SECONDARY V
Week of May 11, 2020

Table of Contents

The Right to Play: Playgrounds Around the World

Information for students

- View the images in James Mollison's playground project by visiting his website at https://www.jamesmollison.com/playground.
- Choose three images that you think represent three very different contexts. View each image once more with these questions in mind: What is the same in each image? What is different in each image?
- Consider the following questions: Who is represented and who is not? What are these images about? How do you know?
- Write a response to the images based on the ideas elicited from the questions. Ultimately, consider what the photographer wants you to know.
- Take photos in order to create a photo essay or a series of images that portray the way children are finding ways to play in our current situation. If you decide to take your photos while walking outside, try to capture images that represent the lack of play right now. Take a picture of an empty playground or park or a discarded toy, for example. Don't forget to respect people's privacy and stay physically distant.
- Read about James Mollison's playground project here: https://www.theguardian.com/artanddesign/2014/sep/19/-sp-tate-of-play-school-playgrounds-from-kenya-to-japan

Extension Activity:

If this has sparked or deepened your interest in photography, try capturing unique and interesting images that reflect your world right now. Share them in any way that works for you.

For some tips on photography, check out these links.:

For photography with a camera: https://expertphotography.com/a-beginners-guide-to-photography/

For photography with a smartphone: https://expertphotography.com/the-complete-guide-to-smartphone-photography-96-tips/

Material required

- Link: https://www.jamesmollison.com/playground
- Paper or pen,
- Camera, phone, tablet or computer.

Information for parents

- Look at the website with your child and discuss the questions.
- The best things your child can do are **read, write and talk every day.**

Écriture automatique surréaliste et artistique

Consignes à l'élève

Inspire-toi des toiles abstraites de l'artiste Québécois Yvan Ducharme pour faire une activité d'écriture automatique.

Qu'est-ce que l'écriture automatique ?

Instructions pour faire une activité d'écriture automatique :

- Écrire sans arrêter, ni réfléchir à la ponctuation, à l'orthographe ou à la syntaxe.
- Écrire sans sujet décidé d'avance et assez vite pour ne pas retenir les idées et ni se relire.
- Écrire pendant trois minutes sans arrêter.
- Inclure cinq noms, cinq adjectifs et cinq verbes qui vous viennent en tête spontanément.
- Essaie d'écrire sans jugement.

Marche à suivre:

1. Clique sur le lien pour découvrir les œuvres d'art d'Yvan Ducharme : artiste Québécois Yvan Ducharme
2. Choisis une peinture que tu aimes ou qui te parle.
3. Commence à écrire en suivant les instructions ci-dessus.
4. Répète l'activité aussi souvent que tu veux.

Tu produiras des textes poétiques et possiblement surprenants !

Matériel requis

- Papier et crayons;
- Visitez le site d'Yvan Ducharme, artiste

Information for parents

- The purpose of automatic writing is not to write “well,” but just to write, without pressure or expectations.
- By writing on a regular basis, children will gain more confidence in their ability to write in French and therefore be less afraid to do so.
- Automatic writing is an effective practice for clearing the head, managing stress and being “in the moment.”
- Parents should encourage their children to repeat this exercise on a daily basis throughout the week.

The Ups and Downs of Navigation[1]

Information for students

- You have a shipment of PPE's (Personal Protective Equipment) arriving at the Quebec City Port. Your container ship is filled to capacity and to dock safely, you must consider the tides as you enter the port because of the variations in the depth of the water.
- On the day you are to arrive, you are informed that high tide occurs at 13h00 (water level at 15.2 m), while low tide occurs at 19h00 (water level at 9.8 m).
- The draft of your container ship, which is the minimum depth of water in which your ship can navigate safely, is 11 m.

Task

- Using your knowledge of cosine functions, determine the depth of the water as a function of the time elapsed since midnight.
- Determine between what times it will be safe to come into port.
- Once you know the answer, use the sine function to verify your answer.

Materials required

- graph paper, writing and drawing materials
- device with internet access
- graphing calculators (i.e. your own, Desmos, GeoGebra).

Information for parents

- Encourage your child to use a graphing calculator to make sense of the problem.
- Ask your child to explain the problem to you (not simply the math, but the practical aspect of the problem - i.e. when is it safe to come into port).

[1] Task adapted from: National Council of Teachers of Mathematics, "Reasoning and Sense Making Task Library: Tidal Waves," 2011, https://www.nctm.org/Standards-and-Positions/Focus-in-High-School-Mathematics/Reasoning-and-Sense-Making-Task-Library/ Accessed on May 1st, 2020.

Appendix A: Solution

Hints and Possible Solutions

- Remind students that 2.25 hours is not 2 hours and 25 minutes, but rather 2 hours and 15 minutes.
- The period of the function is 12 hours in radians. The coefficient would be $\frac{2\pi}{12}$ or $\frac{\pi}{6}$. If students prefer degrees, then it would be $30°$ $degrees$.
- The horizontal shift of the cosine function will be 13 hours.
- Putting it all together, the rule would be: $f(x) = 2.7\cos\left(\left(\frac{\pi}{6}\right)(x-13)\right) + 12.5$
- Or using the sine function: $f(x) = 2.7\sin\left(\left(\frac{\pi}{6}\right)(x-10)\right) + 12.5$
- To know when the boat will be able to come into port, you have to find when $f(x) \geq 11$
- The function first reaches a height of 11 m, as the tide is coming in, after 8.875 hours or at ≈ 8:53 and then passes 11 m, as the tide is going out (4.125 hours after high tide), after 17.125 hours or at ≈ $17{:}08$. Therefore, the boat has approximately 8.25 hours or 8 hours and 15 minutes to come into port within one period (See Figure 1).

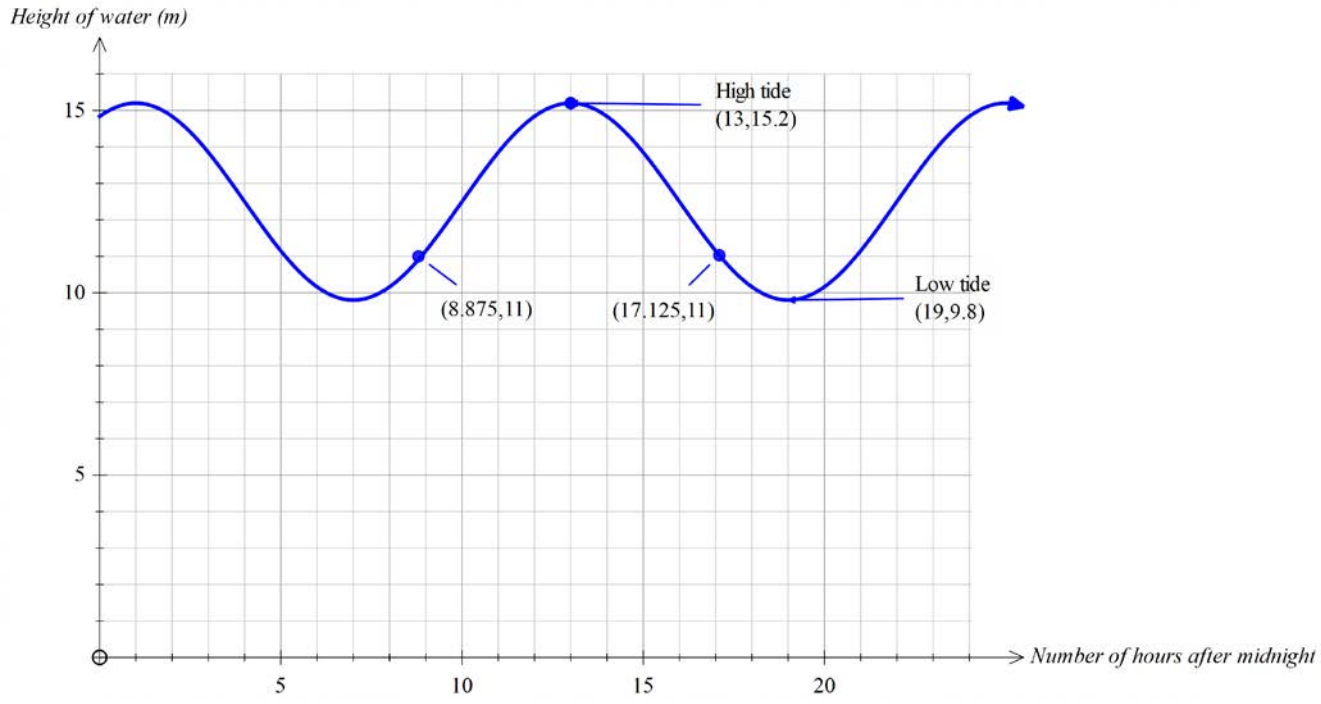


Figure 1: Height of the water at the Quebec City Port in relation to the time of day.

Ready to Reopen!

Information for students

- You are preparing to reopen your restaurant after it was closed because of Covid-19.
- Below are the tasks and prerequisite tasks that must be performed before you can admit seated customers.
- The table below lists the different tasks that must be carried out before you reopen.

STEP	TASK	TIME NEEDED (DAYS)	PREREQUISITE TASK(S)
A	Contact all staff, and draw up staff availability list based on health and age.	1	none
B	Obtain funding for all PPE and sanitizing needs through available government loans.	10	none
C	Design new layout for restaurant (i.e. two metres between tables, hand sanitizing stations, arrows to indicate direction in which customers must move about within the restaurant).	1	none
D	Order hand sanitizer, and determine sanitary requirements for employees and customers (frequent hand-washing, use of PPE, scheduled cleaning between seated customers).	3	C
E	Order PPE for all employees (masks, gloves, shields and Plexiglas).	7	A and B
F	Take out salad bar, move furniture, tape arrows on the floor as per design to indicate direction in which people must move about.	3	D
G	Install Plexiglas around the cashier area.	1	E and F
H	Clean kitchen and restaurant thoroughly.	4	F
I	Prepare kitchen – start fryer.	2	H
J	Calculate new maximum capacity of restaurant and approximate number of meals to be served each day.	2	C
K	Order from suppliers.	1	J
L	Receive and store supplies.	1	K
M	Receive and prepare salads, vegetables and fruit.	1	L
N	Bring in serving staff to go over new procedures and protocols and see new working environment.	1	I, M and G
O	Draw up new staff work schedule.	1	N
P	Design and place ad indicating opening date.	3	O
Q	Opening night	0	P

The questions

- Determine the minimum number of days needed to reopen the restaurant.
- If you needed 5 days to remove the salad bar and move the furniture (step F) but obtained the government loan in only 6 days (step B), determine whether you would need more or less time to reopen than originally planned.

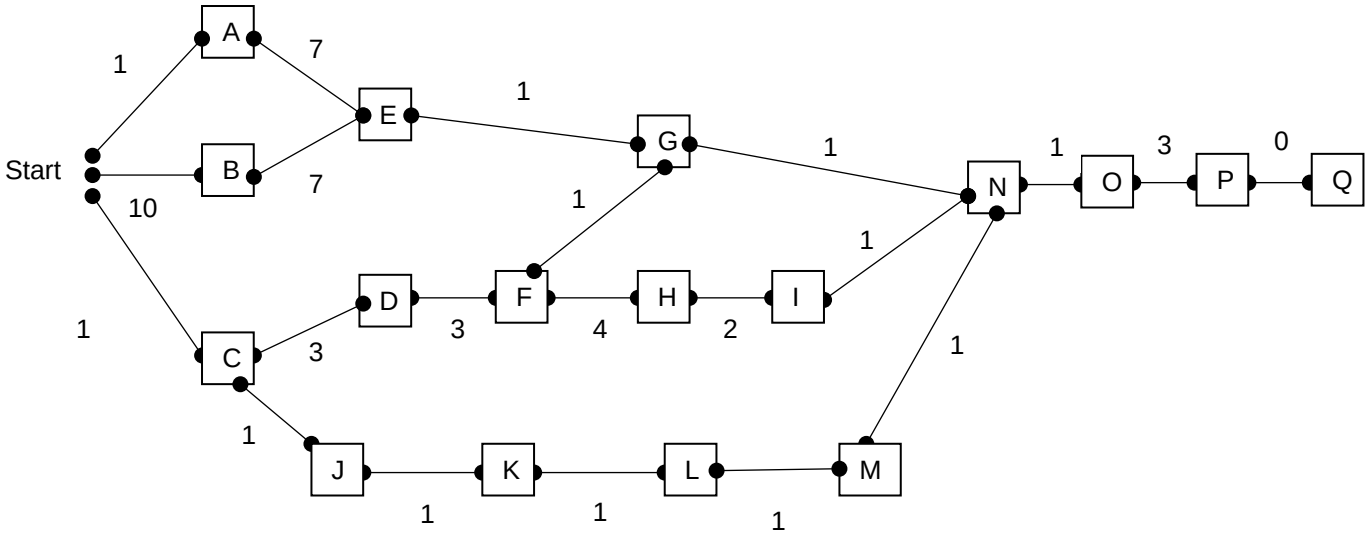
Materials required

- paper, writing and drawing materials

Information for parents

- Encourage your child to persevere.
- Ask your child to explain what this problem means.
- Solutions to the problem can be found in Appendix A.

Appendix A: Solution



Possible Paths

- AEGNOPQ = 14 days
- BEGNOPQ = 23 days
- CDFGNOPQ = 13 days
- CDFHINOPQ = 18 days
- CJKLMNOPQ = 10 days

Answers to the questions

- The minimum number of days required to reopen the restaurant is 23 days.
- If you needed 5 days instead of 3 to remove the salad bar and move the furniture (step F), but obtained the government loan in only 6 days (step B) instead of 10, path BEGNOPQ would be reduced to 19 days, path CDFGNOPQ would be increased to 15 days and path CDNFHINOPQ would be increased to 20 days. Therefore, a minimum of 20 days would actually be required to reopen the restaurant, which would be 3 fewer days than expected.

Le Chatelier's Principle

Information for students

- One of the most important discoveries for humanity was made in the first decade of the 20th century. German chemists Fritz Haber and Carl Bosch worked out a way to combine hydrogen (H_2) and nitrogen (N_2) to produce ammonia (NH_3).

$$N_{2\,(g)} + 3\,H_{2\,(g)} \rightleftharpoons 2\,NH_{3\,(g)} + 92\ kJ$$

The Haber-Bosch process

- Nitrogen, the most common gas in our atmosphere, plays a critical role in the biochemistry of every living thing. However, because nitrogen is so unreactive, plants cannot take it directly from the air. This was once a major limiting factor in agriculture, as plants need nitrogen to grow. Today, we use the Haber-Bosch process to artificially produce ammonia (NH_3), which is used to make fertilizers. These fertilizers allow us to grow more and more crops which, in turn, allows us to feed billions of people.
- In this week's challenge, we will use our understanding of ***"Le Chatelier's principle"*** as we think through the Haber-Bosch process, a process in dynamic equilibrium.

1. Consider the reactant nitrogen (N_2). Why is it difficult for nitrogen to react with other elements?
   (Answer in Appendix A)

2. After introducing the reactants into the process, one of the first steps involves pressure. Is the pressure increased or decreased? Why?
   (Answer in Appendix A)

3. The next step involves the use of a catalyst (usually made of iron or ruthenium). What does the catalyst do in this chemical reaction?
   (Answer in Appendix A)

4. The fourth step involves cooling. Why would decreasing the temperature of the system be helpful in increasing the yield of ammonia (NH_3)?
   (Answer in Appendix A)

5. Finally, as the Haber-Bosch process takes place, the ammonia (NH_3) produced is removed from the system. How does its removal increase the yield of ammonia (NH_3) produced overall?
   (Answers in Appendix A)

Congratulations! You have now thought through the 5 steps of the Haber-Bosch process.

To learn more about the discovery, benefits and drawbacks of the Haber process, click: https://ed.ted.com/lessons/the-chemical-reaction-that-feeds-the-world-daniel-d-dulek

For more information on Le Chatelier's principle, click on https://www.chemguide.co.uk/physical/equilibria/lechatelier.html

Did you know?

- About 80% of the nitrogen in our bodies comes from the Haber-Bosch process.
- In 1901, Henry Louis Le Chatelier attempted to produce a reaction between hydrogen and nitrogen, but a horrible explosion occurred, almost killing his assistant. Later, Haber acknowledged that Le Chatelier's failure accelerated his research, leading to the invention of the Haber process.
- Although the Haber-Bosch process is used today to produce ammonia (NH_3) for crop fertilizers, during WWI, it was used to give Germany an advantage in the production of explosives. (As history reminds us over and over again, science itself is neither good nor bad, it is simply science. The people with the best intentions can have the worst impacts while those who only want to kill might end up saving billions of lives.)
- Haber won a Nobel Prize in Chemistry in 1918, almost a decade after he came up with his invention. But this was controversial, as he had also invented chlorine and mustard gas, which killed thousands during WWI.
- The nitrate runoff from farms, a product of synthetic fertilizers, has a devastating effect on water quality. It causes explosive growths of algae in waterways that use up much of the oxygen and result in "dead zones" where aquatic life cannot exist.

Materials required

- Appendix A
- Device with internet connection (optional)

Information for parents

- Review their understanding of Le Chatelier's principle while learning more about one of the top chemistry inventions of the 20th century.

Appendix A: Solutions

Answers

- The two nitrogen atoms in a nitrogen molecule are held together by a triple bond. This bond is not easy to break. In addition, the activation energy barrier to overcome is very high.
- Since the goal of the process is to produce the highest yield of ammonia (NH_3) possible, the gaseous mixture should have its pressure increased. Looking at the equation, we see that pressure drives the equilibrium to the right. Le Chatelier's principle tells us that since one mole of nitrogen and three moles of hydrogen result in 2 moles of ammonia (NH_3), increasing pressure would drive the reaction to the right and thus increase the yield of ammonia (NH_3).).

** *Note: The pressure during the Haber-Bosch process is 200 atmospheres* **

- The catalyst is used to lower the high activation energy of this reaction. This is needed in order to break the strong nitrogen triple bond.

** *Note: Haber noted that uranium would be a better catalyst, but it was too expensive* **

- This reaction is exothermic. We see this since energy is written as one of the products of the forward reaction. Le Chatelier's principle tells us that when heat energy is removed (i.e. the temperature is lowered), the reaction will favor replacing this heat energy and thus the forward reaction will be favored. In this case, this would result in an increase in the production of ammonia (NH_3).

** *Note: The temperature used in the reaction is between 400 °C and 450 °C* **

- By removing the ammonia (NH_3), the forward reaction will be favored. Le Chatelier's principle dictates that when there is less reactant/product the system will move to increase those reactants/products to re-establish equilibrium. So, in removing ammonia (NH_3), the forward reaction will be favored in order to re-establish equilibrium, hence increasing the yield of ammonia (NH_3).

** *Note: Ammonia is the first step in creating many explosives (e.g. nitro. and TNT)* **

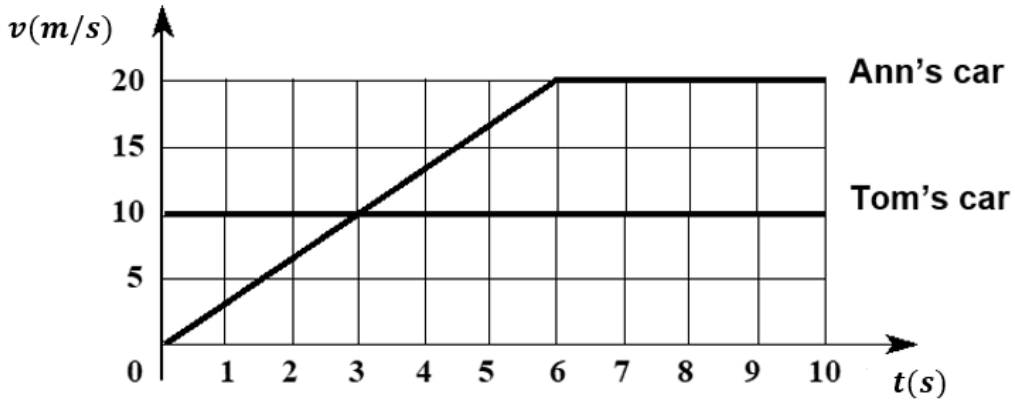
Velocity - Time Graph

Information for students

- $v_2 = v_1 + a\Delta t$
- $\Delta d = \frac{(v_1+v_2)}{2}\Delta t$
- $\Delta d = v_1\Delta t + \frac{1}{2}a\Delta t^2$
- ${v_2}^2 = {v_1}^2 + 2a\Delta d$

where:
$\Delta \boldsymbol{d}$ = change in distance (m)
$\boldsymbol{v_1}$ = initial velocity (m/s)
$\boldsymbol{v_2}$ = final velocity (m/s)
$\boldsymbol{a}$ = acceleration (m/s^2)
$\Delta \boldsymbol{t}$ = change in time (s)

- Describe what is happening in the graph below.



- A science teacher gave the following question to her class.
  Ann is waiting for a red light to change. When the light turns green, Tom, who is travelling in the same direction, at a constant speed, passes Ann just as she starts to move. At what time (in seconds) will Ann pass Tom?

- The graph above represents the velocity of the two cars as a function of time.
- Four students correctly found the answer to be 6 seconds, but each of them used a different strategy.
  - Steven found the solution algebraically
  - Melissa created a displacement vs time graph
  - Peter used trial and error
  - Isabel noticed that the area under the curve equals displacement during a time interval.
- Show how each student might have answered the question.
- At what time will Ann pass Tom, if Tom is travelling at a constant speed of 12 m/s?

Information for parents

- Links to help your child learn more about velocity-time graphs:
  - What are velocity time graphs? https://youtu.be/b1Zd8hUWpw0
  - The Physics Classroom https://www.physicsclassroom.com/class/1DKin/Lesson-4/Meaning-of-Shape-for-a-v-t-Graph
  - Why distance is the area under the velocity-time line. https://youtu.be/d-_eqgj5-K8

Learn About Hunger and Fullness and Get Moving!

Information for students

Activity 1: How does your body know you are full?

- Watch this video.
- What types of food keep you feeling fuller for longer?
- Discuss what you learned with a family member. For better effect, you could do so during a mealtime!

Activity 2: Get moving!

- Complete the 30-Minute Hip-Hop Workout in this video.
- Adjust the movements and level of intensity to your personal fitness level.

If you are up for practicing your French and want to explore more activity ideas, visit the Rest Actif! website.

Materials required

- None

Information for Parents

Children should:

- learn about fullness and satiety
- complete a hip-hop fitness workout

Parents could:

- ask their children questions about what they learned about hunger and fullness
- complete the workout with their children

Ethics and Clothing

Information for students

The carbon footprint caused by the clothing industry is drawing a lot of attention these days. Watch this short National Geographic video to learn about some of the issues involved: https://video.nationalgeographic.com/video/00000144-0a29-d3cb-a96c-7b2dea6c0000.

Now watch at this TED-Ed lesson called “Quest 2: The Clothes We Wear” by the Earth School to further your reflections: https://ed.ted.com/on/bcCRJEX9?theme_id=earth-school.

Check out some of the other quests on the Earth School website. Try them all! Scroll down to see all the weekly themes. New quests will be appearing all through May!

Materials required

- Device with Internet access

Information for parents

- Visit the Earth School website and explore the proposed quests with your child: https://ed.ted.com/earth-school.
- Click on a quest and use the open-ended questions found under the Discuss tab on the right to spark a discussion in your home.

Financial Options

Information for students

- Since this is your last year in high school, you are probably thinking of various items you would like to or will need to buy for next year, such as a ***car***, ***computer***, ***microwave***, ***washer and dryer***, or some other item you might need.
- Select an item that you would like to or need to buy in the coming months and begin researching your options using the chart in the Appendix. You may choose to compare two or three options; it is up to you.
- Think about the various things you will need to consider, such as advantages and disadvantages, cost and warranties.
- The ***Charter of essential skills for financial well-being*** offers several suggestions to reflect on as you do your research and make your selection.
  - Define your needs and wants.
  - Examine your lifestyle and make conscious, informed decisions based on your priorities, choices, values and anticipated life changes.
  - Compare the price and features of different products and services based on your needs, your values, etc.
  - Purchase goods and services using the basic tips for saving money.
  - Before purchasing goods or services, determine whether this expense will lead to other expenses in the future.
  - Take into account the opportunity cost for choosing among different options (e.g. deciding not to purchase an item).
  - Recognize the advantages of postponing your purchase of certain goods and services in order to save or find other solutions (page 9).
- You may also need to consult the Educaloi site to find out more about consumer rights and the *Consumer Protection Act*.

Materials required

Useful resources, depending on personal preferences and availability:

- Device with Internet access
- Writing materials (paper, pencil, etc.)

Information for parents

- Help your child to research and consider their options, as needed.

Appendix

Financial Options Chart

Things to Consider	Option #1	Options #2	Option #3
Cost			
Warranties available			
Features (i.e. gas mileage)			
Customer reviews			
Advantages			
Disadvantages			
Other			

Wealth and the Coronavirus Crisis

Information for students

- In your Contemporary World class, you have likely explored the theme of wealth. Some of the topics include:
  - The distribution of wealth
  - Balancing social justice and economic development
  - The control of resources
- During the last several weeks, it has become apparent that dealing with the coronavirus crisis and its consequences is more challenging for some people than others, especially because of an unequal distribution of wealth that causes disparities in the world, and within societies. Since the distribution of wealth generally favours the northern countries over the southern countries, the worldwide sanitary crisis reflects that reality.
- Determining the extent of the crisis in some countries is difficult for a number of reasons: lack of transparency, weakness of the healthcare system, inability to keep track of the number of cases and deaths linked to the virus, etc. These countries are far more at risk than others, and their citizens are unable to be tested, to practise social distancing or to get proper medical care.
- Think about topics that may have been covered in class. How might the pandemic affect certain vulnerable populations or groups of people – and why? Consider the situation of:
  - Refugees, migrants and asylum seekers
  - Communities with no access to clean water
  - The world's most densely populated cities
  - People without adequate health insurance
  - Countries most at risk of being plunged into famine
- Considering that there is a consensus on the need to reduce poverty in the world, but that the way to achieve it is a matter of debate, do you think the international community has an added responsibility during worldwide crises like the ongoing pandemic? Why?
- Do you think it's fair that some countries can control access to key resources (tests, medical/protective gear, ventilators, etc.) and have an advantage other countries when it comes to purchasing these resources? Why?
- Make a list of changes and events you might have seen happening around the world in connection with the pandemic while browsing on social media, watching the news or listening to the radio. In your opinion, to what extent is a fair distribution of wealth possible?
- To support your opinion, consult the United Nations website to find out more about the COVID-19 pandemic around the world.

Materials required

Useful resources, depending on personal preferences and availability:

- Device with Internet access
- Paper and writing materials (paper, pencil, etc.)

Information for parents

- Remember that the purpose is for your child to do research and to become informed, not to produce work to be evaluated.
- You can familiarize your child with some concepts that might be challenging for them. Think about what you might have seen online or on TV.
- Discuss the questions together and perhaps encourage your child to contact a classmate if they have more questions or want to compare their findings.