The goal of Project “Have a Blast” is to create a workable model of a dropper tower that can move up and down.

Student Name: Kelvin Cao

Due Date: November 26th, 2019

Institution: John Fraser Secondary School

Teacher: Mr. Lightbody

1.1 Explain what kind of "Situation" you have, what you are supposed to do:

The problem that we have is that we need to create a workable prototype of an amusement park ride for Wonderland. This prototype should be durable (meaning it won't randomly collapse overnight). The prototype will need to have a working motor that runs it. The ride will have a maximum height of 58 cm, while staying within the compounds of the designated space (45 cm by 45 cm). The ride also shouldn't be too heavy, for that would use too many resources (1000 grams max).

Name information sources and specifications you need for this project.

Sources of Information:	Detailed Specifications:
Mr. Lightbody https://www.canadaswonderland.com/play/rides/drop-tower https://www.instructables.com/id/Basic-Gear-Mechanisms/ https://www.learner.org/exhibits/parkphysics/freefall.html https://www.explainthatstuff.com/pulleys.html	Height: 42.8 cm Width: 18.9 cm (from the edge of the gears), 11 cm (from the main structure of the dropper tower) Length: 18.9 cm (from the edge of the gears) 14 cm (from the main structure of the dropper tower) Weight: Less than 1000 grams

Name what you need to complete this project. Example: type of materials, tools and equipments, etc.

Materials	Tools or equipments
L293d motor driver (Dual H Bridge IC) Small Breadboard Wires Motor 12 volt battery 12 volt motor Foam Board Solder Push buttons Wood glue Hot glue Vinyl Wood (1 cm by 1 cm) Wooden Dowel Pulley wheels Battery Snap Dead Batteries (for weights) Construction paper Tape Marker	Soldering Iron Wire stripper Exact-o Knife Ruler Protractor Scissors Saw Pencil Eraser Sandpaper

Dropper Tower Reflection

The Dropper project is one of the larger assignments of Design Technology and it has taught me many different experiences and skills. I gained many skills in this unit by creating my initial design in 3D on the AutoCAD software. It is a great experience working on AutoCAD because it is very satisfying when you finish the project and then admire it using the 3D orbit command. I have made acquaintances with many people in the class while building the tower and had much fun from drafting the design to building it. Though the process of building the tower was fun and entertaining, there were many challenges that I had to overcome to finish the project. One of the major problems that I needed to deal with was the materials given. The wooden sticks given were all slightly warped in some way or another. This meant that the final dimensions of the tower aren't perfect. I had to bend some of the wooden beams into place and secure them using lots of wood glue and force. After adding tons of wooden supports that help bend the wooden pieces straight, I was able to achieve a relatively straight and rectangular tower. Now that I had the frame done, I had to problem solve how I was going to implement the "drop mechanics" of the tower. My original idea was having a gear that would slide left and right and would release the seats from the motor (allowing it to fall down). This design wasn't reliable, the gears and sliding mechanism made it that the gears would sometimes lock and not interlock. I had to create another design. I eventually decided to implement an H-Bridge and just use switches to control the up and down mechanism. I was going to change the speeds of the motor going up and down, however, I wasn't able to do this with just circuitry (I needed some type of microcontroller). I just had to deal with the ride going up and down at comparatively similar speeds (it goes up slightly slower due to the amount of weight it needs to carry up). Another major problem I needed to fix was the torque of the motor. The motor given wasn't powerful enough to drive my actual ride. I debated 3D printing a gearbox, but I wouldn't be able to print a gearbox small enough and with enough torque

for my tower due to the very small confines. Overall, the creation of my dropper tower was a great experience and helped me gain a lot of knowledge about the process of designing and building.