oscillations.
- In 1837, Robert Cocking became the first person to die from a parachute accident.
- In 1887, Captain Thomas Baldwin invented the first parachute harness and in 1890, Paul Letteman and Kathchen Paulus invented the method of folding or packing the parachute in a knapsack to be worn on the back before its release. Kathchen Paulus was also behind the invention of the intentional breakaway, which is when one small parachute opens first and pulls open the main parachute.
- Two parachuters claim to be the first man to jump from an airplane, both Grant Morton and Captain Albert Berry parachuted from an airplane in 1911. In 1914, Georgia "Tiny" Broadwick made the first freefall jump.
- **First Parachute Training Tower - [Switlik Parachute Company](#)**
Polish-American Stanley Switlik founded the "Canvas-Leather Speciality Company" on October 9, 1920. The company first manufactured items such as leather hampers, golf bags, coal bags, pork roll casings, and postal mail bags. However, Switlik soon switched to making pilot and gunner belts, designing flight clothing, and experimenting with parachutes. The company was soon renamed the Switlik Parachute & Equipment Company. According to Switlik's Website:



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In 1934, Stanley Switlik and George Palmer Putnam, Amelia Earhart's husband, formed a joint venture and built a 115 foot tall tower on Stanley's farm in Ocean County. Designed to train airmen in parachute jumping, the first public jump from the tower was made by Ms. Earhart on June 2, 1935. Witnessed by a crowd of reporters and officials from the Army and Navy, she described the descent as "Loads of Fun!"

Activity 5 (ideally a day or long morning to run this class)

Design brief:

Free range Parachute!

"In a team, design a parachute from the materials provided to carry an uncooked egg safely to the ground from the school roof. Each team should conduct a minimum of 3 materials tests before deciding on their design."

Suggested tasks:

- Establish design criteria with class, (against which the evaluation of outcomes can be judged)
- Discuss what it means to work in a team
- Introduce materials available
- Focused practical task: how can sponge hold egg?
- Demonstrate and initiate a materials test
- Introduce terms such as **drag**, **resistance**, **speed**, **oscillations**
- Focus questions for class discussion/ demonstration

How does a parachute affect the speed of an object falling through the air?

What ways can a parachute move through the air?

Activity 6 Team test drops!

- Establish rules for dropping parachute
- Ensure team member records time and safe egg carriage
- Have box of eggs handy and clearing up materials



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Activity 7

- Conduct evaluations and present prize certificates
- Discuss: how do parachutes relate to everyday life?

(Eg. parasailing, skydiving, windsurfing, sailing, NASA space shuttle returning to earth for runaway landing. Drag racers slowing down at the end of their races)

my own notes:



1 July - 1 October 2024
Book now at Waterfront City
From the Museum of Leonardo da Vinci in Italy,
Waterfront City offers a unique and educational
experience with the first interactive exhibition
of Leonardo da Vinci's flying machines.
The exhibition is based on
original drawings and models.

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