SDG2 Future of Food

MM4: Feeding the World Sustainably and Responsibly

Micro-Module 4: Feeding the World Sustainably and Responsibly

Experimentation and Exploration

Lesson 1: 2000 Years of Human Agriculture, Population and Progress

Subjects: Agricultural Science, CPSE, Geography, Home Economics, SPHE

Lesson Title and Summary: 2000 Years of Human Agriculture, Population and Progress

Through this lesson, we'll learn about the growth in global populations through the ages exploring how population rates have rocketed up in the past century. Understanding how and why population is expected to plateau at 10-11 billion by the end of 2100 and explore the links between population growth, agriculture, and food.

Vocabulary: Agriculture, Population Growth, Nitrogen, Ammonia, Fertiliser, Yield

In this lesson, the learner will:

- Learn about global population growth, agriculture, food, and progress
- Identify information (e.g. statistics) related to population, food production
- Apply learning on how to conduct online research and collate findings
- Understand and accurately use online resources
- Engage in speaking and communication activities applying critical thinking, discussion strategies, and presentation skills

Materials

- Worksheet 1: Population Curve Exercise
- Worksheet 2: Nitrogen as a Fertiliser
- Worksheet 3: World of Data Links + Questions
- Pens and paper
- Online resources (computer / iPhone; website links)
- Blackboard / Whiteboard and chalk / white board markers

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ACTIVITY INSTRUCTIONS

Activity 1: Class Poll (15 minutes)

1. Write the words Human Population and three numbers showing different possibilities for global population including the current figure 8.1 billion.
2. Ask the class to vote on the three numbers indicating which number they think is the correct global population.
3. Reveal that 8.1 billion is the correct figure and discuss.
4. Divide learners into groups of 2.
5. Give learners Worksheet 1: Population Curve Exercise and ask learners to plot population growth over time using the internet for research, if need be. Discuss as a class.

Activity 2: (15 minutes)

1. Staying in groups of 2, give learners Worksheet 2: Nitrogen.
2. Play the video The chemical reaction that feeds the world - Daniel D. Dulek (5:18min) from 0:00min - 1:58min and have learners complete the first part of the Nitrogen worksheet.
3. Discuss their answers as a group.
4. Play the video from 4:05 – 4:55 mins and have learners complete the second part of the Nitrogen worksheet.
5. Discuss their answers as a group.
6. Discuss as a class.

Activity 3: Analysis of Growth of Crop Yields (20 mins)

1. Staying in groups of 2, give learners Worksheet 3: Analysis of Growth of Crop Yields and ask them to work through the interactive maps and charts (see links below) on the two linked pages and answer the questions in the worksheet.
   a. https://ourworldindata.org/fertilizers
   b. https://ourworldindata.org/crop-yields

REFLECTIVE EXERCISE: 3-2-1 (10 mins)

- Three things they feel they have learnt from the tasks.
- Two things they found most interesting and would like to explore more.
- One – their opinion they have about the tasks.

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EXTENSION / REDUCTION ACTIVITIES:

Reduction: For a shorter lesson, run Activity 3 as a flipped classroom and have the learners discuss their summary findings in the next lesson.

Extension: For a longer lesson, watch the video in the media box and extend activity 1 by encouraging students to visit the population matters website and compare their chart with the population explorer tool at: https://explore.populationmatters.org/

MEDIA BOX: (materials, online video links, extra resources, case studies etc)

Websites:

- https://ourworldindata.org/fertilizers
- https://ourworldindata.org/crop-yields
- https://ourworldindata.org/yields-habitat-loss

Video:

TED-Ed: The chemical reaction that feeds the world [5:19min]: https://www.youtube.com/watch?v=o1_D4FscMnU

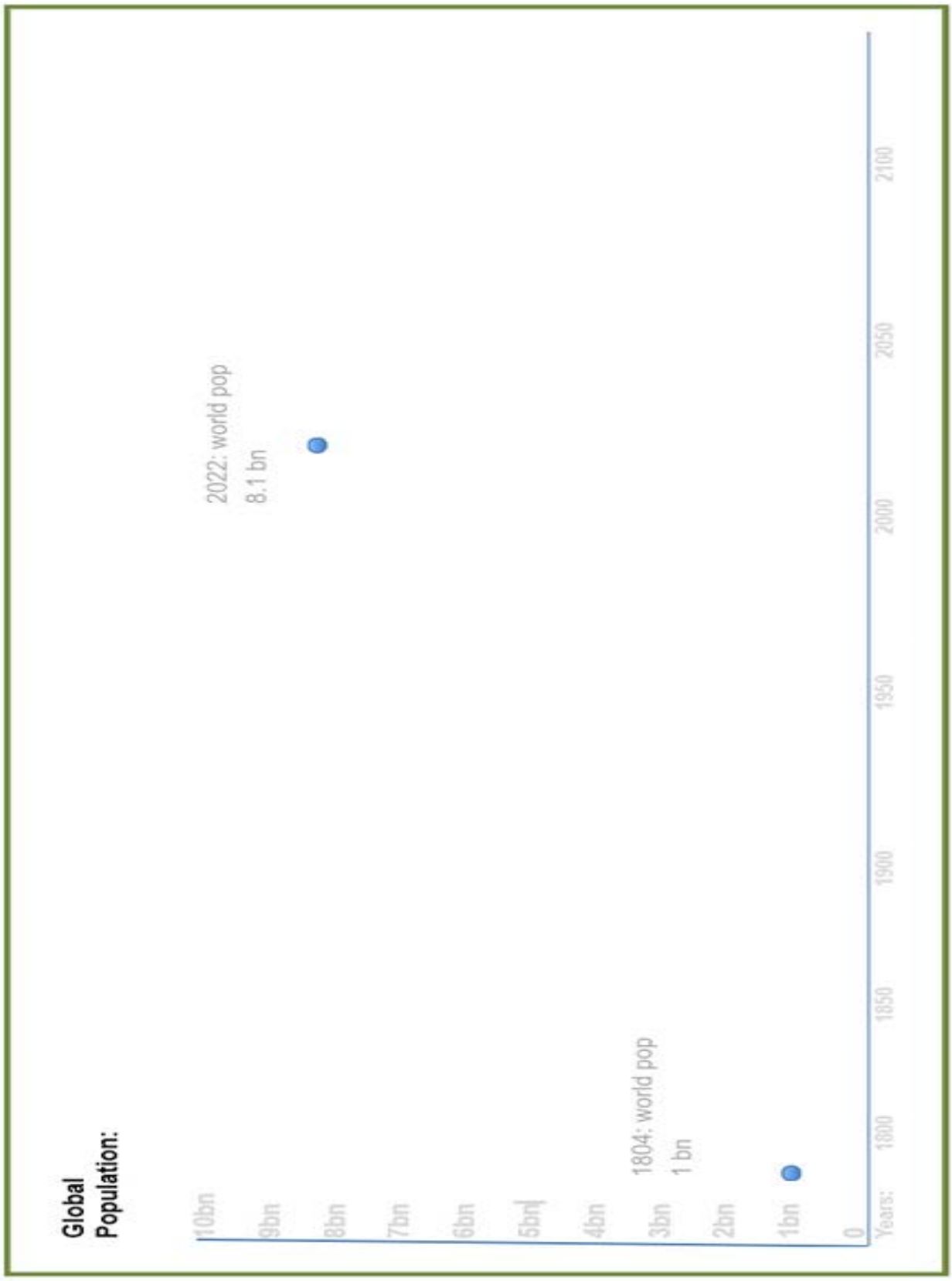
LOCAL TRIP / EXPERTISE / ADDITIONAL WORK AND ASSESSMENTS

Visit a local supermarket or specialty food store and identify 3 foods in the aisles that are made with corn, 3 that are made with wheat, 3 that are made with rice, and 3 that are made with cereals.

Record the details of the various products including price, weight and country of origin.

MM4: L1 WS POPULATION CURVE EXERCISE

Working in pairs, and using the internet to search if required, plot out the timeline for when global population reached 2, 3, 4, 5, 6 and 7 billion and when it is expected to reach 9 and 10 billion.



MM4: L1 WS NITROGEN AS A FERTILIZER

Part 1

The Haber Process is (circle one):

a. Turning air into fertiliser
b. Turning water into fertiliser
c. Turning fertiliser into air
d. Turning water into air

True or False: A nitrogen gas molecule plus three hydrogen gas molecules gets you two ammonia gas molecules t_____ / f____

Without the faber process how many people could farmers feed? _____

Where do plants normally get their nitrogen? _____

What percentage of the air is nitrogen? _____

In what year did Fritz Harber make his discovery?

_____

Part 2

How much ammonia is produced in the world each year? _____

How many elephants would it take to match the weight of that ammonia _____

What % of the ammonia produced is used for fertiliser in agriculture _____

What percentage of fertiliser is not absorbed by these plants _____

Where does this nitrogen go and what does it lead to?

_____

_____

MM4: L1 WS ANALYSIS OF GROWTH OF CROP

Working in pairs, visit the two world of data websites, explore the data and answer the questions below:

First Website: https://ourworldindata.org/fertilizers

Question 1: Looking at fertilizer use and using the map view, try to capture the names of the countries that have applied less than 12.5 kg of nitrogen fertiliser per hectare:

_____

_____

_____

Question 2: What do you notice about these countries?

_____

_____

_____

Second Website: https://ourworldindata.org/crop-yields

Question 3: Looking at four key crops: corn (maize), rice, cereal & wheat, what are the two smallest yield segments per hectare per crop?

Wheat: _____ & _____
Corn (Maize): _____ & _____
Rice: _____ & _____
Cereal: _____ & _____

Question 4: Name 5 countries from these two lowest performing segments for each of the four crops:

_____

_____

_____