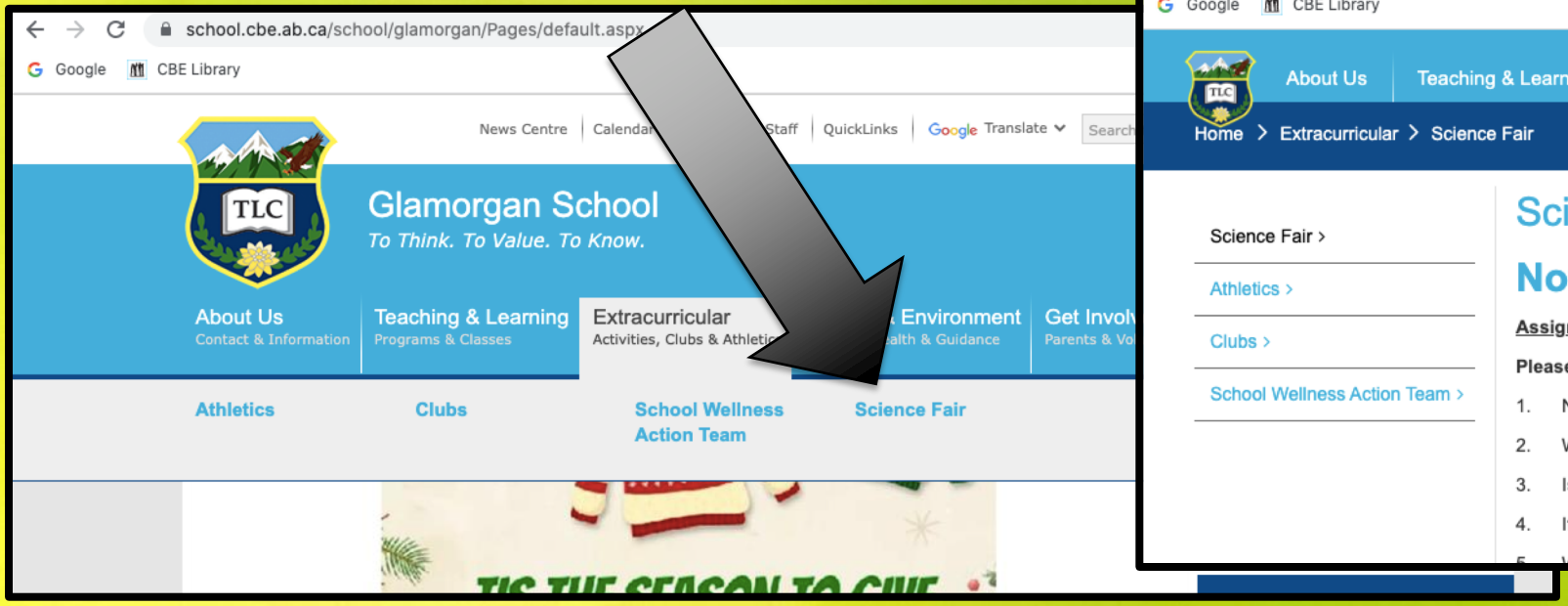
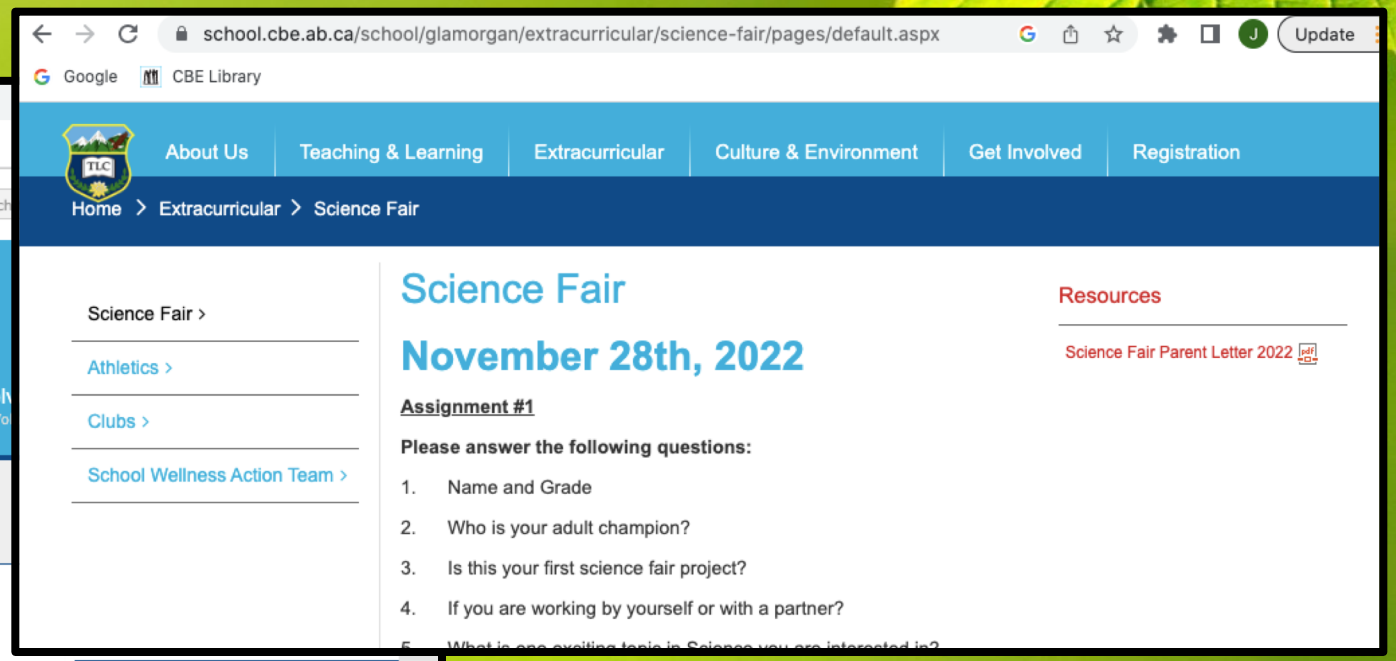
GSSF
Meeting 2

GSSF website

- Check regularly for notes, assignments and updates
- jmrip@cbe.ab.ca
- Use Glamorgan School Website





What is my big question or topic?

- Pick something you are passionate about
- Think about big issues in science
- Experimental or research project
- Consider CYSF topics if interested

- Experimental projects are typically more successful than research projects

Hypothesis

- From your question come up with an “educated guess” as to the answer
- Must be testable and lead to predictions
- Predictions
  - “if_____ then_____” statements based on hypothesis
  - Relate to your independent variable (something you change) and dependent variable (something you measure)

Examples
www.sciencebuddies.org

Question	Hypothesis	Prediction
How does the size of a dog affect how much food it eats?	Larger animals of the same species expend more energy than smaller animals of the same type. To get the energy their bodies need, the larger animals eat more food.	If I let a 70-pound dog and a 30-pound dog eat as much food as they want, then the 70-pound dog will eat more than the 30-pound dog.
Does fertilizer make a plant grow bigger?	Plants need many types of nutrients to grow. Fertilizer adds those nutrients to the soil, thus allowing plants to grow more.	If I add fertilizer to the soil of some tomato seedlings, but not others, then the seedlings that got fertilizer will grow taller and have more leaves than the non-fertilized ones.
Is a classroom noisier when the teacher leaves the room?	Teachers have rules about when to talk in the classroom. If they leave the classroom, the students feel free to break the rules and talk more, making the room noisier.	If I measure the noise level in a classroom when a teacher is in it and when she leaves the room, then I will see that the noise level is higher when my teacher is not in my classroom.

Variables

- **Independent variables**: what you will change. Usually just one!
- **Dependent variables**: what you will measure.
- **Controlled variables**: what you will keep the same. Related to sources of error.
- All variables should be measurable

Variables

- Research projects will typically have variables as well. Think about what your are comparing and how you will measure what you are comparing.
- May not have controlled variables but make sure you are comparing similar things
- **Natural Disasters**: Independent - different disaster types, Dependent - cost of disaster in human lives and damage
- **Health**: Independent – different exercise programs, Dependent – life span or body weight

Examples
www.sciencebuddies.org

Question	Independent Variable (What I change)	Dependent Variables (What I observe)	Controlled Variables (What I keep the same)
How much water flows through a faucet at different openings?	Water faucet opening (closed, half open, fully open)	Amount of water flowing, measured in liters per minute	•The faucet •Water pressure, or how much the water is "pushing" "Different water pressure might also cause different amounts of water to flow and different faucets may behave differently, so to ensure a fair test, I want to keep the water pressure and the faucet the same for each faucet opening that I test."
Does heating water allow it to dissolve more sugar?	Temperature of the water measured in degrees Celsius	Amount of sugar that dissolves completely, measured in grams	•Stirring •Type of sugar "More stirring might also increase the amount of sugar that dissolves, and different sugars might dissolve in different amounts, so to ensure a fair test I want to keep these variables the same for each cup of water."
Does fertilizer make a plant grow bigger?	Amount of fertilizer, measured in grams	•Growth of the plant, measured by its height •Growth of the plant, measured by the number of leaves	•Same type of fertilizer •Same pot size for each plant •Same plant type in each pot •Same type and amount of soil in each pot •Same amount of water and light •Make measurements of growth for each plant at the same time "The many variables above can each change how fast a plant grows, so to ensure a fair test of the fertilizer, each of them must be kept the same for every pot."

Ethics and due care

- If you are using human or animal subjects you need to make an appointment to come and see me
- Requires several forms to be completed before you begin
- Send me an email with Ethics in the subject jmrip@cbe.ab.ca

Things to keep in mind

- Experimental: SAFETY!
  - Who will supervise your experiment
  - Risks, severity of risk and safety procedures

- All experiments must be “Low Risk”

Log book

- All students must have a log book
- Can by a physical copy or digital
- Add the date each time
- Include notes, observations, ideas
- Add feedback from other students, parents, teachers, etc.
- Add all your references: websites, books, etc.
- Take a lot of pictures of your experiment
- Write down what worked and more importantly what didn’t
  - This will become very important in your “Next Steps” section of your presentation

Assignment 1

- Email me your responses jmrip@cbe.ab.ca
- Due Monday, December 2 at 4:00 pm

1. Your question
2. Your hypothesis and predictions
3. Your independent, dependent, and controlled variables
4. One resource you used for information