

**Team Booklet
for
Grade 4 - 6**

**Halton Skills
Technology
Competition**

April 05, 2016

TEAM # _____

Challenge Situation:

Canada's Wonderland has asked a team of experts to design a new ride called the Skill Rider to open in the summer of 2016. The ride needs to be exciting and fast. You and your team have been selected to help design it.

You will design and construct a model ride for the park. The model must move people up to the loading platform and onto the ride. Then the passenger will ride along the track through many twists and turns without falling out. A signal must indicate when the passenger is at the bottom. Since the ride is in Canada's Wonderland the ride should be stable, aesthetically pleasing (looks good) and fit the size requirements of the park.

Challenge Design Criteria:

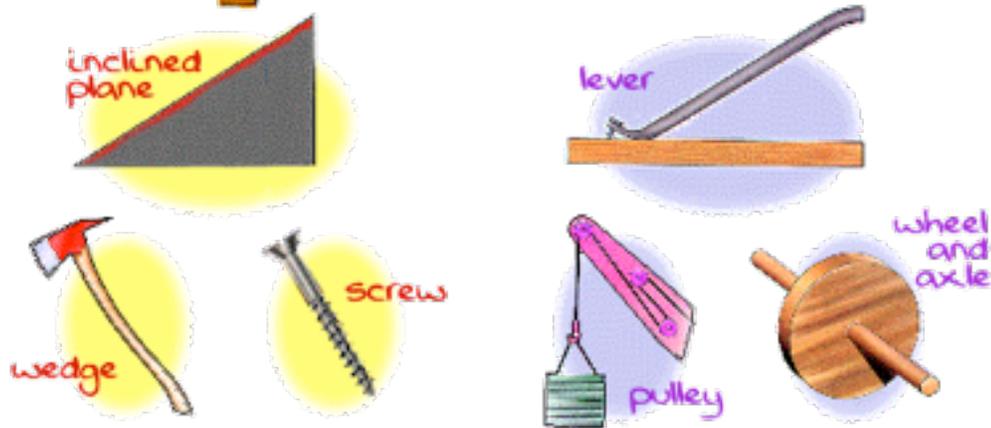
- You may use **only** those materials supplied in your package
- You may use **only** the tools available
- The group cannot ask for or receive outside help
- Size Specifications: your model must fit on the base provided which has a:
 - Maximum length – 60 cm
 - Maximum width – 40 cm
- And may be no taller than:
 - Maximum height – 40 cm
- The course model must have a **functioning** gear system or pulley system with which to bring the passenger up and onto the track
- The structure itself must demonstrate principles of strength and structural stability in order to complete the task of bringing the passenger up and onto the track and throughout the ride
- The structure must have a signal system which will signal when the task is complete (i.e. when the passenger finishes the ride) by using a light or a buzzer
- The structure must be aesthetically pleasing (look good) with accurately made joints and without too much glue at its joints

Hints:

Think of things that would improve your structure's performance. Some suggestions to think about:

- Think of the different types of simple machines (inclined planes, levers, wedges, screws, pulleys, wheel & axles) that you can use in your model

Simple Machines



- Think of the different types of forces that you can use in your model (gravitational, muscular, magnetic, buoyant, friction)
- Will your model work properly without tipping over or falling apart?
- Does the pulley or gear system work to raise the passenger to the start line at the top of the track effectively?
- Does your model have a signaling system (light and/or buzzer) to signal the completion of the ride?

Testing:

To test the model ride:

The model will be tested at the team's table. Judges will be assessing the **efficiency and functioning** of the gear or pulley system used in the model to bring the passenger up and onto the track at the top of the ride as well as the **signaling system** that signals when the passenger is at the bottom.

The Model Canada's Wonderland Ride:

- **Be a challenging and interesting course with many twists and turns**
- **Creative use of materials for the ride**
- **Be a structure which is strong and stable (i.e.: no tipping)**
- **Use at least one functioning pulley or gear system in order to bring the passenger up and onto the track at the top of the course**
- **Signal the completion of the ride by the use of a buzzer or light**

The judges' decision is final.

Materials: (Gr. 4-6)

You will receive the following:

- Challenge Booklet
- 1 (60 cm x 40 cm) piece of chloroplast to be used as the **base of the model**
- 0.5 meter of string (this will be dispensed on an “as needed” basis)
- 5 elastic bands
- 0.5 meter of masking tape (this will be dispensed on an “as needed” basis)
- 4 pieces of dowel
- 15 pieces of 1cm x 1cm basswood
- 4 assorted pulleys
- 4 assorted gears
- 2 battery connectors
- 2 pieces of wire with alligator clips
- 2 AA batteries
- 1 light bulb
- 1 light bulb holder
- 1 buzzer
- 2 sheets of gussets
- 4 sheets of cardstock
- 2 sheets of plain paper
- 5 dixie cups
- 20 “popsicle sticks”
- 2 paperclips
- 2 thumb tacks
- 2 clothes pegs
- 2 straws
- 1 marble (to use as the passenger)

Please note: You must check your materials and report anything that is missing within 20 minutes of the start of the competition. Beyond the 20 minute point, materials will not be supplied.

Tools:

Your team will have access to the following hand tools:

- junior hacksaws, hand-drills, mitre boxes/C-clamps, glue guns, scissors

Safety Considerations:

As you will be using a variety of tools it is important that you follow proper safety procedures:

General Rules:

- When using any tool **eye protection** is required
- Loose clothing is to be tucked in and long sleeves rolled up
- Jewelry should be removed and stored in a safe place
- Long hair needs to be tied back with an elastic band
- Focus on the task at hand
- Do not crowd or distract people who are using tools
- Use the tools only for the function for which they were designed
- Keep your work area organized and free of debris

Glue Guns:

- Wear **eye protection**
- Avoid crowding. If there are no glue guns available, wait until one is available (three steps back is safest)
- Avoid coming in contact with the tip of the glue gun
- Handle the glue gun in such a way as to avoid it coming into contact with others around you
- Be careful of melted, hot glue that might drip from the tip of the glue gun
- Aim the glue gun down towards the table when re-filling with a new glue stick (do not aim anywhere else)
- For minor glue gun injuries run the affected part under cold water
- For more serious injuries see one of the teachers

Drills:

- Wear **eye protection**
- Secure loose hair and loose clothing

- Make sure that the material being drilled is held in place securely in the mitre box or with a clamp

Junior Hacksaws:

- Wear eye protection
- Keep hands and fingers away from the cutting surface of the saw
- Tuck in loose clothing and roll up long sleeves
- Only use the saws to cut wood
- Only use the saws with a mitre box to hold the wood
- Make sure that the mitre box is securely fastened
- The saw will be easiest to use if it is used while you are standing up
- Make sure that you are using the saw at a speed that ensures that you are in complete control of it
- Generally the slower you saw the more accurate the cut

Judging:

Your team's performance will be judged in each of the following:

- The effectiveness of your model's design when using a functioning pulley or gear system to bring the passenger up to and onto the track at the top of the ride and the signaling of the completion of the course by use of a buzzer or light
- The use of structural stability principles in your structure
- The aesthetics and craftsmanship of the ride (ie; use of glue, straight cuts, visual appearance)
- The challenge of the ride (ie; twists and turns, creative use of materials)
- The group's ability to work as a safe and effective team
- An oral presentation outlining the process that you will use to solve the problem
- The judges' decision is final

Presentation:

Your team will be required to make a 10 minute presentation. The presentation must address the following elements of the problem-solving model in a clear concise way:

- A clear statement of the problem that you are attempting to solve
- The possible solutions which you have brainstormed that might solve the problem
- Your preferred solution and the reasons why it was chosen
- A work plan outlining how your team will organize the work
- The strengths and weaknesses of your solution and the ways in which it could be improved

All four of your team members will be involved in this presentation. Although the presentation will be given orally, written notes, drawings and sketches may accompany it.

Please note:

You are not presenting your completed project in this presentation you are only presenting your organizational information.

As well as evaluating your presentation and the degree of success of your prototype, Judges will be assessing your team's safe and effective use of tools & equipment. They will also be assessing how well each group functions as a team. This will be done on an ongoing basis throughout the competition.

Evaluation will be based on:

- 40% presentation, safety and group process
- 60% prototype (your model's) performance

Please note: It is important that teams involved in the competition receive no outside help of any kind. If it appears as though outside help is being offered from parents, teachers or bystanders the team will receive a warning and be assessed a 10 point penalty. If a second infraction occurs the team will be disqualified.

Good luck with the challenge!

You may use the following sheets to organize your plan:

Problem Statement:

Possible Solutions:

Your Chosen Solution:

Reasons for Your Choice:

Construction Considerations:

Project Organization: (construction steps & sequence as well as team members responsibilities)

Evaluation:

- What are the strengths of your design?
- What are the weaknesses of your design?
- What are some of the ways that these weaknesses could be corrected?

AGENDA

8:30 – 9:00	Registration
9:00 – 9:15	Orientation & Challenge Outlined
9:15 – 9:45	Planning time
9:45 – 12:00	Work Time / Presentations Begin
12:00 – 1:00	Lunch
1:00 – 2:15	Work time / Presentations Continue
2:15 – 2:45	Prototype Testing
2:45 – 3:00	Clean up/ Judges' Tabulate Scores