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# THE WAY PEOPLE MOVE student's workbook

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*Promoting empathy through  
the medium of English and  
Technology*

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# THE WAY PEOPLE MOVE

## INTRODUCTION

In the next units you will discover how Technology becomes imbued with human hardships. We use to talk about our subject in terms of those who live in a Developed Countries, but not everybody have the same opportunities. Facts as famine and unemployment are almost solved in Catalonia, but what is happening around our comfortable lives?

Poverty, wars, starvation, unemployment are common in many countries on the world. Therefore, while wealth nations are thinking in sending people to Mars, people from developing countries just try to survive where they born. For many desperate people, migration is the only expectation to run away from misery, to get a better life.

During this term we will analyze transport and the way people move. We will focus in developing countries and the different systems of transport they use to go and fro, focusing on bicycles.

This optional subject will help you to understand how human necessities make Technology improve. As Spanish say, “la necesidad aguza el Ingenio”, (hardship sharpen one’s wits),

By the end of the term you will have to built a raft, as a way to imitated the kind of boats people use to escape from their poor lives.

## 1. LEARNING OUTCOMES

*What learners will be able to do at the end of the lesson?*

- To realize that there is poverty in the world and that it affects the way the people live, focus on transports
- To speak in English in a confident way
- Read and find specific information from different sources including Internet
- To work in collaboration
- To handle the tools of the technology lab in a safety way
- To work autonomously
- To do an industrial project following the protocols of an Industrial Process
- To recognize and use vocabulary related to different topics such as economics, cooperation and development
- To use the technical drawing as a way to communicate an idea
- To construct a model as a really DIY person, being aware of the importance of recycling materials
- Listen and understand other students describing objects, vocabulary, slides...
- To understand the importance of the Technology as a way to improve our standards of life

## 2. CONSIDERING THE BALANCE BETWEEN CONTEXT, COGNITION, CULTURE AND LANGUAGE 3 As

**1st A Analyse:** Language of the theme (content)

**Language demands:** *Vocabulary areas*

- Classroom language: build oral language skills
- Tools description
- How it works the tool
- Comparing the world: wealth and poverty
- Safety rules: what I need to use if....
- Specific vocabulary: Glossary words
- Antonyms and Synonyms
- Compound words: handlebars
- Research and write: What I know, What I want to find out, What I learned

**2<sup>nd</sup> A Add:** Language for learning (e.g. Scaffolding strategies for reading and understanding a difficult text)

**Grammar**

- Present simple
- Past tenses
- Future: Analyzing the future scenarios
- Adjectives
- Comparisons
- Sentence structure
- Modal verbs Instructions in the Technology-lab
- Prepositions of place (descriptions)

**3rd A Apply/Assure:** Language through learning. The language emerge through the learning context. The content and the language will be integrated.

**Cognitive demands** The students will be working out different skills (listen, speak, read and write):

- Organizing vocabulary in a coherent way: glossary words
- Describing the tools of the technology-lab
- Describing the different components of a bicycle
- Understanding that some physical phenomena are easily observable
- Observing how parts of a bike can create motion

- Getting information about the Evolution of transport, focus on bicycle
- Exchanging information
- Present their own learning material: Memory, Technical drawings, cards...

### 3. SELECTING KEY TEXTS AND MATERIALS

#### Collecting resources

- To satisfy syllabus demands, refer to national curriculum and books in Catalan for brain storming and ideas
- ICT
- Realia/ authentic documents

#### Preparing resources:

- Making decisions regarding the suitability of the L2 resources in terms of appropriacy of cognitive level and language level.
- Using the Cumming's Matrix. From low cognitive demands to high cognitive demands. In some topics such as Technical Drawings they will have some previous knowledge. These will help them to begin the project in a medium cognitive (constructivism) demands and as a teachers will have to encourage them to achieve the higher cognitive demands for their level.
- Making decisions regarding text modification (simplification or amplification.
- Making decisions regarding the amount of scaffolding. This affects the types of tasks used
- Final audit linking materials/resources to the task types and their relative objectives

#### Monitoring and evaluation

- Ongoing during the teaching. At the same time the students will be assessed in class evaluating the effectiveness of materials in assisting the achievement of learning outcomes
- Create a data base of effective materials according the collaborative demands of CRLE (Centre de Recursos de Llengües Estrangeres de la Generalitat de Catalunya) with the teachers involved in CLIL Projects.

## 4. Timing

The project is divided into 8 units. The table below will show you the structure of every unit. Total hours: 35

### THE WAY THE PEOPLE MOVE

| <b>UNIT 1 EVOLUTION OF TRANSPORT</b>                                                                                                    |                |
|-----------------------------------------------------------------------------------------------------------------------------------------|----------------|
| <b>TOTAL TIMING</b>                                                                                                                     | <b>4 H</b>     |
| <b>CONTENTS</b>                                                                                                                         | <b>Session</b> |
| ➤ The way people move. Introduction                                                                                                     | 1              |
| ➤ The evolution of transport through the years. Pre-knowledge vocabulary                                                                | 1              |
| ➤ Evolution of transport                                                                                                                | 2              |
| ➤ Poverty, migration and transport, key words: Cultural implications.                                                                   | 3              |
| ➤ Nina Simone                                                                                                                           | 3              |
| ➤ Communication: Contractions                                                                                                           | 3              |
| ➤ Communication: Video The evolution of transport in inland northwest                                                                   | 4              |
|                                                                                                                                         |                |
| <b>TASKS</b>                                                                                                                            |                |
| ➤ Pre-knowledge vocabulary. Drag the following pictures                                                                                 | 1              |
| ➤ Evolution of transport. Playing cards                                                                                                 | 2              |
| ➤ Writing skills, Reading & Speaking: follow the pattern and find the correct the correct one to find out which cards have your fellows | 2              |
| ➤ Writing skills, Reading & Speaking: Key words. Translate them into Catalan and doing your best try to draw them                       | 2              |
| ➤ Listening a song: Ain't got no life.                                                                                                  | 3              |
| ➤ Writing skills, Reading & Speaking: Write a short story using the words provided to fill the gaps                                     | 3              |
| ➤ Writing skills, Reading & Speaking: Answer the following questions                                                                    | 3              |
| ➤ Communication: How many contractions can you find?                                                                                    | 4              |
| ➤ True or false. Ways of transport by land                                                                                              | 4              |

\* Because we are using CLIL methodology, although in some units we will focus on English as a language, most of the time students will learn contents through the medium of English. This is often particularly rewarding where there is a direct overlap between the foreign language and the content subject

| <b>UNIT 2 INFRASTRUTURE AND MEANS OF TRANSPORT IN DEVELOPING COUNTRIES</b>   |                |
|------------------------------------------------------------------------------|----------------|
| <b>TOTAL TIMING</b>                                                          | <b>3 H</b>     |
| <b>CONTENTS</b>                                                              | <b>SESSION</b> |
| ➤ Reading: The lack of infrastructures in Africa. Infrastructure, definition | <b>5</b>       |
| ➤ Contents and culture: Trans-African Highway network                        | <b>5</b>       |
| ➤ Communication and culture: Counting in Swahili from one to ten             | <b>5</b>       |
| ➤ Contents and culture: World electricity consumption 2005-2007              | <b>5</b>       |
| ➤ Poverty in developing countries. One planet several worlds                 | <b>5</b>       |
| ➤ Looking some pictures related with poverty                                 | <b>6</b>       |
| ➤ Is migration a problem?                                                    | <b>6</b>       |
|                                                                              |                |
| <b>TASKS</b>                                                                 |                |
| ➤ Communication: Jumble words                                                | <b>4</b>       |
| ➤ Writing: Use the words provided and write a sentence                       | <b>4</b>       |
| ➤ Analyzing graphics. Answer the following questions                         | <b>5</b>       |
| ➤ Fill the table: List of transports                                         | <b>5</b>       |
| ➤ Answer the following questions related with poverty                        | <b>6</b>       |
| ➤ Echoing exercises: promoting empathy                                       | <b>6</b>       |
| ➤ Is migration a problem? Which is your opinion?                             | <b>6</b>       |

| <b>UNIT 3 THE EVOLUTION OF TRANSPORT. BICYCLE, HISTORICAL OUTLINE</b>                   |                |
|-----------------------------------------------------------------------------------------|----------------|
| <b>TOTAL TIMING</b>                                                                     | <b>4 H</b>     |
| <b>CONTENTS</b>                                                                         | <b>SESSION</b> |
| ➤ The first wheel. Moment of force                                                      | <b>7</b>       |
| ➤ Video: folding a bike (1' 05")                                                        | <b>7</b>       |
| ➤ Video: How to fold a bike (1'32")                                                     | <b>7</b>       |
| ➤ Reading: Bicycle, historical outline 10'                                              | <b>7</b>       |
| ➤ Video: Bicycles and wheelchairs: a short history (3'30")                              | <b>7</b>       |
| ➤ Audio: (Contents, communication) : Leonardo's bike (3'31")                            | <b>8</b>       |
| ➤ Reading .Who has done it? Leonardo's bicycle.                                         | <b>9</b>       |
| ➤ The evolution of transport. Bicycle, historical outline                               | <b>10</b>      |
| <b>TASKS</b>                                                                            |                |
| ➤ Pre-reading. Inventions related with transports. Working in pairs 15'                 | <b>7</b>       |
| ➤ Find 5 types of wheels in or on your car and fill the list 5'                         | <b>7</b>       |
| ➤ Fill the gaps with one of the following words                                         | <b>8</b>       |
| ➤ Communication: Leonardo's bike. Dividing the class in groups. How it ends your text?  | <b>8</b>       |
| ➤ Web quest. The evolution of transport. The Leonardo's bike                            | <b>9</b>       |
| ➤ Communication: Playing cards. The evolution of transport. Bicycle, historical outline | <b>10</b>      |

| <b>UNIT 4 THE BICYCLE AND ITS COMPONDS TIMING :</b>                                                 |                |
|-----------------------------------------------------------------------------------------------------|----------------|
| <b>TOTAL TIMING</b>                                                                                 | <b>4 H</b>     |
| <b>CONTENTS</b>                                                                                     | <b>SESSION</b> |
| ➤ Video: La bicicleta. Components i relació de transmissió. 3'30". (from videoteca xtec in Catalan) | <b>11</b>      |
| ➤ Key words. Communication. The bicycle and its componds                                            | <b>11</b>      |
| ➤ Assesment. Label Bicycle Diagram                                                                  | <b>12</b>      |
| ➤ Assesment. Transport and travel                                                                   | <b>12</b>      |
| <b>TASKS</b>                                                                                        |                |
| Game play: Memory card game                                                                         | <b>11</b>      |

| <b>UNIT 5 THE PENNY FARTHING AND THE VELOCITY RATIO</b>                 |                |
|-------------------------------------------------------------------------|----------------|
| <b>TIMING : 6h</b>                                                      |                |
| <b>CONTENTS</b>                                                         | <b>SESSION</b> |
| ➤ Reading: a bicycle called Penny-Farthing. 15'                         | <b>16</b>      |
| ➤ Culture: Did you know it? Gear ratio or velocity ratio                | <b>16</b>      |
| ➤ The gear ratio                                                        | <b>17</b>      |
| ➤ How to calculate the gear ratio                                       | <b>17</b>      |
|                                                                         |                |
| <b>TASKS</b>                                                            |                |
| ➤ Writing skills, Reading & Speaking: Answer the following questions    | <b>16</b>      |
| ➤ Choose the appropriate key word: gear ratio, sprocket, chain, pulleys | <b>17</b>      |
| ➤ Calculation. Answer the following questions: the gear ratio is...     | <b>17</b>      |
| ➤ Workshop: the gear ratio. Deduction and Prediction                    | <b>18/19</b>   |
| ➤ Workshop: Gears, size and teeth. Deduction and Prediction             | <b>20/21</b>   |
| ➤ Workshop: Gears, size and teeth. Deduction and Prediction             | <b>22</b>      |

| <b>UNIT 6 THE IMPERIAL SYSTEM VS INTERNATIONAL SYSTEM</b> |                |
|-----------------------------------------------------------|----------------|
| <b>TIMING :</b>                                           |                |
| <b>CONTENTS</b>                                           | <b>SESSION</b> |
| ➤ Did you know it: Where the word mile comes from         | <b>23</b>      |
|                                                           |                |
| <b>TASKS</b>                                              |                |
| ➤ Culture and calculation. How high is... How many miles  | <b>23</b>      |

| <b>UNIT 7. HOW STIFF IS YOUR BIKE</b>                                     |                |
|---------------------------------------------------------------------------|----------------|
| <b>CONTENTS</b>                                                           | <b>SESSION</b> |
| ➤ How stiff is your bike?                                                 | <b>24</b>      |
| ➤ What is an alloy?                                                       | <b>24</b>      |
| ➤ Advantages and disadvantages of the most common bicycle frame materials | <b>25</b>      |
| ➤ Key words.                                                              | <b>26</b>      |
| <b>TASKS</b>                                                              |                |
| ➤ Crossword. Bikes and its compounds                                      | <b>26</b>      |
| ➤ Assessment. How stiff is your bike?                                     | <b>26</b>      |

| <b>UNIT 8. BUILDING A RAFT</b>                            |                         |
|-----------------------------------------------------------|-------------------------|
| <b>TIMING :</b>                                           |                         |
| <b>CONTENTS</b>                                           | <b>SESSION</b>          |
| ➤ Reading: What is a Raft, Boat people                    | <b>27</b>               |
| ➤ Reading: Running away from misery                       | <b>28</b>               |
| <b>TASK</b>                                               |                         |
| ➤ For and against. Key words                              | <b>29</b>               |
| ➤ Antonyms and synonyms                                   | <b>29</b>               |
| ➤ Writing and communication: Making a chronological story | <b>29</b>               |
| ➤ SOS: we are totally lost                                | <b>30/31</b>            |
| ➤ Raft: Designing and building                            | <b>32/33/34/<br/>35</b> |

# 1. EVOLUTION OF TRANSPORT

## SESSION 1

Date \_\_\_\_\_

### Contents

#### The evolution of transports through the years



BBC proposes you to play this game about the History of Transports. To start click on the icon. <http://www.bbc.co.uk/education/dynamo/history/show.shtml>

This game will help you to understand the concept of chronology and the notion of the passing of time. You have to place objects in a chronological order, and see the development of objects over time.



**PRE-KNOWLEDGE VOCABULARY. What do I know about the new topic?**  
Drag the following pictures into the correct box. We could use the table as game card.

|  |  |                                                          |
|--|--|----------------------------------------------------------|
|  |  | 3500 BC - Wheeled carts and river boats are invented     |
|  |  | 2000 BC - Horses are tamed and used for transport        |
|  |  | 770 DC - Iron horseshoes improve transportation by horse |
|  |  | 1662 - Blaise Pascal invents a horse-drawn public bus    |

# 1. EVOLUTION OF TRANSPORT

## SESSION 1

Date \_\_\_\_\_

|  |                                                                                      |
|--|--------------------------------------------------------------------------------------|
|  | 1783 - Joseph Montgolfier and Étienne Montgolfier launch the first hot air balloons  |
|  | 1814 - George Stephenson built the first practical steam powered railroad locomotive |
|  | 1816 – Bicycle. German Baron Karl von Drais rode his two wheels machine              |
|  | 1900 - Ferdinand von Zeppelin builds the first successful airship                    |
|  | 1903 - Orville Wright and Wilbur Wright fly the first motor-driven airplane          |
|  | 1908 - Henry Ford develops the assembly line method of automobile manufacturing      |
|  | 1935 - First flight of the DC-3                                                      |
|  | 1957 - Sputnik 1, the first man-made satellite to be launched into orbit             |
|  | 1964 Bullet Train between Tokyo and Osaka. Trains average speeds of 160 km/h         |

# 1. EVOLUTION OF TRANSPORT

## SESSION 1

Date \_\_\_\_\_

|  |                                                                                        |
|--|----------------------------------------------------------------------------------------|
|  | 1969 - First manned Moon landing                                                       |
|  | 1976 - Concorde made the world's first commercial passenger carrying supersonic flight |
|  | 1981 - First flight of the space shuttle                                               |



# 1. EVOLUTION OF TRANSPORT

## SESSION 2

Date \_\_\_\_\_



**PLAYING CARDS.** Timing 10'. New vocabulary

|  |                                        |
|--|----------------------------------------|
|  | VEHICLES BICYCLES                      |
|  | CABLES AND TROLLEYS                    |
|  | BEYOND 21st CENTURY                    |
|  | AUTOMOBILE                             |
|  | ANIMAL-DRAWN                           |
|  | WALKING, RUNNING, RIDING               |
|  | UNDERGROUND:<br>TUNNELS, SUBWAYS, TUBE |
|  | RAILWAY LOCOMOTIVE                     |



Follow the pattern and use the correct one to find out which cards have your fellows

Does it have an engine?

*Yes it does*

*No it doesn't*

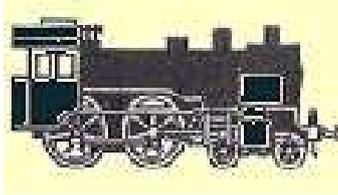
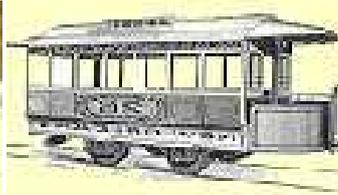
How many people can use it at the same time?

*Not many, a lot, just one, two...*

Do you have a \_\_\_\_\_?

*Yes I do, congratulations. Well done!!!*

*No, I don't. You have to carry on!!!*





**Key words. Translate them into Catalan and doing your best try to draw them.**

animal-drawn vehicles: \_\_\_\_\_

beyond 21st century : \_\_\_\_\_

cables and trolleys : \_\_\_\_\_

railway locomotive: \_\_\_\_\_

underground: tunnels, subways, tube: \_\_\_\_\_

walking, running, riding: \_\_\_\_\_

# 1. EVOLUTION OF TRANSPORT

## SESSION 3

Date \_\_\_\_\_

### Relationship between poverty, migration and transport



We will hear a song in class twice.

2' 16'' NINA SIMONE - AIN'T GOT NO/ I GOT LIFE

Fill in the gaps with one of the following words:

**home / money / bed / schooling / brain / hands/ brains / blood / freedom / life**

Ain't got no ....., ain't got no shoes  
Ain't got no ....., ain't got no class  
Ain't got no skirts, ain't got no sweater  
Ain't got no perfume, ain't got no .....,  
Ain't got no mind  
Ain't got no mother, ain't got no culture  
Ain't got no friends, ain't got no .....,  
Ain't got no love, ain't got no name  
Ain't got no ticket, ain't got no token  
Ain't got no love  
What have I got?  
Why am I alive anyway?  
Yeah, what have I got?  
Nobody can take away  
I got my hair, I got my head  
I got my ....., I got my ears  
I got my eyes, I got my nose  
I got my mouth, I got my smile  
I got my tongue, I got my chin  
I got my neck, I got my boobs  
I got my heart, I got my soul  
I got my back, I got my sex  
I got my arms, I got my .....,  
I got my fingers, got my legs  
I got my feet, I got my toes  
I got my liver, got my .....,  
I've got ....., I got my .....,  
I've got a ....., I've got a .....,  
I'm gonna keep it  
I've got a ....., nobody is gonna take it away  
I've got a .....,

# 1. EVOLUTION OF TRANSPORT

## SESSION 3

Date \_\_\_\_\_

### Communication

Write a short story using the words provided to fill the gaps:

home / money / bed / schooling / brain / hands/ brains / blood / freedom / life

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Why do you think we are listening this song? You will share your opinions with your classmates.

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What has this song to do with transport? You will share your opinions with your classmates.

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**KEEP CALM!!! WE'LL FIND OUT IN A MOMENT**

# 1. EVOLUTION OF TRANSPORT

## SESSION 3

Date \_\_\_\_\_

(TRADUCCIÓ)

No tengo hogar, no tengo zapatos  
No tengo dinero, no tengo clase  
No tengo faldas, no tengo jersey  
No tengo perfume, no tengo cama  
No tengo inteligencia  
No tengo madre, no tengo cultura  
No tengo amigos, no tengo educación  
No tengo amor, no tengo nombre  
No tengo billete, no tengo cupón  
No tengo amor  
¿Qué es lo que tengo?  
¿Por qué estoy viva entonces?  
Tengo mi pelo, tengo mi cabeza  
Tengo mi cerebro, tengo mis orejas  
Tengo mis ojos, tengo mi nariz  
Tengo mi boca, tengo mi sonrisa  
Tengo mi lengua, tengo mi barbilla  
Tengo mi cuello, tengo mis pechos  
Tengo mi corazón, tengo mi alma  
Tengo mi culo, tengo mi sexo  
Tengo mis brazos, tengo mis manos  
Tengo mis dedos, tengo mis piernas  
Tengo mis pies, tengo mis dedos (pies)  
Tengo mi hígado, tengo mi sangre  
Tengo vida, yo tengo mi libertad  
Tengo mi vida, tengo mi vida  
Voy a mantenerla  
Tengo mi vida, nadie me la quitará  
Tengo mi vida

# 1. EVOLUTION OF TRANSPORT

## SESSION 3

Date \_\_\_\_\_

### Cognition

What is this song talking about?

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Whose is this song talking about?

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### Culture

**Nina Simone** (1933-2003), was an Afro-American woman, who became especially famous as a jazz singer during the fifties. One of her popular songs is **Ain't got no/ I got life**. It has been suggested that the lyrics are in reference to the **slavery** and oppression of black people.



African people were brought to The United States of America as slaves, mainly during the 18<sup>th</sup>-19<sup>th</sup> century.

Although eradicated in developed countries, slavery has not disappeared yet in our planet. Moreover, beside Slavery, today another unfair issue is spreading all over the world...**Migration**. To be immigrant worker in a foreign country means for many people to be called "sin papeles", "wetback" or even "xarnego". They usually have to work under inhuman conditions without any kind of rights... Be aware, not everybody has the same opportunities.

### **Key words:**

*Sin papeles, xarnego, wetback, migration, slavery*

### Writing

What do you think people in your town are commenting about migration?

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# 1. EVOLUTION OF TRANSPORT

## SESSION 4

Date \_\_\_\_\_

### Communication

#### ***Ain't***

Ain't is a contraction originally just for "am not", but can include "is not", "are not", "has not", or "have not" in the common vernacular. It is a word used by many people but is generally considered nonstandard English. **Contraction** is the formation of a new word from one or more individual words.

How many contractions can you find in the text provided below? Underline them and find out where the contraction comes from and its meaning.

*Do you feel confident enough with your English? Don't panic!! With this subject we'll try you to feel as much confident as possible with the use of this foreign language. English isn't easy at all, so effort is required if you wanna be a successful English Speaker... Sometimes isn't only a question of knowledge, but also a question of accent. People use to hook up words. Contractions are common in a conversation and makes difficult to understand what people say in a conversation...*

| Contractions | Words contracted |
|--------------|------------------|
| Ex. Don't    | Ex. Do not       |
|              |                  |
|              |                  |
|              |                  |

# 1. EVOLUTION OF TRANSPORT

## SESSION 4

Date \_\_\_\_\_

### Communication



video 3' 20" timing: 10'

### THE EVOLUTION OF TRANSPORT IN INLAND NORTHWEST

As a Introduction we are going to see in this story the different modes of transport throughout Spokane's history (Washington DC USA). Just listen and watch the video and don't worry about English, remember this is the Introduction. We will watch it twice. Be cool.... And go!!! Click on the next icon..... 



**TASK 1. THE EVOLUTION OF TRANSPORT IN INLAND NORTHWEST**  
video session. Timing 5 minutes.



**TRUE OR FALSE.** Do you remember how many kinds of transport people from Spokane have been using from 18<sup>th</sup> century until today.

| Ways of transport by land | True | False |
|---------------------------|------|-------|
| ➤ by plane                |      |       |
| ➤ canoe                   |      |       |
| ➤ spacecraft              |      |       |
| ➤ riding a camel          |      |       |
| ➤ by train                |      |       |
| ➤ by bicycle              |      |       |
| ➤ by car                  |      |       |
| ➤ on foot                 |      |       |

## 2. INFRASTRUCTURE AND MEANS OF TRANSPORT IN DEVELOPING COUNTRIES

### SESSION 5

Date \_\_\_\_\_

#### Communication

#### The lack of infrastructures in Africa

##### INFRASTRUCTURE

(<http://www.thefreedictionary.com/infrastructure>)

*The term has been used since 1927 to refer collectively to the roads, bridges, rail lines, and similar public works that are required for an industrial economy, or a portion of it, to function..*



People need to communicate, to exchange experiences. We need to talk, as a way to improve our knowledge. From time immemorial Technology has spread all around the world through Caravans, ships, and other different ways of trade.

Today is so easy for anyone to switch on computers and sharing experiences with someone else who is sitting far, far away. But...Do you really think that one is it easy for anyone?



Several maps and information has been provided in the next pages to help you to answer these questions. They will try you to prove that although millions and millions of people are living in the same planet, in terms of infrastructures, opportunities and facilities,.... **the Earth is home for "different and unfair worlds"...**

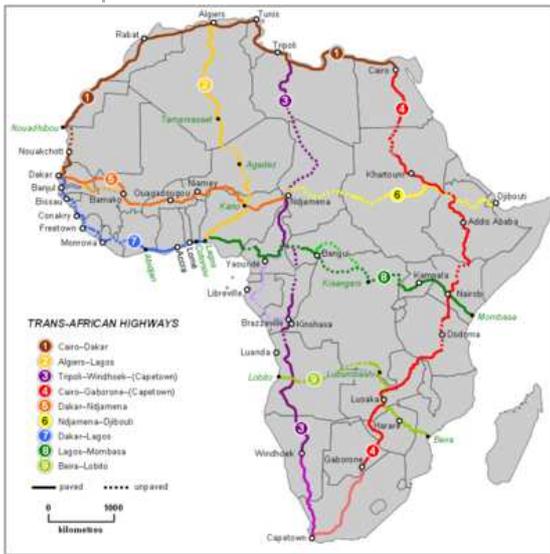


## 2. INFRASTRUCTURE AND MEANS OF TRANSPORT IN DEVELOPING COUNTRIES

### SESSION 5

Date \_\_\_\_\_

#### Contents, culture



#### TRANS-AFRICAN HIGHWAY NETWORK from Wikipedia, the free encyclopedia

The Trans-African Highway is an African project developed by some governmental African organizations in conjunction with regional international communities to promote trade and alleviate poverty in Africa. This infrastructure will stimulate trade and so alleviates poverty, as well as benefitting health and education since they allow medical and educational services to be distributed to previously inaccessible areas.

But by the end of 2007, there were so many missing links across countries, and road travel in all weather conditions was only relatively easy between East and Southern Africa.

So... How people go to and from in Africa? In the picture provided below you will discover one of the most common ways of transport, the **Matatu**.



**Matatu** is a very familiar mean of transport. Most of times is a really uncomfortable way for travelling. No matter what, there is always room for one more person.

"Matatu" comes from the Swahili word for "three." It used to cost 3 shillings to ride in a matatu. A matatu is a public transport used mainly in Kenya, Tanzania, and Uganda. It is usually a van or a pickup truck crowded of people, baggage, and perhaps some livestock. And often there would be baggage on the top, and perhaps

some chickens as well, and several people hanging out the back door.

## 2. INFRASTRUCTURE AND MEANS OF TRANSPORT IN DEVELOPING COUNTRIES

### SESSION 5

Date \_\_\_\_\_

#### Communication, culture.

#### Counting in Swahili from one to ten

|      |       |       |      |      |      |       |       |      |      |
|------|-------|-------|------|------|------|-------|-------|------|------|
| 1    | 2     | 3     | 4    | 5    | 6    | 7     | 8     | 9    | 10   |
| Moja | Mbili | Tatu  | Nane | Tano | Sita | Saba  | Nane  | Tisa | Kumi |
| One  | Two   | Three | Four | Five | Six  | Seven | Eight | Nine | Ten  |

#### TASK 1. INFRASTRUCTURES

#### Communication. Jumble words

Put the key words in order:

| Jumble words   | Word | Definition                                                                                                                             |
|----------------|------|----------------------------------------------------------------------------------------------------------------------------------------|
| iancotduE      |      | knowledge acquired by learning and instruction                                                                                         |
| rsuarlrttcnufe |      | the basic systems and services, such as transport and power supplies, that a country or organization uses in order to work effectively |
| tPeyvro        |      | the state of having little or no money and few or no material possessions                                                              |
| aTrde          |      | the commercial exchange (buying and selling on domestic or international markets) of goods and services                                |
| otwkNre        |      | a system of intersecting lines or channels                                                                                             |
| asRdo          |      | an open way (generally public) for travel or transport                                                                                 |

Once worked out, use the words from the box and write a sentence with all of them

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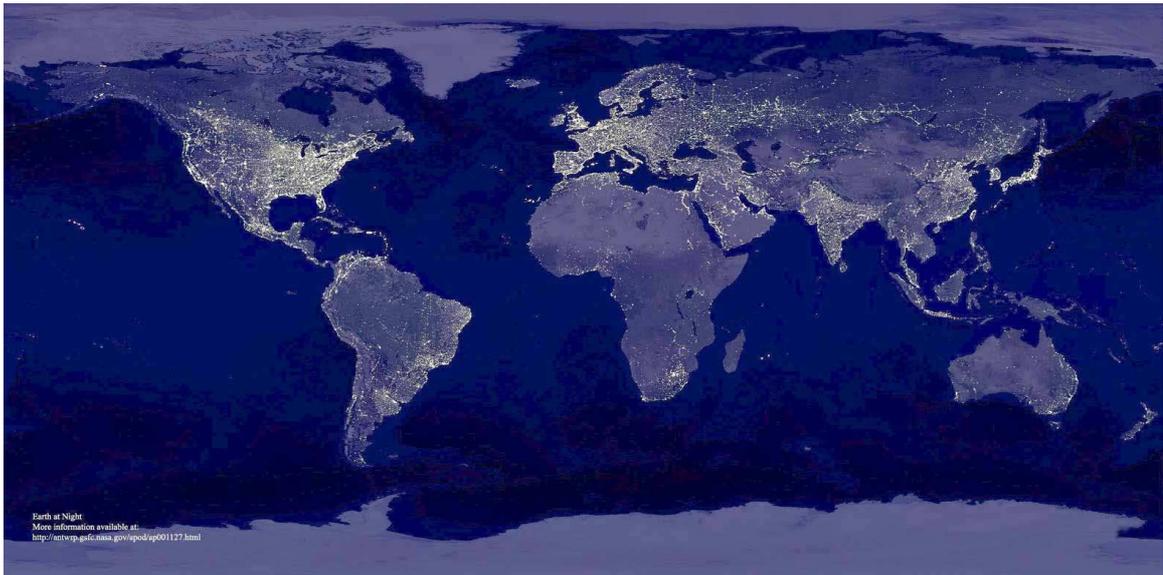
## 2. INFRASTRUCTURE AND MEANS OF TRANSPORT IN DEVELOPING COUNTRIES

### SESSION 6

Date \_\_\_\_\_

Contents and culture:

#### WORLD ELECTRICITY – CONSUMPTION (KWH) BETWEEN 2005 – 2007 THE EARTH AT NIGHT



If "some one out there" could take a glance of the Earth from the space probably they will think that they are not alone... but almost!!! Thousand kilometers far from Earth at night, the planet seems a huge desert only inhabited in few areas, such as Europe or the United States of America.... but, where are the people?...

*.....Is there nobody in Africa, nor in South America? What about Asia?.....*



## 2. INFRASTRUCTURE AND MEANS OF TRANSPORT IN DEVELOPING COUNTRIES

### SESSION 6

Date \_\_\_\_\_

| Rank | Country               | Electricity - consumption<br>(kWh)<br>2005 - 2007 |
|------|-----------------------|---------------------------------------------------|
| 1    | <b>World</b>          | 16,780,000,000,000                                |
| 2    | <b>United States</b>  | 3,816,000,000,000                                 |
| 3    | <b>China</b>          | 2,859,000,000,000                                 |
| 4    | <b>European Union</b> | 2,810,000,000,000                                 |
| 5    | <b>Russia</b>         | 985,200,000,000                                   |
| 6    | <b>Japan</b>          | 974,200,000,000                                   |
| 7    | <b>Canada</b>         | 540,200,000,000                                   |
| 8    | <b>India</b>          | 488,500,000,000                                   |
| 9    | <b>Korea, South</b>   | 368,600,000,000                                   |
| 10   | <b>Brazil</b>         | 368,500,000,000                                   |

| Country                         | Population<br>Million people<br>(July 2007 est.) | Electricity -<br>(kWh) | %<br>population | %<br>kWh   |
|---------------------------------|--------------------------------------------------|------------------------|-----------------|------------|
| China                           | 1300                                             | 2859                   |                 |            |
| India                           | 1100                                             | 488                    |                 |            |
| European Union                  | 490                                              | 2810                   |                 |            |
| United States                   | 301                                              | 3816                   |                 |            |
| Indonesia                       | 235                                              | 108                    |                 |            |
| Brazil                          | 190                                              | 368                    |                 |            |
| Pakistan                        | 165                                              | 67                     |                 |            |
| Bangladesh                      | 151                                              | 19                     |                 |            |
| Russia                          | 142                                              | 985                    |                 |            |
| Nigeria                         | 135                                              | 17                     |                 |            |
| Canada                          | 34                                               | 540                    |                 |            |
| <b>(Total 11<br/>countries)</b> | 4243                                             | 9548                   |                 |            |
| <b>World</b>                    | 6600                                             | 16780                  | <b>100</b>      | <b>100</b> |

Source: *World Electricity Consumption, World Population*

The world fact book. CIA 2008

<https://www.cia.gov/library/publications/the-world-factbook/rankorder/2042rank.html>

## **2. INFRASTRUCTURE AND MEANS OF TRANSPORT IN DEVELOPING COUNTRIES**

### **SESSION 6**

Date \_\_\_\_\_

**Analyzing tables. Answer the following questions.**

Which country is the first consumer of electricity in terms of population?

\_\_\_\_\_

Which country is the smallest consumer of electricity in terms of population?

\_\_\_\_\_

## 2. INFRASTRUCTURE AND MEANS OF TRANSPORT IN DEVELOPING COUNTRIES

### SESSION 7

Date \_\_\_\_\_

#### Learning outcomes:

Realizing that there is poverty in the world and that it affects the way the people live, focusing on transport.

Understanding the importance of Technology as a way to improve our standards of life.

**Poverty in developing countries. One planet several worlds.**

#### Communication and Cognition



How do you imagine people move from one place to another in developing countries?  
Work in pairs.

**Fill the table. How many transports do you know?**

**List of transports**

|   |
|---|
| ➤ |
| ➤ |
| ➤ |
| ➤ |
| ➤ |
| ➤ |
| ➤ |
| ➤ |
| ➤ |
| ➤ |

## 2. INFRASTRUCTURE AND MEANS OF TRANSPORT IN DEVELOPING COUNTRIES

### SESSION 7

Date \_\_\_\_\_

Answer the following questions.

Where might this picture have been taken? What are the bicycles carrying? What is the bicycle used for in each case?

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Look at the pictures above. Describe the situation. What are they doing?

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Which is the main topic?

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## 2. INFRASTRUCTURE AND MEANS OF TRANSPORT IN DEVELOPING COUNTRIES

### SESSION 7

Date \_\_\_\_\_

**Echoing exercises. Promoting empathy.** Think about 10 words related with migration and you will write a sentence describing each word. In groups of two read your sentences with the aim that your fellow will guess which words were chosen at the beginning

|    |                                                                                     |     |
|----|-------------------------------------------------------------------------------------|-----|
| 1. | 2.                                                                                  | 3.  |
| 4. |  | 5.  |
| 6. |                                                                                     | 7.  |
| 8. | 9.                                                                                  | 10. |

## 2. INFRASTRUCTURE AND MEANS OF TRANSPORT IN DEVELOPING COUNTRIES

### SESSION 7

Date \_\_\_\_\_

What does this picture suggest? You have to look for words that express your feelings:

From BBC news

Friday, 7 July 2006.

Is migration a  
"PROBLEM"???

Thousands of Africans risk their lives, using illegal and dangerous means, to leave the continent. Should Europe open its borders to migrants?



So far this year, more than 10,000 Africans have taken a precarious journey, in a rickety boat, in the hope of getting Europe. Thousands have died along the way.

It is estimated that a further 80,000 are waiting to make similar crossings from the coastlines of various African states.

Ministers from the European Union and Africa will meet on Monday to work on a plan to cease the illegal flow.

*Are migrants really a problem for Europe?*

## **2. INFRASTRUCTURE AND MEANS OF TRANSPORT IN DEVELOPING COUNTRIES**

### **SESSION 7**

Date \_\_\_\_\_

#### **Which is your opinion?**

Write a sentence not longer than 10 lines where you will express your fears about migration, your opinions and your propositions to begin to solve the issue.

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### 3. THE EVOLUTION OF TRANSPORT. BICYCLE, HISTORICAL OUTLINE

#### SESSION 8

Date \_\_\_\_\_

**Pre-reading. Timing 15'.**

#### Column Chart

You will be reading about an important invention in history. Before introducing the reading you should fill the table below. In the left column write the names of inventions related with TRANSPORT. Do the same with the right column but now explain how these inventions have changed our lives. Describe an invention for your partner to guess. Don't help!!!

**Work in pairs, and remember that English is the way to communicate.**

#### GUESS IT!!!

Which is the INVENTION

#### HOW THIS INVENTION CHANGED OUR LIVES

**PLANE:** *(example). It has wings and flies as a bird. Is made from metal, and it was invented at the beginning of the 20th century.*

**ANSWER:** *It helps people to reach the further country in few hours. It takes less than two hours to go from Barcelona to London.*

\_\_\_\_\_:

ANSWER:

\_\_\_\_\_:

ANSWER:

\_\_\_\_\_:

ANSWER:

#### Communication

### 3. THE EVOLUTION OF TRANSPORT. BICYCLE, HISTORICAL OUTLINE

#### SESSION 8

Date \_\_\_\_\_

#### THE FIRST WHEEL

THE WHEEL <http://en.wikipedia.org/wiki/Wheel>



The wheel is a circular device that is capable of rotating on its axis, facilitating movement or transport or performing labour in machines. In order for wheels to rotate a moment needs to be applied to the wheel about its axis, either by way of gravity or by application of another external force.

#### MACHINES AT HOME

Cars have wheels, of course! Four of them. Wrong! Cars have dozens and dozens of wheels. Remember that **rollers**, **gears**, and **pulleys** are all types of wheels. Find at least five different types of wheels in or on your car and fill the list

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_



pulley



roller



gears

#### What is a moment of force?

In physics, the moment of force represents the magnitude of force applied to a rotational system at a distance from the axis of rotation. The concept of the moment arm, this characteristic distance, is key to the operation of the lever, pulley, gear, and most other simple machines capable of generating mechanical advantage. The SI unit for moment is the Newton meter (Nm).

### 3. THE EVOLUTION OF TRANSPORT. BICYCLE, HISTORICAL OUTLINE

#### SESSION 8

Date \_\_\_\_\_

Think about things that has wheels in its components.

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**FOLDING A BIKE. The latest in bicycles** Video timing: 1'05"

**The suitcase bike:** There is only music. Just click on the icon and enjoy yourself!! From China comes this bike that can transform itself into a suitcase. Here's a video demonstrating the bike opening and closing.



**How to fold a bike: video.1' 32"**

### 3.THE EVOLUTION OF TRANSPORT. BICYCLE, HISTORICAL OUTLINE

#### SESSION 9

Date \_\_\_\_\_

Contents The evolution of transport. Bicycle, historical outline. Reading.  
Timing 15'



Video: [Bicycles and Wheelchairs: A short history 3' 30''](#)

<http://www.youtube.com/watch?v=SFeJFnI6yWI>

In the eighteenth century the first bicycle, the **Hobby horse** was built but it had a major disadvantage – it did not have **pedals!** Pedals were introduced in 1839 by a Scottish blacksmith, Kirkpatrick Macmillan.



Early bicycles were made out of wood and the first all-metal machines did not appear until 1870s. The pedals were still fixed to the front wheel. It was at this time that the **penny-farthing** bicycle was invented with its enormous front wheel and a small rear wheel.

In the 1880s the **safety bicycle** was invented. This bicycle had a **chain** and a **sprocket drive** on the **rear wheel**. It was the forerunner of the modern bicycle; although the idea of the chain and **cog** was said to have been suggested by Leonardo Da Vinci in the fifteenth century. By 1890 the **pneumatic tyre** had been invented by a veterinary surgeon called John Dunlop. Toward the end of the nineteenth century gears were introduced.

Today there are several styles of bicycle, the main ones include the standard



road bicycle, mountain bicycle, racing bicycle. While the road bike looks similar in style to the bicycle of the 1950s there have been many technological advances. The classic Raleigh bicycle of the 1950s had a **steel frame** and weighed over 20 kg. Today modern bikes are made from a variety of materials including **aluminium, titanium and carbon fibre**. They are much lighter.

### **3. THE EVOLUTION OF TRANSPORT. BICYCLE, HISTORICAL OUTLINE**

#### **SESSION 9**

Date \_\_\_\_\_

A **pedal force** is needed to start the bike moving and change speed. Resistive forces have to be overcome; these include friction between the tyres and the road, and air resistance.

#### **Contents, communication**

**Fill the gaps with one of the following words:**

**hobby-horse / blacksmith / pedals / wood / huge / small / safety / chain / sprocket  
/ cog / Leonardo Da Vinci / Gears / John Dunlop / pneumatic**

The ..... was built in the eighteenth century.

An Scottish..... designed the first..... in 1839.

Early bicycles were made out of .....

The penny –farthing was a bicycle with a ..... front wheel and  
an ..... rear wheel.

In 1880's the ..... bicycle was invented. This bicycle had a chain and a  
..... drive on the rear wheel.

The idea of a ..... and..... is said to have been suggested by .....  
..... were introduced by the end of the nineteenth century.

..... invented the.....tyre.

### 3. THE EVOLUTION OF TRANSPORT. THE LEONARDO'S BICYCLE

#### SESSION 10

Date \_\_\_\_\_



LEONARDO'S BIKE [by John H. Lienhard](#)

<http://www.uh.edu/engines/epi888.htm>



Audio timing: 3' 31"

The following text has been divided in 4 different sections. The class will be divided in groups of 4. Everybody will hear the audio twice and each group will fill the gaps of their section. Soon afterwards, results will be shared one group each other. By the end of the session you should put in order the 4 sections therefore you will get the full script.

In order to help you, the last sentence of each section will be repeated in the next one. You will need to talk with their classmates following the pattern provided.

Let's focus on the listening and avoid being absent-minded. Good luck.

Follow the pattern:

How it ends your text? My text ends with the sentence...  
How it begins your text? My text begins with the sentence...

Some vocabulary will help you to introduce words related to the components of a bicycle. We will focus on them during the next sessions.

### **3. THE EVOLUTION OF TRANSPORT. THE LEONARDO'S BICYCLE**

#### **SESSION 10**

Date \_\_\_\_\_

#### **Section 1**

Today, we find a **bicycle** in the wrong place. The **University** of Houston's College of Engineering presents this series about the machines that make our **civilization** run, and the people whose ingenuity created them.

I'm almost used to being surprised by Leonardo Da Vinci; but I was really astonished by an **item** that **turned up** in the **Codex Atlanticus**. That's a collection of Leonardo's **drawings** that someone pasted into a **scrapbook** soon after he died.

Leonardo was fastidious about writing on both sides of his paper. The man who made this **scrapbook** cut a big square **hole** in each mounting sheet so you could see both sides. Leonardo's students had practiced on the back of some pages. No holes for them. The student scribbles were permanently **sealed off**.

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#### **Section 2**

The **scrapbook** was dismantled during the **1970s**. We could finally see everything. Then the most **astonishing** thing turned up. In **1504** Leonardo made sketches on two of the pages while he was trying to improve coastal defenses. Nothing special there.

### **3. THE EVOLUTION OF TRANSPORT. THE LEONARDO'S BICYCLE**

#### **SESSION 10**

Date \_\_\_\_\_

On the back, student sketches: two pornographic drawings and a mocking sketch of **Leonardo's** favorite model -- a **teenage** boy, also a student. Still nothing special. But there's one more item in the upper right corner that you or I might hardly notice. It's too familiar. It's a bike -- like the one you rode as a kid.

It has two wheels of equal size -- with **spokes**. It has **pedals**, a chain, and a **sprocket**. It has **handlebars**.

---

#### **Section 3**

Leonardo anticipated many things -- **helicopters**, parachutes, tanks. Most were out of **proportion**. They would never really have worked. This was different. This one would've worked.

The development of the modern bicycle began in **1816**. It took its modern form - - the form in Leonardo's **sketch** -- around 1885. Very little has changed since then. That **odd** sketch was pasted into a scrapbook 300 years before the first 19th-century bike. It was unpasted **90** years after such bikes were finished.

The sketch clearly had no connection with the invention of the modern bike. Yet there it sits, quite impossible, but there.

Who **cooked up** this **machine**? Leonardo or the student? From what kind of thin air did it flow? Leonardo gives a detail of that sprocket and chain in another codex. We can be almost certain that the student copied the **bike** from some lost Leonardo drawing.

### 3. THE EVOLUTION OF TRANSPORT. THE LEONARDO'S BICYCLE

#### SESSION 10

Date \_\_\_\_\_

#### Section 4

You see, the **bicycle** was very hard to **invent**. The concept of unstable two-wheeled motion didn't come easily. This **sketch** hints that there might be one optimal **bicycle design**, and that Leonardo thought it up. It seems he really did create a **design** so subtle that it took most of the **19th century** to reinvent it -- and that he did it entirely in his head, without ever making the real thing.

That's almost too astonishing to believe. But we have no better explanation for that **crazy** anachronistic **drawing** -- suddenly spinning into our **world** from the wrong, wrong, century.

I'm John Lienhard, at the University of Houston, where we're interested in the way inventive minds work.

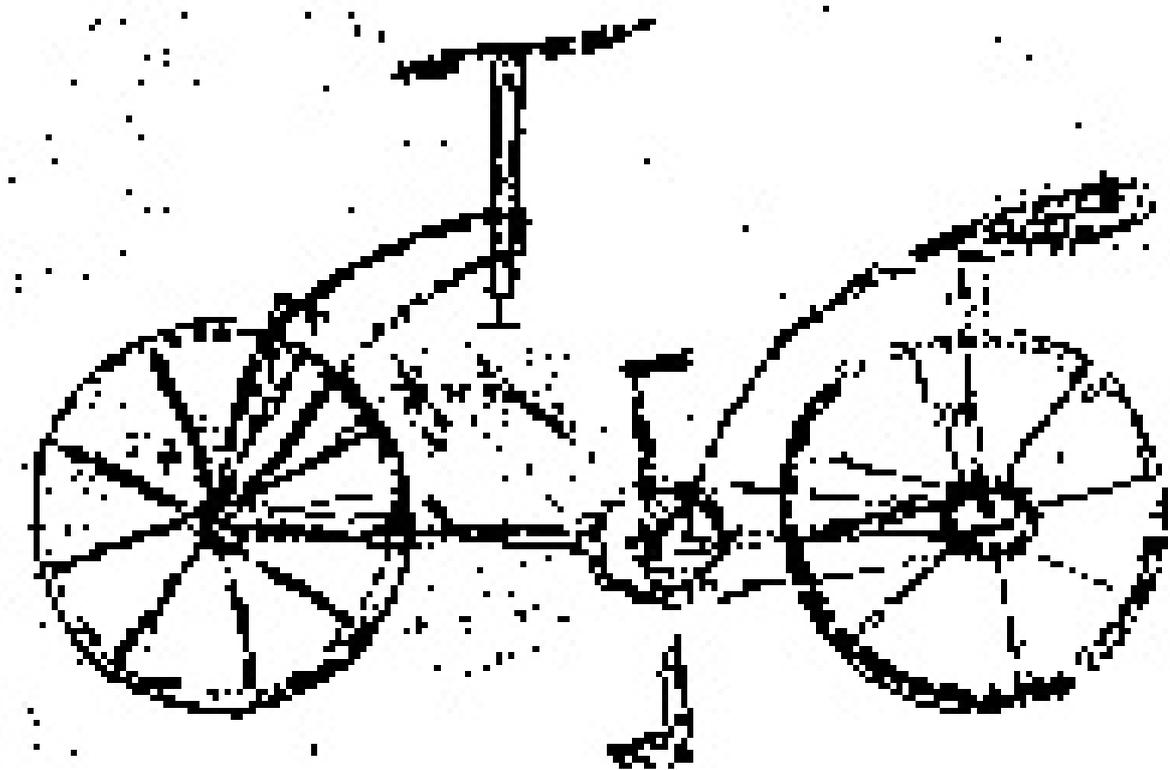
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**3. THE EVOLUTION OF TRANSPORT. THE  
LEONARDO'S BICYCLE**

**SESSION 11**

Date \_\_\_\_\_

**Who had done it?  
???**



**Going in quest of the truth**

### 3. EVOLUTION OF TRANSPORT. THE LEONARDO'S BICYCLE

SESSION 11 Date \_\_\_\_\_

#### Culture

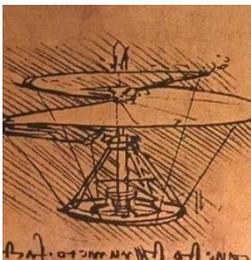
Who was Leonardo Da Vinci?



**Leonardo di ser Piero da Vinci** (April 15, 1452 – May 2, 1519) was an Italian polymath, having been a scientist, mathematician, engineer, inventor, anatomist, painter, sculptor, architect, botanist, musician and writer.

Leonardo has often been described as the archetype of the "Renaissance man", a man whose seemingly infinite curiosity was equaled only by his powers of invention. He is widely considered to be one of the greatest painters of all time and perhaps the most diversely talented person ever to have lived.

Two of his most famous works are the *Mona Lisa* and *The Last Supper*. Leonardo's drawing of the *Vitruvian Man* is also iconic. His notebooks with drawings, scientific diagrams, and his thoughts on the nature of painting, comprise a contribution to later generations of artists only rivaled by that of his contemporary, Michelangelo.



As an engineer, Leonardo's ideas were vastly ahead of his time. He conceptualized a helicopter, a tank, concentrated solar power, a calculator, the double hull...Relatively few of his designs were constructed or were even feasible during his lifetime. As a scientist, he greatly advanced the state of knowledge in the fields of anatomy, civil engineering, optics, and hydrodynamics.

#### Exploring Leonardo. Museum of Science. Boston

It is an interesting link to visit with students in class. You will find interactive exercises related with Leonardo's inventions. <http://www.mos.org/sln/Leonardo/>

### 3. EVOLUTION OF TRANSPORT. THE LEONARDO'S BICYCLE

#### SESSION 11

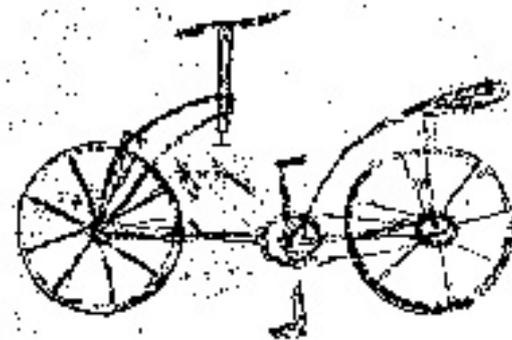
Date \_\_\_\_\_

Who knows the truth?. The Leonardo's bicycle.

The Evidence against "Leonardo's Bicycle"

<http://www.cyclepublishing.com/history/leonardo%20da%20vinci%20bicycle.htm>

Text of a paper presented at the 8th **International Conference on Cycling History**, Glasgow School of Art, August 1997 Prof. Dr. Hans-Erhard Lessing



*(...) News of a bicycle-like sketch said to have been discovered during the ten-year restoring period of Leonardo da Vinci's Codex Atlanticus popped up in 1974, when literary historian Augusto Marinoni gave a lecture in Vinci, Leonardo's birthplace. From the chronology of disclosures and (in part circumstantial) evidence, it is now becoming clear that we are dealing with a recent forgery.(...)*

#### The Leonardo da Vinci Bicycle Hoax

([http://users.aol.com/pryordodge/Leonardo\\_da\\_Vinci.html](http://users.aol.com/pryordodge/Leonardo_da_Vinci.html))

Recently, a drawing of a bicycle, thought to have been from the studio of Leonardo da Vinci, is now considered a hoax. This drawing was believed to be by Giacomo Caprotti (c. 1493), a pupil of Leonardo. Only the two circles are originally from the Codex.

133 VERSO. New. Black chalk.

Scribbles, including the word 'salaj', not by Leonardo, probably not from Leonardo's time. Self-explanatory.

SEE f. 132 VERSO, to which this sheet was originally joined. When I examined the original sheets in 1961, holding them against a strong light so as to detect elements of their (at that time) hidden versos, I noticed the presence of scribbles in black chalk as well as light traces of circles in pen and ink, which appeared to be the beginning of some geometrical diagrams.

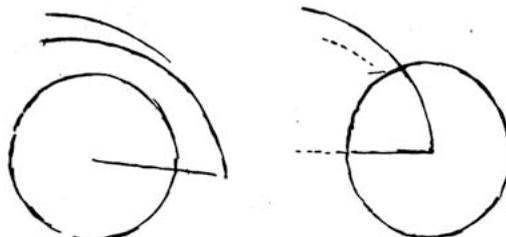


Fig. e.

Author's record of geometrical diagrams on f. 133 VERSO as seen from the RECTO in 1961.

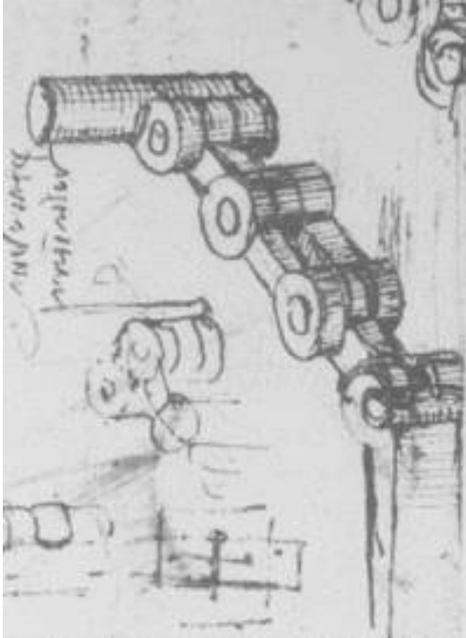
### 3. EVOLUTION OF TRANSPORT. THE LEONARDO'S BICYCLE

SESSION 12

Date \_\_\_\_\_

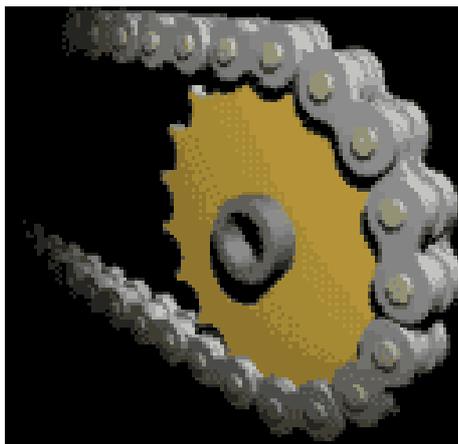
#### LEONARDO Y LA TRANSMISIÓN POR CADENA

[http://www.geocities.com/mcdepicciotto2001/bicicletas\\_cadena.html](http://www.geocities.com/mcdepicciotto2001/bicicletas_cadena.html)



Leonardo da Vinci imaginó una bicicleta con cadena y desmultiplicación, aunque careciente de dirección. Se ha puesto en duda la autenticidad del proyecto, ya que no fue descubierto sino hasta hace pocos años, en unas hojas pegadas del Códice Atlántico en el momento en que lo restauraban. Además, el dibujo de la bicicleta no es de Leonardo, aunque se haya atribuido a uno de sus discípulos.

Sin embargo, la idea de la cadena y la desmultiplicación aparece en otros proyectos de Leonardo, por lo que no es imposible que los haya aplicado a un celerífero como los que aparecieron por entonces.



### 3. THE EVOLUTION OF TRANSPORT. THE LEONARDO'S BICYCLE

#### SESSION 12

Date \_\_\_\_\_

|                                                                                    |                                        |                                                                                                                                                       |
|------------------------------------------------------------------------------------|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
|   | 1. Leonardo da Vinci Bicycle Hoax      | ➤ Draw yourself, "free hand", the supposed Leonardo's bike sketch.                                                                                    |
|   | 2. La bicicleta de Leonardo            | ➤ Where were founded the Leonardo's bike sketches?<br>_____                                                                                           |
|   | 3. Leonardo and the roller chain       | ➤ Which is supposed to be the main Leonardo's contribution on Bicycles?<br>_____<br>➤ Who is credited with inventing the roller chain? When?<br>_____ |
|  | 4. Leonardo's bike by John H. Lienhard | ➤ Who has invented the bicycle, attending what Mr.Lienhard says?<br>_____                                                                             |

### 3. THE EVOLUTION OF TRANSPORT. THE LEONARDO'S BICYCLE

#### SESSION 12

Date \_\_\_\_\_

|                                                                                    |                                                              |                                                                                                                                                                                |
|------------------------------------------------------------------------------------|--------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   | 5. Bicycle History                                           | <p>➤ Are they talking about Leonardo?. Click on Bicycle's childhood?</p> <hr/> <hr/> <hr/>                                                                                     |
|  | 6. Cuando aparece la primera bicicleta y quienes la crearon? | <p>➤ Do you think this address is credible enough?</p> <hr/> <hr/> <hr/> <p>➤ Do they talk about resources? Do we know who the author of the article is?</p> <hr/> <hr/> <hr/> |

### 3. THE EVOLUTION OF TRANSPORT. THE LEONARDO'S BICYCLE

#### SESSION 12

Date \_\_\_\_\_

|                                                                                   |                                                  |                                                                                                                                      |
|-----------------------------------------------------------------------------------|--------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
|  | 7. Historic figures.<br>Kirkpatrick<br>Macmillan | <p>➤ Do you think this page is reliable enough? Why? Who is, in their words the truly inventor of the bicycle?</p> <hr/> <hr/> <hr/> |
|  | 8. Leonardo's mysterious machinery               | <p>➤ Open the page and answer the questions proposed in the "Leonardo's Sketches" game</p>                                           |

### 3.THE EVOLUTION OF TRANSPORT. BICYCLE, HISTORICAL OUTLINE

#### SESSION 13

Date \_\_\_\_\_



#### **Celerifere/1797**

France's Comte de Sivrac is said to have invented the Celerifere (Celeripede in English) with a frame in the form of animals such as horses, birds, and snakes. Having no pedals, riders propelled it by pushing their feet against the ground and could only steer by leaning.



#### **Draisienne (Hobby Horse)/1817**

Designed by Germany's Baron von Drais and introduced to the world in 1818 in Paris. This walking machine is said to be the progenitor of the bicycle. It was later introduced to Great Britain where it came to be called a hobby horse.



#### **MacMillan Velocipede/1839**

Designed by Kirkpatrick MacMillan, a Scottish blacksmith. It had a driving mechanism consisting of a crank and pedals which propelled it by a downward and forward thrust of the foot, enabling people to ride a cycle for the first time without touching their feet to the ground.



#### **Michaux Velocipede/1863**

This machine, powered by pedals and a crank, was designed by Pierre Michaux, a Parisian manufacturer of baby carriages and horse carriages. It was the world's first mass-produced riding machine, and continued to spread around the world until 1870. It is also known as a bone shaker.



#### **Penny-farthing 1870**

Around this time, the diameter of bicycle front wheels started to get gradually larger and larger. The reason for this was the larger the front wheel, the farther the bicycle travels with each wheel revolution, thereby producing higher speeds. Another name for this model was a penny-farthing because it resembled the English penny and farthing (one-quarter pence) placed next to each other.

### **3.THE EVOLUTION OF TRANSPORT. BICYCLE, HISTORICAL OUTLINE**

#### **SESSION 13**

Date \_\_\_\_\_



#### **Safety Bicycle/1885 to 1890**

While the front wheel of the Michaux velocipede was getting larger, research was advancing on rear-wheel driven models using gears and a chain. In 1885, an Englishman by the name of John Kemp Starley created the Rover, a bicycle with equal sized wheels. This was the prototype of the modern-day bicycle. As the name implies, safety bicycles were safer to ride than earlier models. They had a saddle, handlebar grips, and logical placement of the crank axle, making the bicycles easy to ride. A distinguishing feature of the safety bicycle is its cross frame with a tension structure.

Playing cards: Open folder: Etiquetes historia de la bicicleta

## 4.THE BICYCLE AND ITS COMPONDS

### SESSION 14

Date \_\_\_\_\_



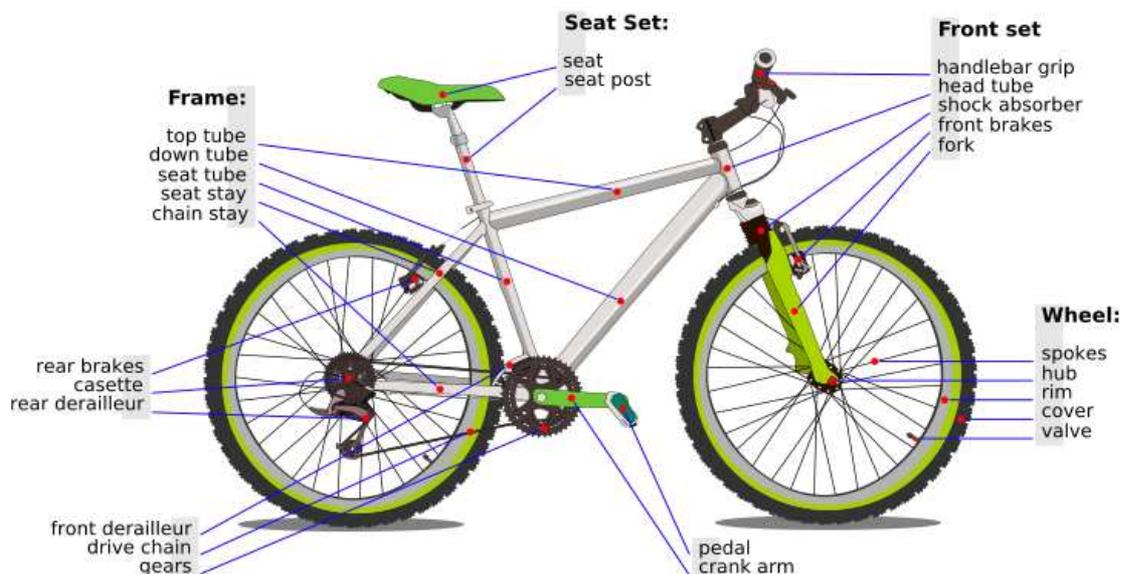
Video 3' 30" timing: 10'???

La bicicleta. Components i relació de transmissió. Video facilitat per videoteca d'xtec.

Durada: 3'30"



**Resum:** En aquest programa estudiarem la bicicleta. Veurem quin és el mecanisme a través del qual es mou una bicicleta, és a dir, explicarem com a partir de pedalejar emetem una força que es transforma en energia (cinètica) i posteriorment en moviment i/o velocitat.



## 4. THE BICYCLE AND ITS COMPONDS

### SESSION 14

Date \_\_\_\_\_

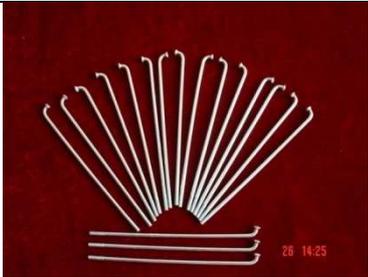


Key words. Communication

### *THE BICYCLE AND ITS COMPONDS*

|                                                                                     |                                                                                      |                                                                                       |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|    |    |    |
| <b><i>HANDLEBAR</i></b>                                                             | <b><i>SADDLE BIKE</i></b>                                                            | <b><i>FRAME</i></b>                                                                   |
|   |   |   |
| <b><i>WHEEL BIKE</i></b>                                                            | <b><i>BRAKE BIKE</i></b>                                                             | <b><i>BRAKES PAD</i></b>                                                              |
|  |  |  |
| <b><i>BRAKE CABLE</i></b>                                                           | <b><i>PEDAL</i></b>                                                                  | <b><u><i>CHAIN</i></u></b>                                                            |

## **THE BICYCLE AND ITS COMPOUNDS**

|                                                                                     |                                                                                      |                                                                                                                                                  |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
|    |     |  <p style="font-size: small;">©1996 Bk e-Pro Publications</p> |
| <p><b>CRANK</b></p>                                                                 | <p><b>FRONT CHAIN WHEEL</b></p>                                                      | <p><b>SHIFTLEVERS</b></p>                                                                                                                        |
|    |   |                                                              |
| <p><b>GEARS BIKE</b></p>                                                            | <p><b>HANDLEBAR STEM</b></p>                                                         | <p><b>INNER TUBE</b></p>                                                                                                                         |
|  |  |                                                                                                                                                  |
| <p><b>FRONT FORK</b></p>                                                            | <p><b>SPOKES</b></p>                                                                 |                                                                                                                                                  |



[Ramon Casas i Carbó](#) (1866-1932) *Ramón Casas y Pere Romeu en Tàndem*, art from the interior of Els 4 Gats (Barcelona), 1897

Original now in the collection of the Museu d'Art Modern (MNAC), Barcelona

## 4.THE BICYCLE AND ITS COMPONDS

### SESSION 15

Date \_\_\_\_\_

#### Assessment. Label Bicycle Diagram

Using the terms listed below, label the bicycle diagram

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Brake lever</b> - the hand lever used to activate the brakes.</p> <p><b>Chain</b> - it transfers the energy from the motion of the pedals to the back wheel.</p> <p><b>Chain wheel</b> - the large wheel on which the chain is held, near the pedals.</p> <p><b>Down tube</b> - the tube that attaches the.</p> <p><b>Front brake</b> - it stops the front wheel.</p> <p><b>Front fork</b> - it attached the front wheel to the bicycle.</p> <p><b>Front reflector</b> - a safety device in the front of the bike that lets cars see you at night.</p> <p><b>Handlebar stem</b> - this supports the handlebar.</p> <p><b>Handlebars</b> - where you hold onto the bicycle to steer it.</p> <p><b>Hub</b> - the central part of a wheel.</p> | <p><b>Pedal</b> - where your feet go to power the bicycle.</p> <p><b>Rear brake</b> - it stops the rear wheel.</p> <p><b>Rear reflector</b> - a safety device in the back of the bike that lets cars see you at night.</p> <p><b>Rim</b> - the support of the wheel.</p> <p><b>Saddle</b> - the seat.</p> <p><b>Seat tube</b> - the tube that supports the seat post.</p> <p><b>Seat post</b> - it supports the seat.</p> <p><b>Shift levers</b> - the levers on the handlebars used to shift gears.</p> <p><b>Spokes</b> - the thin, metal wires that attach the rim to the wheel hub.</p> <p><b>Tire</b> - the inflated, rubber part of the wheel.</p> <p><b>Top tube</b> - the tube that attaches the handlebar stem to the seat post.</p> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



## 4. ASSESSMENT. TRANSPORT AND TRAVEL

### SESSION 15

Date \_\_\_\_\_

#### TASK 6. TRANSPORT and TRAVEL

##### Comprehension. Timing 10'

From BBC | British Council

[www.teachingenglish.org.uk](http://www.teachingenglish.org.uk)

For each of the six questions choose the **one** correct answer

**1. Which word best completes this sentence? The fastest way to \_\_\_\_\_ is by plane.**

- a. voyage
- b. journey
- c. travel
- d. trip

**2. Which word is the odd one out?**

- a. windscreen
- b. tyre
- c. brake
- d. carriage

**3. Which of the following words is not connected with roads?**

- a. bypass
- b. roundabout
- c. lay by
- d. runway

**4. Which of the following forms of transport would sink if it were on water?**

- a. a yacht
- b. a liner
- c. a barge
- d. a glider

**5. Which of the following compound nouns do you not find on a car?**

- a. steering wheel
- b. number plate
- c. landing gear
- d. passenger seat

**6. "Coming home from work, he always gets stuck in a traffic \_\_\_\_\_."**

- a. line
- b. block
- c. jam
- d. queue

## 5. THE PENNY FARTHING AND THE VELOCITY RATIO

### SESSION 16

Date \_\_\_\_\_



Reading. Timing 15'  
A bicycle called Penny-farthing!!!



You have seen a picture of the bicycle called "**penny-farthing**", the one with a huge front wheel and a tiny rear wheel. Currently, bicycles have two wheels of the same reasonable size, a pair of pedals in the middle of the bike and then a chain that connects the pedals to the rear wheel.

**So why did penny-farthing bicycles ever exist?** In a penny-farthing bicycle, the pedals and the front wheel are directly connected just like they are on a kid's tricycle. That means that when you turn the pedals one time, the wheel goes around one time. Therefore now, let's think about a kid's tricycle.

The front wheel can be **16 inches (40 cm)** in diameter, or  $16 * 3.14 = 50$  inches (127 cm) in circumference. That means that each time a kid on a tricycle pedals through one revolution of the front wheel, the tricycle moves forward 50 inches (127 cm). Let's say that the kid is turning the front wheel at 60 rpm, or one revolution per second. That means that the tricycle is moving forward 50 inches per second. That is only **2.8 miles per hour (4.5 kph)**. If the kid pedals twice as fast, at 120 rpm, the **trike** is moving at just over 5 miles per hour (9 kph), and the kid looks like his legs are about to spin off because 120 rpm is a lot of pedalling!

If an adult wants to ride a tricycle at a reasonable speed, maybe 15 mph (24 kph), and if the adult does not want his or her legs to fly off, then the tricycle's front wheel has to be pretty big. If the adult wants to pedal at 60 rpm, the front wheel needs to be 84 inches in diameter that is **7 feet (more than 2 meters)** in diameter!

## 5. THE GEAR RATIO

### SESSION 16

Date \_\_\_\_\_



Did you know it?

#### GEAR RATIO OR VELOCITY RATIO

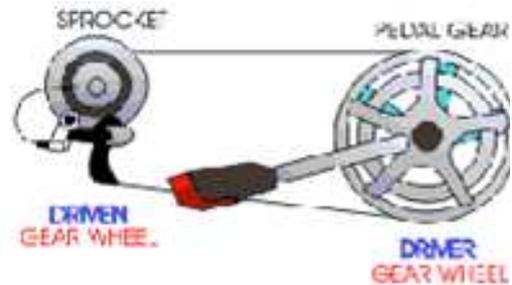
Many machines use gears. A very good example is a bicycle which has gears that make it easier to cycle, especially up hills. Bicycles normally have a large gear wheel which has a pedal attached and a selection of gear wheels of different sizes, on the back wheel. When the pedal is revolved the chain pulls round the gear wheels at the back.



Look at the gear wheel with the pedal attached and compare it in size to the gear wheels in the centre of the back wheel.

Most people have cycled a bicycle up a hill. The steeper the hill gets the more difficult it is to pedal and normally a cyclist will change gears

to make it easier. When the cyclist changes gear, the chain moves from a small gear to a larger gear with more teeth, making it easier to push the pedals round. The more teeth the back gear has, the easier it is to cycle uphill although the bicycle moves forward more slowly.



**What will happen if a cyclist going up a hill changes gear from a larger to a smaller gear wheel? Will it be easier or harder to pedal?**

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## 5. THE GEAR RATIO

### SESSION 17

Date \_\_\_\_\_



Timing 10' Choose the most appropriate key word:

Key words: gear ratio/sprocket/chain/pulleys

#### VELOCITY RATIO or GEAR RATIO

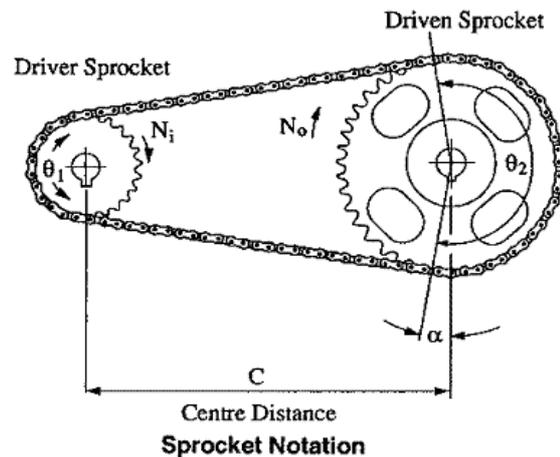
The reason bicycles are easier to cycle up a hill when the gears are changed is due to what is called gear ratio/sprocket/chain/pulleys (velocity ratio). gear ratio/sprocket/chain/pulleys can be worked out in the form of numbers and examples are shown below. Basically, the ratio is determined by the number of teeth on each gear wheel, the gear ratio/sprocket/chain/pulleys is ignored and does not enter the equation.

#### CHAINS AND SPROCKETS

A gear ratio/sprocket/chain/pulleys is a toothed wheel driven by a gear ratio/sprocket/chain/pulleys (a series of metal links). Bicycles and motorbikes use sprockets and chains because of their greater strength and the fact that they do not slip.

**Advantages of chains and sprockets over belts and gear ratio/sprocket/chain/pulleys:**

- Larger forces can be transmitted
- They do not slip
- The links can be taken apart and removed for maintenance



## 5. HOW TO CALCULATE THE GEAR RATIO

### SESSION 17

Date \_\_\_\_\_



#### Calculation. Timing

<http://www.technologystudent.com/gears1/gearat2.htm>

EXAMPLE: from [www.technologystudent.com](http://www.technologystudent.com)

**Look at the example provided before, if the pedal gear revolves once how many times will the sprocket gear revolve?**

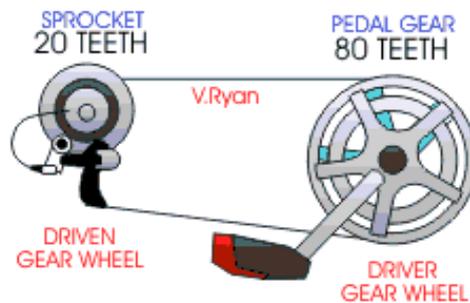
Sprocket gear: 30 teeth

Pedal Gear: 60 teeth

$$\frac{\text{N}^{\circ} \text{ of teeth on pedal gear}}{\text{n}^{\circ} \text{ of teeth on sprocket}} = \frac{60}{30}$$

The gear ratio is 1(Pedal gear):2 sprocket gear

#### ANSWER THE FOLLOWING QUESTIONS :



- **If the pedal gear revolves once how many times will the sprocket gear revolve?**

Sprocket gear: 20 teeth

Pedal Gear: 80 teeth

$$\frac{\text{N}^{\circ} \text{ of teeth on pedal gear}}{\text{n}^{\circ} \text{ of teeth on sprocket}} =$$

The gear ratio is 1(Pedal gear):4 sprocket gear

## 5. THE GEAR RATIO. WORKSHOP

### SESSION 18

Date \_\_\_\_\_



Adapted from the web quest provided in:

<http://www.galaxy.net/~k12/machines/index.shtml>

### WHEELS

#### **Purpose**

*To reinforce that there are many types of wheels. To let students try out some different types of wheels: pulleys and gears. Students will have to follow a diagram to set up a fairly complicated configuration with 2 pulleys. It's a great exercise in teamwork if one child reads the diagram and tells the other one what to do.*

*Icons in the instructions will help students to keep in their mind the meaning of some key words.*

#### **Notes**

**Gears 1:** *An introduction to gears and terminology. Let students get familiar with how to set them up and use them. The focus is on the direction of rotation. Give students a chance to analyze their data and deduce the fact that whether or not the follower turns in the same direction as the driver depends only on if there's an odd or even number of gears in between.*

*Students are asked to make a prediction which they should certainly test. Presumably they will find that their rule applies independent of the size of the gears.*

**Gears 2:** *In this experiment, we look at the speed of gears of different sizes and derive the concept that, regardless of size or shape, if the driver turns the distance of one tooth, the adjacent gear will also move exactly one tooth. So, if the driver has 20 teeth (small gear) and the follower 40 (medium gear), you*

## 5. THE GEAR RATIO. WORKSHOP

### SESSION 18

Date \_\_\_\_\_

must turn the driver two times around (20 + 20 teeth) to get the follower to turn one time around.

There's another chance in this experiment to analyze data graphically, to deduce the rule being followed and then apply the rule to a new situation.

### INTRODUCTION

Gears are just wheels with teeth. You can use gears to slow things down or speed them up, to change direction or to control several things at once. First we'll look at gears of the same size.

### MATERIALS

1 set of gears, 2 labels

### PROCEDURE

1. Put one axle (  ) in each of the four small gears (  ).
2. Find or make a mark on one tooth (  ) on each gear.
3. Use the stickers to label (  ) one gear as the driver, "D", and one as the follower, "F". We will use the driver to move the follower.
4. Put these two gears on the base board with the marked teeth touching. See Figure 1.
5. Turn the driver one complete time around clockwise direction (  ). Watch the follower as you do. Record how many times the follower turns and in what direction.
6. Now put another gear between the driver and the follower as in Figure 2. Turn the driver in step 5 and record what happens to the follower.
7. Finally, repeat this procedure with two gears between the driver and follower. See Figure 3.

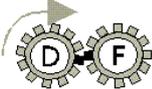
Figure 1  with  
in a

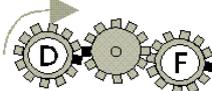
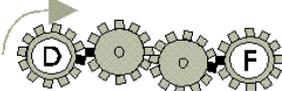
Figure 2 

Figure 3  and  
as

## 5. THE GEAR RATIO. DEDUCTION AND PREDICTION. WORKSHOP

**SESSION 19/20**

Date \_\_\_\_\_

| NUMBER OF GEARS IN BETWEEN | TURNS | DIRECTION |
|----------------------------|-------|-----------|
| 0                          |       |           |
| 1                          |       |           |
| 2                          |       |           |
|                            |       |           |

### DEDUCTION

Look at your results. What pattern or rule can you deduce about how the follower gear will turn?

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### PREDICTION

Let's say that both the driver and the follower were medium sized gears. What do you think would happen if we turned the driver one time around in the clockwise direction? How many times do you think the follower will turn and in what direction?

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## 5. THE GEAR RATIO. GEARS, SIZE AND TEETH.

### WORKSHOP

**SESSION 20/21**

Date \_\_\_\_\_



#### WORKSHOP

TASK 12

**GEARS 2:** Adapted from the webquest provided in:

<http://www.galaxy.net/~k12/machines/index.shtml>

#### INTRODUCTION

Gears aren't always the same size and don't always have the same number of teeth. Let's investigate what happens with different sized gears.

#### MATERIALS

1 set of gears (  ), 1 ruler (  )

#### PROCEDURE

1. For this part of the experiment, we are going to use a small gear as the follower and a medium gear as the driver. Set them up on the base board with the marked teeth touching.
2. Turn the driver one time and record how many times the follower turns.
3. Next turn the driver 2 times and then 3 times and record how many times the follower turns.

| NUMBER OF TURNS DRIVER | NUMBER OF TURNS FOLLOWER |
|------------------------|--------------------------|
| 1                      |                          |
| 2                      |                          |
| 3                      |                          |
| 5                      |                          |

4. How many times the follower will turn if the driver turns 5 times: \_\_\_\_\_

7. Try it and record your results.

## 5. THE GEAR RATIO

### SESSION 22

Date \_\_\_\_\_

8. In session 17 you were probably able to predict very accurately how many times the follower would turn. Let's see if it has anything to do with the number of teeth. Start by counting the number of teeth on a gear of each size and record it below.

9. Use the same set up as before: a medium gear for the driver and a small gear for the follower. Turn the driver one time and record how many times the follower turns.

| DRIVER |                 | FOLLOWER        |       |
|--------|-----------------|-----------------|-------|
| SIZE   | NUMBER OF TEETH | NUMBER OF TEETH | TURNS |
| Large  |                 | 20              |       |
| Medium |                 | 20              |       |
| Small  |                 | 20              |       |

10. Repeat step 9 using a large size gear as the driver.

11. Finally, repeat step 9 using a small gear as the driver.

#### DEDUCTION

Can you detect a rule or pattern in your data that will help you predict how other combinations of gears will work?

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## 6. THE IMPERIAL SYSTEM VS INTERNATIONAL SYSTEM

### SESSION 23

Date \_\_\_\_\_



Did you know it?

#### WHERE THE WORD MILE COMES FROM?

*1 mile = 1,609 km!!!*



A mile is a unit of length, usually used to measure distances in some Anglo-Saxon countries such as United Kingdom, the United States, or Australia. British normally use the **Imperial Units**, a collection of units for weighting and measuring. Instead of the one we use, the **International System** of Units (SI from

French *Système International d'Unités*)

#### HISTORICAL DEFINITIONS

Mile as a unit of distance was first used by the Romans and denoted a distance of **1,000 paces** (one pace is two steps, 1,000 paces being, in Latin, **mille passus**) or 5,000 Roman feet, and corresponded to about 1,480 meters, or 1,618 modern yards.

#### OTHER IMPERIAL UNITS

| Unit        | Relative value to yard | Metric value |
|-------------|------------------------|--------------|
| <i>foot</i> | $\frac{1}{3}$          | 30.48 cm     |
| <i>yard</i> | 1                      | 91.44 cm     |
| <i>inch</i> | $\frac{1}{36}$         | 2.54 cm      |

## 6. THE IMPERIAL SYSTEM VS INTERNATIONAL SYSTEM

### SESSION 23

Date \_\_\_\_\_



Did you know it?

#### LOCH NESS



Loch Ness is Britain's most famous lake because of the Loch Ness Monster. It is a long lake in the North of Scotland. Its length is **23 miles (36 km)** and its depth is **700 feet (213 metres)** in some places. 'Loch' is the Scottish word for 'lake'.

The Loch Ness Monster is a large prehistoric creature. Some people believe it lives in the deep waters of Loch Ness, but nobody has proved it, yet. 'Nessie' is the popular nickname for the Loch Ness Monster.

Calculation. Timing 10'



#### BEN NEVIS

All mountains over 3000 ft (914m) in height are known in Scotland as Munro. The highest mountain in the British Isles is the Scottish Munro called Ben Nevis. Its summit reached 4,406 feet above sea level. According the table provided, how high is Ben Nevis in meters?

Write the answer



## 6. THE IMPERIAL SYSTEM VS INTERNATIONAL SYSTEM

### SESSION 23

Date \_\_\_\_\_



Did you know it?

#### BIG BEN

The **Clock Tower** is the world's largest four-faced, chiming clock. The structure is situated at the Houses of Parliament building in Westminster, London. It is often referred to as **Big Ben**. The Clock Tower has also been referred to as *The Tower of Big Ben*.



Calculation. Timing. 10'

If we go from Glasgow to London we need to cover an equivalent distance of 645 km. How many miles will be covered during the same trip? Write the answer

## 7. HOW STIFF IS YOUR BIKE?

### SESSION 24

Date \_\_\_\_\_



Did you know it?



### HOW STIFF IS YOUR BIKE?

#### Material Assets

Which is the best frame material for you?

Titanium, Carbon Fibre, Aluminium, Steel

From *Bicycling Magazine*  
[www.bicyclingmagazine.com](http://www.bicyclingmagazine.com)

When we buy a bike, it is important to think about how we will use it. Depending on materials bicycles will be really light or heavy, strong and resistant or really “tacky”.

### ...Do you know why? ...

Because materials vary in strength, stiffness, and density (weight).

#### Examples:

➤ **Aluminium frames:**

Have fat, thin-wall tubes, They don't deflect much side to side when you sprint.

➤ **Steel frames:**

Have smaller-diameter, thin-wall tubes, and flex noticeably in a sprint.

➤ **Titanium and carbon frames:**

fall in between.



## ALLOY

*Mixture of two or more metals or of metallic and non-metallic elements usually fused together or dissolving into each other when molten.*

## 7. HOW STIFF IS YOUR BIKE? ADVANTAGES AND DISADVANTAGES OF THE MOST COMMON BICYCLE FRAME MATERIALS.

**SESSION 25**

**Date** \_\_\_\_\_

| STUFF                                                                                                                                                                                                                                                                                                                                        | THE GOOD                                                                                                                                                                                                | THE BAD                                                                                                                                                                                                                          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>STEEL:</b> Alloy, mostly iron with carbon. Stiff but dense (heavy). Not convenient for light frames.</p>                                                                                                                                                                                                                               | <p>Best steel alloys are very strong<br/>Best stiffness overall<br/>Long life</p>                                                                                                                       | <p>Can be heavy<br/>Rust-prone (tendency to rust)</p>                                                                                                                                                                            |
| <p><b>ALUMINUM (Al):</b><br/>Stiff and light (density is so low), tubes have to be much larger in diameter to compensate. Convenient for stiff, light frames.</p>                                                                                                                                                                            | <p>One-third the density of steel.<br/>Even cheap frames can be light<br/>Doesn't rust</p>                                                                                                              | <p>One-third to one-half the strength of best steels and titanium.<br/>One-third the stiffness of any steel, which requires larger diameter tubes<br/>Modest <b>fatigue</b> strength<br/>Not easily repaired or straightened</p> |
| <p><b>TITANIUM (Ti)</b><br/>Chemical metal element, light, strong, corrosion-resistant (even to sea water), grayish color. Alloyable with other elements such as iron, aluminium, vanadium, molybdenum. Produce strong lightweight alloys. Used for aerospace, military, automotive, medical, and sporting goods.</p>                        | <p>Half as dense as steel. Makes the lightest resilient frames<br/>As strong as most steels<br/>Will not rust - no paint needed (corrosion resistant)<br/>Good <b>fatigue strength</b></p>              | <p>Half as stiff as steel and known to be somewhat flexible<br/>Difficult to repair<br/>Expensive</p>                                                                                                                            |
| <p><b>CARBON FIBER</b><br/>Individual fibres of carbon are strong and stiff, but they are useless unless arranged in a strong pattern, and held together with strong "glue" (usually <b>epoxy</b>). This is the ultimate frame material for unconventional frames. and shapes, as it can be <b>moulded and tuned</b> more than any metal</p> | <p>Readily moulded into exotic shapes<br/>Excellent fatigue strength; not rust<br/>Strength and stiffness are controllable<br/>Low density and high strength make very light strong frames possible</p> | <p>Expensive raw material<br/>Break-prone</p>                                                                                                                                                                                    |

**7. HOW STIFF IS YOUR BIKE? ADVANTAGES AND DISADVANTAGES OF THE MOST COMMON BICYCLE FRAME MATERIALS. KEY WORDS**

**SESSION 26**

**Date** \_\_\_\_\_

**Materials**

- Alloy
- Mould
- Tune

- Iron Metal Chemical
- Carbon Chemical element
- titanium Metal Chemical element
- Aluminium Alloy

- Stiff
- Dense, Density
- Heavy
- Light
- Steel
- Strong
- Resistant, Strength, Fatigue
- Resilient
- Lightweight
- Straightened
- Colour
- Prone Rust Break Corrosion

## 7.HOW STIFF IS YOUR BIKE? ASSESMENT

**SESSION 26**

**Date** \_\_\_\_\_

Choose the correct key word:

**Titanium, rust, carbon fibre, resilient, alloy,  
Aluminium, stiffness, steel frames**

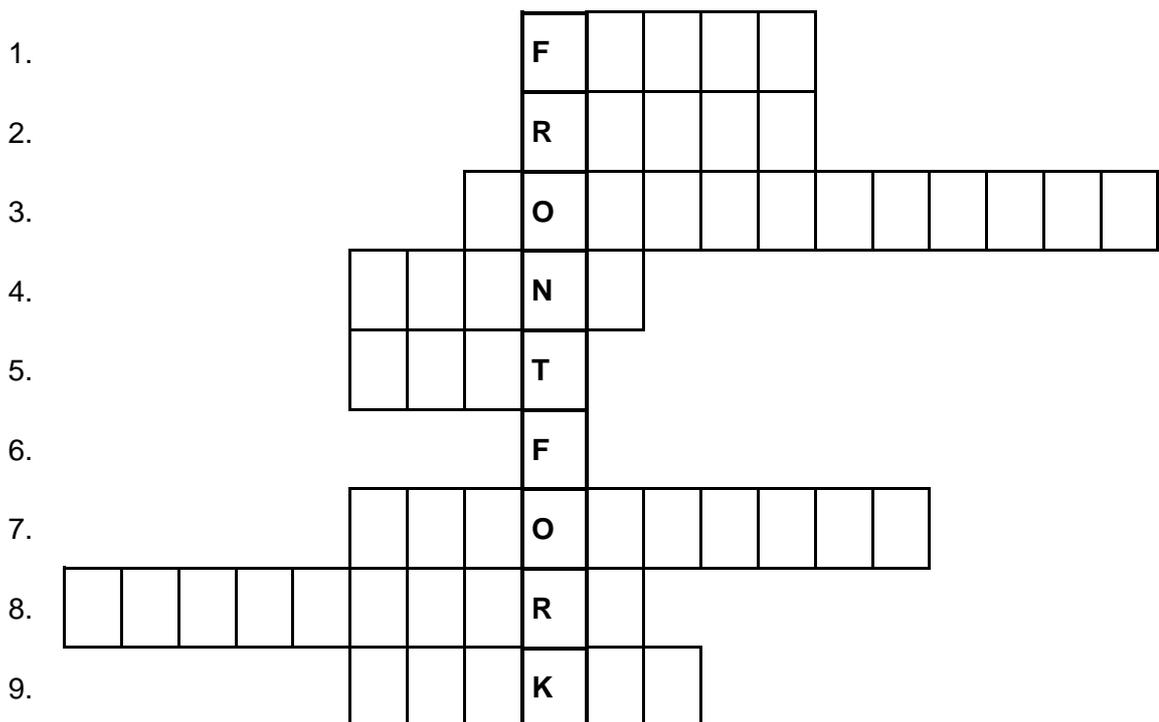
1. The resistance of an elastic body to deflection or deformation by an applied force is:
2. Chemical metal element, light, strong, corrosion-resistant (even to sea water),
3. Which is the ultimate frame material for unconventional frames?
4. Which frame has the smaller diameter?
5. Returning to the original form or position after being bent, compressed, or stretched.
6. When in contact with water and oxygen, or other strong oxidant or acids, iron is \_\_\_\_\_-prone
7. Solid solution of two or more elements, at least one of which is a metal
8. Alloy consisting mostly of iron, with some carbon content.
9. It has one-third the density of steel

**7. CROSSWORD. HISTORY OF BICYCLE. COMPOUNDS OF A BIKE. ASSESSMENT**

**SESSION 26**

**Date** \_\_\_\_\_

**Crossword. Bikes and its compounds**



1. Structure of a bike, usually made of metal tubes welded together.
2. Bicycle with equal sized wheels created by John Kemp
3. Bicycle distinguished by wide tires and horizontal handlebars, often used for off-road cycling.
4. A device for transmitting rotary motion, consisting of a handle or arm attached at right angles to a shaft crank.
5. A place for sitting.
6. Sixth letter of the alphabet
7. An early bicycle propelled by pushing the feet along the ground while straddling the vehicle
8. A cylindrical, straight or curved steering bar, usually fitted with handles at each end, as on a bicycle. Often used in the plural.
9. A device for slowing or stopping motion, as of a vehicle, especially by contact, plural

## 8. BUILDING A RAFT IN CLASS

SESSION 27

Date \_\_\_\_\_

### What is a Raft



From Wikipedia, the free encyclopedia

Traditional raft, 1884. Edition of [Adventures of Huckleberry Finn](#).



Children successfully test their raft, in a pool, in Caldes de Montbui, Catalonia. The raft is made from PVC poles, ropes, and tubes and wooden

A **raft** is any flat floating structure for travel over water. It is the most basic of boat design, characterized by the absence of a hull. Instead, rafts are kept afloat using any combination of buoyant materials such as wood, sealed barrels, or inflated air chambers. Traditional or primitive rafts are constructed of wood or reeds (such as Totoras in Lake Titicaca). Modern rafts may also use pontoons, drums, or extruded polystyrene blocks. Inflatable rafts use durable, multi-layered rubberized fabrics.

Timber rafting is used by the logging industry for the transportation of logs, by tying them together into rafts, and drifting or pulling them down a river. This method was very common up until the middle of the 20th century but is now used only rarely.

**Key words:**

**Hull, wood, reed, pontoons, drums,  
extruded polystyrene, timber rafting, logging**

## 8. BUILDING A RAFT IN CLASS

SESSION 27

Date \_\_\_\_\_

**Boat people** is a term (usually) referring to impoverished illegal immigrants or asylum seekers, who arrive en masse in old or home-made boats. The term came into common use during the 1970s, with the mass departure of Vietnamese refugees from



communist-control. It is also a widely-used form of migration or escape for people migrating from Cuba, Haiti, Morocco, Vietnam or Albania. They often risk their lives on dangerously crude and overcrowded boats, to escape poverty in their home nations. In 2001, 353 asylum-seekers sailing from Indonesia to Australia drowned, when their vessel sank.

What kind of boat is a <PATERA>?

<http://es.wikipedia.org/wiki/Patera>

*Una patera es una embarcación pequeña y de fondo plano. Erróneamente se suele llamar patera a cualquier tipo de embarcación utilizada por grupos de inmigrantes para acceder clandestinamente a las costas del sur de España, desde las costas de Marruecos y el Sahara Occidental, sea a través del Estrecho de Gibraltar o el Mar Mediterráneo (para arribar a Andalucía o Murcia), o bien del Océano Atlántico (para llegar a las Islas Canarias).*

*La patera es un tipo de bote abierto, esto es, sin cubierta, de escasa eslora, fondo plano, reducida obra muerta, construcción no demasiado robusta, por lo general de madera, que tiene diversos usos.*

Find out how people construct it. Describe in terms of materials, shape, security... Why and where do people usually use it? Look the text provided above.

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## 8. BUILDING A RAFT IN CLASS

### SESSION 28

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From BBC World News [By Dominic Bailey](#)

#### The European Union is seen as the land of opportunity by many living in desperate poverty in Africa

On a clear day you can see Spain across the water from Morocco and many have drowned trying to cross the narrow straits in rubber dinghies, old boats or on inflatable inner tubes.

But the enclaves of Ceuta and Melilla - Spanish territory clinging to the Moroccan coast - offer an alternative entry point. Across the double fences lies Europe and the dream of a better life.



There are thought to be more than a million illegal immigrants in Spain.

Last year, Spanish authorities detained more than 15,674. But those who arrive without identity papers are often released as Spanish immigration laws do not allow police to expel people if they cannot prove their identity or nationality within 40 days.

But faced with increasing numbers trying to cross the border fences Spain has revived a 1992 accord with Morocco to allow expulsions of illegal entrants back to Morocco, even if they are of different nationalities.

This year alone more than 12,000 have attempted to enter Melilla in the hope of getting that foothold in Spain. Some in recent weeks have died trying.

Human rights groups are concerned that Spanish and Moroccan governments' efforts to control these crossings are going too far and putting immigrants' lives at risk.

Alarmed by the latest mass crossing attempt, the Spanish government has sent army reinforcements to the border police, who work in tandem with Moroccan guards on the other side.

The double fence barrier that marks the perimeter is being raised from three to six metres tall and should be completed by February 2006. An extra perimeter barrier mesh (malla metálica) of steel wires, which the government says will cause less injuries, is also due to be built around the existing fences.

Sensors will also alert guards to possible immigrant invasions....

## 8. BUILDING A RAFT IN CLASS

### SESSION 28

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From BBC World News [By Dominic Bailey](#)

...Earlier this week Melilla border police faced 1,000 people trying to cross the fences. They managed to repel most but around 300 got through.

#### Increased risk

News about the border fence being raised from three to six metres has prompted more people to try to cross before the work is completed.

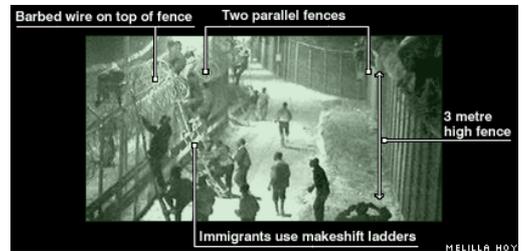
Furthermore The fears that increasing the height of the fence will not stop people trying to cross it - only add to the tragedy.

Enrique Santiago, president CEAR, helper immigrants:

*"The crossing in Ceuta last night was at part of the border which was already six metres high," he said. "The only thing this has done is cause two deaths caused by falling six metres. The risk increases, but it is not going to stop the crossings."*

*"They are not delinquents; they are not committing a crime,"*

*"They are trying to abandon their misery and get to countries which supposedly have better living conditions." [www.bbc.co.uk](http://www.bbc.co.uk) September 2005)*



Frame article BBC world news. Read the highlighted sentences

#### Reading and Writing skills

#### SUMMING UP THE TEXT

When it happened?

\_\_\_\_\_

Where it happened? \_\_\_\_\_

Who was involved in this story? \_\_\_\_\_

\_\_\_\_\_

## 8. BUILDING A RAFT IN CLASS

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### **KEY WORDS:**

Drowned, Rubber, Dinghies, clinging, fences, released, expel, border, foothold, concerned, mesh, steel, wires, injuries, prompted, furthermore

**Words related to countries:**

**Words related to materials:**

**Words related to transport:**

**Connectives:**

**Verbs:**

**Substantives**

### **“FOR” AND “AGAINST”, AGREE AND DISAGREE TITLE: SPANISH IMMIGRATION LAWS**

Spanish immigration laws do not allow police to expel people if they cannot prove their identity or nationality within 40 days... "They are not delinquents, they are not committing a crime,"..."They are trying to abandon their misery and get to countries which supposedly have better living conditions."...

One is an immigrant who tries to reach Catalonia and the other one is a local. Find out why the local person argues against your right to settle in Catalonia. Write 3 sentences with your arguments **for** and **against**. Share the questions and the answer with your partner.

#### **FOR**

|  |
|--|
|  |
|  |
|  |

#### **AGAINST**

|  |
|--|
|  |
|  |
|  |

## 8. BUILDING A RAFT IN CLASS

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#### *Antonym and Synonyms*

Fill in the chart of antonyms and synonyms of the words in the box. Use a dictionary if you need help.

| Key Word  | Antonym | Synonym |
|-----------|---------|---------|
| ▪ concern |         |         |
| ▪ fences  |         |         |
| ▪ dinghy  |         |         |
| ▪ drown   |         |         |
| ▪ prompt  |         |         |
| ▪ expel   |         |         |

## 8. BUILDING A RAFT IN CLASS

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### Making a chronological story from the pictures

#### RUNNING AWAY FROM LIBERIA:

*Put the bullets in order. Each picture has its own sentence. Once in the correct order, you will tell an story using the bullets as a summary. Groups of fives!! Avoid using the phrase "and then". Use connectives as **so, thus, therefore, moreover, thereby***

...

Not everybody get to step ashore in a new country



Once in the new country ...



This not only happens in Africa but...



From TV everybody thinks they know how wealthy people in Europe are



Mary and her son are starving in Liberia



## 8. BUILDING A RAFT IN CLASS

SESSION 30

Date \_\_\_\_\_

**SOS, SOS WE ARE TOTALLY LOST !!! HELP WE ARE GOING TO DIE...**



### **Task**

A man is in trouble, and is almost sure that he is going to die if nobody helps him. He decides to call the emergency number (112) with his mobile, hoping that someone on the other side will answer quickly. As time is passing the weather conditions are

becoming really bad.

Following the pattern provided, you should fill the frame in pairs. Remember that neither your partner nor you have ever seen each other.

The **person 1**, who is in trouble, has to describe what is happening to him. The **person 2** needs to know as much personal detail as possible. Therefore, person 2 will have to ask as many questions as possible to get the maximum information required to save the man in trouble.



## 8. BUILDING A RAFT IN CLASS

**SESSION 30**

**Date** \_\_\_\_\_

*PERSON 1...*

*SOMEWHERE in the middle of Mediterranean sea. You will answer questions related with the following items:*

Name:

Age:

Country:

Health conditions:

Number of people in the boat:

Boat conditions:

Food on board:

Place and of departure:

*PERSON 2...*

*BAY WATCH DEPARTMENT, Algeciras (Spain). You will ask questions related to the following items:*

Bay watch officer name:

Immigrant's Age:

Immigrant's country:

Boat people's health conditions:

Number of people in the boat:

Boat conditions:

Food on board:

Place of departure:

*PERSON 1...*

**WEATHER.** You will answer questions describing the weather conditions

Sky:

Rain:

Size of the waves:

Wind:

*PERSON 2...*

**WEATHER.** You will ask questions about the weather conditions

Sky:

Rain:

Size of the waves:

Wind:

## 8. BUILDING A RAFT IN CLASS

**SESSION 31**

**Date** \_\_\_\_\_



**FROM COAST TO COAST THERE ARE NO MORE THAN 9 MILES... AN SMALL STEP FOR EUROPEAN PEOPLE...A HUGE STRAIT FOR AFRICAN PEOPLE!!**

Try to find out where the raft is, helping you with a compass and a map. You should make a call claiming for helping, with a compass, a ruler, and a protractor you will find 3 drifts. If you work out properly the bay watchers from the Catalan border will locate you swift. Remember... Time is gold and your life is almost over so, don't waste your time...make a call or you will die in a few minutes!!!

Let use the list provided below to answer the Bay watcher's questions. You should provide at least three subjects from the frame.

| <b>NORTH COAST</b>                                                                                                                                                                                                                                                                                                                                                          | <b>SOUTH COAST</b>                                                                                             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| GREEN FOREST<br>STONE MOUNTAINS<br>AERIAL<br>PLANE<br>SMALLVILLE<br>HIGH SNOWED MOUNTAIN<br>CASTLE ON A HILL<br>WIND CENTRAL POWER<br>BIG CITY<br>BIG AERIAL BISE A CHURCH<br>CHURCH ON THE TOP OF A HILL<br>BLUE-RED SKYSCRAPER<br>HARBOUR AND DOCKS<br>A BUNCH OF CRANES BESIDE THE SEE<br>AIRPORT<br>SAND BEACH<br>FERRY<br>TWIN TOWERS<br>LIGHTHOUSE ON AN SMALL ISLAND | AERIAL<br>MOSQUE<br>PALMS<br>SMALL BUSHES<br>SNOWED SMOKING VOLCANO<br>SAND DUNES<br>A COUPLE OF SMALL ISLANDS |

## 8. BUILDING A RAFT IN CLASS

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Example: I can see a **lighthouse on a small island...**

Once you have decided which icons from the map you will describe, you will need to handle some drawing tools to define the location of your raft. You will need to work out at least three drifts to help bay watchers to find out your position. Remember, because the boat is moving all

the time you will need to fix three different points on the map that it means every drift it will belong to one point.



## 8. BUILDING A RAFT IN CLASS

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Follow the pattern...

#### Migrant on the boat (using a walkie-talkie)

-Help, help, the boat is sinking, help, help...We'll die, we'll die...gggg,ggggg,.... Is anybody listening to me? We are in the middle of the sea... Can you hear me?... Please, this is an SOS...We are going to drown... Oh, Allah, Allah, help us...

#### Bay watcher from the coast (answering from the radio station)

-This is Captain Martinez from Algeciras Bay watcher Headquarters,... Who are you?... , gggg,ggg, who are you? So, what is your name my friend? I can hear you, but there are a lot of interferences...

#### Migrant:

\_\_\_\_\_ Marwan...

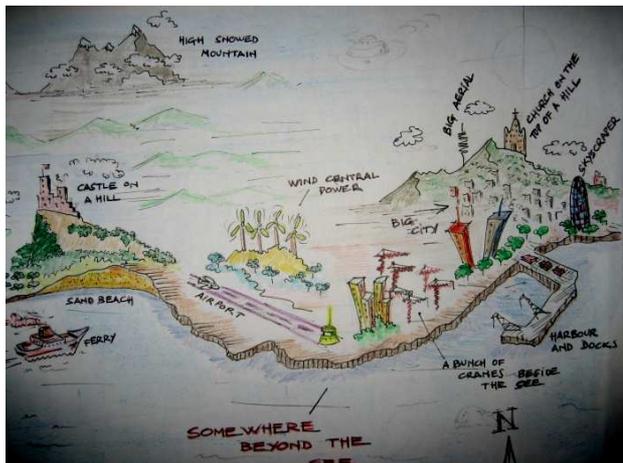
#### Baywatcher:

Ok, guy, take it easy, be cool, and don't worry. We are going to help you as soon as possible. Keep calm, Keep calm. So.....

#### Marwan:

Ok, I will, but ...but...gggggggg.gggggg....please, please

#### Baywatcher:



Ok, Marwan,... Be quiet, and try to take it easy... We'll be there in few minutes, but I'll need you to help us, so... What can you see from your boat, I mean...Could you describe any special thing? Could you see any special object on the skyline? Looking to your RIGHT/LEFT/IN FRONT OF/BEHIND. What can you see? How many people are on the boat?...

**...and now, is time to help the migrants. So, let organize the rescue!!!**



## 8. BUILDING A RAFT IN CLASS

**SESSION 32/33/34/35**

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### The inner tube raft design

Nowadays, thousands of people all around the world are using similar crafts to move away from their land with the hope to get a better life.

The inner tube raft is an ideal experience to promote empathy among the students.

During the process of making a raft students will realize how precarious and shaky these rafts are. We can test the raft in the sea, in a lake or in a swimming pool as I did with my students from the IES BIGUES I RIELLS in 2007.



The boat has to support the greatest amount of people of the class. We will do several tasks on board related with migration.

### OBJECTIVE

Students will design and construct a raft that can support the greatest amount of weight before “sinking”.

**Which tools do you need to use?**

### LIMITATIONS

You will use the materials provided.  
Device cannot be attached to bottom of the testing pool.  
Device must be able to float.  
Device will use a sail.

**...Feel free to enhance the designs provided in the next pages...**



## 8. BUILDING A RAFT IN CLASS

**SESSION 32/33/34/35**

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### TOOLS PROVIDED

You will get both the tools and the materials you need from the lab-tech.

**Materials de suport per a les fitxes de les eines de l'aula de Tecnologia** (Alonso Pallí, Eduard Inglada, Francisco Fernández) <http://www.xtec.cat/aulatec/matfitx.pdf>

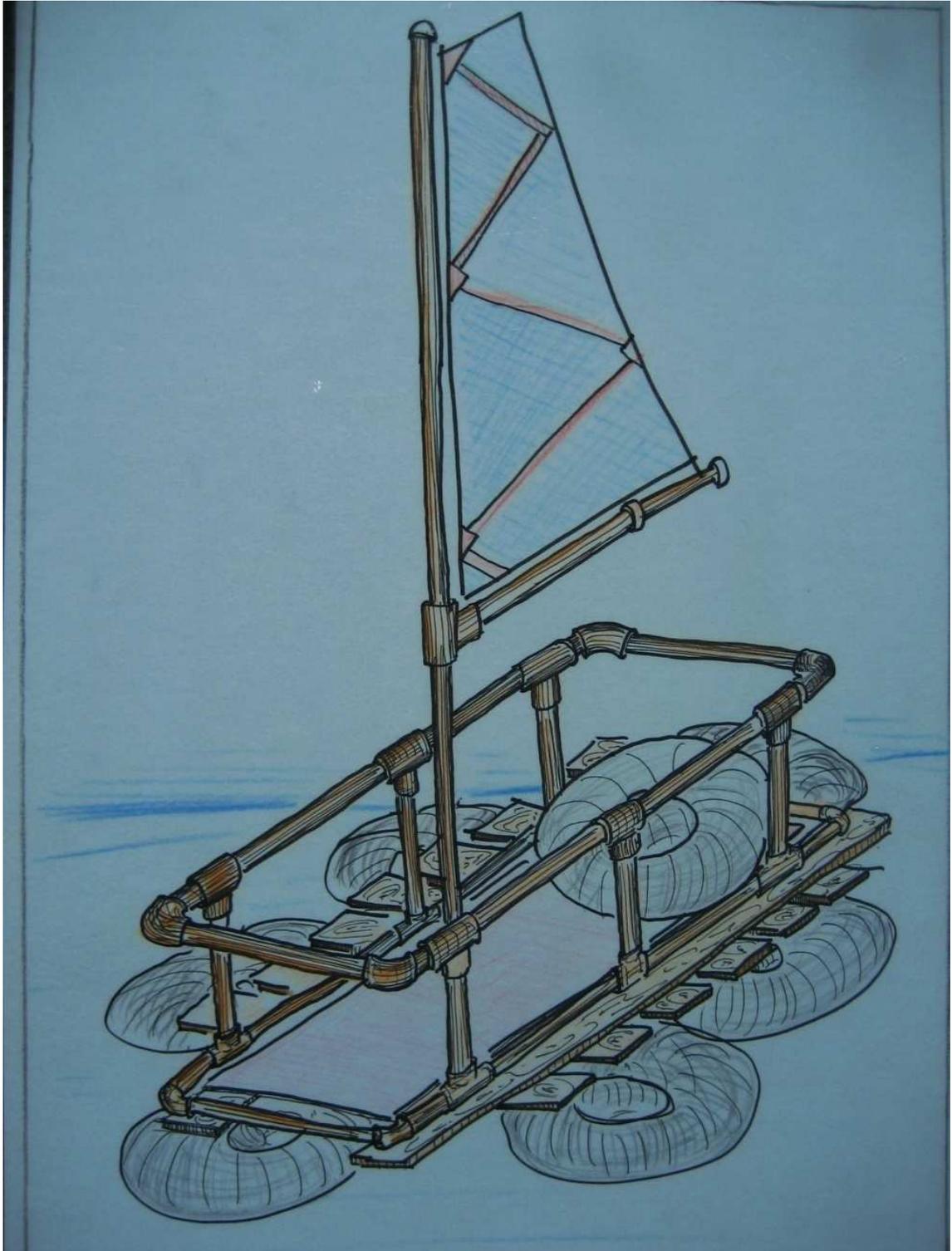
Translate into Catalan the list of tools provided to make the raft

| <b>TOOLS</b>                | <b>EINES</b> |
|-----------------------------|--------------|
| CUTTER                      |              |
| SCISSORS                    |              |
| HAMMERS                     |              |
| BIKE PUMP                   |              |
| PLIERS                      |              |
| BENCH VICE (CARGOL DE BANC) |              |
| FILES                       |              |
| TAPE MEASURE                |              |
| GIMLET                      |              |
| APRON                       |              |
| DRILLS                      |              |
| GAUNTLET                    |              |
| TRY SQUARES                 |              |
| CLAMPS                      |              |
| LEVEL                       |              |
| RASP OR SCRAPER             |              |
| STEEL RULER                 |              |
| PORTABLE ELECTRIC JIG SAW   |              |
| BENCH DRILLING MACHINE      |              |
| PORTABLE ELECTRIC DRILL     |              |
| GOGGLES                     |              |
| HAND SAW                    |              |

## 8. BUILDING A RAFT IN CLASS

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## **8. BUILDING A RAFT IN CLASS**

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In order to help you, the following links will show you different ways to make a raft, some with tubes, some with pop bottles, or timbers.

<http://homepage.eircom.net/~csi/onwater.pdf>

[http://www.associatedcontent.com/article/46450/instructions\\_for\\_making\\_a\\_pop\\_bottle.html?cat=24](http://www.associatedcontent.com/article/46450/instructions_for_making_a_pop_bottle.html?cat=24)

<http://www.xanga.com/fallenkiwi/489249083/glorv.html>

<http://waycoolpictures.blogspot.com/2008/05/how-to-make-bottle-raft.html>

YouTube is also interesting, just write “making a raft” and you will get many videos.

Remember that you will only have 4 sessions to make the raft and the tasks as well.

**GOOD SAILING AND GOOD LUCK AND REMEMBER..  
TAKE CARE!!!**