Division 1 Take Home Activity: North Shore Mountain Landforms

Look out your window and what do you see? Mountains! They're all around Vancouver and nearby cities. If you take a peek at the North Shore Mountains you'll see they have many natural landforms, like mountain peaks, lakes, rivers, and valleys.

Although some people have built homes far up these steep slopes, the natural landforms in these areas impact what people can do or build there. They impact the urban landscape that people can create in that area. Urban landscapes are places where people have built something for a specific purpose, like a city. For example, one area may be safe to build homes, another may be better used as a ski slope or dam.

In this activity, Division 1 teams will learn about these natural landforms, how they are different, what they are called, and how they come into play with shaping an urban landscape.

Instructions:

Step 1: Research

What is a landform? Where are the North Shore Mountains? What landforms are usually in this type of area?

Go online or visit your local library to research these landforms. If your group has the time, consider visiting the North Shore to look at these landforms in person or visit Google Earth and fly through this area on your computer. Take notes and diagrams about interesting features you observe.

- Remember to **create a source list** to show the research you've done. Make sure to include the website name and link or the book name and name of the author. You should have at least three different sources on your source list.

Step 2: Choose your landforms

Pick at least three landforms from the North Shore Mountains to show in your diorama. At least one of these landforms must limit what humans can create there and one landform must be appropriate for human use. In highlighting the landforms, your team must give an accurate name, a description of what it is, and describe how the landform affects how humans use the land. Your team can pick more than three landforms to highlight if there are other landforms that you're interested in from this area.

Step 3: Create your diorama

Decide how you would like to showcase your landforms. What will you use to build your diorama? Your dioramas should be 3D. Remember to be creative! Look in the 'Rules' section below to see size and weight restrictions for Science Games dioramas. Get your adult team leader to help you find the materials that you need to build your diorama. If using a glue gun, remember to ask for help from an adult.

Step 4: Prepare for your presentation with Science Games judges

Your team must be able to talk about your diorama to the judges, demonstrating your understanding of the landforms and how they may affect our urban landscape and how humans use the space. Teams are not expected to create a report for this activity but can create and bring a cheat sheet to use during their team presentation.

Step 5: Bring your diorama and source list to the Science Games.

Please bring your diorama, source list, and cheat sheet to the Science Games. Make sure your diorama is sturdy enough to be transported to the Science Games without damage.

Questions about this activity?

Please contact Chelsea Smith, Communications Coordinator
Direct: 604.412.4892
Email: csmith@apeg.bc.ca

APEGBC 2017 Science Games

Division 1 Take Home Activity: North Shore Mountain Landforms

Rules:

1. Materials used to create your diorama must be available for purchase at a dollarstore, common household items, or no cost (e.g; items from your recycling bin or old toys).
2. Diorama must be primarily created by your student team members (adult help permitted where appropriate, e.g; use of hot glue guns).
3. Diorama must be no bigger than 45 cm x 45 cm x 45 cm. It must have at least one side open for viewing and not weigh more than 5 lbs.
4. Dioramas must be stable enough to be transported to the Science Games without damage.
5. Dioramas must show three or more natural landforms found in the North Shore Mountains, ideally shown in context to the mountains. At least one landform must be suitable for some form of human use. At least one of your three landforms must limit human use in some way.
6. Dioramas must be labelled in some way to show the landforms present.
7. Team must be able to talk about their diorama to the judges, demonstrating their understanding of the landforms and how they can or do affect our urban landscape and human use of that space.
8. Team must provide a source list to Science Games judges showing where their information was found. Each source list should have a minimum of three sources listed.

APEGBC 2017 Science Games

Division 1 Mystery Activity: High Fly Delivery

Saturday, March 4, 2017 | 8:30 AM – 12:30 PM | Science World at TELUS World of Science

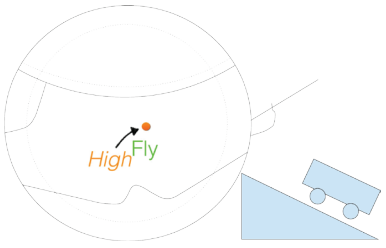
Imagine you and your team are in the future. While many things have changed, some challenges we face today are still there. People still have difficulty moving large items over great distances by plane or boat. If you transport a large item by plane it's very costly and impacts the environment. If you transport large products by boat it takes several days.

An exciting new method for transporting large packages has been developed by Jillian Physica. Her company, High Fly Delivery, uses a catapult to launch a cargo container (ping pong ball) from one point to another. Jillian has taken on a job to send a package from Shanghai International Airport to the Vancouver International Airport. This is a huge task so Jillian has hired your team to help her create a receiving station for High Fly Delivery in Vancouver.

In this activity, Division 1 teams will work together to create a receiving station for High Fly Delivery's cargo containers (ping pong balls).

Teams should try to create a receiving station that:

- Captures their cargo container (ping pong ball) from the air.
- Allows their cargo container (ping pong ball) to come to a slow stop.



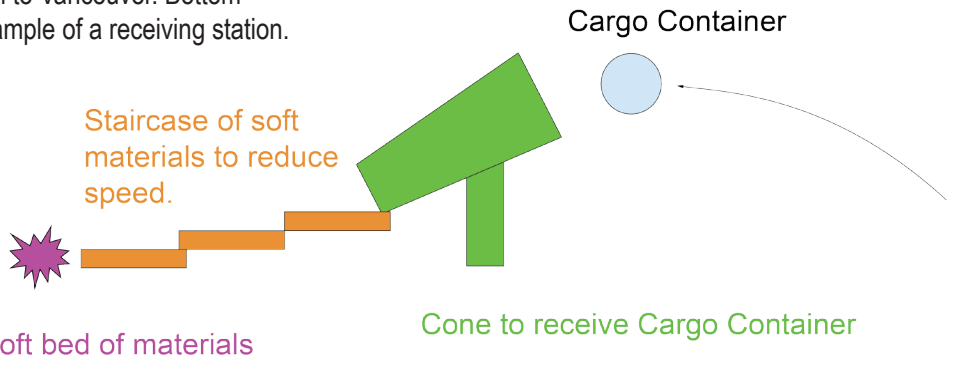
Left: A "cargo container" is loaded with materials to be delivered from Shanghai to Vancouver. Bottom Right: Sample of a receiving station.

Instructions:

1. **Test the Launching Device:** Before creating your Receiving Station, your team will need to test the launching device that Jillian Physica has created. Use a sample cargo container (ping pong ball) to ensure your package can make it across the ocean.

   What happens to the cargo container when it travels? Does it move fast or slow? Where does it land? Does it rotate? Take notes on what you see as a team.

2. **Design Your Receiving Station:** Work together as a team to come up with a design for your receiving stations. Check out the items that you have to create your receiving station. You will want to do two things with your station:
   - Direct the cargo container (ping pong ball): Slow down the cargo container (ping pong ball) so that the contents aren't damaged in transport.
   - Create your Receiving Station: Work together as a team to build your Receiving Station. Think like an engineer and try to build something that is creative but also looks appealing. Presentation is important!



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Division 1 Mystery Activity: High Fly Delivery

Saturday, March 4, 2017 | 8:30 AM – 12:30 PM | Science World at TELUS World of Science

3. **Deliver Packages:** When your team's receiving station is built, call over a judge to help you test your Receiving Station. Science Games judges will watch 10 deliveries and record your score for the top five deliveries for your team. Teams can make adjustments to their receiving station in between launches.

Rules:

1. Teams can only use the materials provided to create their Receiving Station.
2. Teams must launch from the designated launch area at the end of their table.
3. Receiving stations cannot go over the ocean and must fit on the receiving zone.
4. Missed deliveries will not earn teams points.
5. Teams must call over a judge to verify your recorded launches.

APEGBC 2017 Science Games

Division 1 Mystery Activity: Balloon Bonanza

Saturday, March 4, 2017 | 8:30 AM – 12:30 PM | Science World at TELUS World of Science

There are many different types of engineering, like electrical, structural and chemical just to name a few. While these engineers may work in different fields, what's one thing they all have in common? When faced with a challenge, they all use their knowledge of science and math to create a solution. Today, you'll work together as a team to create a solution for the following problem:

Using only the materials provided, create a balloon trap which is capable of holding the largest number of balloons possible.

Science Games judges will be awarding points to teams based on the number of balloons held, use of materials, teamwork and creativity.

INSTRUCTIONS

1. **Assess Your building materials and space:** As a group, review the materials you have, then check out the space your team has to create your balloon trap. Certain items within this space, like the two chairs, can be moved to best suit your balloon trap. Discuss what materials your team plans to use and where will you lay your balloon trap within your construction space. How will you work as a team to build your balloon trap?

2. **Design Your Plan:** Draw a picture of your plan. As a team, make a prediction (an educated guess) of how many balloons your structure will be able to hold. Remember to work together as a team and write your team's name on your balloon trap plan.

3. **Build and Test Your Design:** Using materials provided build your balloon trap, a structure or contraption that can hold the most amount of balloons between two chairs. Did you follow your plan? What modifications did your team make from the original design? How many balloons did you actually hold? Call over a judge when your design is complete and you have trapped as many balloons as possible.

RULES

1. Teams can only use the materials given to create their balloon trap and the two chairs in their construction area.
2. Balloons cannot touch the floor.
3. Your team's balloon trap should be free standing without being supported by team members.
4. Your team's balloon trap should span the distance between two chairs. Each team can move the two chairs in their construction space to best suit their balloon trap design.
5. Your team's two chairs must be positioned in the designated chair area. All chairs must be at least 12 inches apart.
6. Balloons may be supported/touching the chairs however any balloons directly touching the chairs will not be counted towards your team's total number of trapped balloons. This will impact your score.
7. Team members should not deliberately pop balloons.

Division 2 Take Home Activity: Minerals in the Bathroom

When you think about minerals, what comes to mind? Do you picture a pretty crystal, a bottle of water, or something else? Minerals can be found all around you in a variety of different forms. In fact, minerals are used as the building blocks in many of the objects we use in our everyday lives.

The bathroom is one place where we can identify many uses of minerals in everything from mirrors to medicine and even some bubble baths. For example, chromite is a mineral that is used to create chromium for chrome plating. Chrome plating is used on various products because it is easy to clean and resistant to corrosion.

In this activity, Division 2 teams will create a display of items found in the bathroom which use minerals.

Instructions:

Step 1: Research online or at the library

Look for minerals and their uses in everyday life. Can you find any that are used in the bathroom?

- Remember to create a source list to show the research you've done. Make sure to include the website name and link or the book name and name of the author. You should have at least 3 different sources on your source list.

Step 2: Choose your minerals and confirm with APEGBC

After conducting your research, pick at least four minerals to show on your 3D display. Teams are welcome to show more than four minerals. Rocks do not count as minerals (e.g; granite or marble). *Please note*: the minerals you choose for your 3D display can be represented by photos instead of mineral samples.

- Teams must confirm their minerals by February 13, 2017. Email a list of your minerals to sciencegames@apeg.bc.ca to confirm your mineral list.

Step 3: Create your 3D display

Work together to build a 3D display showing your minerals in the bathroom. Be creative but don't forget to label your minerals and the various places they may be used in the bathroom.

Step 4: Prepare for your interview with the Science Games judges

At the Science Games, judges will ask you questions about your 3D display and the minerals you chose to research in the bathroom. These are some questions that the Science Games judges may ask you about your 3D display and your chosen minerals:

- What's the difference between a mineral and a metal?
- Can you name the mineral name and the chemical name for the minerals you have chosen in your 3D display (e.g. Copper sulphide is the chemical name for chalcopyrite)
- What minerals have you chosen? Which of these are metals and which are non-metals?

Step 5: Bring your 3D display and source list to the Science Games.

Please bring your 3D display and source list to the Science Games. Make sure your 3D display is sturdy enough to be transported to the Science Games without damage.

Questions about this activity?

Contact Chelsea Smith,
APEGBC Communications Coordinator
Direct: 604.412.4892
Email: csmith@apeg.bc.ca

APEGBC 2017 Science Games

Division 2 Take Home Activity: Minerals in the Bathroom

Rules:

1. Materials used to create your 3D display must be available for purchase at a dollarstore, common household items, or no cost (e.g; items from your recycling bin or old toys).
2. Do not use rocks (e.g; granite and marble) as one of your minerals.
3. At least two of the minerals you have chosen in your 3D display must be non-metal minerals.
4. Your 3D display must be primarily created by your student team members (adult help permitted where appropriate, e.g; use of hot glue guns).
5. 3D displays must be no bigger than 45 cm x 45 cm x 45 cm. They must have at least one side open for viewing and must not weigh more than 5 lbs.
6. Displays must be labelled in some way to explain contents and your chosen minerals.
7. Minerals may be presented either as the minerals themselves, or photos of the minerals. Four or more minerals should be included.
8. Team must be able to talk about their display to the judge, demonstrating their understanding of the content and explaining why they included the minerals or other items that they did.
9. Team must list their information sources in a source list including the website names and hyperlink and or book title and author.

Activity Tips:

Explore the ingredient lists on everyday items in your bathroom at home, like bubble bath, toothpaste, antacids. See if any of these items are made up of minerals. You may need to Google the ingredients to see if they are minerals or metals.

APEGBC 2017 Science Games

Division 2 Mystery Activity: Crash Landing

Saturday, March 4, 2017 | 12:45 PM – 4:45 PM | Science World at TELUS World of Science

One of the most important things engineers do is plan for when things go wrong. In this activity, teams will be tasked with designing a crumple zone for a car. A crumple zone is a specifically engineered area designed to crumple easily in a crash to absorb the force of an impact. In cars, this absorbs energy from the crash that may otherwise reach and hurt passengers. Crumple zones are one-crash-use, like bicycle helmets. They are designed to absorb force even though it means permanent damage to the item.

In this activity, teams will work together to design a crumple zone which can transport a golf ball when dropped onto the landing zone. Experiment with dropping the ball with different materials on the landing pad.

INSTRUCTIONS

1. **Test Your Materials:** Take stock of what items you have available to build your crumple zone and test your materials. Each team will have one building platform. Teams must build on the top of the platform.

   The landing pad is set up so that a more forceful impact will leave more marks on the bottom of the building platform.

2. **Create Your Design:** Use what you learned from the testing phase to create your Crumple Zone. Draw your design on the paper provided and put your team name on it. Remember that your golf ball must remain on the platform after it is dropped. How can your design achieve this goal?

3. **Build Your Crumple Zone:** Follow your design drawings to create your Crumple Zone.

4. **Final Test Phase:** Test your Crumple Zone one more time to see if your design was successful. You can make changes to your design at this time before calling a judge over.

5. **Final Drop:** Call over a Science Games Judge to score the final drop of your Crumple Zone. Before the final test, your Science Games Judge will place a white label on the base of your building platform. Make sure to give the judge your design drawings to review.

RULES

1. Teams can only build on top of the platform. No materials can be placed below the platform.
2. Golf balls must land and stay in the Crumple Zone created by your team.
3. Platforms cannot be modified in any way.
4. Teams can only use the materials provided. Materials will not be replaced if used during the test phase.
5. Balls will be dropped from a height of 1 meter for the final score. Materials testing can occur at shorter heights.

APEGBC 2017 Science Games

Division 2 Mystery Activity: Circuit Solution

Saturday, March 4, 2017 | 12:45 PM – 4:45 PM | Science World at TELUS World of Science

Engineers are problem solvers. They use their knowledge of science and engineering to make the world better. For example, electrical engineers use their knowledge to develop components for everything from life support systems in hospitals, to electrical systems for a rocket. One of the first things that you learn about as an electrical engineer is circuits and how they work.

In this activity, teams will work together to create different electrical circuits using the tiles provided. Teams will work through 8 different circuit challenges and then will have a chance to design their own circuit, with whatever time remains.

INSTRUCTIONS

1. **Review Materials:** Each team will be provided with a tile toolkit to create their circuits. Before creating your circuit solution, teams should look at the different types of tiles included in their kits. Your kit should have a battery tile, switch tile, light tile and more!

2. **Review the first Circuit Problem:** Each team will be given a circuit problem in word form. Teams will need to translate the word problem into a working circuit.

3. **Create your Circuit Solution:** Teams will then build the circuit that matches their word problem. After your circuit is built you will need to draw a circuit schematic using the correct symbols. Each team will be given a symbol list. Use this list to ensure you record your circuit correctly on paper. Teams will have 10 minutes to complete this step.

   Teams will then repeat Steps 2 and 3 as they work on new Circuit Problems. There are eight different circuit problems for teams to complete.

4. **Design your own Circuit:** After you have finished the eight circuit problems, teams can design their own circuit and draw a schematic.

RULES

1. Teams can only use the circuit tiles provided to them.
2. Teams must provide a schematic (drawing) for each problem that they solve.
3. Teams will have a maximum of 10 minutes to solve each circuit problem and then must move on to the next problem. Teams who complete a circuit early can move onto the next problem immediately.