

Author: Hilario Barrera Rodríguez, Class teacher

School, country: IES Valsequillo , Gran Canaria, Canary Islands, Spain

Subject: Mathematics

Title of activity: Animal farm

Level: 1st year of ESO (Ages: 12-13)

Justification: Maths usually requires a certain level of abstraction. They are frequently complicated for adults who have their minds developed so for kids in their early teens, sometimes they become unreachable. This is the reason why we try to acquire and discover the mathematical concepts with objects they can touch. The handwork must be a previous step to the abstract reasoning.

We also try to provide experiences to remember and, of course, to have fun.

Objectives:

- Associate the distribution of food among the chickens with the mathematical operation of division.
- Associate the responsible distribution (without food wasting) with zero in the remainder of the division. Take the advantage to introduce the concept of divisor and multiple (those with zero in the remainder/ no food wasting).
- Find all the divisors of a number.
- Realization that the prime numbers are those which are only divisible by one and themselves.

Description of the activity: In this role game, we set students in pairs and we ask them to imagine they work in a chicken farm. Their task is to feed the animals in a fair (all the chicks get the same amount of food) and, above all, responsible (no food wasting) way. We provide each couple of students with a set of nine numbered plastic dishes (each dish will represent a chicken) and three bags filled with chickpeas. We all begin with 16 chickpeas and do the first experience together. It's very important that students not only do the distribution by hand but they do the divisions in a blank paper.

Document students work: In the next page

Working on the animal farm

Example:

Number of chickpeas you've got <u>16</u>	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
a) How many chickens are you feeding?	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
b) Is it a fair share? Y/N																
c) How many chickpeas do each chicken get?																
d) How many chickpeas do you waste?																
e) When we have a responsible distribution of our <u>16</u> chickpeas, write an x																

Do you see any coincidence in the answer of d) & e) and the remainders of the divisions you made?

We say that a big number is divisible by a small number when the remainder of the division (the big number divided by the small number) is _____

In this case, we say that the numbers are related by the divisibility relationship calling multiple to the big number and divisor to the small number.

Let's answer to these questions

- 1) 16 is divisible by _____, _____, _____, _____ and _____
- 2) The divisors of 16 are _____, _____, _____, _____ and _____
- 3) 16 is multiple of _____, _____, _____, _____ and _____
- 4) Give at least 3 multiples of 16 (the word multiple comes from multiplying)

Now it's time for you to practice. Experiment 1: (maybe you'll have to cross out some of the columns)

Number of chickpeas you've got _____	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
a) How many chickens are you feeding?																									
b) Is it a fair share? Y/N																									
c) How many chickpeas does each chicken get?																									
d)How many chickpeas do you waste?																									
e) When do we have a fair distribution of our _____ chickpeas? Write an x																									

Divisions: You have to give me all the divisions in a tear-off notebook sheet

Write all the divisors of _____ and at least three multiples

Experiment 2:

Number of chickpeas you've got _____	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
a) How many chickens are you feeding?																									
b) Is it a fair share? Y/N																									
c) How many chickpeas does each chicken get?																									
d)How many chickpeas do you waste?																									
e) When do we have a fair distribution of our _____ chickpeas? Write an x																									

Divisions: You have to give me all the divisions in a tear-off notebook sheet

Write all the divisors of _____ and at least three multiple

Document we use as support

Working on the animal farm

Situation: Imagine you work on an animal farm which breeds chicken. In this farm you have chickens, cocks and hens. The chicks live with their Mums until they are old enough. At that moment (it's very sad I know), the hens are taken away to produce new eggs and your job is to feed the chicks.

Your main goal is to feed the different members of each family fairly and not to waste food (chickpeas).

Example: As you can see, each group has a bag with sixteen chickpeas in it and some numbered dishes. Each dish represents a chick. We are going to study when we can do a fair and responsible (without food wasting) distribution depending on the number of chicks we have to feed.

One chicken: Let's put all the chickpeas in the only dish we have on the table (we are feeding a one chicken family).

- a) Is it a fair share? (We understand as a fair distribution when all the chicks receive the same number of chickpeas)
- b) How many chickpeas do each chicken get?
- c) How many chickpeas are we wasting?
- d) Is it a responsible share? (We mean by responsible share when we don't waste any food)
- e) What mathematical operation (addition, subtraction, multiplication or division) do you think we are doing? Do it

Two chicks: Let's distribute the sixteen chickpeas in the two dishes we are putting on the table (we are feeding a family of two).

- a) Is it a fair share?
- b) How many chickpeas do each chicken get?
- c) How many chickpeas are we wasting?
- d) Is it a responsible share?
- e) What mathematical operation (addition, subtraction, multiplication or division) do you think we are doing? Do it

Three chicks: Let's distribute the sixteen chickpeas in the three dishes we are putting on the table (we are feeding a family of two).

- a) Is it a fair share? (Do all the chicks receive the same number of chickpeas?)

- b) How many chickpeas do each chicken get?
- c) How many chickpeas are we wasting?
- d) Is it a responsible share?
- e) What mathematical operation (addition, subtraction, multiplication or division) do you think we are doing? Do it

Carry on with the process without writing the answers to the questions with a family of four, five and six. In which of these cases will we have a fair and responsible distribution?

Let's take a look to the way I want you to summarize the information **(when they finish the process we check with this document they've done it right and let them answer the questions)**

Number of chickpeas you've got <u>16</u>	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
a) How many chickens are you feeding?	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
b) Is it a fair share? Y/N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
c) How many chickpeas do each chicken get?	16	8	5	4	3	2	2	2	1	1	1	1	1	1	1	1
d)How many chickpeas do you waste?	0	0	1	0	1	4	2	0	7	6	5	4	3	2	1	0
e) When we have a responsible distribution of our <u>16</u> chickpeas, write an x	X	X		X				X								X

Do you see any coincidence in the answer of d) & e) and the remainders of the divisions you made?

We say that a big number is divisible by a small number when the remainder or the division (the big number divided by the small number) is _____

In this case, we say that the numbers are related by the divisibility relationship calling multiple to the big number and divisor to the small number.

Let's answer to these questions

- 5) 16 is divisible by _____, _____, _____, _____ and _____
- 6) The divisors of 16 are _____, _____, _____, _____ and _____
- 7) 16 is multiple of _____, _____, _____, _____ and _____
- 8) Give at least 3 multiples of 16 (the word multiple comes from multiplying)

Now it's time for you to practice.