VOLUME 42, NUMBER 3
Fall 2019

ACCELERATOR

EXECUTIVE HIGHLIGHTS

PROFESSIONAL DEVELOPMENT OPPORTUNITIES

ARTICLES

On the Cover: Teachers drawing the path of marbles on stretchy fabric to help visualize electric fields

Executive of
Saskatchewan Science Teachers' Society

Message From the Editor

Patrick A. Kossmann

Well another year has started for my and for 20 years in I'm still excited to be in the classroom. I have shared a bit about my most recent summer trip. This time I spent a week at the Perimeter Institute helping run their summer Einstein Plus Workshop. There are a bunch of new resources available so check out their website to pick them up. For those of you who have been to PI before we're trying to get an alumni event set up for the province, so stay tuned for that.

This issue picked up the theme of Student Directed study and as such you will find two that Carla Cooper has used in her Biology and Physics classrooms. I will admit I don't do well with giving up the reins of the class and letting the kids explore what they want to. Maybe these SDS's will give me some ideas on how I can do it better. Maybe my intern can show me some ways to incorporate them into my classroom.

Another exciting prospect this year is the return of Sciematics! The SSTS's provincial conference is scheduled to be held at the U of S on April 30th and May 1st. Coming off a 4 year hiatus we are itching to get things rolling again and share some of the great things happening in our province. I will be sharing some of the new Perimeter resources, but we will need more that just me to make a successful conference. If you'd like to share something you're doing in your classroom drop me a line using the form on page 16. The more best practice from our Saskatchewan classroom we can show the better we will all get and that can't hurt our students at all.

If you don't feel like presenting to an audience but would be willing to share the great things you're doing with our readers send mne a message and I'll get you into a future issue. Happy reading.

Themes for Future Issues:

Issue	Theme	Submission Deadline
Winter		Jan, 20, 2020
Spring		May, 20, 2020

If you have a suggestion for a future theme please contact acceleratorsask@gmail.com

CALL FOR SUBMISSIONS

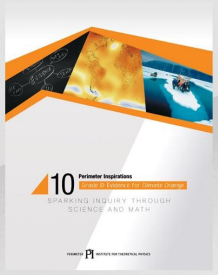
Would you like to share your ideas with other teachers? Would you allow others to benefit from your expertise? Perhaps you have a concern about science education in Saskatchewan today. We are always looking for articles and teacher demos/classroom activities to print in our journal. You can send your articles to us in a variety of ways: by email (preferably MS WORD attachment or plain TEXT) to acceleratorsask@gmail.com, FAX (771-4207), or regular mail (P.O. Box 70, Balgonie SK. S0G 0E0).

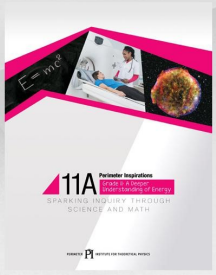
Any photographs that you wish to enclose would be great! They need to be mailed to the editor by snail mail, or an original, not scanned, digital photograph can be emailed along with the article. If you are emailing in an article and/or photograph, please email it to: acceleratorsask@gmail.com at your convenience.

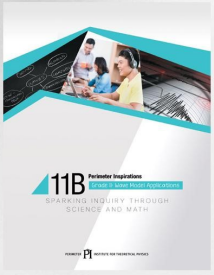
EXPLORE CHANGING IDEAS ABOUT OUR UNIVERSE IN YOUR CLASSROOM

PERIMETER INSTITUTE LESSON PLAN MODULES FOR GRADES 10-11

NOW AVAILABLE







For information about attending or booking professional development workshops in your area, please contact:
Patrick Kossmann at **patrick.kossmann@pvsd.ca**
Karen Kennedy-Allin at **karen.allin@secpsd.ca**

Visit Perimeter's Resource Centre at
www.resources.perimeterinstitute.ca

PERIMETER INSTITUTE FOR THEORETICAL PHYSICS

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EVERYDAY EINSTEIN: GPS & RELATIVITY
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REVOLUTIONS IN SCIENCE
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TEMPERATURE RISING
AUTOMATED FOR THE FUTURE
FIGURING OUTER SPACE
EVIDENCE FOR CLIMATE CHANGE
A DEEPER UNDERSTANDING OF ENERGY
WAVE MODEL APPLICATIONS

PERIMETER EXPLORATIONS

THE MYSTERY OF DARK MATTER
THE CHALLENGE OF QUANTUM REALITY
BEYOND THE ATOM: REMODELLING PARTICLE PHYSICS
BLACK HOLES

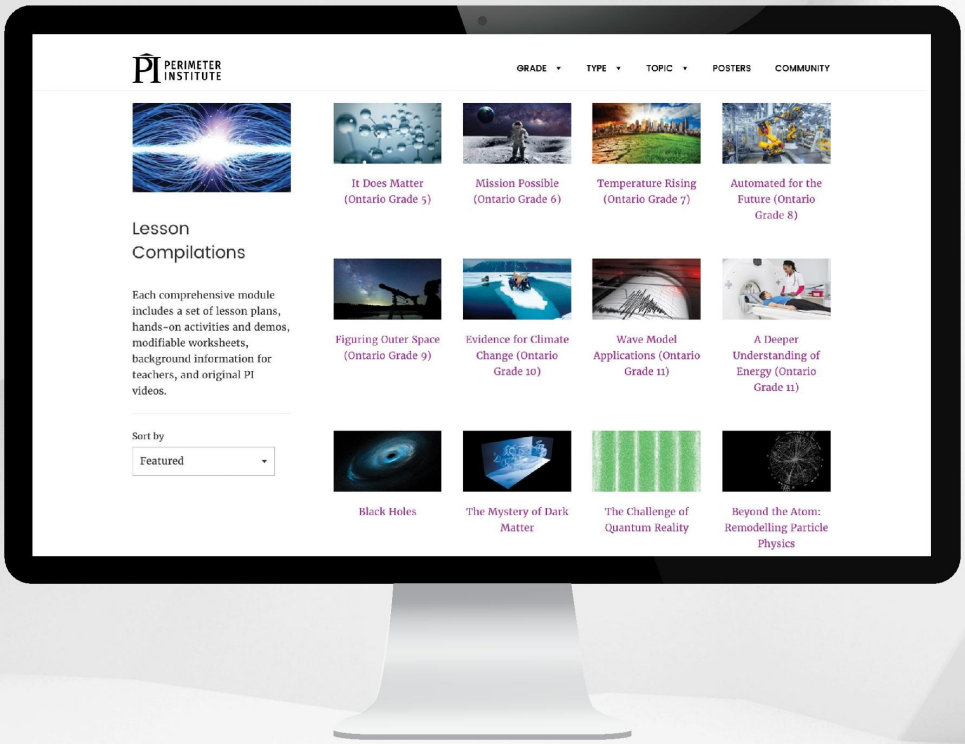
PERIMETER INVESTIGATIONS

MEASURING PLANCK'S CONSTANT LAB

PERIMETER BRAINSTEM

CAREER MOVES: SKILLS FOR THE JOURNEY

FREE download at **www.resources.perimeterinstitute.ca**



SASKATCHEWAN SCIENCE TEACHERS' SOCIETY

presents

SCIΣ 20/20 MATICS

Sciematics is a provincial conference for science and math teachers. The theme this year is "emerging technologies" where you will get to experience the current trends in technology through innovative keynote speakers, displays, tours and presenters.

"emerging technologies"

Keynote Speakers

Dr. Ivar Mendez

Robyn Reist

UNIVERSITY OF SASKATCHEWAN COLLEGE OF AGRICULTURE AND BIORESOURCES

APRIL 30-MAY 1, 2020

Registration opening January 2020

Stay tuned for details @

http://www.ssts.ca/

SCIΣ 20/20 MATICS

Agenda

Thursday April 30, 2020

6:30 p.m.	Registration
7:00 p.m.	Welcome
7:30 p.m.	Keynote - Dr. Ivar Mendez
8:45 p.m.	Wine and Cheese

Friday May 1, 2020

8:30 a.m.	Registration
9:00 a.m.	Session 1
10:15 a.m.	Nutrition Break
10:45 a.m.	Session 2
12:00 p.m.	Lunch
1:00 p.m.	Session 3
2:15 p.m.	Nutrition Break
2:45 p.m.	Session 4
4:15 p.m.	Keynote - Robyn Reist

SASKATCHEWAN SCIENCE TEACHERS' SOCIETY

Check out what's NEW this Fall!

K-12 Educational Programs & Resources

OUT-OF-SCHOOL PROGRAMS | IN-SCHOOL PROGRAMS | RESOURCES

Elementary

Explore AG
Saskatoon & area
GRADES 3 TO 6, SEP-FEB

Ag EXperience
Saskatoon
GRADE 4, OCTOBER

Agribition Agri-Ed Program
Regina & area
GRADES 1 TO 5, NOVEMBER

Harvest Showdown Education Program
Yorkton
GRADES 4 & 7, NOVEMBER

RESOURCES:

Blossom's Big Job
Sci, Arts, Hlth, ELA
GRADES K TO 3

Living Necklace Kit
Sci, Arts
GRADES 1 TO 4

What's in Your Lunchbox?
Sci, Hlth, SS, ELA
GRADES 3 TO 6

The Adventures of Michael & Mia: Stewards of the Land
Sci, SS, ELA
GRADES 4 TO 6

Middle Years

Sask Feeds the World
Regina
GRADES 6 TO 9, OCTOBER 3

Journey 2050
Province-wide
GRADES 7 TO 9, YEAR-ROUND

Sask Food Story
SASKATOON
GRADES 6 TO 9, OCTOBER

Career Game - a thinkAG initiative
Province-wide
GRADES 6 TO 8, YEAR-ROUND

High School

thinkAG Career & Education Expo
Regina & area
GRADES 9 TO 12 , NOVEMBER

Journey 2050
Province-wide
GRADES 10 TO 12, YEAR-ROUND

thinkAG Career Conversations
Province-wide
GRADES 9 TO 12, YEAR-ROUND

Biotechnology Classroom Activities
Saskatoon & area
GRADES 9 TO 12, YEAR-ROUND

RESOURCES:

#MyFoodChoice
Sci, Hlth, ELA, SS
GRADES 9 TO 12

snapAG
Sci, Hlth, SS
GRADES 9 TO 12

The Agri-Environment: Exploring a Healthy Relationship with the Land
ES20

Planet X: 'Out of this World' Opportunities in Agriculture and Food
Sci, Careers, SS
GRADES 9 TO 12

Register for programs and order FREE resources at: **www.aitc.sk.ca**!

Agriculture in the Classroom

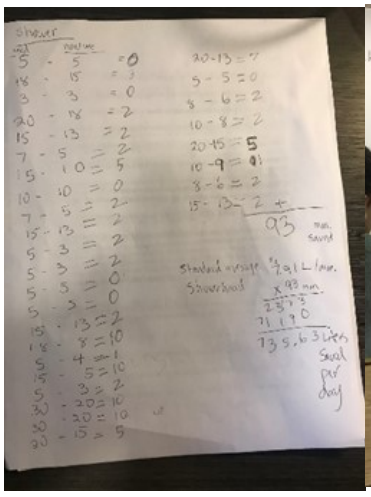
Compete in the Fall 2019 Student Action on Canadian Water Attitudes Competition!

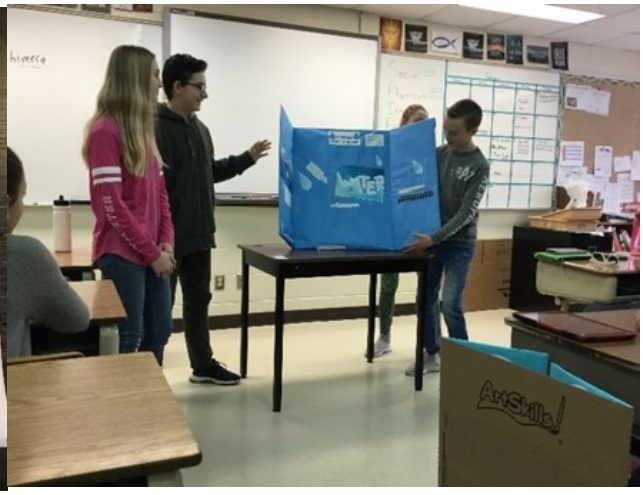
Thanks to funding from The W. Garfield Weston Foundation and RBC, we are holding a Fall 2019 Student Action on Canadian Water Attitudes Competition.
This competition is open to all students, in kindergarten to grade 12, in Canada. Students will investigate water issues in their community/area. The competition will involve students surveying their community to get an understanding of knowledge and attitudes on a topic of their choice and presenting their findings in a report. The grand prize will be for the top school in Canada, it is valued at $3,000 and includes a water bottle filling station, a commemorative plaque, and possibly some reusable water bottles and/or water testing kits! There will also be a prize package for the top school in Saskatchewan, it is valued at $2,200 and includes a water bottle filling station and a commemorative plaque. (Note: If the top school in Canada is located in Saskatchewan then the second place school in Saskatchewan will win the prize package valued at $2,200.)

We will hold webinars that will explain every step of the project. We will be there to support the teachers and their students every step of the way! We will always be available to answer questions, help with tech issues, or just to discuss ideas!

By joining us in changing attitudes on water issues facing Canadian residents, your students not only will have a chance to win an amazing water themed prize package but will also be proactive in positive change in their community and environment!

Visit www.safewater.org/student-action-competition to register today!



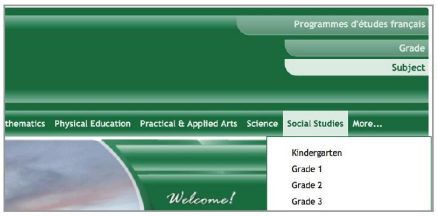


Welcome to the Curriculum Website

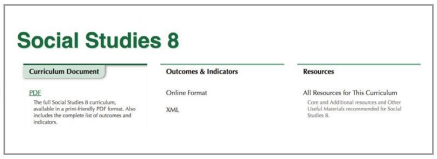
A STEP-BY-STEP GUIDE TO MAKING THE MOST OF THE MINISTRY OF EDUCATION'S CURRICULUM SITE

www.curriculum.gov.sk.ca

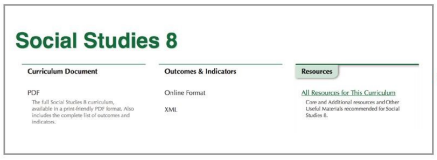
1 Start with the Subject you want to investigate, such as Social Studies 8 (you may also search by grade, if you wish).



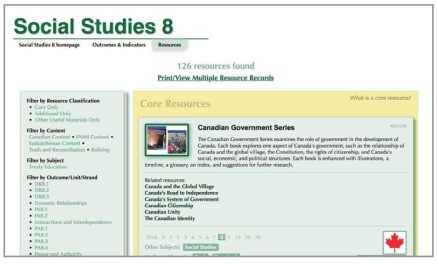
2 Click on Curriculum to open the curriculum document for Social Studies 8.



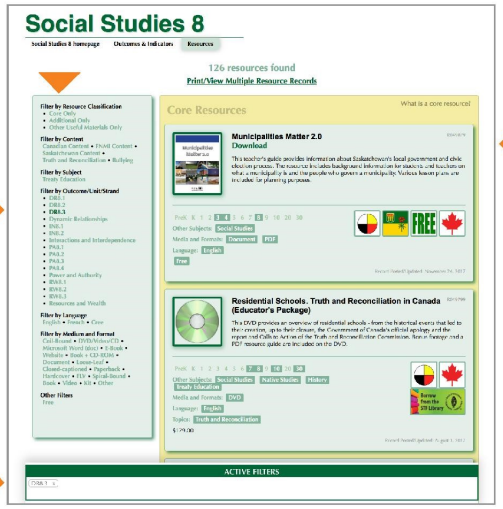
3 Click on Resources to see the Core & Additional resources recommended to support this curriculum, plus Other Useful Materials for the classroom.



4 Core Resources are shown first, followed by Additional Resources, then Other Useful Materials. Definitions are provided for each classification of resource (e.g., What is a core resource?).

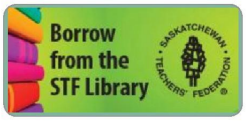


5 Use the filters on the left to narrow your search. For instance, click on DR8.3 to see the resources that support that specific outcome. A list of resources will appear. You may also filter by other topics such as Treaty Education or Truth and Reconciliation. To begin a new search, close the DR8.3 filter that is shown in the Active Filters window at the bottom of the page.

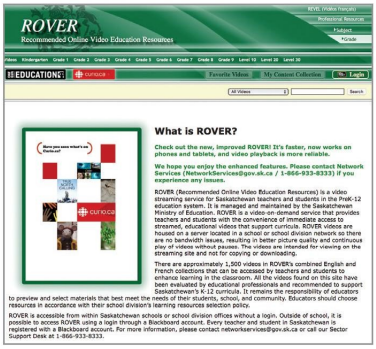


6 If **Download** appears beneath the title of resource, it is available for free download. If **WATCH** appears beneath the title, this is a video available for viewing through the Ministry's free ROVER video streaming service.

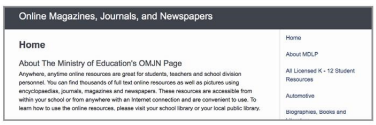
7 Click on the title of any item to see a pop-up of the detailed record. Click on the green Borrow from the STF Library button to see this item in the library catalogue, to email a request to borrow it, and to have it sent to your school, free of charge.



8 Click on ROVER in the Quick Links at the bottom of the curriculum site welcome page to go directly to ROVER and to search all of the videos available for classroom use. ROVER also provides free access to the National Film Board's CAMPUS and to the CBC's Curio website, which now also includes the National Geographic Channel.



9 Be sure to investigate other Quick Links, including the Treaty Education Learning Resource, the Supporting Reconciliation in Saskatchewan Schools website, and the free Online Magazines, Journals and Newspapers available for schools. (The complete Treaty Education Outcomes & Indicators document for K-12 can now be found by visiting Treaty Education Learning Resource > K-9 Treaty Education Learning Resource > Start Here > Downloadables.)



SASKATCHEWAN TEACHERS' FEDERATION

@SaskTeachersFed
www.stf.sk.ca

8060-50 15/11/2018

Forensic Science

By, Mark Edmonds & Amy Jamieson

Over the course of four months (February to May 2019), several school divisions worked collaboratively to write and create current Forensic Science 20L and 30L curricula. The result of the collaboration was two incredible courses! The content was then reviewed by the former manager of the RCMP Forensics Lab, to ensure that everything in both courses reflected current forensic practices. As a result, Saskatchewan high school students now have the opportunity to take these science based electives.

Forensic Science 20 is an introduction to the field, with an emphasis on procedural science. Topics covered in Forensic Science 20L include trace evidence (including gunshot residue, fiber, and blood), impression evidence (including fingerprints, footprints and bite marks), arson and explosives, document analysis, criminal profiling, a student directed study and career exploration. Forensic Science 30L focuses more on forensic science content, covering topics such as DNA, firearm and tool mark impression evidence, cause of death, entomology and anthropology, and computer forensics. There are a ton of great resources out there to support teaching forensic science to high school students, here are a couple to get you started (more can be found in the curriculum documents themselves):

Forensic Science Podcasts: https://play.google.com/music/listen#/ps/I5yzwz6iphz4yydhhftysfuq4u4

The Forensic Teacher Magazine: http://www.theforensicteacher.com/Home.html

All You Ever Wanted To Know About Forensic Science In Canada But Didn't Know Who To Ask!: https://www.csfs.ca/wp-content/uploads/2017/08/Forensic-Science-Career-Booklet-GSA-2017-2nd-Edition-1-ilovepdf-compressed.pdf

If you have interested students, two school divisions offer Forensic Science 20L online (Sun West School Division and Horizon School Division) and Horizon also offers Forensic Science 30L. Check out their websites if you want more information.

Horizon Distance Education School: https://distanceed.horizonsd.ca/Courses

Sun West Distance Learning Center: https://sunwestdlc.ca/

If you are interested in teaching either course in your school, you can request that your school division adopt the current curricula (Locally Developed Courses or LDC's).

Summer at Pi

By, Patrick A. Kossmann

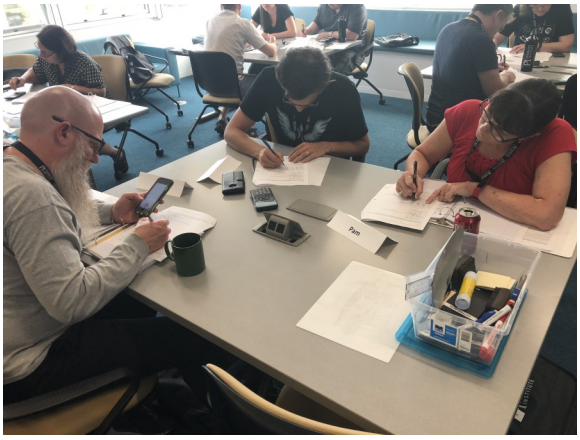
July found me back in Waterloo at one of the places I love to visit most. The Perimeter Institute's Einstein Plus workshop has always been one of the best weeks of physics professional development available. This year I was asked to be a facilitator and worked with some great physics educators from across Canada and the United Kingdom. For months we planned the sessions participants would take part in and once we got to Waterloo we frantically ran about amassing the equipment we felt we needed to show off what PI has put together for teachers.

Our first day was intense for the teachers to get to know each other and to re-evaluate how they teach science and how students learn. I'm not one to have people just sit and listen so my first job was running the groups through a tableaux activity. Each group was given a Physics Law and a prop that they had to use to demonstreate the law while we tried to guess what law they were showing. People stretched their creativity and their legs to work together. New groups were formed and participants went through a series of observation activities. By putting teachers in the student's seats they got to experience how students make observations and how those observations lead them to inferences. One of the observation activities involved looking at a cube with names written on the sides. By evaluating the names, their positions, and some numbers written on the sides the groups had to predict what was on the unseen side of the cube. This activity became my first day of class activity this year. My students seemed to enjoy it as much as the teachers at the workshop did.

Over the next 5 days all participants worked through many of the resources PI has been developing for the last 13 years. Old familiar activities like the black box and the challenge of quantum reality had teachers looking at resources meant to make modern physics more accessible to high school students. The participants worked through many of these activities in groups of four and were encouraged to try them out from a student's perspective, but to also question how the activity could fit into their curriculum back home. One of the older activities I was very excited about was the Planck's Constant lab. Many will remember when this lab first came out and how students would build the circuit to test when LED's would light up. One of the biggest problems with this activity has always been the fact that often when students build the circuits they burn out the potentiometer. The solution to this issue was to replace much of the circuit with Play Doh. The Play Doh is conductive so will carry a current and the length of material used changes the voltage. This set-up made for easier to build circuits and quicker data for use.

The Perimeter Institute has been busy over the last year developing some new resources. There is now a Grade 10 resource on Climate change that examines the data scientists have amassed over the years to support the idea that climate change is happening and humans need to act now to try to stop it. A Grade 12 resource has also been created to allow students to build a better understanding of Energy transfer.

The use of LOL graphs have students evaluate what forms of energy are present at the start, what energies are in the system being evaluated, and what energy forms are present at the end. The process allows students to create the equations they will be using, whether that be Work/Energy equations or Potential/Kinetic Energy equations. The system is more time consuming than just having students choose equation and plug their information, but there is data that shows the process leads to a better foundational understanding of the processes involved in energy transfers. I will admit I am still learning how to use this resource and trying to see how best to fit it into my teaching.



One of the resources I am most excited over is the very new resource on fields. This resource was being piloted at the workshop, but is now available on PI's website. The resource presents some activities to allow students to explore how fields work. From gravitational fields to electric fields to magnetic fields, all areas of field research are explored. Visualizing how the electric fields interact is an important concept in Physics that is hard to present. PI has created an activity that draws arrows on stretched fabric to show fields leading from positive to negative charges. The activity I am more impressed with in this resource is the one explaining aurora. This is a concept I have avoided in the past, but the activity which has students wrapping ribbon around tubes and cones, allows students to visualize how particles move in our atmosphere and my they produce light. The really nice part of the activity is that it is prefaced by a video of a Cree elder sharing the importance of aurora to indigenous culture. With the need to incorporate more indigenous content in physics this is an especially welcome resource.

Not all of the week's activities were workshops. We also got to experience some presentations from special guests. Tanisha Bassan shared the road she took through High School to learn how to program quantum computers. This was a really impressive feat as she is mostly self taught. Marina Cortes shared with us how she is looking at time in a new manner. Her ground breaking, and award winning research is changing how physics looks at time in the early stages of the universe. The last guest was Avery Broderick who spoke to about the first picture of a black hole and what that meant for science. This session was amazing and full of imagery that blew my mind.

My trip to Waterloo was a fun time as it always is. Keep checking the Periemter website for next year's invite. It's worth the trip!

Sciematics 2020 is a provincial conference for Science and Mathematics teachers from Kindergarten to Grade 12. It is hosted by the Saskatchewan Science Teachers' Society. As has been the longstanding tradition of Sciematics, this conference will include quality sessions in math and science.

Do you have some interesting ideas or strategies that you would like to share with your colleagues? We would like to invite you to submit a session proposal for Sciematics 2020. The conference will be held in Saskatoon at the University of Saskatchewan on April 30th and May 1st.

We believe that Sciematics 2020 will be an exciting time when Science and Mathematics teachers will learn new techniques, ideas and strategies that they can use with their students. It is only with the assistance of individuals like you that this will become a reality. We invite you to consider a proposal for a one hour workshop or presentation. Everybody has their area(s) of expertise. The more we share this expertise, the better the outcome for our students!

Although Sciematics 2020 is not able to cover any of your expenses, you will be entitled to a complimentary conference registration (which itself includes a two-year membership with the SSTS). If you plan to be joined by a colleague, the committee is only able to offer one complimentary registration. Please complete the form and return it as soon as possible.

On a closing note, we know that your participation in our conference will contribute to the professional development of Science and Mathematics teachers in Saskatchewan and we hope that we will see you in Saskatoon at the end of April 2020. If you have any questions please contact one of our committee members.

Sciematics Committee Members from SSTS

Lindsay Shaw
shawl@stf.sk.ca

Mark Edmonds
mark.edmonds@pvsd.ca

Sciematics 2020
CALL FOR SPEAKERS

The Saskatchewan Science Teachers Society is proud to host Sciematics 2020 at the U of S in Saskatoon. The conference is scheduled for **Apr 30th to May 1st, 2020.**

We invite you to submit a proposal for a session at this conference. We would love to see a lot of sessions featuring classroom teachers' ideas for teaching mathematics and science.

If you have an idea that you would like to share, please complete the following form and return it by mail or fax or email to: Patrick A. Kossmann, c/o Greenall High School, Box 70, Balgonie, SK S0G 0E0, fax: (306) 771-4207 Patrick.kossmann@pvsd.ca

SCIEMATICS 2020
SPEAKER PROPOSAL

Name:_____

Address:_____

Postal Code:_____ Phone: _____(w) _____(h)

Fax:_____ Email address:_____

Title of Proposed Session: _____

Type of Session:

Workshop (60 min. hands-on session) _____
Presentation (60 min. talk to a large audience; including time for questions) _____

Outline of Proposed Session: A brief interesting description of the session, as you would like it to appear in the program.

Equipment needed:

_____

_____

_____

Audience: Elementary ___ Middle Years ___ Secondary ___ General ___

*Please note that although Sciematics 2020 is not able to cover speakers' expenses, we do offer you **a free conference registration**. All information given will be used in a data bank for the next Sciematics planning committee.*

Student Directed Study

Adapted from: https://sites.google.com/site/msmorabiology/biology-ppt-notes/jurassic-park

SDS1 – Create and carry out a plan to explore one or more topics of personal interest that are relevant to Biology 30.

You and a partner will take a journey through time, working on a project to discover more about biology via dinosaurs from their evolution, genetics, organization and how they impacted life as we know it. As a scientific society, we have learned so much about the process of evolution, carbon dating and identification from the discovery of fossilized bones of dinosaurs. Some would argue that they are one of the best learning aids out there. Are they really extinct???

This assignment is worth 15% of your overall mark in Biology 30. You will be given ~ 7 hours of class time to work on this assignment. We will then require ~ 3 hours of class time to present our projects & posters.

Part 1:

Jurassic Park (Crichton, M., 1990) was a science fiction book that used manipulation of DNA from thousands years-old dinosaurs to resurrect new dinosaurs. The movie *Jurassic Park* was created from the book, and since that movie, *Jurassic World* and *Jurassic World: The Fallen Kingdom* have since been created to continue the story. While these stories are based on science fiction, there is a considerable amount of sound-based science that has been put into researching when writing the book and movies. Since this technology is ever-changing, no websites have been listed for this assignment. It is your job to find relevant, informative and reputable Internet sites that help you answer the questions below. You must list every website you use in this assignment using APA formatting.

Questions:

1. Is this movie a science fiction book that is a future possibility or is it just the author's imagination? (2)
2. Why did they use blood from a mosquito? How did they get it out of the mosquito? Is this actually possible, why or why not? (3)
3. Why other types of DNA did they use in Jurassic World? Why? (5)
4. What biological materials are required to recreate extinct species? Do scientists have access to these materials? Can they create them? (5)
5. What techniques are required to recreate extinct species? (5)
6. How old can DNA be and still be viable to manipulation through the tools of biotechnology? Provide an example. (5)
7. Are there other extinct creatures that could be brought back to life through biotechnology? (5)
8. What role can ancient DNA play in understanding life on earth? (5)
9. With today's technologies it is possible to freeze animal embryos. Describe some reasons or purpose why we would want to. (4)
10. What is the current state of this technology as of today? (4)

Student Directed Study

SDS1 – Create and carry out a plan to explore one or more topics of personal interest that are relevant to Biology 30.

Part 2:
You and your partner must choose one of the following topics and create a Google Slide presentation or a Vlog which you will present to the class. You must list every website you use in this assignment using APA formatting.

Criteria for a Google Slide Presentation:

- 18-20 slides (8-10 min presentation length)
- Introductory slide
- Summary slide
- Three slides should link your topic to Jurassic World
- An interesting and related graphic/video on each slide
- Information must be written in complete sentences
- Grammar and spelling count

Criteria for a Vlog:

- 8-10 minutes long
- Introduction
- Conclusion
- Must have graphics linking your vlog to Jurassic World
- Must have 18-20 graphics/videos relating to your topic
- Must speak clearly - no text speak

Topics:

I. Dinosaurs (characteristics of)

a. Color, size, life span, sight, daily life, defense mechanisms, bone structure

b. Can dinosaurs really run as fast as they did in the movie?

c. How did dinosaurs find food? What foods did they eat?

d. Reproduction of

e. How did dinosaurs communicate?

f. Name some predator-prey relationships

g. Name some instincts of dinosaurs.

h. What animals are related to dinosaurs?

II. Fossils

a. What are the different dating processes?

b. How are fossils preserved?

c. Include how sap of a tree and amber preserve fossils?

III. Dinosaurs died because..... (theories of extinction)

IV. What is chaos theory?

V. History of the earth

a. How old is it?

b. What animals that existed in ancient times still exist?

c. What is the meaning of Jurassic?

d. What was the environment, habitat and atmosphere during the age of dinosaurs?

e. Where are dinosaurs located?

f. What is Pangea?

g. Name some prehistoric plants and animals

h. Geologic Timeline - when did different fossils including dinosaurs appear?

VI. Man vs nature:

Can man harness or change nature? Describe a real life example and give your opinion of it.

VII. Ethics of science :

Write your answers to following questions. Support your ideas with examples.

1. Are we sure we want to do this?
2. Are there hazards in genetic engineering? (If so, what are they?)
3. "The scientists were so preoccupied with whether or not they COULD do it, they never stopped to think if they SHOULD do it!" Should we marvel with the past rather than tamper with the future?

Student Directed Study

SDS1 – Create and carry out a plan to explore one or more topics of personal interest that are relevant to Biology 30.

Part 3:
POSTER You are a team of paleontologists asked to be consultants for a modern day Jurassic Park. It is up to you to help determine what species should and should not be brought back from extinction. You will present a plan to the park sponsors (class) that includes your findings and research. Once all of the teams have presented their ideas for the park, the best proposal will be selected and that team will receive a **bonus of 20 points. Yes, the class will decide by secret ballot - no you cannot vote for yourself, on who will earn these points.** You must list every website you use in this assignment using APA formatting.

You will want to follow these steps to in completing this task

1. Decide which dinosaurs to bring back from extinction. You need a minimum of 10 dinosaurs. Choose 5 of the 10 to research in more depth. For each of those 5 you need to find the following information
    a. Name- scientific and common name (for all 10 dinosaurs)
    b. Location- where have fossils of this dinosaur been discovered?
    c. Time Period- when did this dinosaur originally live on Earth?
    d. Trophic Level/Nutritional Requirements- be specific and include types of food and amounts
    e. Size- how much does it weigh? How tall/long is it?
    f. Appearance/Description
    g. Movement- how does it move? (clumsy, agile, 2 legs or 4, etc.)?
    h. Speed?
    i. Description of habitat and habitat requirements- space, shelter,plants, etc.
    j. Behavior- are they solitary or live in groups? Is it an herbivore? A predator? Is it passive or aggressive?
    k. Cladogram - how closely related are all 10 dinosaurs?

2. When choosing your animals determine what types will need to be present in order for homeostasis to occur. (For instance, you will need a certain amount of meat eaters and plant eaters to keep resources from being depleted.) Also, include what types of plants or other organisms you will need.

3. Determine where your park needs to be located OR how to control the environmental factors. What are the environmental factors that need to be taken into consideration; i.e. will the dinosaurs do better in a warmer or cooler environment?

4. Park Design and Layout- How will your park be designed and managed?

5. Draw a map/diagram and include descriptions of the following:

Dinosaur enclosures/paddocks, safety features/security, water/power sources, food supplies for dinosaurs, lodging/guest accommodations, costs/pricing and packages, park map/layout of building, roads, etc...

Student Directed Study

SDS1 – Create and carry out a plan to explore one or more topics of personal interest that are relevant to Biology 30.

Rubric:

Part 1: **Cooper Marks this portion - Due SEPT 30**
Questions - see marks behind each question. **/43**

These questions can be done and handed in on paper or on Google Classroom.

Part 2: **Self/Group Assessed - Due NOV 25**
Research vlog or slide presentation **/70**

The rubric for this portion of your presentation can be found here.

Part 3: **Self/Group Assessed - Due JAN 13**
Poster presentation **/24**

The rubric for this portion of your poster can be found here.

Questions	**/43**
Research Presentation	**/70**
Poster Presentation	**/24**
Total	**/137**

Physics 30 Project: weight: 15% of your final mark

Physics is the science of matter and its motion. We began this semester discovering how things move through applications of kinematics and dynamics. This project will help your understanding of these applications.

There are four phases to this project:

- ☐ Design proposal: research and design an apparatus for your project. Included in your proposal should be a digram, a list of materials, and an explanation of how the apparatus will work. Due _____
- ☐ Apparatus: build and test your apparatus. This apparatus must be ready for inspection on _____. Apparatus testing will take place on _____ (weather dependent).
- ☐ Research report (one per group): prepare a report after testing is complete. The report should include:
  1. A diagram of the apparatus built
  2. Bibliography
  3. Changes that were made to the proposal and reasons for the changes
  4. A description of how that apparatus functions (see each option for more information)
  5. Results of testing (see each option for more information)
  6. Reflections of what you have learned and how you might improve your design.

  DUE ONE WEEK AFTER THE APPARATUS TESTING!!!
- ☐ Self and Group Evaluations: this will be done in class the day your research report is handed in.

Working in groups of two or three you will create on of the following projects:

Bottle Rockets - Newtons 3 Laws

Today's rockets are remarkable collections of human ingenuity that have their roots in the science and technology of the past. They are natural outgrowths of literally thousands of years of experimentation and research on rockets and rocket propulsion.During the latter part of the 17th century, the scientific foundations for modern rocketry were laid by the great English scientist Sir Isaac Newton (1642-1727). Newton organized his understanding of physical motion into three scientific laws. The laws explain how rockets work and why they are able to work in the vacuum of outer space. Newton's laws soon began to have a practical impact on the design of rockets.

(http://www.grc.nasa.gov/WWW/k-12/TRC/Rockets/history_of_rockets.html)

The goal of the project is to increase your understanding of motion in two dimensions by building a rocket to launch, and by collecting and analyzing your data.

DATA COLLECTION:
Launch the bottle rocket and record:
- launching angle,
- range of flight,
- time of flight

ANALYSIS:
Using the data that you have collected determine the following:
- the initial velocity of the release
- the time to the highest point (estimate the highest point)
- the velocity of the rocket upon lift off
- Explain each of Newtons three laws in regards to at what point in the experiment they were present and how.

DIAGRAM:
Include an annotated vector diagram of the motion of the rocket.

Catapult - Motion in 2D (http://apphysicsb.homestead.com/catapult.html)

A catapult is a mechanism used to throw missiles in ancient and medieval warfare. At first, catapults were specifically designed to shoot spears or other missiles at a low trajectory. They were originally distinguished from ballistae and trebuchets, both of which were large military engines used to hurl stones and other missiles, but these distinctions later blurred. Soon after, larger catapults mounted on a single arm also hurled stones, pots of boiling oil, and incendiaries at a high trajectory. They were used to attack or defend fortifications. Catapults were widely employed in siege warfare, but with the introduction of artillery they passed from use. In the 20th century catapults using hydraulic pressure were reintroduced to launch aircraft from warships.

The goal of the project is to increase your understanding of motion in two dimensions by building a catapult to launch ping-pong balls, and by collecting and analyzing your data. Each team must construct a catapult that can launch a ping-pong ball at various angles on a consistent basis.

DATA COLLECTION:
Launch the ping-pong ball at three different angles recording:
- launching angle,
- range of flight,
- time of flight.

ANALYSIS:
Using the data that you have collected determine the following:
- the initial velocity of the release, initial horizontal and vertical components
- the time to the highest point
- the velocity of the ball upon impact

DIAGRAM:
Include an annotated vector diagram of the motion of the ball.

PROPOSAL: /20

DIAGRAM	/8	
EXPLANATION	/8	
MATERIALS	/4	

APPARATUS: /40

EFFECTIVENESS: ▪ Did it do what it was intended to properly	/10	
EASE OF USE: ▪ Easy to set up ▪ Others could use successfully ▪ SAFE	/10	
DURABILITY: ▪ Withstands wind ▪ reusable	/10	
AESTHETICS: ▪ Name ▪ Visual appeal	/10	

REPORT: /40

VISUALS: ▪ Cover ▪ Diagrams	/10	
RESULTS: ▪ Recorded results (graphs) ▪ Calculations ▪ Proper Bibliography Included	/5	
FUNCTION: ▪ Description of how it worked Including the physics behind how it work	/10	
REFLECTION: ▪ What worked, What didn't ▪ What would you change ▪ What have you learned	/15	

Group Self-Assessment[1]

3 = Exceeding Proficiency 2 = Proficient 1 = Not yet proficient 0 = Experiencing Difficulty

Group Members:				
Project:	*Date:*			
Things to Consider	*Score*			
	3	*2*	*1*	*0*
We develop and adhere to ground rules.				
Each group member has specific things to do.				
We work together as a team.				
We communicate with a purpose and stay on task				
We record data efficiently.				
We examine data closely to search for meaning.				
Relevant and current research is used to support our work.				
Our conclusions are consistent with the data.				
We provide each other with positive and constructive feedback.				
We identify ways to improve our group efforts and efficiency				
Additional Comments:				

[1] Adapted from: "*Group Self-Assessment of Laboratory Activities*" 18 July 2007 <http://www.sasklearning.gov.sk.ca/docs/midlsci/self_as.pdf>

Cooperative Group Learning: Rating Scale for Assessment[2]

Group _____ Date _____

Scoring 5 = Always 4 = Often 3 = Sometimes 2 = Seldom 1 = Attendance is inconsistent 0 = Absent	Names of Group Members							
Considerations								
Negotiates roles and responsibilities of each group member								
Contributes ideas and suggestions								
Encourages the involvement of all group members								
Is receptive to peer questions and criticism								
Listens to the suggestions of others								
Modifies personal thinking to incorporate the ideas of others or new information								
Respects and accepts the contributions of each group member								
Participates positively to resolve conflicts within the group								
Follows through with individual commitments to the group								
Maintains a positive attitude								
Total Score (__/50)								

[2] Adapted from: *"Assessment and Evaluation"* 18 July 2007 <http://www.sasked.gov.sk.ca/docs/midlsoc/gr7/assess7.html>

SASKATCHEWAN SCIENCE TEACHERS' SOCIETY

Saskatchewan Science Teachers' society

Application for Membership

The following information is required to register for special subject councils. The information will be used to contact members for renewal and membership drive purposes, to send out journals or newsletters, and to forward conference and professional development opportunities information. None of the information will be sold or shared with third parties. By signing below, you authorize the SSTS to keep your membership information in a private database for the duration of your membership plus two years.

Please send complete form to:

SSTS
133 Coldwell Rd
Regina SK
S4R 4K7

Name: _____

Mailing Address: _____

Town/City: _____ Postal Code: _____

E-mail Address: _____

Teaching Certificate No. if applicable (to verify STF membership):

_____

I enclose a cheque or money order for a one year membership:

Regular Membership …….	$15.00
Superannuated Membership ……..	$ 5.00
Student Membership……...	$ 5.00

Signature: _____ Date: _____

A copy of this form and etransfer can be sent to: SSTSmembership@gmail.com

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