

Title	Chocolate
Subject(s)	Mathematics, Biology & Chemistry
Learning goal(s)	<ul style="list-style-type: none"> • Data measures, ratio, estimation/calculations connected to the topic of chocolate. • Discovering how a production process works (pay attention to biology and chemistry parts of it) and addressing the issue of child labour. • Evaluating how to contribute to a better and more fair world and have students think about their own contribution.
Time	One or two lessons (circa 50 minutes) depending on the teacher how to use the assignment(s). See teacher notes at the end of the exercise
IBL	The activity asks for IBL: As a teacher you will need to decide how to organize the collaborative work, and how to share/communicate the various strategies and whether to offer more structure, guidance and help. Students can explore their own ideas on how to contribute to a fair production of food and other life necessities.
Achievement	See guideline for teachers next to the worksheet. Students in search of more challenges may want to investigate the production process even further. Or more difficult Math challenges can be added.
Context	The context is relevant to the day-to-day lives of the students, who doesn't eat chocolate? They idea of children your own age being responsible for your chocolate bar is also possibly a shocking context
Culture	Encourage students to find their own solution strategies. Appreciate and acknowledge diverse solutions and take that opportunity to discuss characteristics of the solutions to afford whole class progress.
Fundamental Values	Decision making (head or heart) on moral difficult topics (child labor/ fair trade), valuing each other's reasoning in group discussion. When are products "Fair" or "good"?
SSI/RRI	Child labour/ slavery vs Fairtrade products.

Children and chocolate

Chocolate consumption

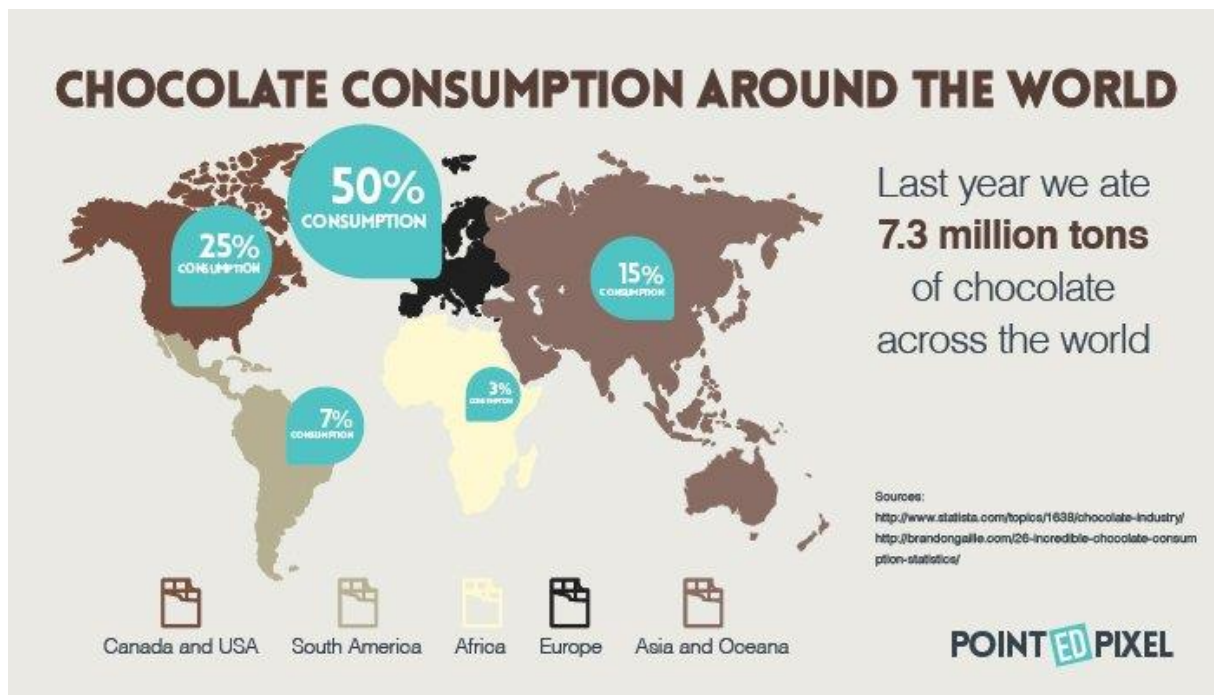
A lot of people like chocolate. It is sweet and some people even claim it makes you happy.

1. Have a poll in your class to find out how much chocolate your class eats per week.

The worldwide consumption of chocolate is about 7.3 million tons per year.

2. Compare this to the result of problem 1. Write at least two conclusions.

The consumption is not equally divided over the world. You can find statistics and infographics on this topic, for example on the website <http://pointedpixel.com/worldchocolateday/>



3. Combine the data from the picture with your classroom data and the results of problems 1 and 2. What does this tell you?

Write a small text that goes with this graph and your classroom data about chocolate consumption. You may want to include other data as well.

Chocolate production

Did you know that chocolate is made from cacao beans (or 'pods') that grow on from cacao trees? It is a complicated process.



4. Find out more about the chocolate production process. Where is it produced; what steps are needed in growing, harvesting and producing chocolate and who are involved?

You may have found out a lot about chocolate production, but some things are not told.



5. Read the story below about child labour in chocolate production in Africa. Can you imagine these numbers?

We'll get straight to the point. There is something fundamentally wrong with the cocoa industry in West Africa. Child labour and modern slavery are a structural feature of the West African cocoa industry. The most recent reliable statistics on child labour were published by Tulane University (a private research university in Louisiana) in 2015.

There are 2.26 million children working on the more than 2.5 million cocoa farms in Ghana and Ivory Coast. More than 90% (2.1 million) of these children are victims of child labour (which is illegal). One of the main reasons for the use of child labour is poverty. (Source: Tulane University 2015)



2.1 million children in Ghana and Ivory Coast are victims of illegal child labor.

source: Tulane University 2015

The 2.5 million cocoa farm households in Ghana and Ivory Coast, who between them produce more than 60% of the world's cocoa, are trapped in lives of poverty.

Source: *Tony's Chocolonely Annual Report 2016/2017*

6. In small groups: think of measures the chocolate industry can take to solve the problems of child labor and poverty. What can customers do? What can you do? Discuss this in class.



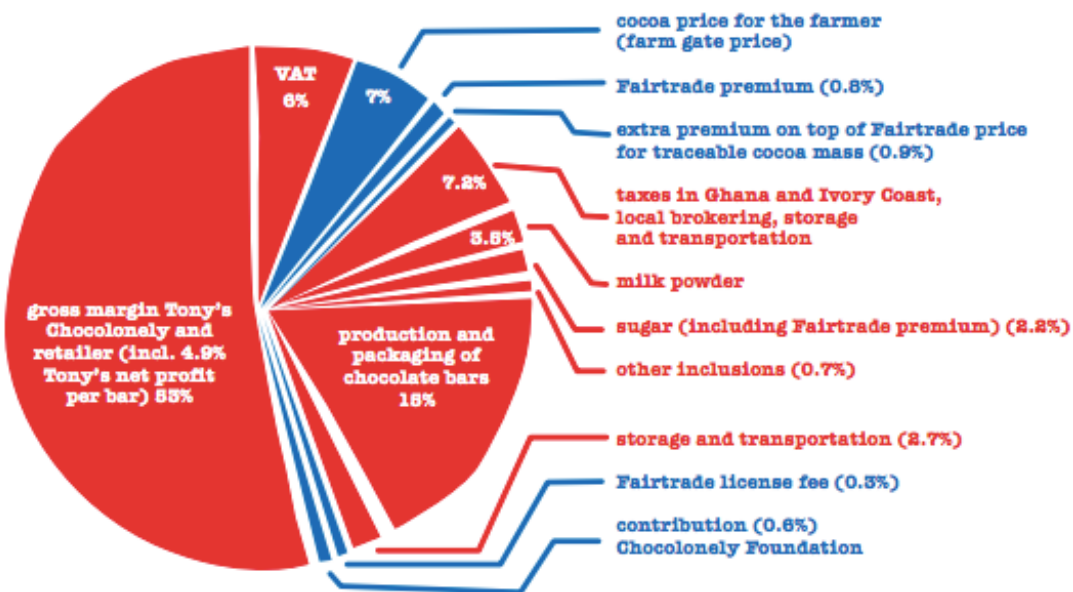
Good chocolate

In several countries there are chocolate factories that take measures to prevent poverty or more general that take care of a 'fair and better' world. Often they have a Fairtrade label. Some of these factories show information on their wrappers.

- Below you see an example from Tony Chocolonely a Dutch chocolate factory. Use the pie chart below to calculate how much money of the chocolate your class eats would go to the farmer. Use the data in problem 1 and the average price of chocolate.

What is the price breakdown of a bar of chocolate?

Do you know the price breakdown of a chocolate bar? You can see that in this delicious pie:



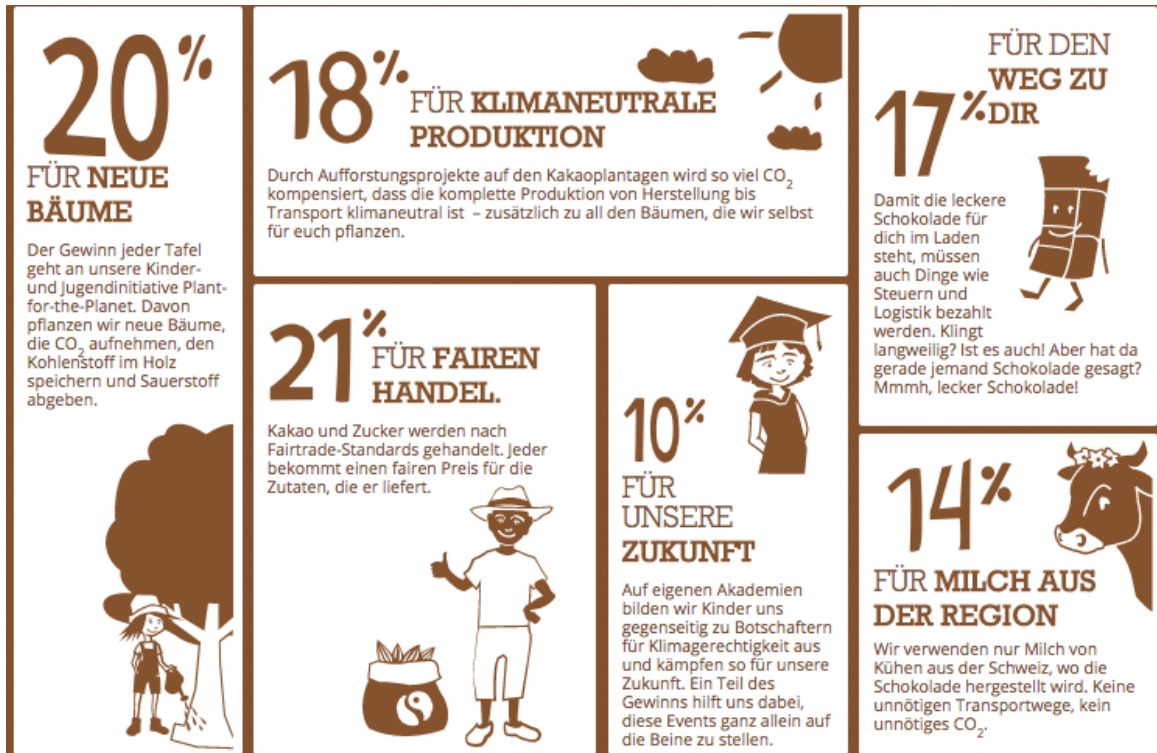
■ is paid to the farmer or projects that benefit the cocoa farmer

- The chocolate bars of this brand are divided in unequal pieces to reflect the unfair situation in chocolate production. A whole bar is 180 gram. Estimate the weight of each piece.



- Die Gute Schokolade (the good chocolate) a German chocolate producer spends parts of their profit on the climate. They show this on their wrappers.





- 20% is spend on new trees (Plant-for-the-planet) to reduce CO₂ pollution
- 18% is used to plant new trees on the cacao-plantations, to compensate CO₂ emission of the factory
- 21% is for buying fair trade sugar and Cacao.
- 10% is for education on climate -justice
- 17% is for transport costs
- 14% is used to buy milk from the region

Present these data in a pie chart and compare the way Tony Chocolonely and Die gute Schokolade contribute to a 'fair and better' world. Which do you prefer and why?

Find a chocolate company in your own country that also contributes to a 'fairer and better' world and compare their way to Tony Chocolonely and Die gute Schokolade.

10. The organization www.foodispower.org provides a list with 'good' and 'bad' chocolate brands. What is your opinion on the following statements. Take position and discuss this in class.

- Selling and buying 'bad' chocolate must be forbidden.
- I will buy fair chocolate even if it is more expensive.

Teacher notes

Consumption

The aim of this part is to have your students connect to the topic of chocolate. Data, measures, ratio, estimation/calculations are needed.

1. Polling the class involves decisions on measurement (weight or number of bars).
2. & 3. Students can compare their own consumption to the world wide consumption. Some calculations need to be made. You may want to use estimation only. Additional data is needed on population size. You may want to include national data as well.
The text can be for a blog or schoolpaper etc.

Production

The aim of this part is twofold – getting to know the production process (and pay attention to biology and chemistry) and addressing the issue of child labor. You can extend this part if it fits your lessons.

4. On the internet you can find information, videos, schematics and even lessons about the way chocolate is produced. You may either choose to present this to class or to have students find this information themselves. If your class is a science class you can address more details of the trees and the process of drying, fermentation etc.:
https://www.tes.com/lessons/vAZCuBdwL8_95w/chocolate-production
5. On child labour in chocolate production see:
<https://tonyschocolonely.com/nl/nl/doe-mee/tony-de-film> (partly in Dutch)
<http://www.slavefreechocolate.org/>
https://en.wikipedia.org/wiki/Child_labor_in_cocoa_production
6. Students may come up with several measures like: paying higher wages to the farmers; improving production process; making chocolate more expensive etc.

Good chocolate

The aim of this section is to present two examples to students on how chocolate factories can contribute to a better and more fair world and have students think about their own contribution. You may use similar national examples.

7. https://tonyschocolonely.com/storage/configurations/tonyschocolonelycom.app/files/jaarfairslag/2017-2017/tc_jaarfairslag_2016_en_totaal_01.pdf
8. You can use this problem as an extra if your class is a math class. Otherwise you may want to skip it. The parts weigh: 35 g; 11 g; 10 g; 8 g (3 p.); 7 g (2 p.); 6 g (4p.); 5 g. (7p.); 4 g (5 p.)
9. Students compare the two companies that produce 'good' chocolate. They can use calculations but they may also discuss what measures are taken and what of results are reached. Tony's focuses on poverty and Gute on the environment (CO₂ reduction)
10. See the list of recommended 'good' chocolate <http://www.foodispower.org/chocolate-list/>. In this task students are asked to reflect on their own role. You may use the method of: 'move-reasoning'. The students physically take their position on the *axis of level of agreement*. Next, the students specify their opinion by choosing a position on the *axis of head-heart*. Students are asked to motivate their position. Next, students take on another position, for instance of a fellow student in the field, and think of a consideration used in that position.