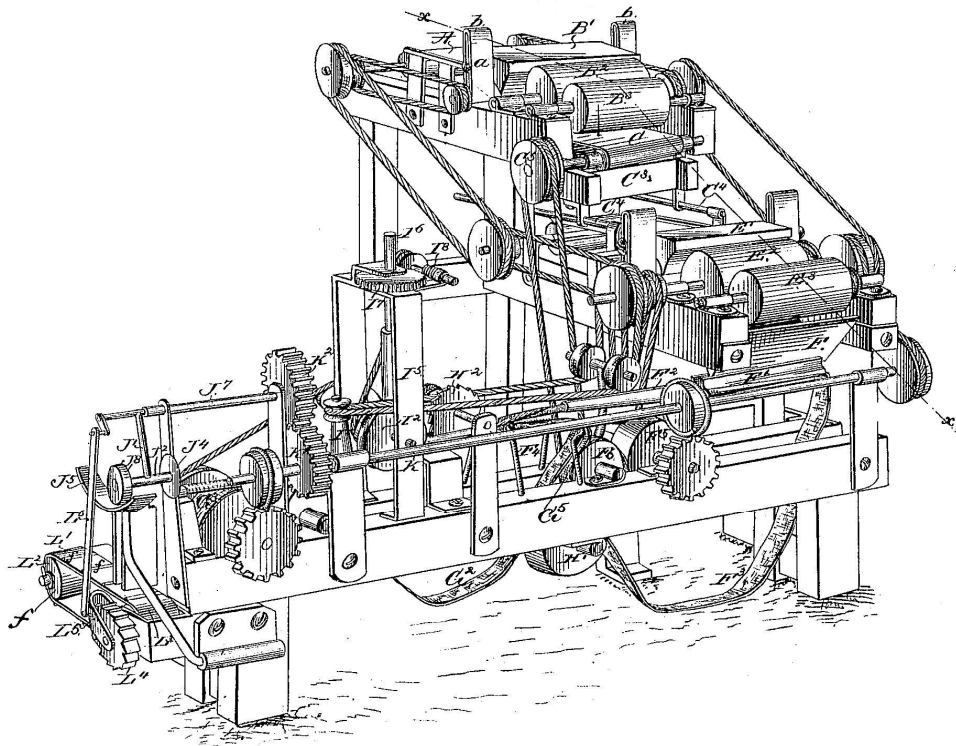# Simple Machines

Lesson plans

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CLIL Course

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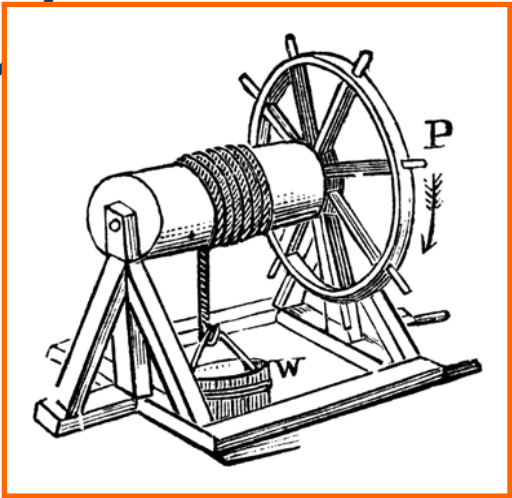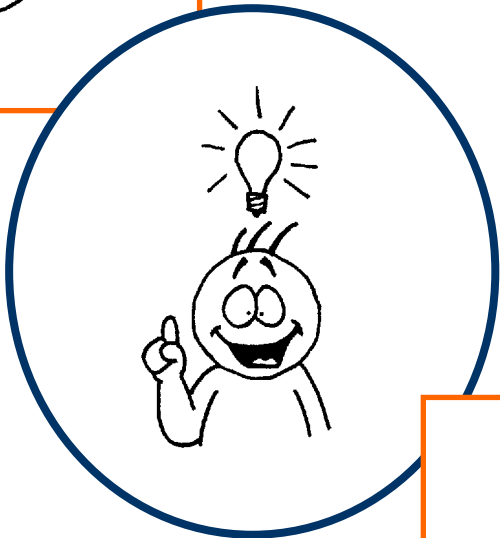
January – March 2010

CONTENTS

Unit 1

Force, work and machines

TOPIC:	**Simple machines**	Timing:
UNIT 1:	Force, work and machines	5 hours

AIMS

- To review the physical concepts of force, work and energy.

- To review some basic quantities and their units of measurement.

- To understand the relationship between work and energy.

- To understand what a machine is.

- To understand what simple machines are and their usefulness.

- To understand the difference between mass and weight.

- To review Newton's second law.

- To understand the conservation of energy principle.

CONTRIBUTION TO COMPETENCES

• **Communicative skills** (Students will be able to…):

- communicate in a variety of ways: talking, writing…

- acquire specific vocabulary related to the topic.

- interact with other students by asking and answering questions to find out some information.

- understand a written text and extract the most important information.

• **Methodological skills** (Students will be able to…):

- handle an array of resources to transform information into personal knowledge.

- put into practice processes of mathematical reasoning in order to solve problems.

• **Personal skills** (Students will be able to…):

- develop individual and collective activities.

- solve problems in a reflective way.

| LEARNING OUTCOMES	
To know..	**To be able to…**
- what force, work and energy are. - some basic quantities and their units. - what a machine is. - what a simple machines is. - what simple machines are for. - the difference between mass and weight. - Newton's second law. - the conservation of energy principle. - what mechanical advantage is.	- work individually and in groups. - identify key vocabulary. - solve problems related to work and mechanical advantage.

COGNITION		CULTURE (Students will…)
predicting answers	comparing	- realize that each person in a group is important.
matching	making conclusions	- be aware of the importance of many simple devices in their daily lives.
arranging information	calculating	- realize that simple machines are everywhere around them.
reasoning	describing	- realize that learning the basics of simple machines is fundamental to understanding more complicated mechanisms.

COMMUNICATION

LANGUAGE OF LEARNING

● **Vocabulary:**

- Inclined plane, wheel, axle, lever, pulley, screw, wedge, force, speed, trajectory, shape, divert, decelerate, deform, accelerate, quantity, measurement, symbol, length, mass, vehicle, mobile phone, wind turbine, machine, motorbike, trolley, lorry, height, weight, lift, rope, power, aeroplane, fridge, computer, bicycle, ventilator, drill, bulldozer, clock, slide down, ramp, join, car's jack, well, log, saw, split, sledgehammer, wooden pallet, crowbar, motion, frictionless, efficiency, ratio.

- Mathematical language (equals, is equal to, times, multiplied by, over, divided by,…).

- Ordinal numbers.

● **Structures:**

- Present simple, past simple, present continuous.

- Questions (what, who, where, when, why)

- I think… / I guess…

- An examples is… / For example… / Such as…

- Will

- Comparatives (half of, double of, the same as, bigger,…)

LANGUAGE FOR LEARNING

Asking and answering questions

Reasoning

Comparing

Describing procedures

Giving opinions

Working out equations/formulae

Giving examples

ASSESSMENT (Students should be able to…)

- explain what force, work and energy are.

- explain force, work and energy units of measurement.

- explain what a machine is

- explain how machines work.

- explain what a simple machine is.

- explain what simple machines are for.

- identify simple machines.

- solve problems related to work and mechanical advantage.

Unit 2

Inclined planes
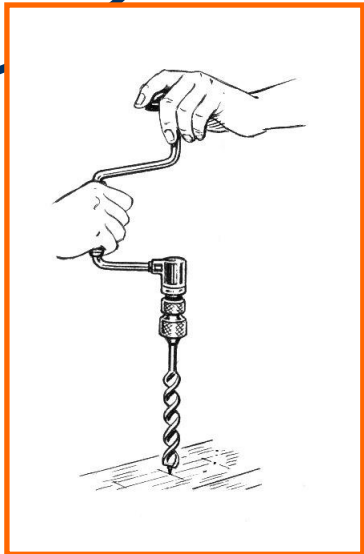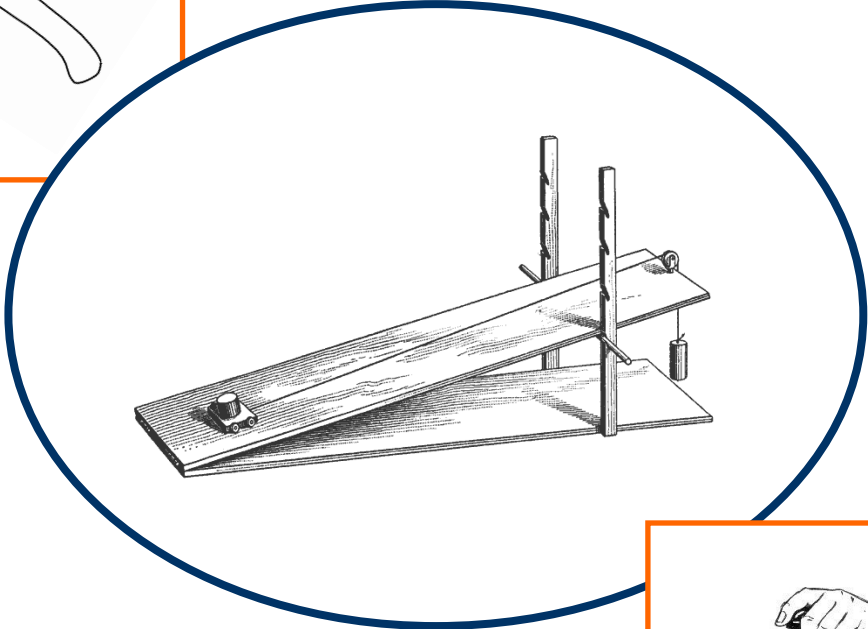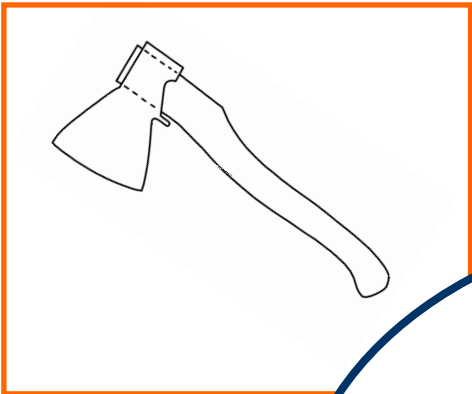
TOPIC:	**Simple machines**	Timing:
UNIT 2:	Inclined planes	5 hours

AIMS

- To understand what inclined planes are and their usefulness.

- To understand the variants on the inclined plane: the screw and the wedge.

CONTRIBUTION TO COMPETENCES

● **Communicative skills** (Students will be able to…):

- communicate in a variety of ways: talking, writing…

- acquire specific vocabulary related to the topic.

- interact with other students by asking and answering questions to find out some information.

- understand a written text and extract the most important information.

● **Methodological skills** (Students will be able to…):

- handle an array of resources to transform information into personal knowledge.

- put into practice processes of mathematical reasoning in order to solve problems.

● **Personal skills** (Students will be able to…):

- develop individual and collective activities.

- solve problems in a reflective way.

LEARNING OUTCOMES

To know..	To be able to…
- what inclined planes, wedges and screws are.	- work individually and in groups.
- what inclined planes, wedges and screws are for.	- identify key vocabulary.
- the main features of inclined planes, wedges and screws.	- understand that inclined planes are simple machines.
- how inclined planes, wedges and screws work.	- understand that wedges and screws are variants on the inclined plane.
	- solve problems related to inclined planes, wedges and screws.

| COGNITION		CULTURE (Students will…)
identifying	describing	- realize that each person in a group is important.
ordering	comparing	- be aware of the importance of inclined planes, screws and wedges in their daily lives.
matching	making conclusions	- realize that learning the basics of inclined planes is fundamental to understanding more complicated mechanisms.
arranging information	calculating	
reasoning	categorizing	

COMMUNICATION

LANGUAGE OF LEARNING

● **Vocabulary:**

- Funnel, pipe, to channel, moving lorry, ramp, stairway, loose, tipper lorry, ski jumping, playground slide, nail, drill, jack, corkscrew, knife, bulb, fork, Archimedes' screw, axe, saw, pin, bow, jar, auger, tip, sharp, edge, doorstop, cathetus, hypotenuse, thread, bolt, nut, pitch, bench vice, c-clamp, calliper.

- Mathematical language (equals, is equal to, times, multiplied by, over, divided by,…).

- Ordinal numbers.

● **Structures:**

- Present simple

- Questions (what, who, where, when, why)

- Imperative forms of verbs.

- Comparatives (bigger, longer…than)

- I think… / I guess… / In my opinion…

- An examples is… / For example… / Such as…

- This is because… / The reason is…

- Modal verbs for hypothesising and suggesting (we should, we could,…)

LANGUAGE FOR LEARNING

Asking and answering questions

Reasoning

Comparing

Describing procedures

Giving opinions

Working out equations/formulae

Giving examples

ASSESSMENT (Students should be able to…)

- identify inclined planes, wedges and screws.

- explain how inclined planes, wedges and screws work.

- describe the main features of inclined planes, wedges and screws.

- solve problems related to inclined planes, wedges and screws.

Unit 3

Levers
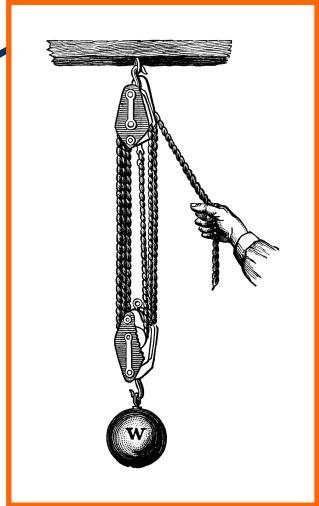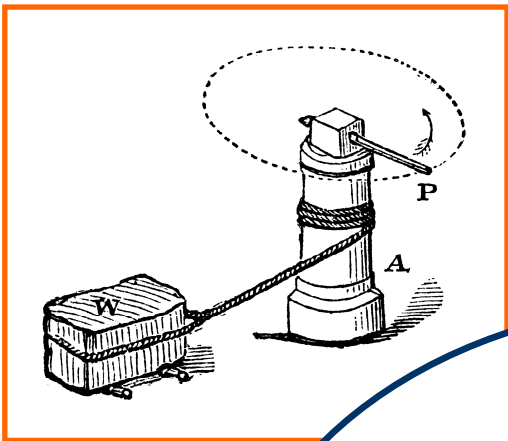
TOPIC:	**Simple machines**	Timing:
UNIT 3:	Levers	5 hours

AIMS

- To understand what levers are, how they work and their usefulness.

- To understand the law of the lever.

- To understand the classes of levers.

- To understand the variants on the lever: the wheel and axle and the pulley.

CONTRIBUTION TO COMPETENCES

● **Communicative skills** (Students will be able to…):

- communicate in a variety of ways: talking, writing…

- acquire specific vocabulary related to the topic.

- interact with other students by asking and answering questions to find out some information.

- understand a written text and extract the most important information.

● **Methodological skills** (Students will be able to…):

- handle an array of resources to transform information into personal knowledge.

- put into practice processes of mathematical reasoning in order to solve problems.

● **Personal skills** (Students will be able to…):

- develop individual and collective activities.

- solve problems in a reflective way.

LEARNING OUTCOMES

To know..	To be able to…
- what levers, wheels and axles and pulleys are.	- work individually and in groups.
- what levers, wheels and axles and pulleys are for.	- identify key vocabulary.
- the main features of levers, wheels and axles and pulleys.	- understand that levers are simple machines.
- how levers, wheels and axles and pulleys work.	- understand that wheels and axles and pulleys are variants on the lever.
- the law of the lever.	- solve problems related to levers, wheels and axles and pulleys
- the classes of levers.	

COGNITION		CULTURE (Students will…)
identifying	describing	- realize that each person in a group is important.
ordering	comparing	- be aware of the importance of levers, wheels and axles and pulleys in their daily lives.
matching	making conclusions	- realize that learning the basics of levers is fundamental to understanding more complicated mechanisms.
arranging information	calculating	
reasoning	categorizing	

COMMUNICATION

LANGUAGE OF LEARNING

● **Vocabulary:**

- Seesaw, to balance, pivoting point, fulcrum, lever arm, scale, measuring tape, moment of force, wheelbarrow, fishing rod, scissors, hole punch, broom, pincers, scales, tongs, nutcracker, pliers, fire extinguisher, handle, paper cutter, tweezers, crowbar, shovel, can opener, stapler, bicycle brake, oar, bottle opener, device, steering wheel, windlass, coffee grinder, pepper mill, water tap, gear, Ferris wheel, to bend, hole, grooved wheel, sailboat, crane, flag pole, fixed, movable, compound, attached, anchored, block and tackle.

- Ordinal numbers.

- Mathematical language (equals, is equal to, times, multiplied by, over, divided by,…).

● **Structures:**

- Present simple, past simple.

- Will

- Questions (what, who, where, when, why)

- 2nd conditional: if + past simple, would + infinitive

- Imperative forms of verbs.

- Comparatives (heavier, longer…than)

- I think… / I guess… / In my opinion…

- An examples is… / For example… / Such as…

- This is because… / The reason is…

- Modal verbs for hypothesising and suggesting (we should, we could,…)

LANGUAGE FOR LEARNING
Asking and answering questions
Reasoning
Comparing
Describing procedures
Giving opinions
Working out equations/formulae
Giving examples

ASSESSMENT (Students should be able to…)

- identify levers, wheels and axles and pulleys.

- explain how levers, wheels and axles and pulleys.

- describe the main features of levers, wheels and axles and pulleys.

- explain the law of the lever.

- solve problems related to levers, wheels and axles and pulleys.