

Co-funded by the Erasmus+ Programme of the European Union



THE **GREEN** MATH EXERCISE BOOK

REDUCING OUR ECOLOGICAL FOOTPRINT THROUGH MATH



"Schools for a Greener Europe"

Erasmus Plus Project: 2020-1-SK01-KA229-078252_5

CONTENTS

Introduction2
Project Partners3
Exercises by Italy4
Exercises by Slovakia13
Exercises by Latvia15
Exercises by Romania21
Exercises by Portugal26
Ecological footprint calculator32
Games

INTRODUCTION

Can math save the planet?

The environment is a global issue that needs to be addressed in many ways. Schools are one of the best places for cultivating environmental awareness early on. The earlier they learn about their surroundings the sooner they'll be able to contribute to safeguarding it.

The Green Math Exercise Book is the product of the Erasmus Plus project "Schools for a Greener Europe". It is a collection of math exercises to which all partners have contributed. The math exercises are connected to environmental issues that have been key topics to the project.

The connection between math and the environment has many benefits for learners. Integrating environmental education into classroom mathematics instruction can help students be more aware of today's environmental issues and develop sustainability habits. Furthermore, using real-life maths provides students with a meaning and context for their learning. Using real-life applications helps learners make connections between math and their everyday life, inspiring them to learn, succeed, and supporting learning retention.

We hope the exercises in this book will help students become reflective, creative problem solvers and active citizens with a positive approach to nature.

PROJECT PARTNERS





N.°1

"THE HOUSE IS ON FIRE"

How much is the Earth's temperature rising each year?



- The average temperature on Earth lies somewhere around 14 degrees Celsius. The global annual temperature has increased at an average rate per decade +0.18°C since 1981.
 If the temperature continues to rise at this rate, what will the average temperature be in 30 years?
- 2. Make a graph representing your results.
- 3. Think and discuss: what can we do to stop the rise of temperature?

N.°2 SAVE ENERGY

The school installed solar panels on the roof in 2020 and has saved 70% on the electric bill every year.

If his bill was 350 euro a month before 2020, how much has the school saved every year since then?



Istituto Comprensivo Giovanni XXIII Terrasini

Did you know?

Solar panels are increasingly popular in Italy and are now a very reliable technology that can cut energy costs. A photovoltaic system is made up of panels that **convert the energy of solar radiation into electricity** that can normally be used to meet the energy needs of a standard home.

N.3

ECOLOGICAL PROBLEMS:

Directions:



Each story has a math problem. Check the fact box to find the problem. Write it in the box below the story.

1. Silvia collected 17 bundles of magazines last week. She collected 4 on Monday, 6 on Tuesday, 3 on Wednesday and 4 on Saturday.



school every morning. They saved 20 liters in 5 days. They saved 100 liters in total.



3. Leonardo collected 38 aluminum cans and Vito collected 37 cans for a total of 75 cans.



Fact box

38+37=75	4+6+3+4= 17	20 x5= 100

N.4

Clean energy

The environmental benefits obtainable from the adoption of photovoltaic systems are proportional to the quantity of energy produced, assuming that this replaces the energy otherwise supplied by conventional sources.

The grid below shows how much carbon dioxide is avoided per year using the photovoltaic system.

According to the data, how much CO2 is avoided per KWh*?

Power (KW)	installed	Functioning per year	hours	Energy per year	produced (kWh)	Kg avoided	CO2
1		1.500		1.500		975	
1,2		1.500		1.800		1.170	
2		1.500		3.000		1.950	
3		1.500		4.500		2.925	
10		1.500		15.000		9.750	

20	1.500	30.000	19.500
----	-------	--------	--------

source:

http://www.cornaviera.it/pagina.asp?codice=calcolo_co2_#:~:text=Potenza%20installata%20

*A kilowatt-hour, or kWh, is a unit of measurement that is used to track your home's electrical usage

N. 5

To produce one kWh of electricity, the equivalent of 2.56 kWh is burned on average in the form of fossil fuels and consequently about 0.65 kg of carbon dioxide are emitted into the air (2.56 kWh * 0.255 kg/kWh).

Calculate the monthly usage of fossil fuels of a 3,000-watt oven used for one hour a day and estimate the quantity of oxygen consumed.

Hint:

- 1. Calculate the KW by dividing the wattage by 1,000: 3000 watts/1,000 = 3 KW
- Get the daily use by multiplying the KW with hours a day: 3 kW X 1 hour = 3 kWh per day
- Multiply that usage by 30 or 31 to get the monthly kWh usage: 3 kWh X 30 days = 90 kWh per month





Drawing by Chiara Fiore- Class 2A

N. 7

The emission reduction of C02 associated with the use of wind energy can be estimated as follows:

CO2 (tons) =0.3 * W* h * 860/1000

How much CO2 is reduced per year if a 660 kW turbine works for 8,000 hours/year?

N.8

During the Erasmus meeting in Italy, each of the 5 partners planted the native Carob tree in the *Capo Rama Nature Reserve*. If a tree absorbs an average of 22 kg of carbon dioxide from the atmosphere per year, how much will the CO2 removal rate be over a period of 20 years? Considering that a carob tree can live for 5 centuries, how much CO2 can the 5 trees absorb over their lifetime?





Learn more about Carob trees: https://en.wikipedia.org/wiki/Carob

Visit the Capo Rama Nature Reserve website:<u>https://wwfcaporama.it/</u>

Did you know?

Trees are critical to stopping climate change because during photosynthesis they absorb carbon dioxide and release oxygen into the atmosphere. But not all trees absorb the same amount of carbon dioxide.

Oak is the genus with the most carbon-absorbing species. Horse-Chestnut tree is also a good carbon absorber as is the Black Walnut tree.

The longest-living trees with the most mass (hardwood trees) are considered to be the best at locking away carbon dioxide. Tree species that grow quickly and live long are ideal "carbon sinks"— a carbon sink is anything that absorbs more carbon from the atmosphere than it releases*.

*SOURCE: <u>www.chandlerpond.org/blog/climate-change-which-tree-absorbs-the-most-carbon-</u> <u>dioxide#:~:text=But%20not%20all%20trees%20abso</u>

N. 9

In March 2022 the Italian Erasmus team planted an olive tree in the school garden. If an olive tree can absorb 2 kg of CO2 per day, how much CO2 will it absorb over a period of 15 years?

Did you know?

Olive trees can live for thousands of years. Their roots are so strong that they can re-grow even when it seems like they've been totally decimated.

Learn more:

https://www.olivegroveoundle.co.uk/what-is-so-special-about-an-olivetree/#:~:text=They're%20tough,they've%20been%20totally%20decimated.





According to research from the University of Oxford, choosing a bike over a car just once a day can reduce the average person's transportation-related emissions by 67%. That's because cycling has a carbon footprint of just 33 grams of CO2 per mile traveled. That's up to 30 times lower than that of a fossil fuel car, and even less than that of walking or taking public transportation. Cycling doesn't have a carbon footprint of zero because of the emissions required to manufacture and distribute a bike, and because of the extra food someone may have to eat to "fuel" the cycling they do. But this carbon footprint is minimal – if you



ride your bike just 2 miles a day, five days a week instead of driving, you'd offset this initial footprint of the bike in less than a year. *



In April 2021 the Erasmus activity "How Green are you" required students to make a commitment to reduce their ecological footprint. Antonino decided to ride his bike every day to school and back home to reduce his ecological footprint. His house is 9 miles from the school. How much CO2 was saved over a period of 30 days? (Use the info above to solve the problem)

*Source: https://www.future.green/futureblog/save-carbon-biking

N. 11

Students are making compost for the school garden. The ideal ratio is $\frac{2}{3}$ of browns and $\frac{1}{3}$ of greens. Students have gathered 25 kg of organic material. 20% is green. Calculate the amount of browns and greens needed for the compost?



layer ratio : 1 part greens to 2 parts brown



N.12

Students need a plant to grow 12 inches before they can plant it in the school garden. The first month it grew 5.47 inches, the next month it grew 3.94 inches, and in the last two weeks it has grown 1.13 inches. How many inches are left for it to grow before students can put it in the school garden?

Did you know?

Trees are critical to stopping climate change because during photosynthesis they absorb carbon dioxide and release oxygen into the atmosphere. But not all trees absorb the same amount of carbon dioxide.

Oak is the genus with the most carbon-absorbing species and, lucky for us, Chandler Pond is surrounded by oak trees. The common Horse-Chestnut tree is also a good carbon absorber as is the Black Walnut tree.

The longest-living trees with the most mass (hardwood trees) are considered to be the best at locking away carbon dioxide. Tree species that grow quickly and live long are ideal "carbon sinks"— a carbon sink is anything that absorbs more carbon from the atmosphere than it releases*.

*SOUICE: <u>www.chandlerpond.org/blog/climate-change-which-tree-absorbs-the-most-carbon-</u> <u>dioxide#:~:text=But%20not%20all%20trees%20abso</u>

N.13

Invasive algae in the Mediterranean Sea

In the Mediterranean sea, invasive tropical species of Caulerpa algae, primarily Caulerpa taxifolia and Caulerpa racemosa are the greatest threats to biodiversity of the sea. Due to the rapid growth and absence of natural enemies in these areas, these algae are a significant threat to the marine ecosystem of the Mediterranean sea.



Caulerpa taxifolia Caulerpa racemosa

If conditions are right, algal blooms take off at a rapid pace. For simplicity, let's say we start off with ONE algae cell in the sea. The algae cell divides.

1. What's the total number of algae after 4 more cell divisions?

Number of algae cell divisions	0	1	2	3	4	5
Total number of algae	1					

<u> </u>												
<u> </u>												
												<u> </u>
												<u> </u>
												<u> </u>

- 2. Graph the data provided in the table above. Label the x-axis (independent variable) and y-axis (dependent variable). Decide on an appropriate scale for your x- and y-axes.
- 3. How would you describe the mathematical relationship in the table above? Can you derive an equation that fits the model? Use your equation to predict how many algae would be present after 10 cellular divisions.

Did you know...?

The biggest problem in removing these invasive algae species is the lack of natural enemies. The only recorded natural enemy of these species is the Mediterranean snail, Oxynoe olivacea and Lobiger serradifalci, which feed on these algae. However, these snails don't have a large population, so they can't prevent the spread of these algae to the Mediterranean Sea.



N.1

If 100 000 people plant 1 tree today, in 2036 these trees will fix half a million tons of

carbon dioxide. How many tons would it be if every pupil in our school and one of his/her parents planted a tree? (Currently our school has 460 pupils.)



N.2

When having a shower 20 litres of water are used every minute. An average shower lasts 5 minutes. Assuming a person has 1 shower a day,

- a) How many litres of water are used per shower?
- b) How many litres of water are used in a month?
- c) How many litres of water are used in a year?



The largest protected area in Slovakia, the National Park of the Low Tatras – NAPANT (designated in 1978), has an area of 81 095 ha and a buffer zone of 205 085 ha. How many m² and km² is it? https://www.napant.sk/



N.4

On the basis of research, it is estimated that 45% of forest in the Malá Fatra national park grows on unstable ground and a further 6% is weakened. The damaging effect of ozone affects a further 1.8% of forest land. How many hectares does this refer to if the park area is 18 557 ha? https://www.npmalafatra.sk/



N. 5

In order for a 50W lightbulb to emit light for 10 hours a day for a whole year, it is necessary to burn approximately 180 kg of coal. As a result of this, 420 kg of carbon dioxide and 3.5 kg of sulphur dioxide are emitted.

- a) How many kilograms of coal is it necessary to burn so that under these conditions 120 lightbulbs could be lit and in doing so how many kilograms of oxides will be produced?
- b) Carry out some research in your school to find out how many lightbulbs are turned on daily and at what time. In addition, work out how many kilograms of coal are burnt and kilograms of oxides are produced as a result of this.



(Don't forget about the Earth 20:30 – 21:30)

Hour – 25th March 2023 |



N. 1

Restoring of forests according to the ownership

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
State forests (1000 ha)	10	11	12	13	18	17	20	19	16	16
Other forests (1000 ha)	26	29	23	19	18	18	20	19	25	23

The tables show the data of restoring the state and other forests (ha) from 2007-2016

The task:

What is:

- 1. Arithmetical mean?
- 2. Median?
- 3. Mode?
- 4. Amplitude?

Solution

	State forests	Other forests
Arithmetical mean	15,2	22
Median	16	23
Mode	16	18 and 23
Amplitude	10	11

Conclusion:

- Other forests, which are not owned by state, so most of the cases they are private, are restored more than state forests
- 2008 was the year when there was the biggest difference of the restoration of state and other forests
- The restoration of forests is not even during the years

N. 2

Wasted garbage for 1 family



Wasted garbage for 1 family per day (Kg)

Mathematics task

Ecological footprint 1

Made by: Krista Jurēvica, Patrīcija Ozoliņa, Klāvs Villerušs, Regnārs Kreičmanis, Ance Vanaga Form 8a Cesis State gymnasium

The task:

In the given table it is shown how the amount of garbage is changed daily for one family. (see the table above)

Using the information provided,

- 1) calculate:
 - a) Amplitude
 - b) Median
 - c) Arithmetical mean
 - d) Mode
- 2) Make bar chart / bar graph.
- 3) Answer how has the amount of waste changed? How many kg?

Solution:

- 1. Amplitude is 3,5-1,2=2,3
- 2. Median is (1,8+2): 2= 3,8: 2= 1,9
- 3. Arithmetical mean is (1,2+1,4+1,8+2+3+3,5):6= 12,9:6= 2,15
- 4. There is no mode, because the numbers do not repeat!

Year	Wasted garbage for 1 family per day (kg)
1970.	1,2 kg
1980.	1,4 kg
1990.	1,8 kg
2000.	2 kg
2010.	3 kg
2020.	3,5 kg

Conclusion:

- 1. One family can produce a lot of waste. That's why we have to think about the packaging we buy and recycling our waste.
- 2. In the last few years, the amount of wasted garbage has increased.

N. 3

Ecological footprint 2

Made by Emīlija Stapulone, Anete Goba, Stella Bleidele, Jēkabs Rozenbergs Form 8a Cesis State gymnasium

Justine every day has been going to school on foot. Once she started thinking about the temperature in September which has been changing from year to year, that's why she decided to make an experiment, where she wrote down the average temperature in September in the last 10 years. She wanted to find out what the average temperatures are and how the temperature has changed due to global warming. Also, she wanted to find out what is the mode of these numbers if the numbers were rounded. Justine wants to calculate the increase or decrease in percentage of the average temperature during September from 2012-2021.



Problem: What is every year's average temperature in September from 2021-2021? How does it affect global warming?

Step 1 – What are the rounded numbers regarding the average temperature in September from 2012-2021?

YEAR	Degrees Celsius, September
2012	13
2013	12
2014	13
2015	13
2016	13
2017	13
2018	15

2019	12
2020	14
2021	11

Step 2 – Mode for rounded numbers



Step 3: Compare the average temperature in September from 2012 to 2021. Is there an increase or decrease?

2012- 13^o C 2021- 11,1^o C 13-11,1= 1,9 1,9:13=0,15

Conclusion: The average temperature in September hasn't decreased or increased much. The most frequent temperature in September is ~13^o C. Source: <u>https://videscentrs.lvgmc.lv/</u>

N.4

CO2 Pollution

Made by Katrīna Jurševska, Madara Kerliņa, Kitija Kronberga, Dženeta Jasinska Form 8a Cesis State gymnasium

Year	Latvia	Russia	Brazil	China	USA	Germany	India	Canada
2012	7,793,610	1,805,521,200	452,526,970	9,973,353,000	5,106,466,900	787,320,500	2,086,788,400	690,725,400
2013	7,738,256	1,787,145,100	480,104,670	10,406,788,000	5,179,078,500	806,144,500	2,157,168,200	698,880,770
2014	7,688,217	1,714,219,200	504,455,730	10,546,277,000	5,258,401,300	765,489,280	2,328,013,400	701,112,570
2015	7,888,468	1,698,007,500	492,986,500	10,461,742,000	5,114,424,000	765,922,900	2,419,637,200	682,765,340
2016	8,157,157	1,661,899,300	462,994,920	10,432,751,400	5,011,686,600	775,752,190	2,533,638,100	675,918,610

The table shows CO2 emissions (t).

TASK:

For every country given in the table, calculate:

- 1. Arithmetical mean?
- 2. Median?

Conclusion

- 1. China has the biggest CO2 pollution
- 2. Latvia has the smallest CO2 pollution
- 3. In China, India and Latvia we can see an increase in CO2 pollution from 2012-2016
- 4. In Russia, USE, Germany the CO2 pollution has increased



N. 1

Aquarium



THE AQUARIUM

The aquarium is an artificially created habitat that supports the balance of the biocenosis. Maria bought 7 angelfish. They need a larger amount of oxygen, while guppies and swordtails are less demanding in this regard. The stone castle occupies a volume of 8% of the total capacity of the aquarium, which is 1500 I, while the shell ornament occupies 5% of the total capacity of the aquarium. From the remaining capacity of the aquarium, 2% represents the volume occupied by the sand. It is known that a fine sand was used, for which 1 cubic decimeter weighs 1300 grams. Find out how much the sand in the aquarium weighs.

To solve this problem, we need to follow these steps:

Step 1: calculate the total volume of the aquarium. The total capacity of the aquarium is given as 1500 IL.

Step 2: calculate the volume occupied by the stone castle. The stone castle occupies a volume of 8% of the total capacity of the aquarium, which is 0.08×1500 L = 120 L.

Step 3: calculate the volume occupied by the shell ornament. the shell ornament occupies a volume of 5% of the total capacity of the aquarium, which is 0.05×1500 L = 75 L.

Step 4: calculate the remaining capacity of the aquarium. The remaining capacity of the aquarium is the total capacity minus the volumes occupied by the stone castle and the shell ornament, which is 1500 L - 120 L - 75 L = 1305 L.

Step 5: calculate the volume occupied by the sand. The volume occupied by the sand is 2% of the remaining capacity of the aquarium, which is $0.02 \times 1305 \text{ L} = 26.1 \text{ L}$.

Step 6: convert the volume of sand from liters to cubic decimeters. $1 L = 1 dm^3$, so the volume of sand is also 26.1 dm³.

Step 7: convert the volume of sand from cubic decimeters (dm³) to grams. Given that 1 dm³ of fine sand weighs 1300 g, we can multiply the volume of sand by the weight per dm³: 26.1 dm³ * 1300 g/dm³ = 33,930 g.

Therefore, the sand in the aquarium weighs approximately 33,930 grams (or 33.93 kg).

N.2

The Olt is surrounded, in some areas, by forests with a varied vegetation and fauna. Tudor and Silviu made some investigation and discovered that there are many different types of trees: beech, spruce, pine, yew, and that the diversity of animal species is impressive: insects, ringworms, reptiles, birds and mammals.



In a nursery, near the Olt, Tudor and Silviu counted the trees that had been planted and noticed the following things:

•the number of beech trees is equal to 80% of the number of spruce trees

•the number of spruce trees is equal to 60% of the number of pine trees

•In total, there are 312 beech, spruce and pine trees.

How many beech trees, spruce trees and pine trees are there?

Solution:

We will use the following notations:

B-the number of beech trees

S-the number of spruce trees P-the number of pine trees

B=(80/100)S => B=(4/5)S (1) S=(60/100)P => S=(3/5)P (2) B+S+P=312 (3)

If we replace S in (1), we get: B=(4/5)*(3/5)P= (12/25)P

By replacing B and S in line (3), we get: (12/25)P + (3/5)P + P = 312 /*25 12P + 15P + 25P = 7800 52P = 7800 => P=150

S=(3/5)*150=90

B=(4/5)*90=72

There are 72 beech trees, 90 spruce trees and 150 pine trees.

N.3

The vegetation of the Făgăraș massif is very rich and varied. Compact forests cover the slopes of the mountains all the way up to almost 1700m and large meadows and glades, filled with all kinds of flowers can be found all over the place.

The beech forest covers most of the lower part of the massif. Thanks to the beauty of the silver beech forests from Valea Bâlei and all the other touristic



attractions which are found in the area(such as rocks, lakes and waterfalls), this place was declared to be a natural reservation by the commission for the protection of natural monuments.

A group of tourists decided to walk on a route for 5 days as following:

- (1/6) of the road on the first day
- · A quarter of the road on the second day

- (1/18) of the road on the third day
- (4/9) of the road on the fourth day
- The remaining 1.5 kilometers on the fifth day.

How long is the route?

Solution:

x-the length of the road (1/6)x + (1/4)x + (1/18)x + (4/9)x + 1.5 = x 6x/36+9x/36+2x/36+16x/36+1.5 = x /*36 6x+9x+2x+16x+54=36x 33x+54=36x = > 3x=54 = > x=18The route is 18 km long

N. 4

Ilinca found out that in 1930 the Rodnei Mountains National Park was created, initially as a nature reservation, which became a Biosphere Reservation in 1979, covering an area of 46,399 hectares.

In 2004, The Natural Park of The Maramures Mountains was created, on an area of about 150,000 hectares, being, after the Danube Delta, the largest protected area in Romania.



A group of students went on a trip to visit the Maramureş Mountains Natural Park. On the first day, the students covered 120 km, on the second day 80% of the length of the road covered on the first day, and on the third day as much as in the first two days combined. Find out the length of the road traveled.

Solution:

x= the length of the road

day 1: 120km day 2: 80% of day 1 day 3: day 1+day 2

day 2=80/100*120km=96 km day 3=120km+96km=216 km x=day 1+ day 2+ day 3 x=120km+96km+216km x=432km(the length of the road)

N. 5

The Letea Forest is a strictly protected area in the Danube Delta, so the entrance is

monitorized. Some of the most interesting species of protected animals and insects have their habitat here, such as the sand viper, the white-tailed eagle (which nests here), three species of raven, etc. At the same time, this is the only place in Europe where there are lianas, the forest being considered one of the most unusual biotopes on the continent. The local authorities organized a painting contest in which 480 students from educational units from Tulcea County participated. The



theme was *Protecting nature from the Letea Forest*; 40% of the students are from high school, three fourths of the rest are from middle school, and the rest from primary school. Find out how many students participated from each category.

Solution:

x= the number of students from highschools y= the number of students from secondary schools z=the number of students from primary schools

total= 480 students

x=40/100*480=192 rest=480-192=288 y=3/4*288 y=216 z=288-216 z=72



N. 1



1- The picture shows data from the Autonomous Region of Madeira in a given year. Indicates, in scientific notation, the values represented by a, b, c, d and e.

Note: 1 ha=10.000 m 2 and 1 t= 1000 kg

Answer

- a = 8,115x10 3
- b =7,63x10 6
- c =2,2732x10 7
- d = 5,63x10.6
- e= 1,2x10 7

N.2

Reforestation is an essential measure to recover natural habitats and maintain plant biodiversity. Using indigenous plants in this reforestation contributes to a greater sustainability of our planet.

After a fire, 1360 native plants- chestnut trees, oaks and cork oaks - were purchased



to reforest the burned area.

To facilitate the transport, these 1360 plants will be distributed in boxes, all with the same number of plants.

The number of plants in each box can be:

a) 9

b) 12

- c) 8
- d) 15

Answer

c)

N. 3

On 22 nd September, we celebrate the World Car Free Day. To celebrate that day, students in the 7 th classes collected miniature cars and put them on an exhibition. Tomás contributed with 36 miniatures, which correspond to 16% of the total numbers of miniature cars on display.

3.1- Find out the numbers of miniatures exposed.

3.2- Knowing that 20% of the cars exposed were red, how many red cars were there?



Answer

- 3.1-225 miniatures
- 3.2-45 miniatures

Homemade recipe

At Matilde's house there is a cleaning product that results from a homemade recipe. In the preparation of this product P there are four elements:

- C: Sodium carbonate
- A: Water
- B: Baking soda
- D: Citric acid



These elements intertwine in the proportions indicated in the figure above.

4.1- Complete the following table.

<i>P:</i> Products (in liters)	2 L	4 L	5 L	8 L
C: Sodium carbonate (20%)				
A: Water (45%)				
B: Baking soda (10%)				
D: Citric acid (25%)				

4.2- Consider P,C,A, B and D in litres.

Complete the following equation.

4.2.1- C= P 4.2.2- A= P 4.2.3- B= P 4.2.4-D= P

4.3- In this recipe the amount of sodium carbonate in liters is directly proportional to the amount of product in litres.

If *f* is the respective function of direct proportionality

4.3.1 Find out and explain the meaning of:

a) f (10) b) f (15) c) f (25)

Answer

4.1-

<i>P:</i> Products (in liters)	2 L	4 L	5 L	8 L
C: Sodium carbonate (20%)	0,4	0,8	1	1,6
A: Water (45%)	0,9	1,8	2,25	3,6
B: Baking soda (10%)	0,2	0,4	0,5	0,8
D: Citric acid (25%)	0,5	1	1,25	2

4.2.1- C= 0,2 P

4.2.2- A= 0,45P

4.2.3- B= 0,1 p

4.2.4. D= a,25 p

4.3.1

- a) 10 litres of product has 2 litres of sodium carbonate
- b) 15 litres of product has 3 litres of sodium carbonate
- c) 25 litres of product has 5 litres of sodium carbonate

N.5

The following table shows the burned areas in 2019 and in 2020 in some Portuguese

Municipalities.

Note 1 ha=10000 m



	Burnt Area (ha)		
Cities/Year	2019	2020	
Tondela	4	6	
Aveiro	25	?	
Leiria	25	71	
Arouca	50	670	

- 5.1-Consider the data from the Municipality of Tondela
- 5.1.1- What was the increase in ha in the burnt area from 2019 to 2020?
- 5.1.2- Complete the following statement:

- The burnt area in 2020 had an increase of%, in relation to the burnt area in 2019.

5.2- In the municipality of Aveiro the burnt area in 2020 had a decrease of 88% in relation to the burnt area of 2019.

5.2.1- What do the following expressions represent?

- a) 0.88x25 b) 25-0.88x25
- 5.2.2- Find out in ha, the burnt area in 2020.

5.3- Concerning the municipality of Leiria, which of the following percentages represent the growth of the burnt area from 2019 to 2020?

a) 1.84% b) 18.4% c) 184% d) 0.184%

Answer

- 5.1.1-2 ha
- 5.1.2-50%
- 5.2.1- a) The decrease in ha of the burnt area from 2019 to 2020.
- 5.2.2- The burning area in ha in the Municipality of Aveiro in 2020- 3 ha
- 5.4- a) 184%



Ecological

footprint calculator

What is your impact on the planet?

TRANSPORT

I drive in a car to get around for short distances.....8 I carpool to school and sport practice....4 I walk or ride my bike short distances.....2 No car miles.....0 Distance travelled annually by public transport More than 20,000 miles......8 Between 10,000 and 20,000 miles....4 Between 5,000 and 10,000 miles.....2 No miles.....0 ENERGY I always turn off the light when I leave the room....8 I sometimes leave the light on....4 I hardly ever leave the light on2 I never leave the light on...0 **RENEWABLE ENERGY** From what source does your energy supply come from? Renewable / Green tariff.....2 Non Renewable......8

WATER CONSUMPTION

If you have a dishwasher, how many times do you run it on an average week?

More than 9 times... 8



Between 4 and 9 times... 6 Between 3 and 4 times ... 4 Between 1 and 3 times....2 Never......0

FOOD CONSUMPTION

Are you:

Regular meat eater Heavy Meat eater...8

Vegetarian.....4

Vegan....2

TOTAL SCORE:

RED.....BETWEEN 100-128

ORANGE......BETWEEN 64-100

GREEN ... BETWEEN 0-64

Discuss with your classmates what you can do to lower your impact on the environment.

GAMES

EVERY CHOICE COUNTS: ECOLOGICAL FOOTPRINT GAME

This game helps students understand how everyday choices affect our ecological footprint

MATERIALS:

- Small mats, Hula Hoops.
- Cards listing the choices that influence eco-footprint. (Attached)

PROCEDURE:

1. Give each participant a mat. This is the amount of productive land on the planet available to them. They must stand on their mat. Throughout the game, the number of mats available will increase and decrease. At all times, each person must remain on a mat. If the mat a participant is standing on is removed, the student must go stand on a mat with another person.

2. Draw a card from the set and have a student read the choice on the card out loud. This student will add or remove a mat as appropriate for the choice (for example, the choice "You added insulation to your house" means the group will get another mat. The choice "You run the dishwasher when it is half full" means the group will lose a mat).

DISCUSSION:

1. What impact does our use of energy and resources have on the environment in our family, school, community?

2. How do you think our use of resources affects people in other parts of the world? Can you think of differences between the way we use resources and the way people in Africa use resources? (for example, the use of water)

3. How can our choices contribute to a cleaner, healthier environment?

4. What is one thing you can do right away that would help our environment?

Your friend has come to live with you. (add a mat)	You heat your house with electricity instead of gas. (remove a mat)	You added insulation to your house. (add a mat)
You ride your bike to school. (add a mat)	You leave the tap running while you brush your teeth. <mark>(remove a mat)</mark>	You use a solar panel to heat water. (add a mat)
You eat vegetarian meals. (add a mat)	You move into a bigger house. (remove a mat)	You carpool to football practice. (add a mat)
You use bar soap instead of liquid soap. (add a mat)	You recycle waste. (add a mat)	Your sink has a leak. <mark>(remove a mat)</mark>
You buy food grown locally. (add a mat)	You leave the lights on when you leave the room. (remove a mat)	You replaced light bulbs with LED bulbs in our house. (add a mat)
You use disposable water bottles. (add a mat)	You fill your sink up with soapy water instead of leaving the water running while you wash the dishes. (add a mat)	You leave the water running while washing dishes. (remove a mat)

You run the dishwasher when it's half empty. (remove a mat)	You grow a garden. (Add a mat)	You plant some trees. (Add a mat)
You eat at fast food restaurants. <mark>(remove a</mark> mat)	You drive everywhere you go. <mark>(remove a mat)</mark>	You never use the back side of paper. (remove a mat)

THE ECO GAME

How to play

The players take turns spinning the recycle spinner. The spinner will give you a recyclable category (paper, glass, plastic, steel, aluminum, compost). The *number spinner* will give you a number from 1 to 12. You need to find a tile on the *Board* with a multiple of the number you rolled that has a picture of an object that belongs to the category you got from the spinner. You cover it with a plastic cap. For example, I spin paper and roll number 4. I need to look for a multiple of 4 that belongs to the paper category like the newspaper. If you cannot find a matching tile you wait for your next turn.

The first player to mark four in a row horizontally, vertically, or diagonally wins.



Setup

Print the *Board* and glue it on a piece of recycled cardboard (a cereal box works great) previously cut to fit. Do the same for the two spinners. Insert a paper pin in the center of each spinner and attach a paper clip to it. Write a number in each square.



THE RECYCLE SPINNER

Scan the QR code below to use the DIGITAL RECYCLE SPINNER





THE NUMBER SPINNER

Scan the QR code below to use the DIGITAL NUMBER SPINNER



Ecosystem Jenga



Card category	Ecosystem damage
	No damage to ecosystem
	Water pollution
	Animal extinction
	Plant extinction
	Air pollution

Setup

- 1. Use a marker to write the ecosystem damages on pieces of tape and stick them on the Jenga blocks.
- 2. Print out the playing cards (see "Playing Cards" below). Write the problem on the cards for students to solve (it can be a simple addition, an equation or a

word problem, etc.) Set up the Jenga tower that will represent a healthy ecosystem.

Play

- The first player picks a card from the pile, reads it aloud, and solves the problem written on the card then removes one of the blocks belonging to the ecosystem damage represented by the card. Only the block being removed may be touched. Player is not allowed to hold the rest of the stack together while removing the block(s).
- 2. Take turns reading a card (cards are face down)and remove the jenga block indicated on the card from the ecosystem. Continue to play until the ecosystem collapses. Do not add the piece to the top of the tower.

Playing Cards

	¥	

Think

This game is a representation of how human-caused changes can potentially impact the stability of a whole ecosystem. All parts of an ecosystem are connected and function as a whole. When one part of an ecosystem is removed, the other parts have trouble surviving.

Brainstorm ways to try and rebuild the ecosystem and reintroduce some of the blocks back into the ecosystem.

RECYCLE PUZZLE

Setup

Print the puzzle sheet and glue on recycled cardstock paper for sturdiness and durability. Cut out the puzzle pieces.

Play

Take turns matching the piece that has the math problem with the piece that has the solution.

Scan the QR code to customize the puzzle with different math problems.



