



WATER: Use, waste and save

NINES ORTIZ GARRE, IES MAREMAR, EL MASNOU, FEBRUARY 2008.

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UNIT 0: WATER EVERYWHERE

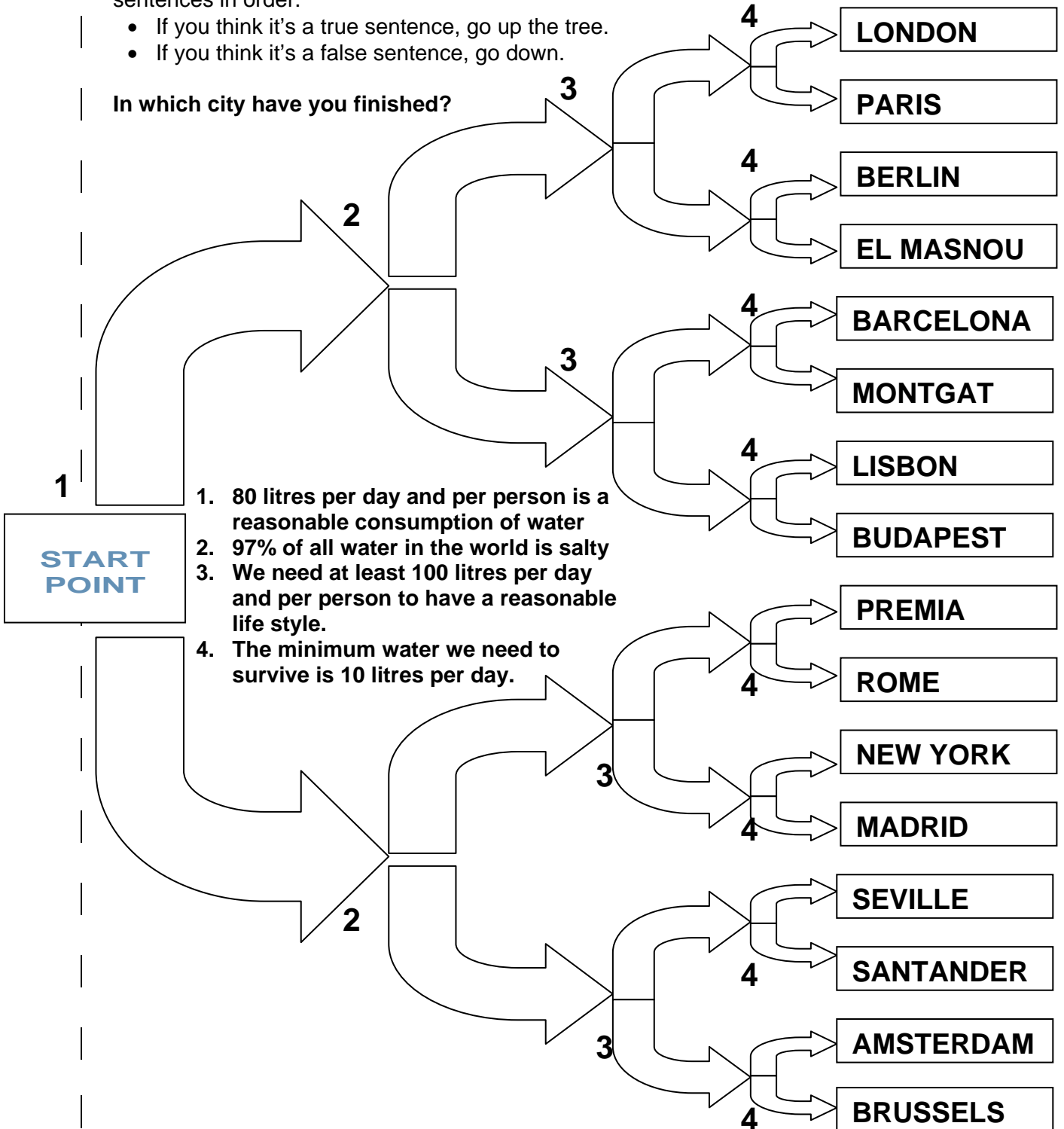
LESSON 1

ACTIVITY 1: PRIOR KNOWLEDGE JOURNEY

Begin this tree on the start point and follow the sentences in order.

- If you think it's a true sentence, go up the tree.
- If you think it's a false sentence, go down.

In which city have you finished?



ACTIVITY 2: PREDICTING and READING

In the table, you'll find some FIGURES

Try to predict what they mean, by building the correct sentences.

3000	%	a day	of all water	walk	is the water consumption of	salty		
97						is not unusual in some developing countries		
2						for a healthy living		
5						for domestic use		
80						km	is the minimum need of water	fresh
20						litres	is	Madagascar citizen
500							to find water	some unreasonable rich people in certain part of the world
3							is the water we require to	a developed world citizen
100								stored in rivers, lakes and undergrounds stores
5,4								a us citizen
1			sustain a reasonable quality of life					

Write those sentences of which YOU ARE SURER.

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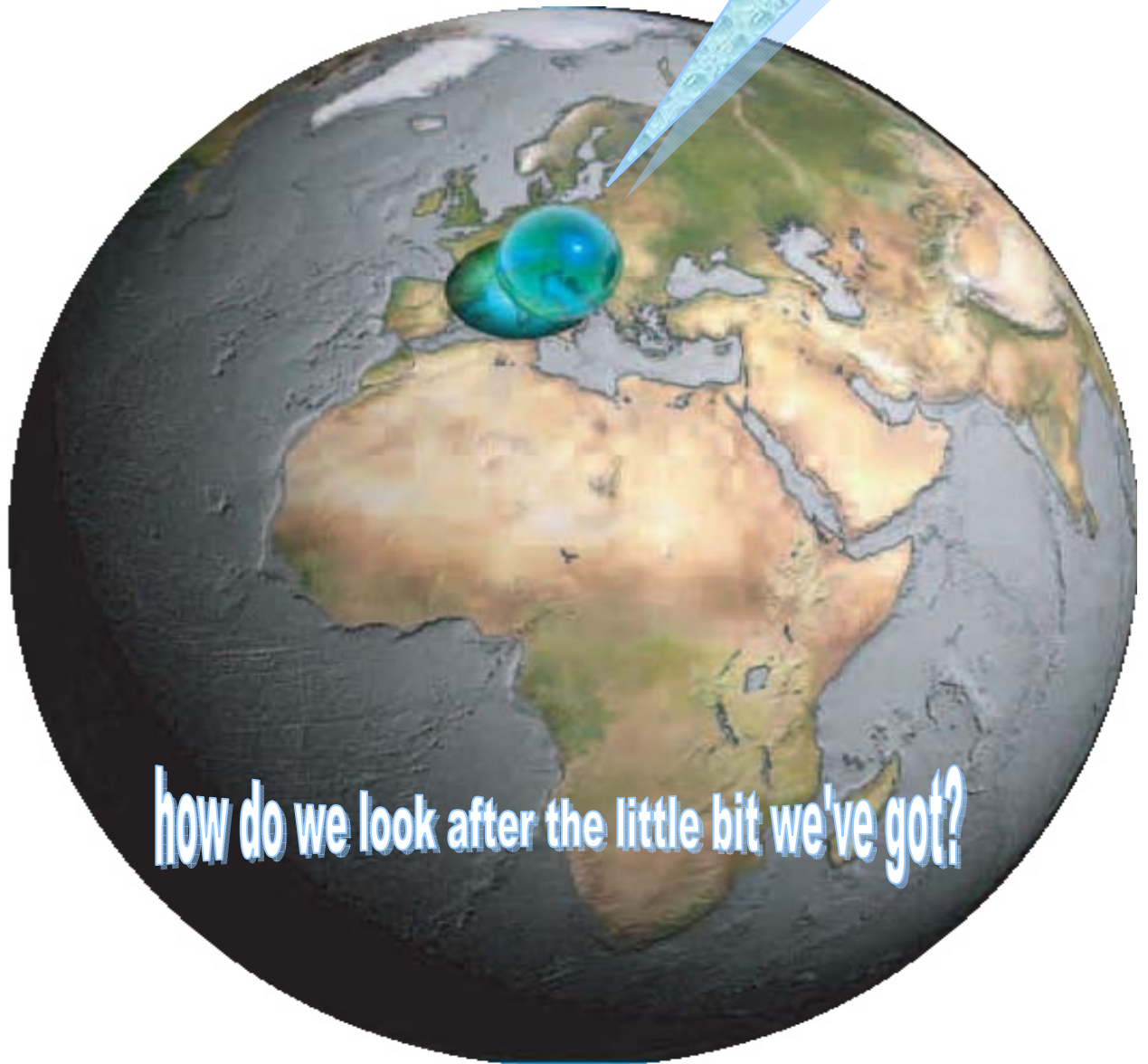
“WATER, THE LIQUID OF LIFE”

THE WATER RAP

**Water, water, water everywhere
Most of it is salty
Less of it is fresh!
Let's take care of it
It's the best we have!!**



**IF ALL FRESH WATER
WAS GETHERED, THIS IS
ALL THERE WOULD BE!!!**



Water, water everywhere, but it's incredible how little of it is directly usable.

We live on the water planet. From space, the blue of the water is its dominant colour.

Nevertheless, over 97% of all water is salty. Less than 3% is fresh, most of which is in the ice caps. The atmosphere, rivers, lakes and underground stores hold less than 1%.

Yet hundreds of millions of human beings have difficulty in getting the 5 litres a day needed for survival. In countries with piped water, consumption is much higher than in developing countries, where a 2Km walk to find water is not unusual.

In fact, as we become more “advanced”, so we use ever-increasing amounts of water.

The **absolute minimum** a person needs for domestic use is **5 litres a day**, with a more realistic figure around **20 litres**, a developed world citizen consumes well **over 100 litres**. When we add in industry, this total can jump up to **500 litres**.

We should remember that **according to the UN, everyone needs a minimum of 20 litres of water a day for healthy living, to sustain a reasonable quality of life we require about 80 litres of water per person and per day**. And that this amount can go from the 5,4 litres per day of a Madagascar citizen, to the **500 litres** per day of a US citizen, or exorbitant amount of **3.000 litres** per person a day in some other rich places.

Our lifestyles depend of the availability of fresh water.

If for whatever reason, our taps ran dry, our daily routines would collapse, our health would be at risk, factories would stop and agriculture would be in dire straits.

This is an immediate danger, increased by the constant reduction in the ice caps, as a consequence of global warming, caused by **the greenhouse effect** for an excess of CO₂ in the atmosphere.

But we can do something to maintain this valuable resource, if **we change our behaviour urgently**.

Our governments have to look for more acceptable uses of water for industry and agriculture.

But every citizen that uses more than 80 litres per day in domestic use should find a way to save those extra litres.

Let's find out if this is possible!

ACTIVITY 3: SUMMARISING DATA

Have you understood this text? Let's find out!

In the table, you'll find all figures included in the text. Match **NOW** the numbers in the correct sentence.

3000	% km litres	a day of all water walk	is the water consumption of is the minimum need of water is to find water is the water we require to	salty
97				is not unusual in some developing countries
2				for a healthy living
5				for domestic use
80				fresh
20				Madagascar citizen
500				some unreasonable rich people in certain part of the world
3				a developed world citizen
100				stored in rivers, lakes and undergrounds stores
5,4				a us citizen
1	sustain a reasonable quality of life			

Now, summarise the text on the previous page in your own words using at least **3 sentences from the table above**.

.....

.....

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Summarise the text in **only one very important sentence** for you:

.....

.....

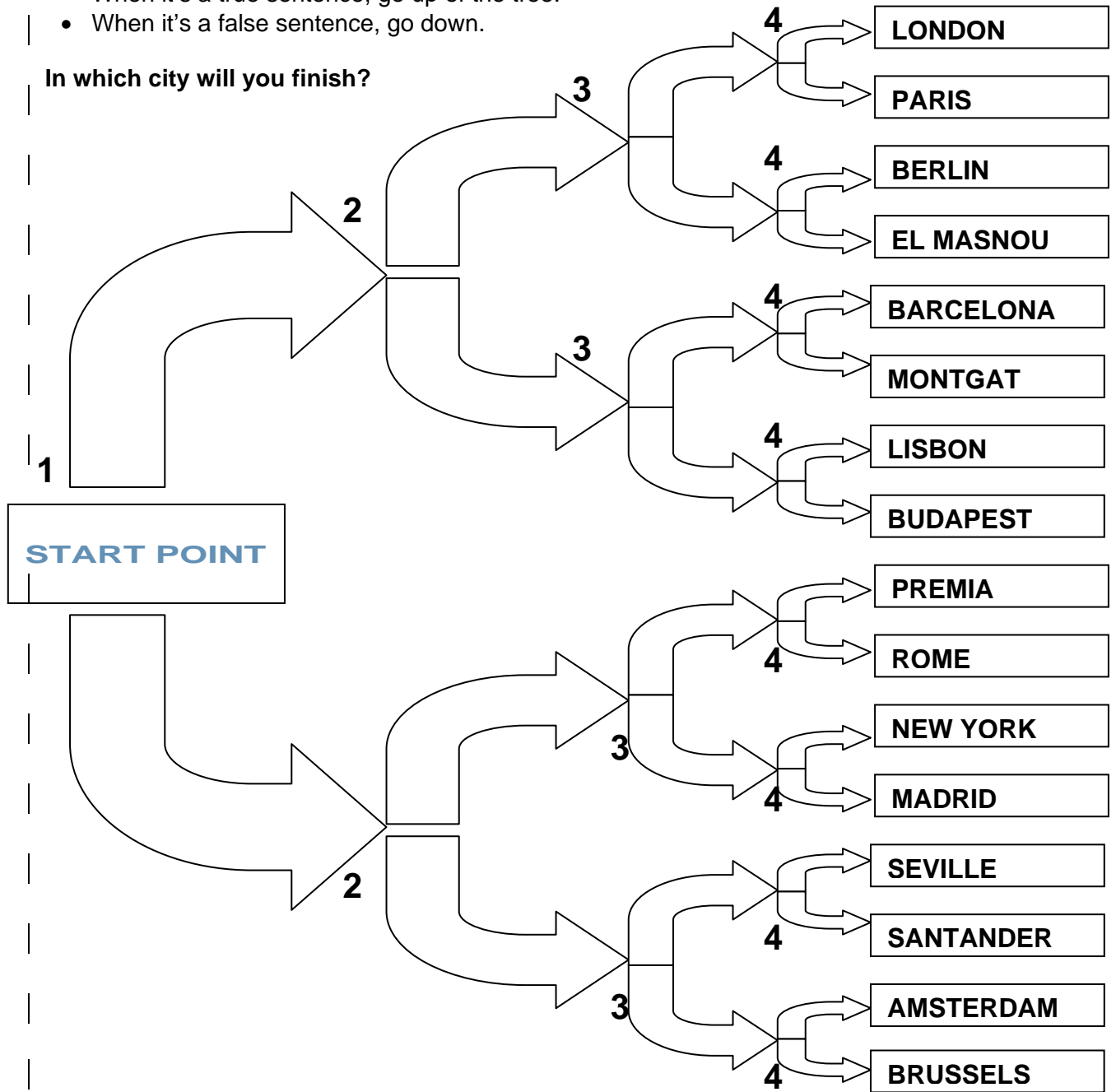
.....

ACTIVITY 4: ASSESSMENT JOURNEY

Working in pairs, think of 4 sentences, true or false about water use..

- When it's a true sentence, go up of the tree.
- When it's a false sentence, go down.

In which city will you finish?



1.
2.
3.
4.

UNIT 1. HOW MUCH WATER DO WE USE AT HOME?

LESSON 1

ACTIVITY 5. HOW MUCH WATER DO WE USE AT HOME?

SURVEY TABLE

To know how much water we use at home we must:

- Know the flow of every tap at home.
Here you can find the most common flows.

TAP / FAUCET	FLOW
Washbasin tap	0,1 l/s
Shower tap	0,2 l/s
Bath tap	0,3 l/s
Kitchen sink tap	0,2 l/s
Garden watering plants tap	0,2 l/s

- Know the volume/capacity of most tanks at home.
Here you can find the most common volumes:

COMPONENT	VOLUME
Modern toilet tanks. Double choice.	3l / 6l
Old toilet tanks	6l / 10l
Bath tub	About 350l

- Know how much water our electric components use for a normal cycle

MACHINE	VOLUME
Washing machine. White clothes program	60l
Washing machine Coloured clothes program	40l
Dishwasher eco program	20l

Every machine uses a different volume of water. **These are indicative volumes.**

- Know how long every member of the family spends in each water activity.
All times must be shown in seconds.
For example:
Father, **shower**: 6 minutes. 6 minutes x 60 seconds per minute= 360 seconds
Brother, **teeth brushing**: 2 minutes. 2 minutes x 60 s/min= 120 seconds
- Make an exhaustive survey **of each activity** at home, **of every member of your family**, during **7 days** in the following way:

Week 1: Tuesday and Friday

Week 2: Wednesday and Saturday

Week 3: Monday, Thursday and Sunday

In 3 weeks, you should have a complete table of all activities and a total calculation of all water consumption for an average week.

To create the table, follow these instructions:

1. The table will have as many rows as needed to have:
 - Number of water individual activities +
 - Number of common activities +
 - First row for headline +
 - Last row to summarize all water used

2. The table will have as many columns as needed to have:
 - Number of members of the family +
 - A column for common activities +
 - A column for the activities and appliances used +
 - Last column for the flow of each tap and volume of tanks.

3. You can add sub-columns to put the amounts of water used, beside each family member and the common activities column.

4. Once you have created the table, with its corresponding rows and columns, fill all cells.
 - Choose an appropriate style of letter and apply to all the table
 - Put the names of your family, the activities, the flows and all pre-determined names.
 - Begin to check the time used for each activity.
 - Introduce it to the corresponding cell and convert into seconds (multiply for 60 seconds, each minute)
 - Multiply each time for the flow corresponding to its tap.
 - Then, you will have the water used in every activity.
 - When finished all the activities, join all the data and mark the total amount per family member and the total amount per family in that day.

5. This will be the table of a certain day. Do the same 7 times for every week day, as shown in the last paragraph of the last page.

On the following page you'll find an example of a finished consumption table.

Monday,of 200....

Father	Mother	Sister	me	Common	Activities and appliances	Flow and volume
6'x60sx0'2 l/s= 72 l	3'x60sx0'2 l/s= 36 l	5'x60sx0'2 l/s= 60 l	5'x60sx0'2 l/s= 60 l		Showering	0'2 l/s
2x20sx0'1 l/s= 4 l	3x20sx0'1 l/s= 6 l	2x25sx0'1 l/s= 5 l	2x20sx0'1 l/s= 4 l		Teeth brushing	0'1 l/s
7x10sx0'1 l/s= 7 l	6x15sx0'1 l/s= 9 l	6x13sx0'1 l/s= 7'8 l	5x18sx0'1 l/s= 9 l		Hands washing	0'1 l/s
20sx0'1 l/s= 2 l	20sx0'1 l/s= 2 l	30sx0'1 l/s= 3 l	25sx0'1 l/s= 2'5 l		Face washing	0'1 l/s
40sx0'1 l/s= 4 l	_____ 0 l	_____ 0 l	_____ 0 l		Shaving	0'1 l/s
_____ 0 l	_____ 0 l	1'x60sx0'1 l/s= 6 l	40sx9'1 l/s= 4 l		Hair	0'1 l/s
7 x 6 l= 42 l	6 x 6 l= 36 l	6 x 6 l= 36 l	5 x 6 l= 30 l		WC (use of)	6 l
				5'x60sx0'2 l/s= 60 l	Cooking	0'2 l/s
				2'x60sx0'2 l/s= 24 l		
				2x3'x60sx0'2 l/s= 72 l	Dishwasher	0'2 l/s
				2 x 40 l= 80 l	Washing machine	With: 40 l
				1 x 60 l= 60 l	Colour: 60 l	
				_____ 0 l	Plants watering	0'2 l/s
				3'x60sx0'2 l/s= 36 l	House cleaning	0'2 l/s
				20sx0'2 l/s= 4 l		
131 l	89 l	117'8 l	109'5 l	336 l	All together:	763'3 l

Name:.....

LESSON 2

ACTIVITY 6: CONSUMPTION TABLE CONSTRUCTION

INSTRUCTIONS

1. Make groups of 4 people.
2. In your group, decide who is father, mother, brother and sister.
3. Look at the table and complete the table and complete your column.
4. Together design the full table and the common activities.

ACTIVITIES OF THIS FAMILY

- Both parents have a 5 minute shower every day.
- The sister spends 9 minute under the shower.
- The brother showers at the football club where he plays.
- Each member of the family brushes their teeth twice a day and spends 2 minutes every time, and leaves the tap running.
- Each member of the family goes to the toilet an average of 4 times a day, and the toilet tank has 10 litres.
- They use the washing machine once a day and the average use of water of it is 40 litres.
- They wash the dishes by hand twice a day, and while rinsing they let the tap run for approximately 10 minutes.
- They water the garden for 10 minutes per day.

As you have the flow of every tap (look at page 10), complete the table with **ONLY THE ACTIVITIES MENTIONED**.

QUESTIONS:

1. How many litres does the father use for his own activities?.....
 - **Add all items of father's column**
2. How much water does this family use in one day?.....
 - **Add all items of each member plus common activities.**
3. What is the average use of water per member of family and day?.....
 - **Divide the total amount per the number of family members (4).**

Write here your calculations

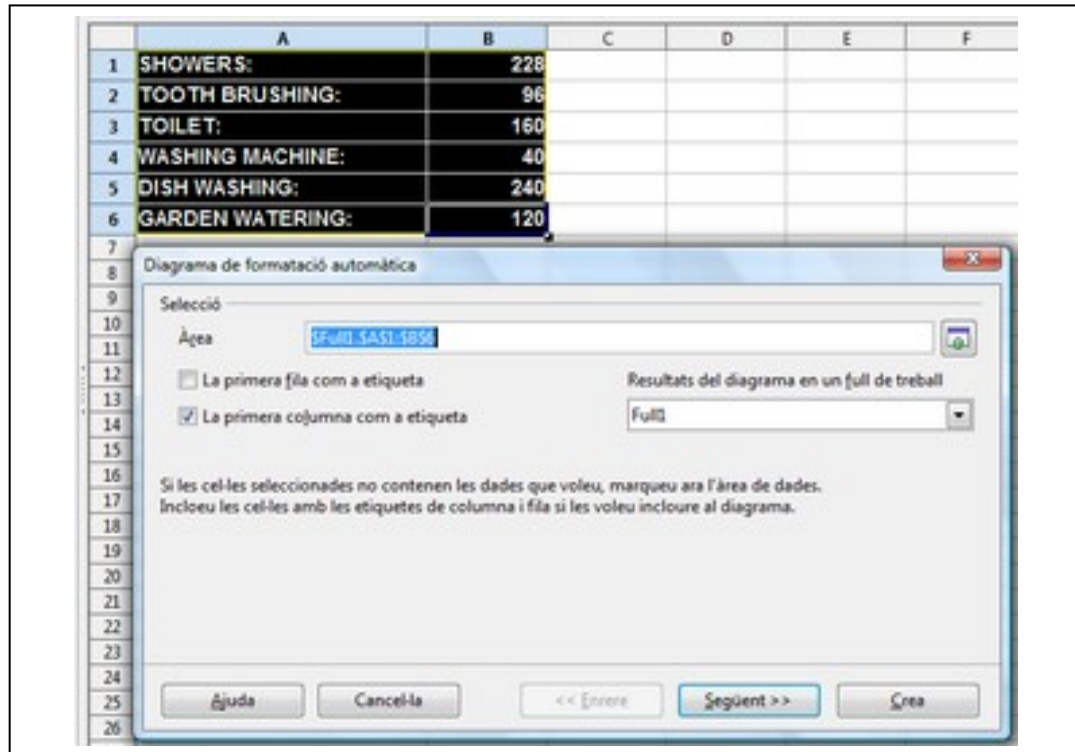
FATHER	MOTHER	BROTHER	SISTER	COMMONS	ACTIVITY	FLOWS
TOTAL						

ACTIVITY 7: PIE CHART

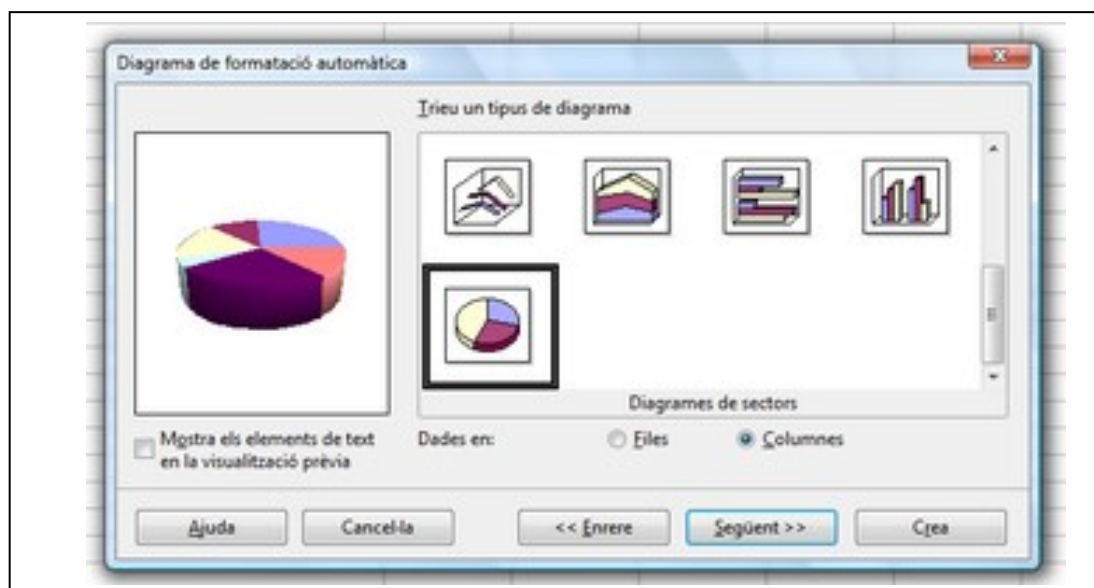
With the results from the table above, create the consumption pie chart for this family.
Use shareware: **OpenOffice.org Calc**

To create it, follow the instructions:

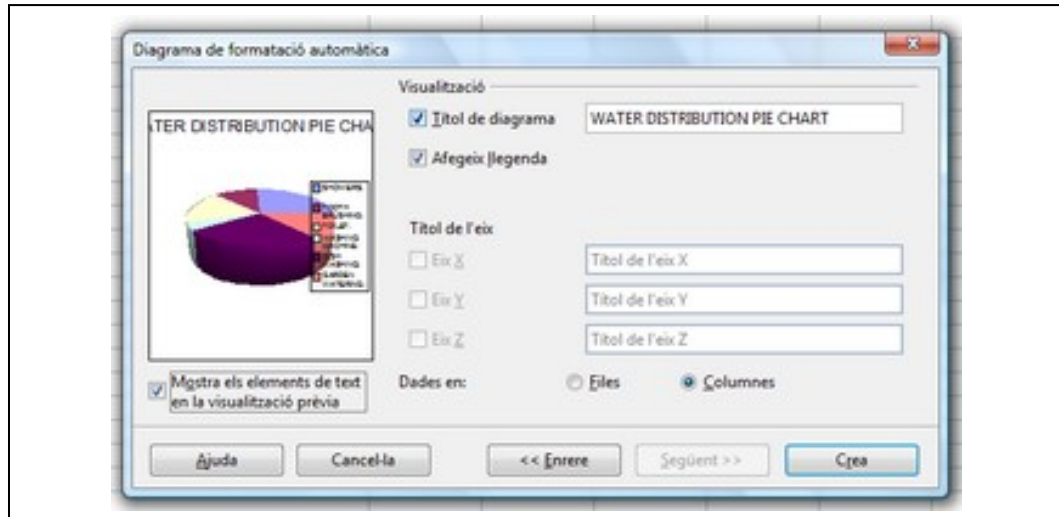
1. Create an OpenOffice.org Calc document
2. Insert in the first columns and rows the total amount of water used in every activity. Don't put any unit: just the **figures**.



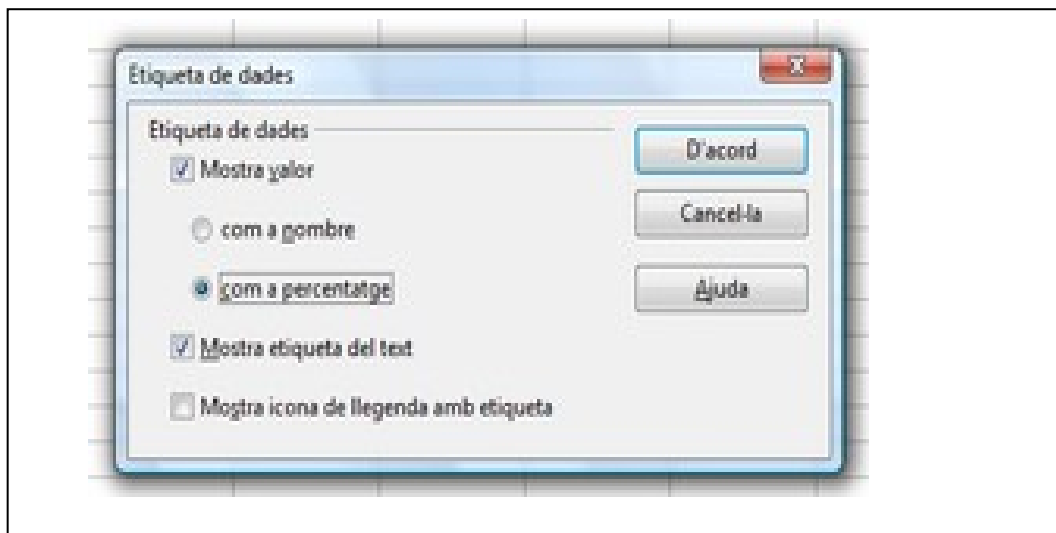
3. Select all cells used
4. Open the "Insert" menu, and choose the "CHART WIZZARD" option. A new window will open and you have to choose the "PIE" wizards. Choose the pie chart you wish.



5. Follow instructions in the Chart wizard window. (Clicking Next). You will see the results before finishing.
6. Now create a title for your pie chart.

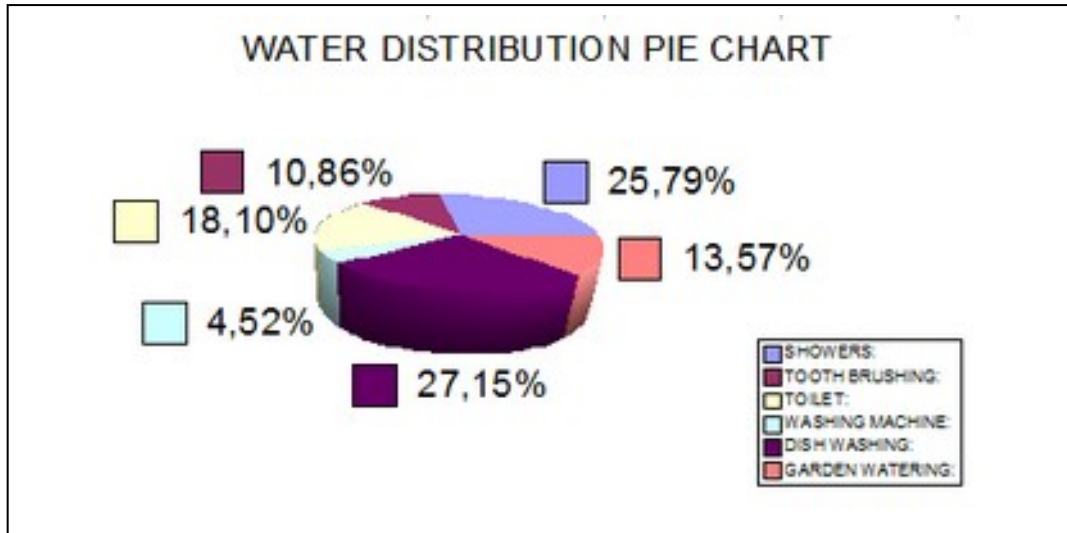


7. Click on “next” (crea) until Finish.
8. When your pie chart is edited adjust it until you have the pie chart you wish.
9. Add the percentages. Clicking the menu Insert, choose “FORMAT DATA SERIES” (Etiqueta de dades), and choose “PERCENTAGE”.

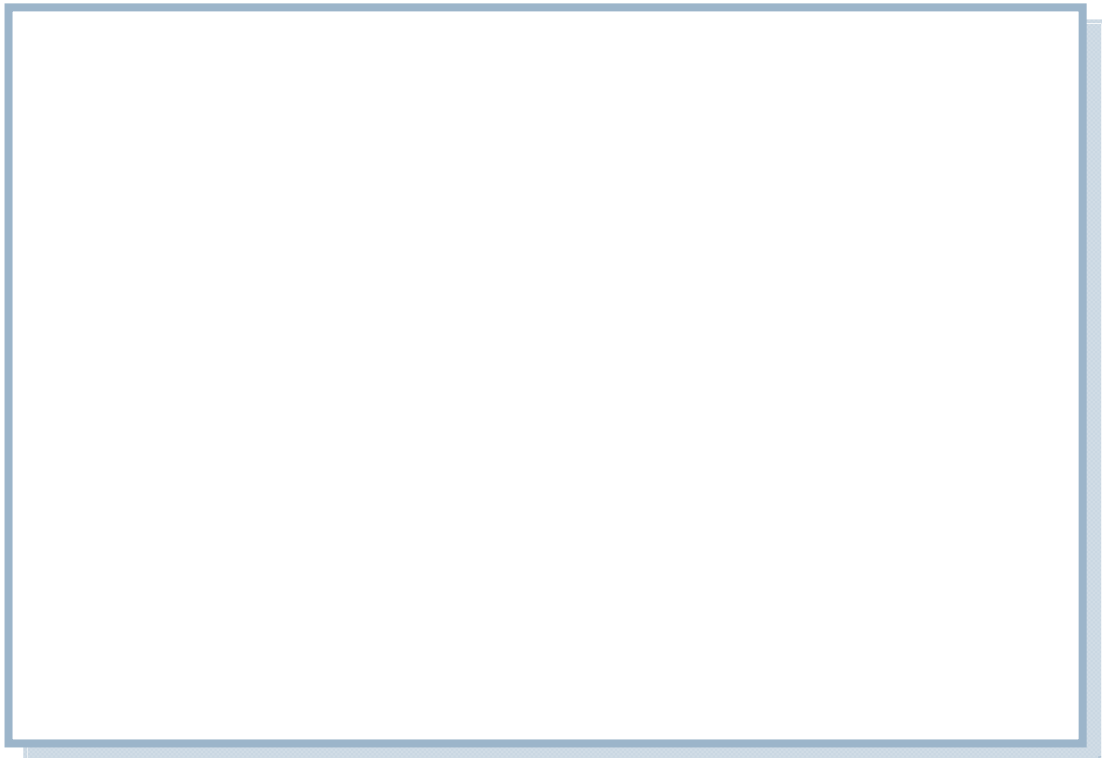


10. Clicking on the edge of the area, choose the font type, font size, colours and other features to have in your final pie chart.

You should have something similar to this.



11. Copy and paste it into a word document. Print it and paste it here.



LESSON 3

ACTIVITY 8: ENGLISH WATER BILL ANALYSIS.

In EL MASNOU, the water distribution company is called.....

In NORWICH (NORFOLK, ENGLAND), the water distribution company is called:
ANGLIAN WATER.

This is an ANGLIAN WATER water bill.

anglianwater

Account number 114 393 176	Customer name(s)	PO Box 770 Lincoln LN5 7WX
Account date 11 Jan 08	Premises supplied	VAT Reg. No: 514060002
Payment number		www.anglianwater.co.uk

how your charges have been calculated:

Balance of last bill		£192.18
Payments received (since last bill)		
15/08/07	Payment	£47.00cr
20/11/07	Payment	£145.18cr
Total payments		£192.18cr
Balance brought forward as at account date		£0.00

meter no: 98M021062U meter size: 15mm

Readings	Standard rate	
Present - Read 11/01/08	1014	
Previous - Estimate	980	
Volume used - cubic metres (m ³)	34	

Water supply

Volume used	34m ³ x	115.14p	£39.14
Standing charge	164 days x	6.56p	£10.75
Total water charge			£49.89

Sewerage service

Volume used (foul & surface) (at 90% of water used)	30.60m ³ x	124.49p	£38.09
Standing charge	164 days x	18.31p	£30.02
Total sewerage charge			£68.11

Bill amount		£118.00
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Image 2: private bill

SOME INTERSESTING WORDS

Try to translate the following words

ENGLISH WORD	CATALAN	SPANISH
BILL		
CUSTOMER		
ENQUIRIES		
ACCOUNT		
SEWERAGE SERVICE		
DRINKABLE WATER		
BILL AMOUNT		
TAX		
PAYMENT		

Look carefully at the water bill and answer the following questions:

1. Which is the period quoted in this bill?

From.....to

2. How much water has this costumer used in this bill?

.....m³, orlitres

3. How much does a m³ of water costs in Norwich?

.....£ or GBP (Great Britain Pounds)

4. What do you think the SEWERAGE CHARGE is?

- a. A tax on the cost of cleaning used water**
- b. A tax on the cost of purification water to make it drinkable**
- c. The price of every m³ of water used**


5. This bill belongs to a 4 member family. How much water do they use per person and per day?

..... litres per person and day

Write here your calculations

ACTIVITY 9: WATER BILLS COMPARISON


Now, look at a water bill of a citizen of El Masnou



SOREA
SERVEI MUNICIPAL DE SUBMINISTRAMENT D'AIGUA POTABLE DEL MASNOU
SOREA N.I.F.: A08146367
C/ITALIA,50 1ª PLTA."EDIFICI CENTRE"
08320-EL MASNOU
tel.935-55.06.28 - / http://www.sorea.es/elmasnou

TELEFON ATENCIÓ CLIENT
902 250 070

TELEFON AVARIES
902 250 370



NÚM. CONTRACTE/Nº CONTRATO		DATA EMISSIÓ/FECHA EMISIÓN
2070011632		19-06-2007
NÚM. FACTURA/Nº FACTURA		PERIODE/PERÍODO
07018346		ABR/JUN-2007/2
NÚM. COMPTADOR Nº CONTADOR	DIÀMETRE (mm) DIÀMETRE (mm)	NOMBRE D'UNITATS Nº UNIDADES
01077462	13	1
LECTURA ANTERIOR	LECTURA ACTUAL	CONSUM/ CONSUMO (m³)
5-03-2007 670	6-06-2007 713	43

TITULAR - DOMICILI DE SUBMINISTRAMENT/DOMICILIO DE SUMINISTRO: 35103261V

TARIFA: DOMÈSTICA
Junta Govern Local de 22-02-2007
CÀNON AIGUA-Decrets 103/2000,3/2003,47/2005

Sorea, Sociedad Regional de Abastecimiento de Aguas S.A. - CIF A08146367 - Avda. Diagonal 211, 08018 Barcelona - R.M. Barcelona, Tomo 36067, Folio 55, Hoja B 16139, Insc. 243

FACTURA	2070011632	2500230100000
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Detall de la factura	Quantitat	Preu unitari	Import Eur.	Sub-total Eur.	% IVA
SERVEI MUNICIPAL D'AIGUA A08146367:					
AIGUA					
Quota de servei			3,24		
1 bloc consum	43,00	0,3043	13,08	16,32	7
CONSERVACIÓ					
Comptador			1,47	1,47	16
IVA 7,00 %S/			1,14		
IVA 16,00 %S/			0,24	1,38	
TOTAL SERVEI MUNICIPAL D'AIGUA				19,17	
AGÈNCIA CATALANA DE L'AIGUA Q0801031F:					
CÀNON DE L'AIGUA					
Minim 0,3287 x 1	18,00	0,3287	5,92		
1 Tram 0,3287 x 1	12,00	0,3287	3,94		
2 Tram 0,3448 x 2	13,00	0,6896	8,96	18,82	7
IVA 7,00 %S/			1,32	1,32	
TOTAL AGÈNCIA CATALANA DE L'AIGUA				20,14	
Total factura				39,31	

MISSATGES/MENSAJES

- La vostra despesa mitjana en aquest període ha estat de 0,41 Eur./dia, dels quals 0,18 Eur./dia corresponen a aigua.
- Horari d'oficines del servei: de dilluns a divendres de 9 a 13 hores.
- Dijous tarda de 15,30 a 19.30 hores, excepte juliol, agost i setembre.

INFORMACIÓ ESTADÍSTICA/INFORMACIÓN ESTADÍSTICA

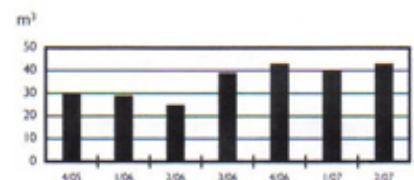


Image 3: private bill

NINES ORTIZ GARRE. IES MAREMAR. EL MASNOU

Find the differences between the 2 bills

Fill in the following table with the differences found.

	SOREA	ANGLIAN WATER
Price per m ³ of water used		
Different price per m ³ , depending on the amount of water used.		
Tax per sewerage service		
Amount of water used per person and day		
Total bill amount		

England doesn't have the problem we have in Catalonia:

1. What problem do we have? _____
2. Nevertheless, the price of the water is _____ than in Catalonia.
3. What do you think about the price of water in Catalonia? _____

4. Do you think the price of water in Catalonia and Spain will change in the future? _____
5. Why? _____

UNIT 2: HOW IS HOME PLUMBING SYSTEM?

LESSON 1

ACTIVITY 10: PRIOR KNOWLEDGE. WATER AT HOME

At home, there are several components from which you can obtain water. Some others just use it to develop their function.

You can easily recognize most of them. Try to fill in the blanks to complete the names of those components.

 4	_____ -----	 10	_____ -----
 5	_____ -----	 11	SHOWER _____ -----
 6	CLOSE COUPLED -----	 12	SHOWER SET _____ -----
 7	2 BOWLED KITCHEN _____ -----	 13	_____ -----
 8	SHOWER _____ -----	 14	SHOWER _____ -----
 9	_____ -----	 15	BATHROOM _____ or _____ -----

Images 4-15: <http://www.global-b2b-network.com/>

ACTIVITY 11: LISTENING AND COMPREHENSION

“UNBLOCK A SINK WITH A TUBULAR TRAP”

SOME INTERESTING WORDS

Try to translate the following words

ENGLISH WORD	CATALAN	SPANISH
PLUMBER		
SINK		
BLOCKED / UNBLOCK		
BUCKET		
PLUNGER		
WIRE		
BLEACH		
WRENCH		
PIPE		
TRAP		
SCREW / UNSCREW		

After viewing the video, fill the blanks on the instructions to **UNBLOCK A SINK** using the words in the table.

LISTEN

Unblock a Sink with a Tubular Trap. A _____ can easily become _____ through everyday use and there is often no need to call a _____ as unblocking it is fairly easy.

We show you two different methods to help you _____ a household _____.

Step 1: You will need:

- 1 _____
- 1 bowl
- 1 _____
- some kitchen towel
- some newspapers
- a piece of _____
- a cloth
- some household _____ or disinfectant
- a _____

Step 2: Place newspapers onto the floor

Put some newspapers down onto the floor in case of any water spillage

Step 3: The _____ Method

Block the overflow of the _____ using some wet kitchen towel. This prevents air from escaping when you start plunging.

Using both hands, push the _____ down several times over the plug hole. This will force water through the waste _____ and hopefully dislodge the _____.

Step 4: Removing the _____

If the _____ hasn't solved the problem you will need to remove the _____ beneath the _____ and examine it for _____.

Step 5: Bale out the water

It's a good idea to bale out as much of the water in the _____ as possible using a bowl or a _____.

Step 6: Put the plug in

If your _____ still has water in – like this, then you should put the plug in unless you want an impromptu shower later on.

Step 7: Position the _____

The _____ connected to the underside of the _____, typically a "U" shaped piece of drainage _____. As all _____ are connected to the foul water drain of the property, the _____ is full of water all of the time which creates a permanent barrier stopping smelly gasses from entering your home. Place the _____ underneath the _____ below the _____.

Step 8: _____

Use either a _____ or your hands to _____ the _____. Once both ends of the _____ are fully loosened, remove it and empty the contents into the _____.

Step 9: Clear with _____

Use the _____ to clear away any _____ both inside the _____ and in the _____.

Step 10: Replace the _____

Carefully reposition the _____. Make sure to _____ the nuts on tightly so that they don't leak.

Step 11: Test the _____

Run some water from the taps down the _____ keeping an eye on the _____ for leaks. If the _____ does not back up again, you've completed the job.

Step 12: Pour some household _____ down the _____

Pouring some household _____ or disinfectant will cleanse your _____ and clear away any remaining residue

LESSON 2

ACTIVITY 12: ORDER A PROCESS. PRONUNCIATION

Decide the order of the process, and after having it decided, read in loud voice your label.

ACTIVITY 13: MATCH WASTEWATER ELEMENTS

The plumbing techniques include:

- Wastewater system (mainly with CPVC)



**STRAIGHT
PVC
CONNECTOR**
1



**90/45 DEGREE
PVC
ELBOW**
2 - 2'



**EQUAL
TEE and
"Y" TEES**
3 - 3'

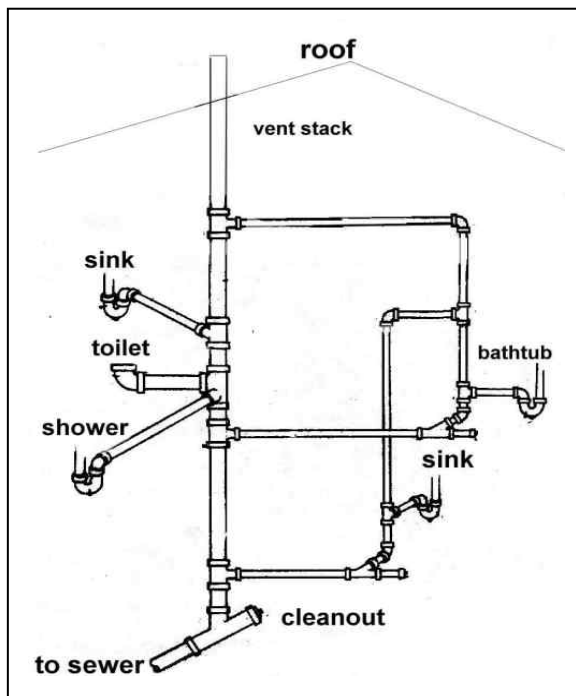


**SEAL
PLASTIC
TRAP**
4



**CHROME
BASIN
TRAP**
5

Images 16-20: <http://im.edirectory.co.uk/>



Mark in the picture on the left the name of every piece in the wastewater net. Make a list of how many of the following pieces you need for it:

- 90 degree CPVC elbow:
- 45 degree CPVC elbow:
- Equal tees:
- Equal "Y":
- Seal plastic traps:

Image 21: www.make-my-own-house.com/images/uprightsystem.jpg

- Fresh water system (mainly with copper)



**COPPER
STRAIGHT
PIPES**



**90 DEGREE
COPPER
ELBOW**



**45 DEGREE
COPPER
ELBOW**



**EQUAL
TEE**



**GATE
VALVE**



**PLATED BALL
VALVE**

Images 22 -27: <http://im.edirectory.co.uk/>

LESSON 3

ACTIVITY 14: MATCHING ELEMENTS AND SYMBOLS

What do you think this drawing is?

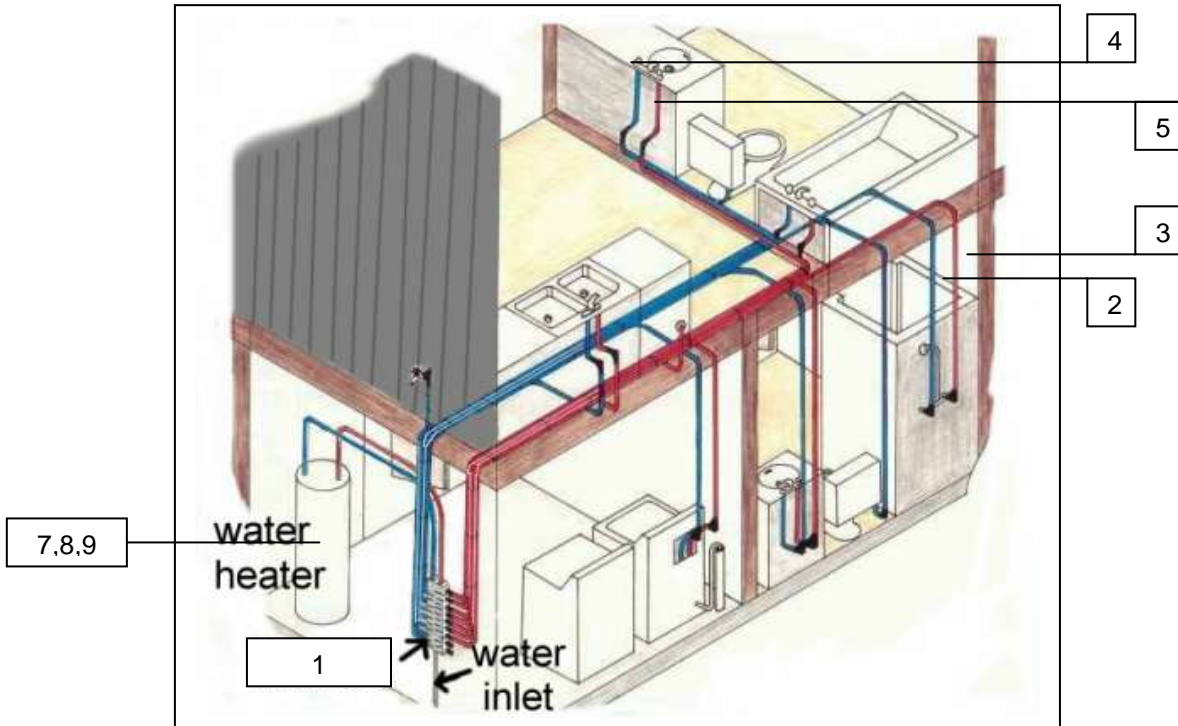


Image 28: www.make-my-own-house.com/images/Pextubing.jpg

But as it is difficult to draw, there are technological standardised symbols for plumbing.

Match the number of each element with its corresponding name and symbol IN THE LEFT COLUMN. TRANSLATE THE NAME OF EACH ELEMENT.

	General counter	ENGLISH TERMS	CATALAN TERMS	SPANISH TERMS
	Cold water pipe			
	Hot water pipe			
	Cold water tap			
	Hot water tap			
	Key valve			
	Tankless gas heater			
	Gas heater with water tank			

PLUMBING RESIDENTIAL SYSTEMS

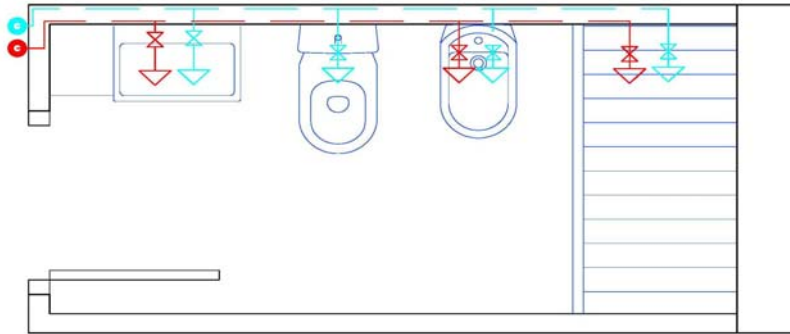
Generally there are two basic types of plumbing system layouts found in typical residential piping: **series plumbed and branched**.

There are of course, many variations and combinations of the two types.

SERIES PLUMBED SYSTEM.

The diagram below represents a typical series plumbed system.

Series plumbed system means that the water lines go from one fixture to the next, then from that fixture to the next, etc.



BRANCHED PLUMBED SYSTEM and MIXED PLUMBED SYSTEM.

Branched plumbed system means that the water lines go individually from the main pipe and from the heater to each component/water outlet.

Usually, the best is a mixed system: series-branched, where there is a general branched system for each water room (kitchen, bathroom1, bathroom 2...), but in every water room, there is a serial system. It's cheaper than the completely branched system, but when a part of the pipe inside the water room bursts, all the room is out of service.

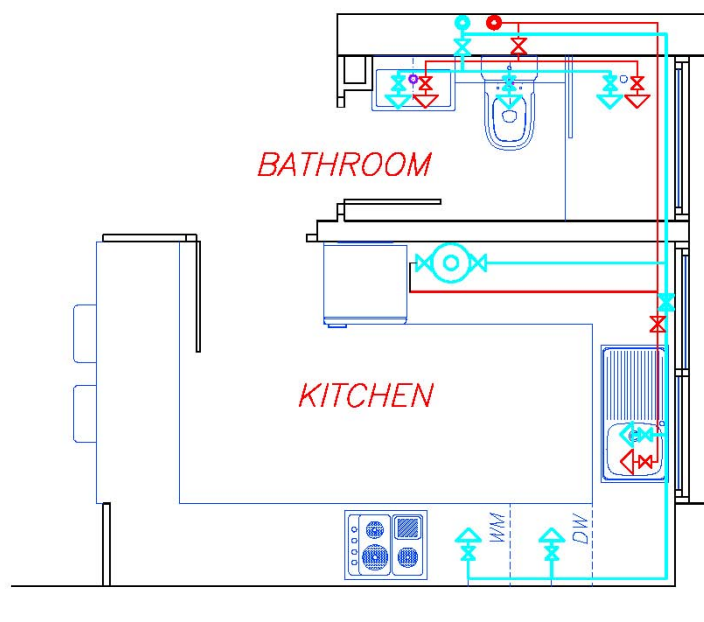


Image 29-30: Author's drawings

LESSON 4

ACTIVITY 15: PLUMBING LAYOUT IN YOUR HOME

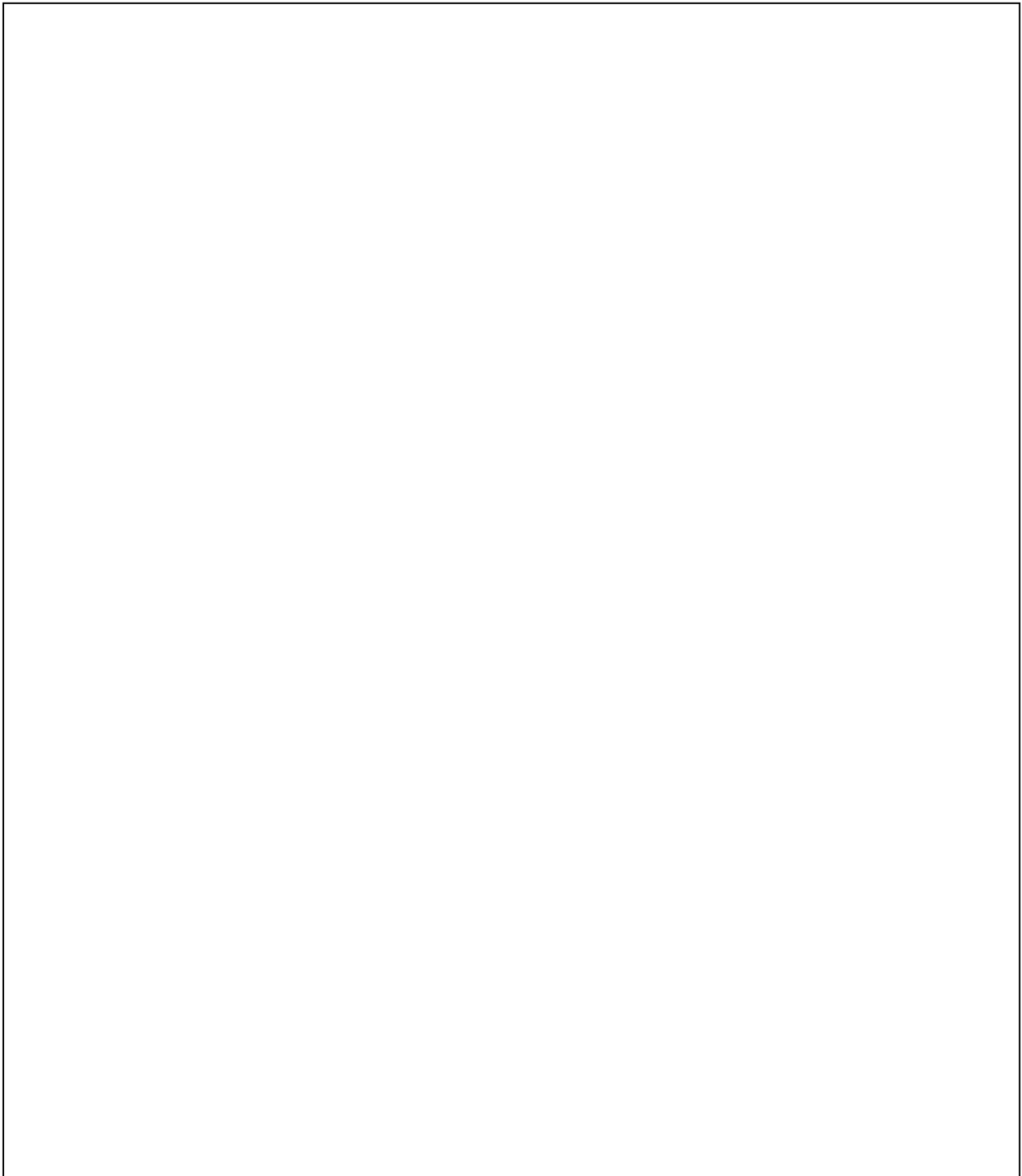
Draw the plumbing layout in your home.

Using a scale of 1:50 (every **1cm** on the drawing will represent **50cm** in reality), draw all water rooms (kitchen, bathroom(s), washing room...).

Remember you've already drawn these kinds of layouts in the past building unit!

Every water element must have

- its corresponding tap, with the corresponding key valve,
- A general key valve for each pipe in each water room,
- The heater system you have at home situated in the correct place.



LESSON 5

ACTIVITY 16: TANK WATER HEATERS (R & C)

GAS HEATER WITH WATER TANK

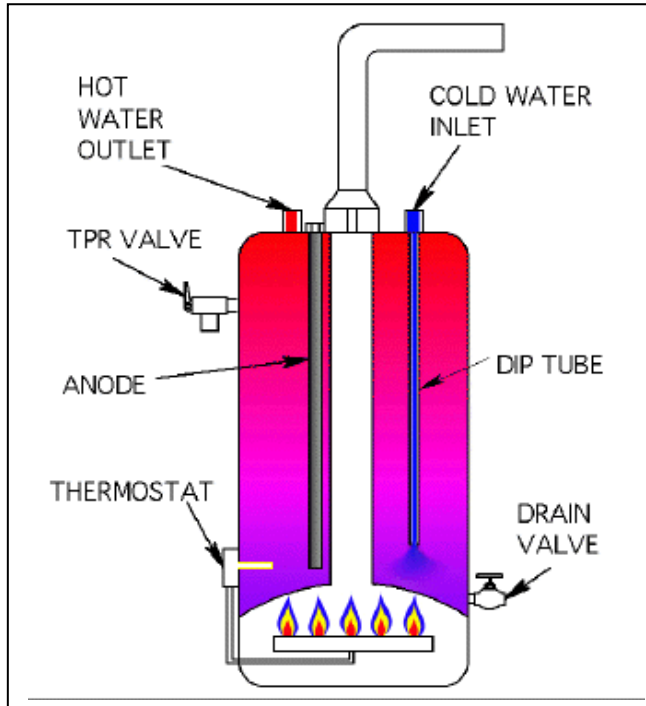


Image 31: www.chillipepperapp.com/gwh.htm

Gas water heaters are the most common type. Gas gets the tank up to a temperature about twice as fast as electric units do, and cost less than a half of what it takes for an electric unit.

Warning! The tank should be firmly fixed to a structure such as the wall to prevent a potential gas fire if the tank falls over and breaks the gas connection.

ELEMENTS

On the drawing, there are 7 elements.

Fill the labels with the corresponding name, from the drawing.

-

Storage type units that have a tank have a (Temperature Pressure Relief). Tankless units usually don't have one. It's a safety device that releases pressure from the tank if the pressure or temperature reaches unsafe levels.

-

The is a metal rod usually MAGNESIUM or ALUMINIUM which helps prevent corrosion of the metal tank. Once the anode is gone, the tank itself begins to corrode. To prolong the life of the tank, make sure your anode rod is still there, and replace it when needed.

-

The is a long narrow tube that directs incoming cold liquid to the bottom of the tank, preventing premature mixing of incoming cold water with without hot liquid at the top of the tank.

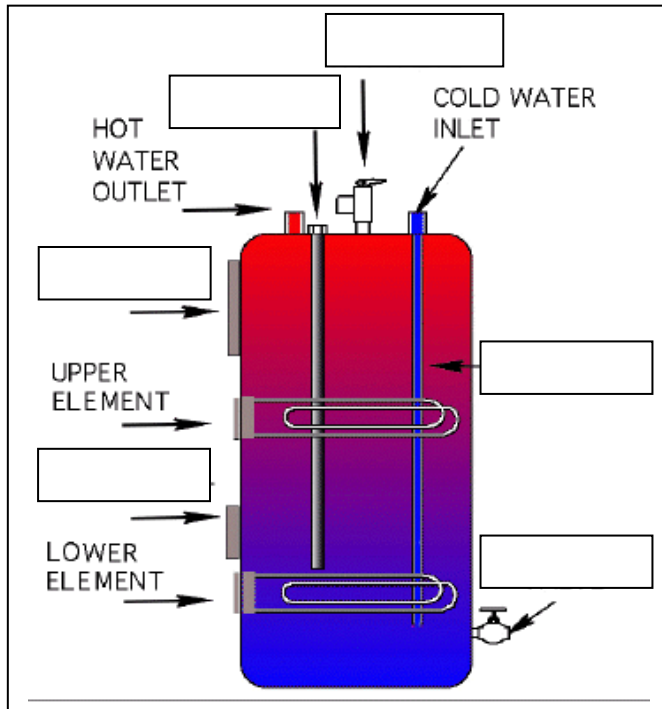
-

The senses when the tank drops below a certain pre-set temperature and causes the burner to come on. When the desired temperature is reached, the thermostat shuts off the burner.

-

The allows the tank to be drained for various reasons including periodic removal of sediment or for replacement. In areas with high mineral content, it is recommended to drain at least 5 gallons from the drain valve every six months or so to prevent sediment build up.

ELECTRIC WATER HEATER



Electric water heaters are very common in UK, but not so much in Spain. All of them have a tank to accumulate the heated water, so they need a huge space to be placed on.

ELEMENTS

- **TPR VALVE**
- **ANODE**
- **DIP TUBE**
- **THERMOSTAT (it has 2: Upper and lower thermostat)**
- **DRAIN VALVE**

Image 32: www.chilipepperapp.com/ewh.htm

Fill the labels of the drawing with the element names.

SPECIAL ELEMENT

This element is the only one that is special for an electrical heater. All the others are common. It can be placed in place easy to check.

- **HIGH LIMIT SWITCH**

When the tank gets too hot it trips the high limit switch (a circuit breaker). In order to get it working again the high limit switch must be manually reset by pushing in the red button.

SOME TECHNICAL WORDS

Translate the following words

ENGLISH WORD	CATALAN	SPANISH
VALVE		
ANODE		
DIP TUBE		
THERMOSTAT		
DRAIN VALVE		
SWITCH		
TANK		
TO RESET		
COLD WATER INLET		
HOT WATER OUTLET		

ACTIVITY 17: TANKLESS GAS HEATERS (R & C)

TANKLESS GAS WATER HEATERS

Most gas water heaters we see in our homes are tankless (they don't have any accumulating water system).

The Process:

1. A hot water tap is turned on.
2. Water enters the heater.
3. The water flow sensor detects the water flow.
4. The computer automatically ignites the burner.
5. Water circulates through the heat exchanger.
6. The heat exchanger heats the water to the designated temperature.
7. When the tap is turned off, the unit shuts down.

Mark the pieces that are **different** from TANK water heaters like that.

And those that are **common**, like that.

Pieces common to ALL GAS HEATERS must be hatched like that.

Image 33: www.robinhoodpropertyservicespain.com/img/Gas_heater_big.jpg

Working in pairs, think about PROS and CONS of TANKLESS heaters in front of TANK HEATERS.

	PROS (ADVANTAGES)	CONS (DISADVANTAGES)
TANK HEATERS (electrical or gas)		
TANKLESS HEATERS (gas)		

Now look at the main PROS and CONS, and mark those you had already thought about.

If you think there may be some other pros or cons, mark them at the end.

TANKLESS HEATERS

• **PROS**

- They can supply an endless supply of hot water,
- Save energy. Storage tank-type water heaters raise and maintain the water temperature to the temperature setting on the tank (usually between 120° -140° F (49° -60° C). Even if no hot water is drawn from the tank (and cold water enters the tank), the heater will operate periodically to maintain the water temperature.
-

• **CONS**

- There is a limit to the amount of hot water that can be produced at one time.
- They are more expensive to purchase than a conventional storage type water heater.
- They also take longer for you to get your hot water, since they don't start heating the water until you turn on the tap.
- The tankless water heaters also cause an increase in water wastage since you have to let the water run longer to get your hot water.
-

Thinking of these ADVANTAGES and DISADVANTAGES, which do you think is the best system, and why?

Use the language frames in the table below

.....

.....

.....

.....

.....

.....

.....

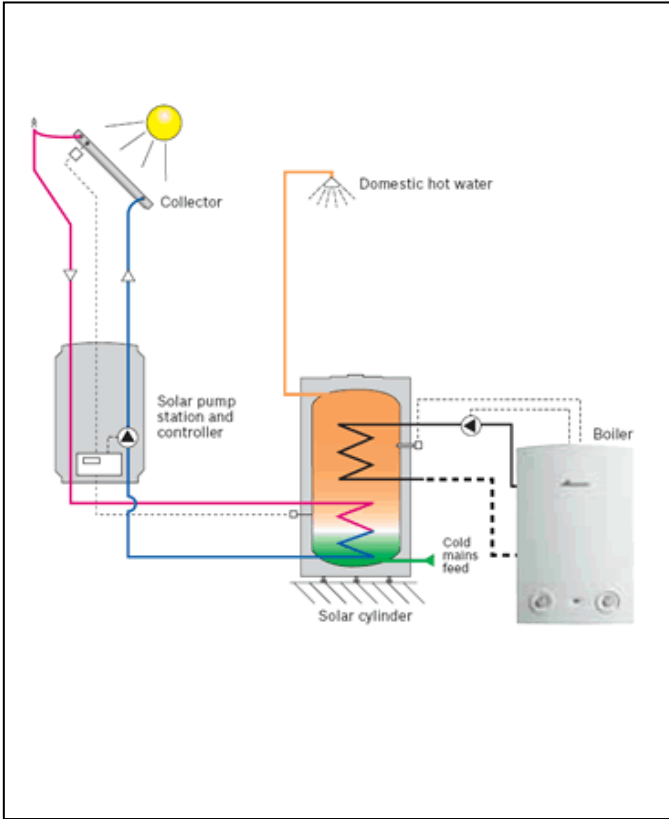
.....

TO BEGIN	TO CONTINUE	TO FINISH
To begin with, it	After that...	As a result of this
First of all	There are several reasons for this	The final result is that
One function of...	Another reason is	This explanation is based on
There are several reasons for this, the first	And this means	In conclusion the facts show
The first reason is,	After that	Consequently...
	One explanation for this is	Finally...
	The evidence for this is	

LESSON 6

ACTIVITY 18: TANKLESS SOLAR HEATERS (R & C)

SOLAR POWER- HOT WATER HEATERS WITH TANK



This is the best solution to all problems caused by traditional systems.

What is it?

Solar water heating converts the sun's energy into useable heat. This heat is transferred to your hot water cylinder supplementing the original boiler supply.

How does it work?

Solar panels are attached to your roof and through a heat transfer system are connected to a solar hot water cylinder. The cylinder stores hot water that has been produced during the day for when you need it.

Image 34: <http://mackheating.com/images/layout/pics/solarheating.jpg>

Working in pairs, think of PROS and CONS of **SOLAR POWER WATER HEATERS**

	PROS (ADVANTAGES)	CONS (DISADVANTAGES)
SOLAR POWER WATER HEATERS		

Now look at the main PROS and CONS, and mark those you had already thought about.

SOLAR POWER WATER HEATERS

• **ADVANTAGES (PROS)**

- A typical system will cut your heating bills by up to 90% in the summer & up to 30% in the winter, on average this equates to approximately 50-70% reduction in your costs.
- You can reduce your carbon dioxide emissions by anything from 400-750kg per year.
- Modern technologies allow solar panels to make the best use of the climate, even in cloudy/broken sunshine.

• **DISADVANTAGES (CONS)**

- Ideally solar panels are fitted to a south facing roof to ensure highest exposure to the sun. However, they can also be fitted to a south-east/south-west facing roof provided there is minimal shading.
- The roof will need to be strong enough to support the panels due to their weight, which can be quite heavy. Panels can be fitted to flat roofs, gable ends or an outbuilding. Typically you'll require 2 to 5 square meters for the installation
- A special hot water cylinder is required and this can be a conversion of an original one or if this is not possible then a new one may be required.
- It's expensive, although the saving on energy pays the bill after 7 years.

Thinking of these ADVANTAGES or DISADVANTAGES, would you install a solar power heater?.....

Why?.....

ACTIVITY 19: ANALYSIS. ALL WATER HEATERS

Which water heater do you have at home?

.....

Do you think it is the best heater you could have? Why?

.....

Working in pairs, fill in the table, marking which of the following pieces can be found in each water heater.

(Mark them with an “X”). Some of them might be common to some of them!!

	TANKLESS	WITH TANK		
	GAS WATER HEATER	GAS HEATER	ELECTRICAL HEATER	SOLAR POWER HEATER
DIP TUBE				
DRAIN VALVE				
SOLAR CELL				
THERMOSTAT				
TPR VALVE				
ACUMMULATING TANK				
HEAT EXCHANGER				
BURNER				
HIGH LIMIT SWITCH				

LESSON 7

ACTIVITY 20: WATER HEATERS GENERAL COMPARISON

Working in pairs, fill in the table with the names of heaters, and list all the advantages and disadvantages they have

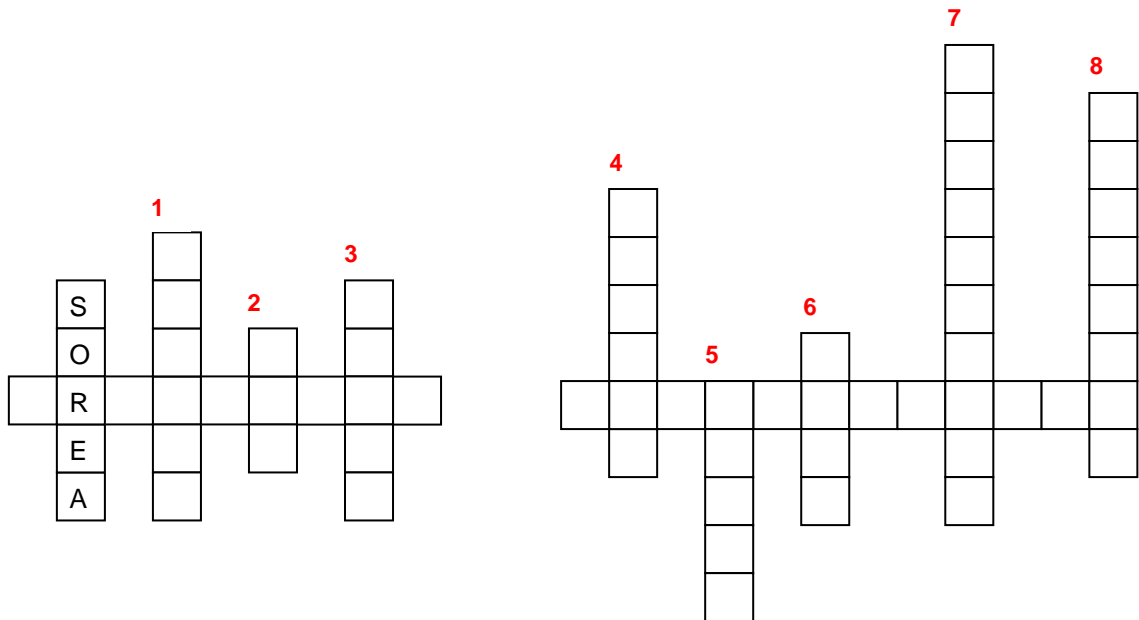
		ADVANTAGES	DISADVANTAGES
TANKLESS	GAS WATER HEATER		
WITH TANK	ELECTRICAL HEATER		
	ELECTRICAL HEATER		
	SOLAR POWER HEATER		

ACTIVITY 21: VOCABULARY PUZZLE

Use the definitions of words to do with work to complete the two word puzzles below. **What are the horizontal words?**

Example: **0** The water distribution company in El Maresme.

1. Piece of a tankless gas heater where the flame is
2. Substance in air-like form that is used as a fuel for heating and cooking
3. A device which opens and closes to control the flow of liquid or gases in a machine
4. Traditional pipes are made of it.
5. The negative end of an electric water heater.
6. A bowl that is fixed to the wall in a kitchen or bathroom that you wash dishes or your hands.
7. Automatic system of detecting temperature changes to control a water heater.
8. The work of connecting water and other pipes in a building.



First word definition:
The water you obtain when you turn on the tap in developed countries.....

Second word definition:
The process of taking salt off the sea water.....

UNIT 3. HOW CAN WE SAVE SOME WATER?

LESSON 1

ACTIVITY 22: BETTING GAME

Bet a certain amount (25, 50, 75 or 100) to the saving proposals.

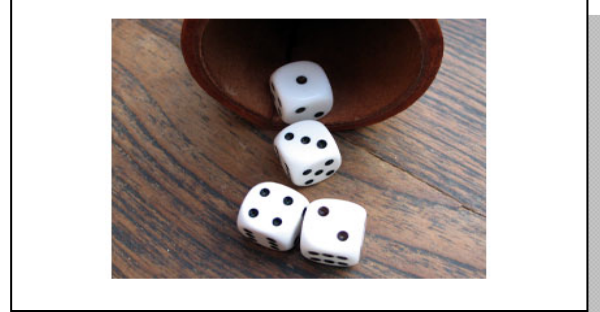


Image 35, 36: <http://www.danirambla.blogspot.com/>

	RIGHT	WRONG	BET	LOSS	GAIN
Take a 20 min shower, instead of a bath.					
Wash the dishes by hand					
Wash your hands less often					
Use the dishwasher.					
Water plants after dusk					
When you go to the toilet, don't flush it.					
Brush your teeth with the tap off.					
Don't shower every day					
Put a bottle into the toilet tank					
Brush your teeth only once a day					
Put the economy half load on in the washing machine					
In the garden plant needle-like leaves plants					
Capture rainwater for water in a dry period					
				TOTAL	

GRAND TOTAL:

ACTIVITY 23: ANALYSING SAVING MEASURES

Mark those tips you could apply at home.

In the kitchen	Don't use combined washer-dryers , they use more water than conventional machines. Cold water is used to <u>cool</u> the machine and can therefore increase the consumption by between 25 and 55 liters.
	If you have a dishwasher, make sure it's full before use
	When buying one, choose an economical model that fits your needs - water use can vary between 20 and 50 litres per load
	If you prefer your tap water on the cool side, leave a covered jug in the fridge – any chlorine taste will evaporate.
	Check for <u>dripping taps</u> and replace them. A dripping tap can waste 26 litres of water in 24 hours - that's enough for a shower.
	Use a bowl for washing up rather than filling the sink
	Clean vegetables and rinse <u>cutlery</u> in a bowl rather than under a running tap
	If you're replacing your machine, look out for the Eco-label which will provide water consumption figures
Put a full <u>load</u> in your machine or the economy half load if you have one	
In the bathroom	Pop in a bottle of water and save up to one litre every time you flush
	Tissues, cotton wool and plastics are better in the <u>bin</u> , don't waste water <u>flushing</u> them down the toilet
	If you have a dual flush toilet, use the short flush where possible, as the longer flush often uses more water than necessary
	Consider fitting a <u>mixing tap</u> , which uses less water than if you mix hot and cold water separately in the basin
	Fit a <u>tap aerator</u> - this makes the flow of water seem stronger without actually using more water
	Don't leave the tap running when you clean your teeth, you can waste up to 10 litres of water each time
	Have showers instead of baths.
	The amount used will depend on the type of shower and the length of time the shower is on. Don't waste more than necessary under the water. You don't need 20 minutes to be clean!!
In the garden	LAWNS
	Consider reducing the size of your <u>lawn</u> or don't have one at all. A really good lawn can be a real <u>drain</u> in both water and money.
	Don't overwater a lawn as this encourages roots to grow close to the <u>soil</u> surface.. A lawn may turn brown but will quickly recover in wetter months
	MULCH
	Use a thick <u>mulch</u> to limit evaporation from the soil and suppress the <u>weeds</u> . Mulch types include gravel, compost or <u>bark</u> which aid water retention in the soil.
	It's best to add mulch in the spring, preferably after heavy rain to keep the moisture trapped.
	WATERING
	Water plants in the evening to retain <u>moisture</u> in the soil and water at the base of the plant, no need to water the leaves
	Create a 'reservoir' or depression in the ground around the plant to prevent the water running away. It is best to give plants a good <u>soaking</u> rather than watering little and often.
	Invest in a <u>water butt</u> and capture rainwater for use in a dry period. Rainwater is very good for plants
	A <u>hose gun</u> fitted to your hosepipe allows you to turn water on and off easily as you move around the garden. (Remember, a <u>sprinkler</u> uses a large quantity of water, over 10L per m)
	PLANTING
	Choosing the right plants is important. Try to select plants that will tolerate dry conditions, many have a type of foliage to minimize water loss or store water in periods of drought
Hairy leaves, these reduce the drying effect of the wind and reflect the sun's rays	
Leathery or <u>waxy leaves</u> - <u>tough leathery</u> leaves help prevent water loss	
Thin <u>needle-like leaves</u> lose very little water (<u>grasses and conifers</u>)	

ACTIVITY 24: VOCABULARY EXERCICES

Match every word with its corresponding description.

	WORDS		DESCRIPTION
1	TO COOL	a	a container for waste
2	DRIPPING TAP	b	an area of grass, especially near to a house or in a park, which is cut regularly to keep it short
3	LOAD	c	the material on the surface of the ground in which plants grow
4	BIN	d	a covering of decaying leaves that is spread over the soil in order to keep water in it or to improve it
5	FLUSH (to)	e	to cause something to become cold
6	TAP AERATOR	f	a liquid such as water in the form of very small drops, either in the air, or on a surface
7	LAWN	g	drops of liquid falling from a tap
8	DRAIN (to)	h	to make very wet, or (of liquid) to be absorbed in large amounts
9	SOIL	i	to put a lot of things into a machine:
10	MULCH	j	a large container used to store liquids
11	WEEDS	k	a thin hard pointed leaf of a pine tree or similar
12	MOISTURE	l	to empty the content of a toilet tank
13	SOAK (to)	m	a device with a lot of small holes which you put on the end of a hose in order to water plants, grass, etc
14	BUTT (water)	n	device that in the tap introduces air into the water, reducing the flow
15	HOSE GUN	o	slightly shiny; looking like wax
16	SPRINKLER	p	to remove the liquid from something
17	WAXY	q	any wild plant which grows in an unwanted place, especially in a garden or field where it prevents the cultivated plants from growing freely
18	NEEDLE	r	a device which is held in the hand and used for sending out liquid such as paint or water in very small drops

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

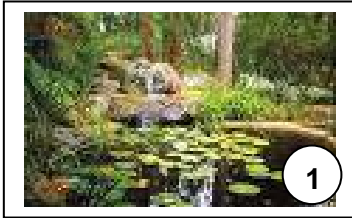
Translate these words.

ENGLISH	CATALAN	SPANISH
TO COOL		
DRIPPING TAPS		
LOAD		
BIN		
FLUSH (to)		
TAP AERATOR		
LAWN		
DRAIN		
SOIL		
MULCH		
WEEDS		
MOISTURE		
SOAK (to)		
BUTT (water)		
HOSE GUN		
SPRINKLER		
WAXY LEAVES		
NEEDLE LIKE		

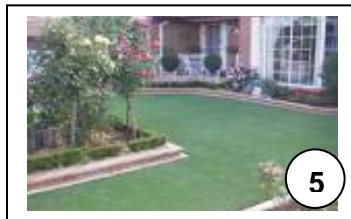
LESSON 2

ACTIVITY 25: RECOGNIZE climate friendly GARDENS

Fine blooms and foliage do not necessarily require large amounts of water.
 Could you recognize which of these gardens are convenient for Catalonia climate?



Images 37-39: www.articulos.infojardin.com...diseno-jardin.jpg, www.foroantiguo.infojardin.com, www.ced.ltd.uk



Images 40-42: www.pdphoto.org...balboa_6_bg_111900.jpg, www.cproduce.com.auassets/IMG0438.JPG, www.nrw.qld.gov.au...imageskelly.jpg

- Which of these gardens do you think can develop in Catalonia without water problems?

- Explain why some of them are not suitable in our country.

- In groups of 3 people, describe ONE garden using the words already learnt.
 Describe the garden to the rest of the class. They have to guess it.

GARDEN	DESCRIPTION
1	
2	
3	
4	
5	
6	

ACTIVITY 26: VOCABULARY PUZZLE

Work in pairs

Use the definitions of words to find the 14 words described in the word search puzzle below.

- Example: **1** Device with a lot of small holes which you put on the end of a hose in order to water plants, grass.
- 2.** A large container used to store liquids
 - 3.** To remove the liquid from something
 - 4.** To empty the content of a toilet tank
 - 5.** a device which is held in the hand and used for sending out liquid such as paint or water in very small drops
 - 6.** an area of grass, especially near to a house or in a park, which is cut regularly to keep it short
 - 7.** a liquid such as water in the form of very small drops, either in the air, or on a surface.
 - 8.** a covering of decaying leaves that is spread over the soil in order to keep water in it or to improve it
 - 9.** to make very wet
 - 10.** the material on the surface of the ground in which plants grow
 - 11.** device that controls the flow of liquid, especially water, from a pipe
 - 12.** device that in the tap introduce air into the water, reducing the flow
 - 13.** Slightly shiny, looking like wax leaves.
 - 14.** any wild plant which grows in an unwanted place, especially in a garden or field where it prevents the cultivated plants from growing freely

U	S	P	R	I	N	K	L	E	R	N	S
R	N	T	O	M	V	S	N	M	W	E	H
M	A	I	T	M	L	Y	U	A	V	S	O
P	H	W	A	K	O	L	L	A	M	Z	S
D	A	R	R	R	C	I	E	M	S	M	E
E	U	W	E	H	D	L	S	O	A	K	G
Y	S	G	A	L	Y	K	C	T	O	D	U
M	D	Q	P	X	B	A	U	S	U	R	N
B	E	Q	A	H	S	U	L	F	Q	R	Q
D	E	W	T	U	O	J	T	J	P	U	E
J	W	J	P	U	I	S	O	T	K	M	M
X	X	V	G	N	L	J	M	E	F	M	B

LESSON 3

ACTIVITY 27: LISTENING AND COMPREHENSION

“HOW TO CONSERVE WATER”

SOME INTERESTING WORDS

Try to translate the following words

ENGLISH WORD	CATALAN	SPANISH
BALANCE		
WASTE		
SUPPLY		
ENVIRONMENT		
AWARENESS		
DRIPPING		
SETTING		
RAINWATER		
WEIGHED		

After viewing the video, fill the blanks on the instructions to **HOW TO CONSERVE WATER** using the words of the table and some others you will recognize.

Water is essential for _____ life, but the _____ between _____ and demand is becoming a crucial issue. The amount of water we use and _____, in day to day life has a direct impact on the _____, so VideoJug shows you the _____ way to _____ water.

Step 1: **Fit a water meter**

You may be very surprised by how much water you are _____ using. Fitting a water meter will raise your _____ and consequently _____ your water intake.

Call your local water board to request one - it may even reduce your _____.

Step 2: **Shower Vs. Bath**

A _____ can use up to 100 litres of water! Where as a _____ will only use a _____ of this amount. The maths is simply - take a shower and _____ that water.

Step 3: **Running** _____

Do not let your _____ run when you are not using them.

That includes _____ your teeth, a whopping 5 litres a minute can be _____ if you _____ off while you _____

Step 4: **Fix it**

Are any of the _____ in your house _____? If so, fix them fast.

This could _____ up to 140 litres a week. Have a look at VideoJug's films on fixing a _____ tap to see how to do this the _____ way.

Step 5: _____ **machine**
 Running your washing machine when you only have a ___ items is a _____ of _____ as well as water. Use the economy _____ or wait until you have enough to make a wash worth while

Step 6: _____ **tank**
 If you have a _____, invest in a _____ tank. With hosepipe bans becoming the norm you will still have a _____ of water to use on your garden without draining _____

Step 7: _____ **the water in your** _____
 Each time you _____ up to 9 litres of _____ water are used. Reduce this amount by placing a plastic bottle, _____ down with _____ and filled with water, in the _____.
 This will reduce the amount of water being flushed away
 Alternatively order a 'save-a flush' or 'hippo' from your water board
 Finally, only _____ the toilet is you really _____ to. Remember, that's 9 litres of clean water you are using _____ time.

ACTIVITY 28: SURVEY TABLES CALCULATIONS

By that time, you should have your SEVEN consumption tables already done.

Complete the following questions:

1. How much water does your father use in an average working day?

2. How much water does your father use in an average weekend day?

3. How much water do your family use in a week?

4. How much water do your family use in a year? (in litres and in cubic meters)

5. Which is the average use of water per person and day in your family?

Write your calculations here

LESSON 4

ACTIVITY 29: A TAILOR MADE SAVING PLAN

With all the measures you chose for saving water in activity 20, make your own saving plan.

The table must be similar to your SURVEY table, but you'll only make ONE TABLE.

This table has the same number of rows and columns as the SURVEY table.

In each cell mark the WATER SAVED if your proposal affect to the activity.
If not, leave it empty.

For example:

SURVEY TABLE CELL

BROTHER SHOWER (before)
15 min x 60 s/min = 900 s
900 s x 0,2 l/s = 180 litres

SAVING PLAN TABLE CELL

BROTHER SHOWER (proposal)
-10 min x 60 s/min = 600 s
600 s x 0,2 l/s = 120 litres

In this example, there's a reduction of 10 minutes from the original 15 minute shower.
It means that the brother will take a **5 minute shower**. The total water saving is **120 litres**.

The table will be a SAVING TABLE.

Adding all litres saved you will have the water saved in the family per day.

QUESTIONS:

1. How much water would your family save in one day with your saving plan?.....
2. How much water would your family save in one week?.....
3. How much water would your family save in one YEAR?.....
4. How many CUBIC METERS do this saving represent?.....
5. If a swimming pool is 2m depth, which is the surface of the swimming pool you can fill with the water saved in your family in ONE YEAR?.....
6. If every family in your village did the same, how many swimming pools could they fill in?.....

Write here your calculations

Place your SAVING PLAN TABLE here

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ACTIVITY 30. CREATE YOUR SLOGAN

Fill in the gaps of the conclusion sentence, or slogan example:

**THEWE WILL HAVE IN THE.....,
IS THE WE USE.....**

Now, create your own slogan and with it, design the front page of this portfolio.

When you have it, remove at least 4 important words and make a card with your slogan and the blanks where the missing words were.

Swap the cards with your classmates and try to guess the words missing in your class mate card.