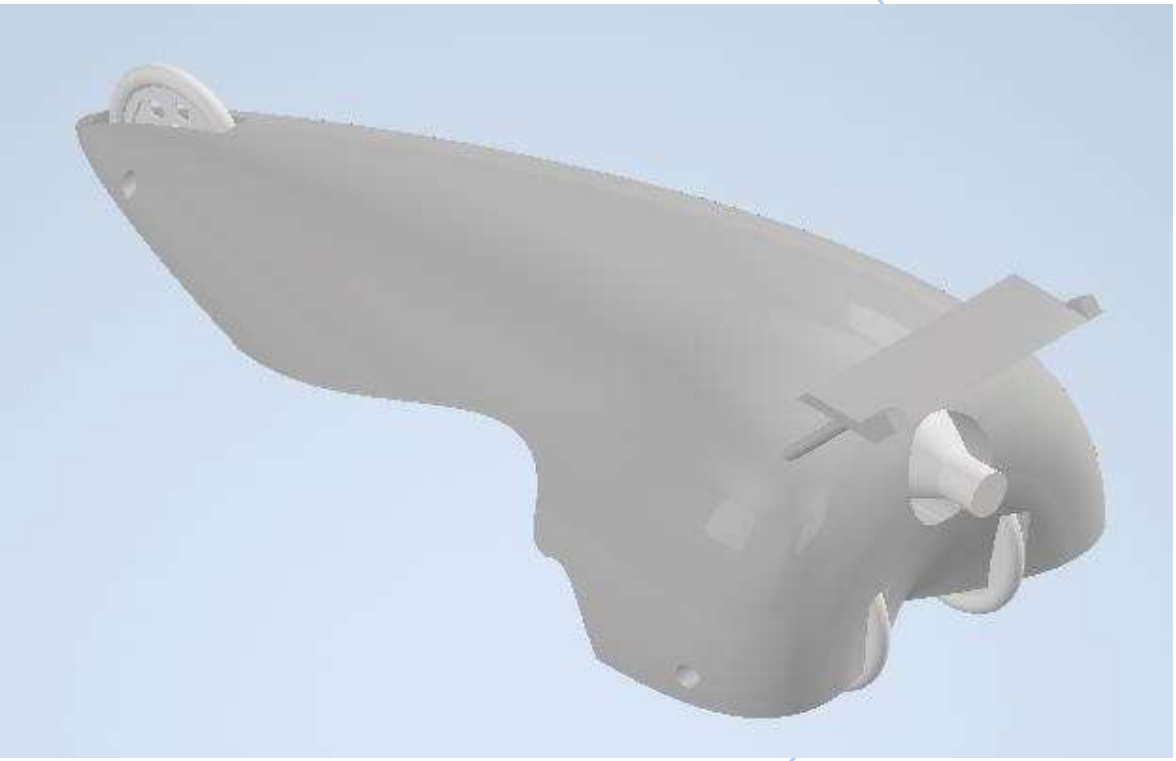
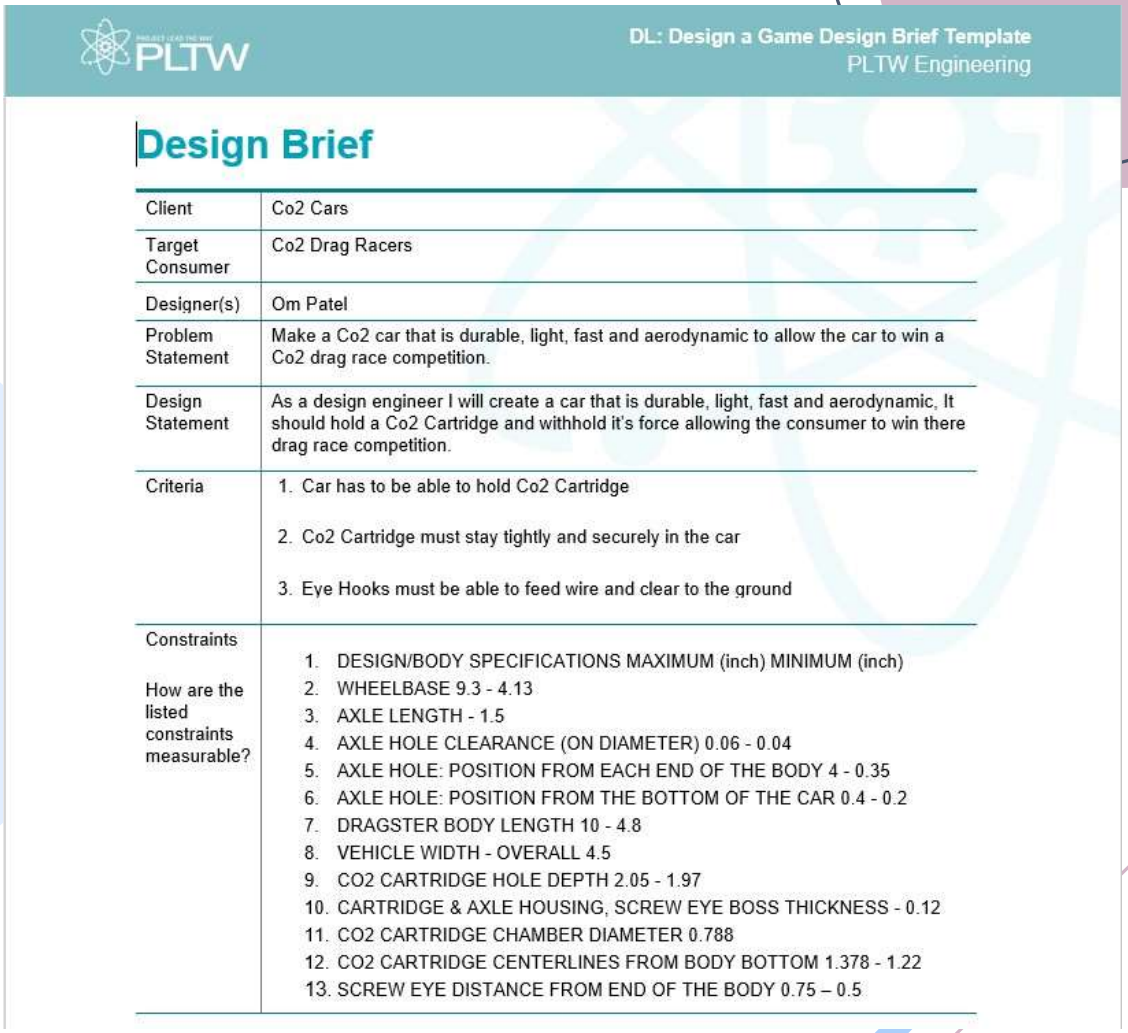


CO2 Car

By: Om Patel
BVT
Engineering & Robotics
4-7-22

TABLE OF CONTENTS

Design Brief



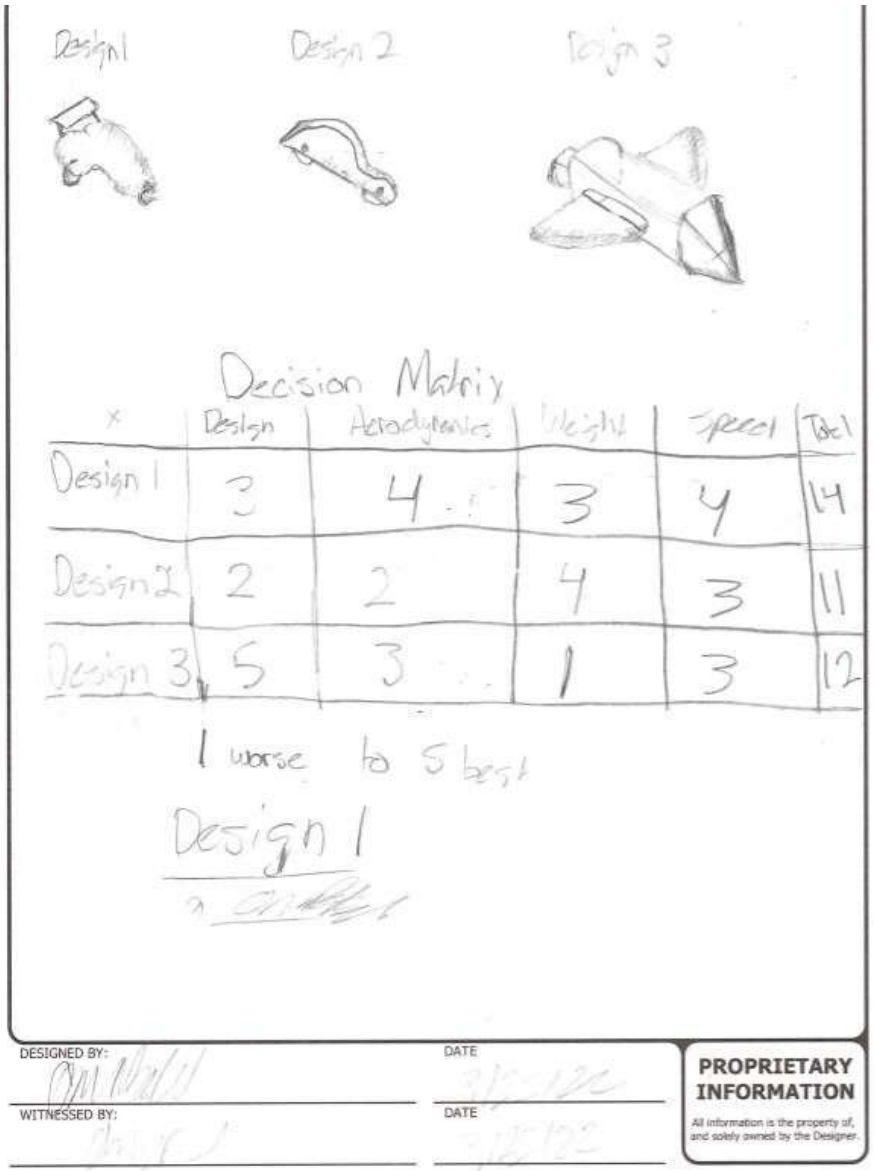
PLTW

DL: Design a Game Design Brief Template
PLTW Engineering

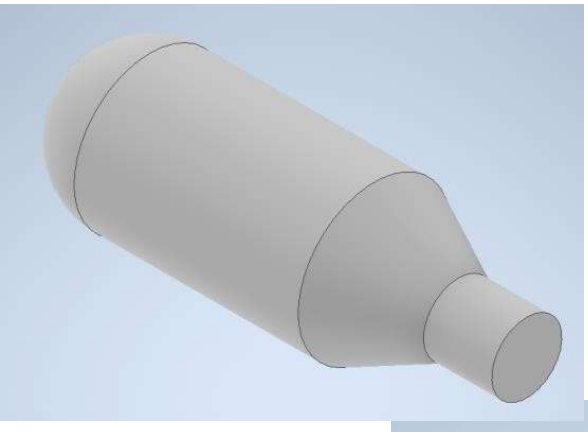
Design Brief

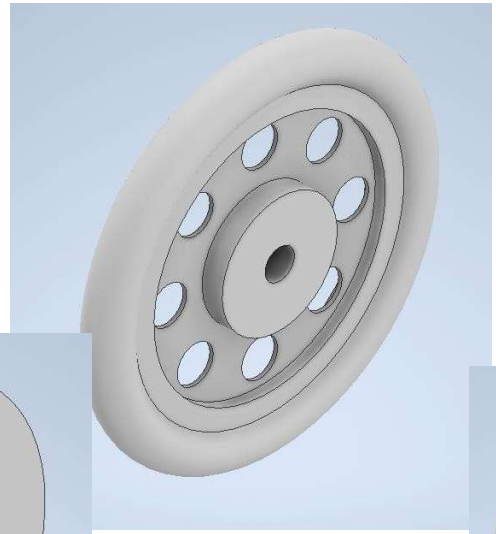
Client	Co2 Cars
Target Consumer	Co2 Drag Racers
Designer(s)	Om Patel
Problem Statement	Make a Co2 car that is durable, light, fast and aerodynamic to allow the car to win a Co2 drag race competition.
Design Statement	As a design engineer I will create a car that is durable, light, fast and aerodynamic, It should hold a Co2 Cartridge and withhold it's force allowing the consumer to win there drag race competition.
Criteria	1. Car has to be able to hold Co2 Cartridge 2. Co2 Cartridge must stay tightly and securely in the car 3. Eye Hooks must be able to feed wire and clear to the ground
Constraints How are the listed constraints measurable?	1. DESIGN/BODY SPECIFICATIONS MAXIMUM (inch) MINIMUM (inch) 2. WHEELBASE 9.3 - 4.13 3. AXLE LENGTH - 1.5 4. AXLE HOLE CLEARANCE (ON DIAMETER) 0.06 - 0.04 5. AXLE HOLE: POSITION FROM EACH END OF THE BODY 4 - 0.35 6. AXLE HOLE: POSITION FROM THE BOTTOM OF THE CAR 0.4 - 0.2 7. DRAGSTER BODY LENGTH 10 - 4.8 8. VEHICLE WIDTH - OVERALL 4.5 9. CO2 CARTRIDGE HOLE DEPTH 2.05 - 1.97 10. CARTRIDGE & AXLE HOUSING, SCREW EYE BOSS THICKNESS - 0.12 11. CO2 CARTRIDGE CHAMBER DIAMETER 0.788 12. CO2 CARTRIDGE CENTERLINES FROM BODY BOTTOM 1.378 - 1.22 13. SCREW EYE DISTANCE FROM END OF THE BODY 0.75 – 0.5

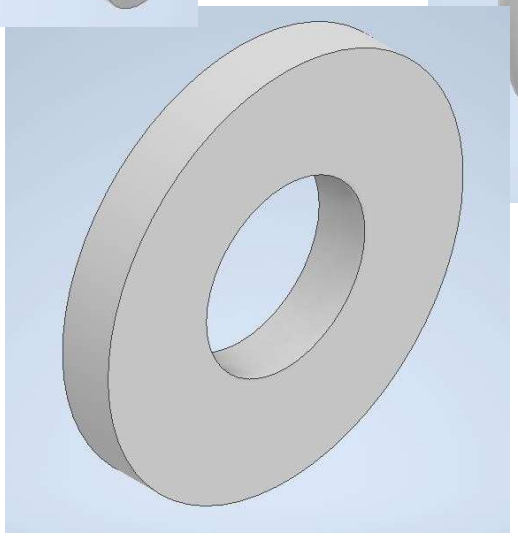
Design Sketches E Decision Matrix

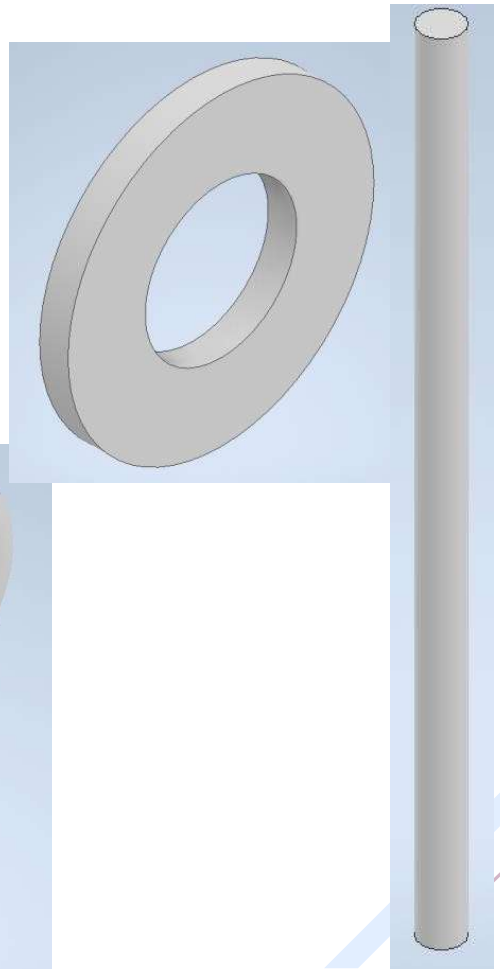


CO2 Car Parts from Inventor

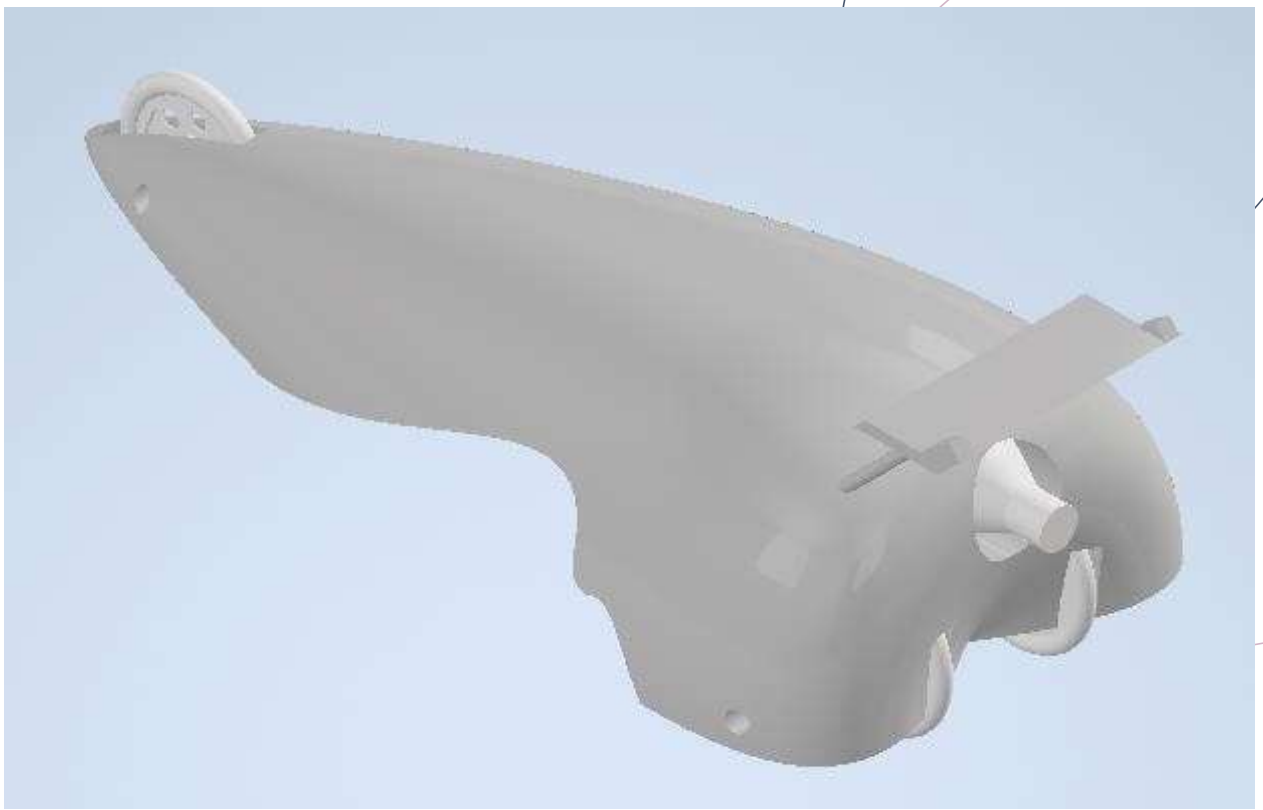




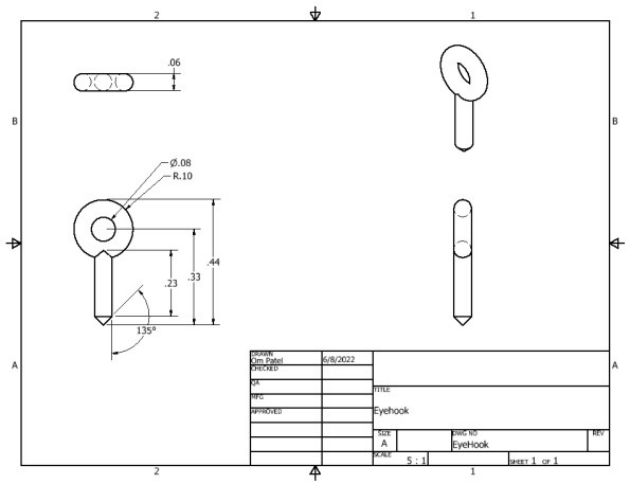


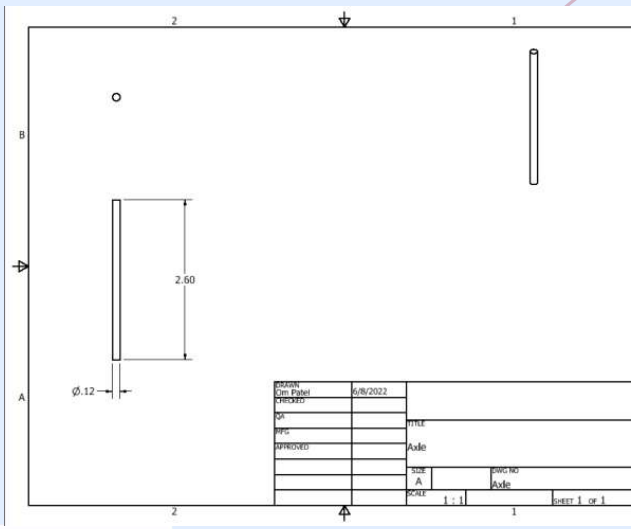


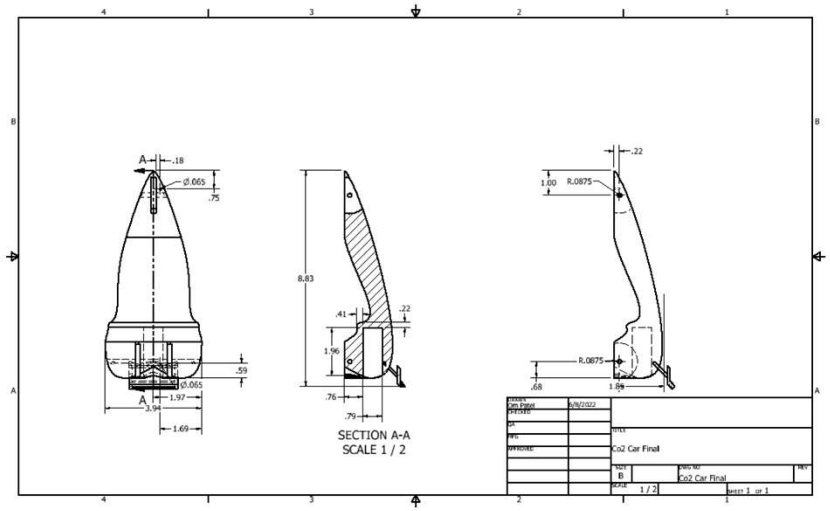
CO2 Car Assembly from Inventor

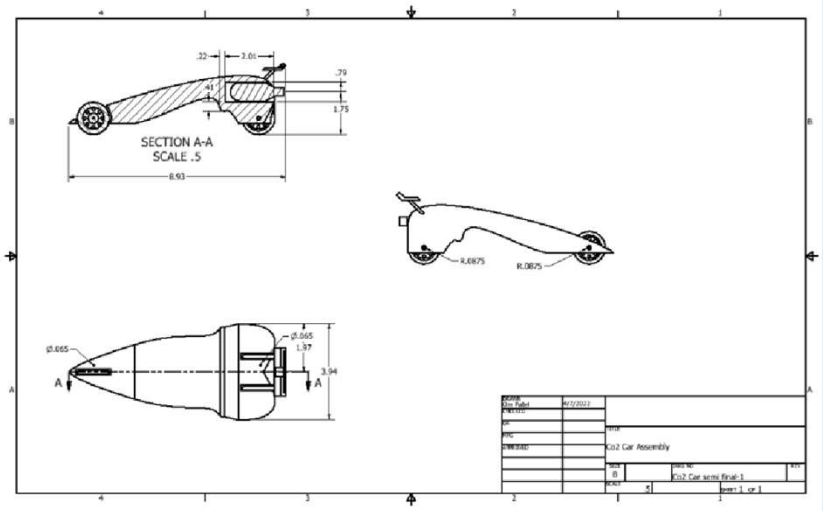


Dimensioned Drawings of CO2 Parts E Assembly from Inventor 1

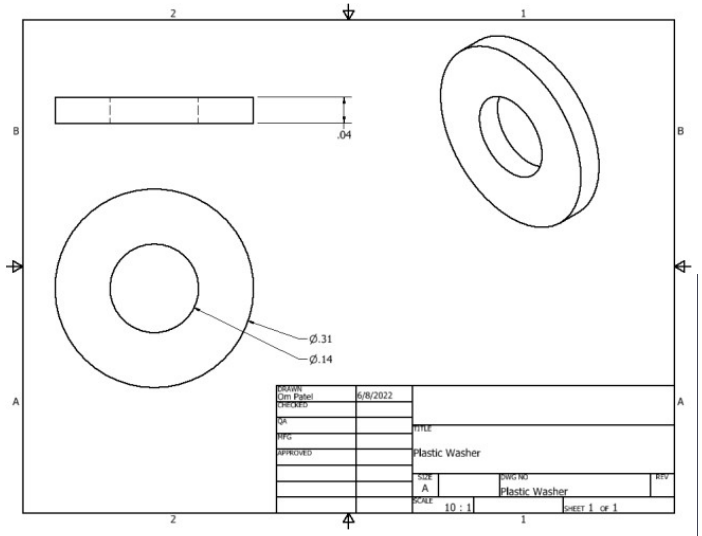


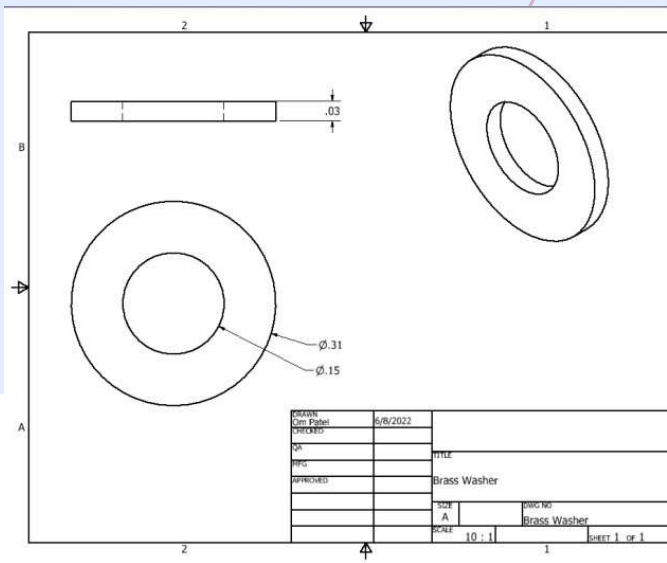


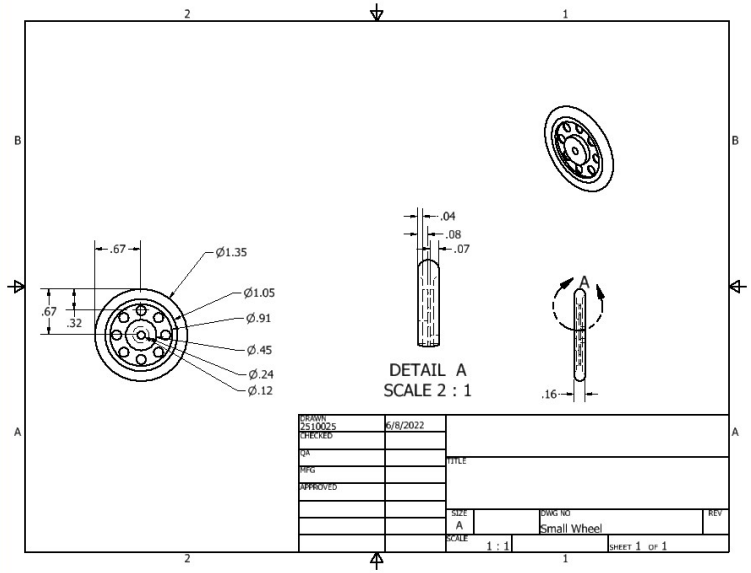




Dimensioned Drawings of CO2 Parts E Assembly from Inventor 2

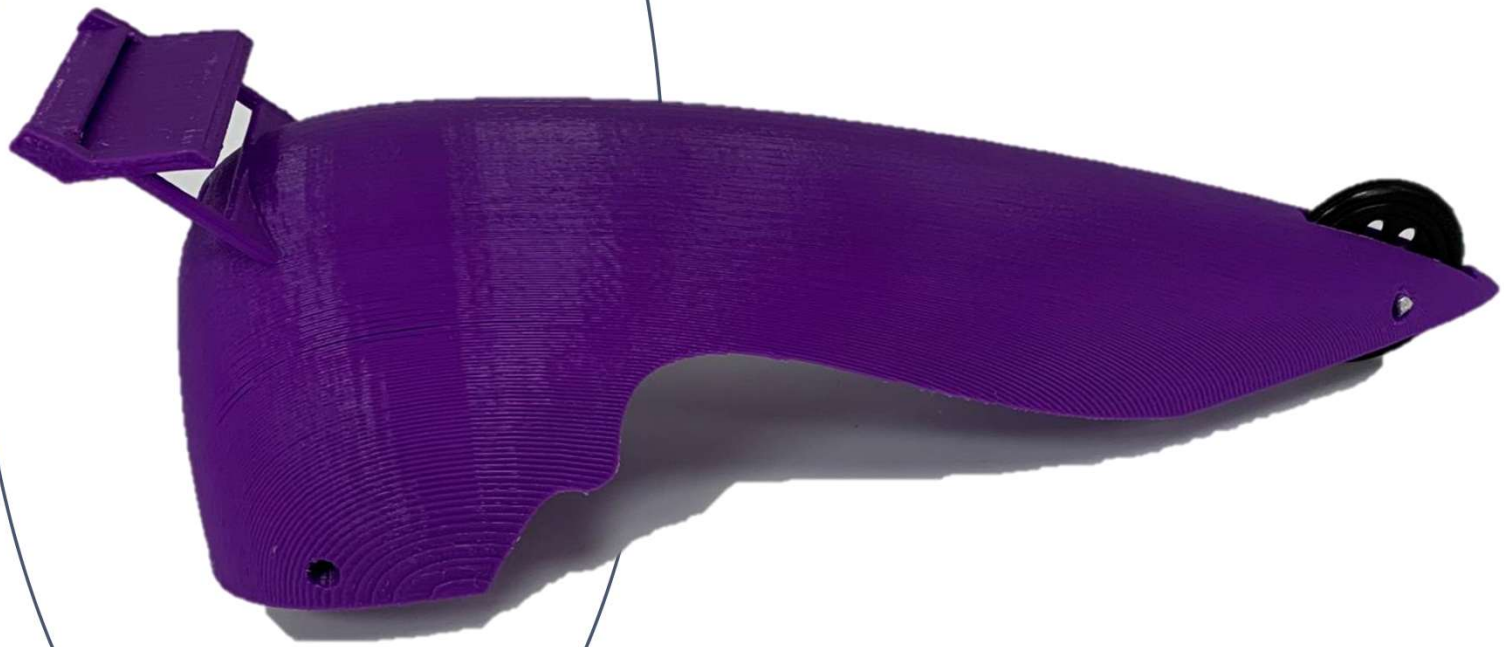




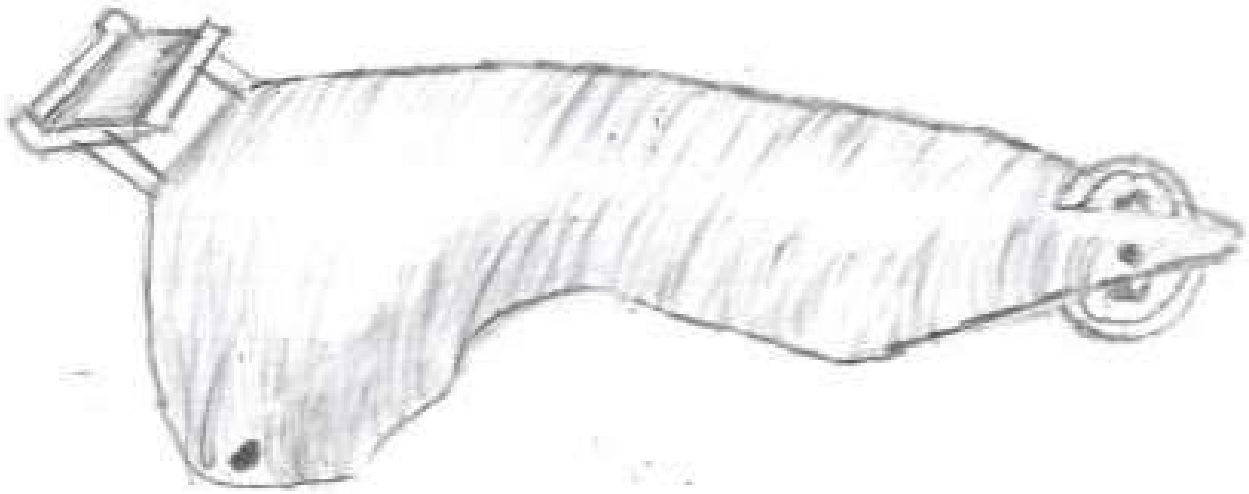


Picture of CO2 Car Disassembled

Picture of CO2 Car Assembled

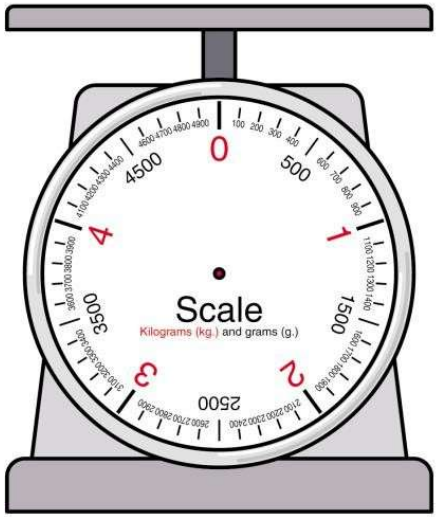


Isometric Hand Sketch of CO2 Car



Weight of CO2 Car

The weight of the fully assembled Co2 Car was **135.91 grams.**



Excel Sheet with Competitors Times E Results

Names	Reaction Tim	Final Time	Speed Ft/S	Speed MPH
Albert	0.4	1.733	37.796	25.764
Anthony	0.248	1.256	52.150	35.549
Steven	0.503	1.63	40.184	27.392
Saim	0.343	1.68	38.988	26.577
Allan	0.324	2.031	32.250	21.984
Wyatt	0.202	2.128	30.780	20.982
Justin	0.295	1.831	35.773	24.385
Will	0.097	1.188	55.135	37.583
Conner	0.186	1.733	37.796	25.764
Ben	0.344	2.341	27.979	19.073
Matt	0.31	3.301	19.842	13.526
Kenny	0.219	1.69	38.757	26.419
Dylan L	0.267	2.545	25.737	17.544
Sam	0.161	4.009	16.338	11.137
Eric	0.159	1.556	42.095	28.695
Caroline	0.25	1.443	45.392	30.942
Trevor	0.244	2.095	31.265	21.312
Emily	0.221	1.502	43.609	29.726
Jake	0.189	1.162	56.368	38.424
Om	0.225	1.896	34.546	23.549
Joel	0.209	2.223	29.465	20.085
Jayden	0.189	1.169	56.031	38.194
Luke	0.207	2.67	24.532	16.722
Dylan R	0.197	1.214	53.954	36.778
Alexa	0.156	1.148	57.056	38.893
Stephanie	0.183	1.756	37.301	25.427
Mason	0.192	1.951	33.573	22.885
Audrey	0.22	1.51	43.377	29.569
Josh	0.182	1.654	39.601	26.995
Alex	0.165	2.177	30.087	20.509

Names	RT	FT	Speed Ft/S	Speed MPH
Sam	0.161	1.543	42.450	28.936
Audrey	0.183	1.513	43.291	29.510
Anthony	0.214	1.206	54.312	37.022
Saim	0.202	1.55	42.258	28.806
Justin	0.19	1.74	37.644	25.660
Will	0.219	1.324	49.471	33.723
Ben	0.185	2.155	30.394	20.719
Kenny	0.249	1.711	38.282	26.095
Eric	0.159	1.556	42.095	28.695
Caroline	0.178	1.37	47.810	32.590
Jake	N/A	N/A	N/A	N/A
Om	0.224	1.415	46.290	31.554
Jayden	0.194	1.174	55.792	38.031
Alexa	0.142	1.301	50.346	34.319
Josh	0.189	1.689	38.780	26.435
Stephanie	0.207	1.79	36.592	24.944

Names	RT	FT	Speed Ft/S	Speed MPH
Audrey	0.21	1.543	42.450	28.936
Anthony	0.218	1.22	53.689	36.597
Will	0.231	1.329	49.285	33.596
Kenny	0.225	1.725	37.971	25.883
Caroline	0.17	1.39	47.122	32.122
Om	0.195	1.933	33.885	23.098
Jayden	0.179	1.17	55.983	38.161
Josh	0.171	1.667	39.292	26.784

Names	RT	FT	Speed Ft/S	Speed MPH
Anthony	0.238	1.26	51.984	35.436
Will	0.265	1.303	50.263	34.266
Caroline	0.18	1.489	43.989	29.986
Jayden	0.169	1.159	56.514	38.524

Round 1	RT	FT	Speed Ft/S	Speed MPH	Winner
Jayden	0.157	1.143	57.305	39.063	Jayden
Anthony	0.186	1.222	53.601	36.538	

Round 2	RT	FT	Speed Ft/S	Speed MPH
Anthony	0.164	1.171	55.935	38.129
Jayden	0.164	1.147	57.105	38.927

Names	Average ft/s	Average Mph
Albert	37.796	25.764
Anthony	53.612	36.545
Steven	40.184	27.392
Saim	40.623	27.691
Allan	32.25	21.984
Wyatt	30.78	20.982
Justin	36.708	25.023
Will	51.040	34.792
Conner	37.796	25.764
Ben	29.187	19.896
Matt	19.842	13.526
Kenny	38.337	26.133
Dylan L	25.737	17.544
Sam	29.394	20.037
Eric	42.095	28.695
Caroline	46.775	31.885
Trevor	31.265	21.312
Emily	43.609	29.726
Jake	56.368	38.424
Om	38.240	26.067
Joel	29.465	20.085
Jayden	56.455	38.483
Luke	24.532	16.722
Dylan R	53.954	36.778
Alexa	53.701	36.606
Stephanie	36.946	25.185
Mason	33.573	22.885
Audrey	43.040	29.338
Josh	39.224	26.738
Alex	30.087	20.509

Average Reaction	StDev Reaction	Average Final	StDev Final	Average ft/s	StDev ft/s	Average Mph	StDev Mph
0.215	0.065	1.658	0.522	42.458	10.128	28.942	6.904

Excel Sheet with my Times

Run #	Reaction Time	Run Time	Average Speed (ft/s)	Average Speed (mph)
1	0.225	1.896	34.546	23.549
2	0.224	1.415	46.290	31.554
3	0.195	1.933	33.885	23.098
Average	0.215	1.748	38.240	26.067
Standard Dev	0.014	0.236	5.698	3.884