Model Based Systems Quadruped

Virtual Design Review 1

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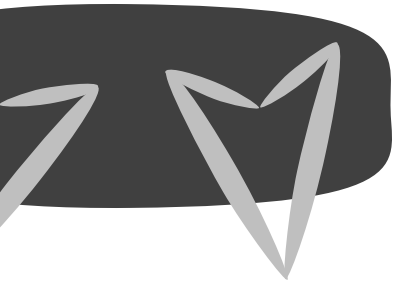

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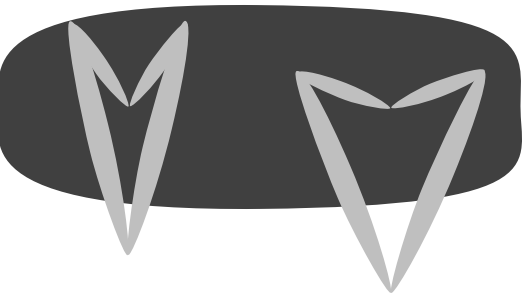

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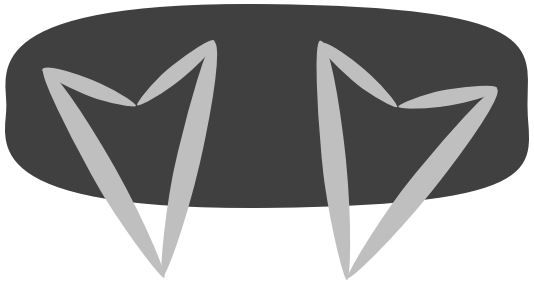

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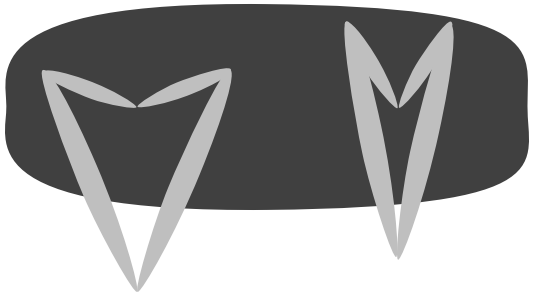

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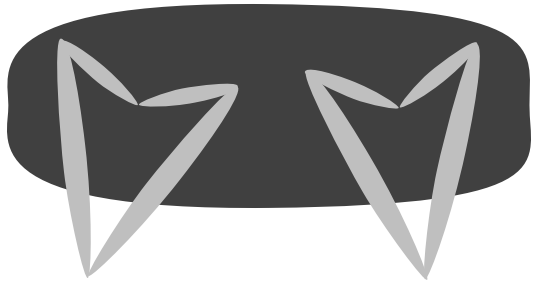

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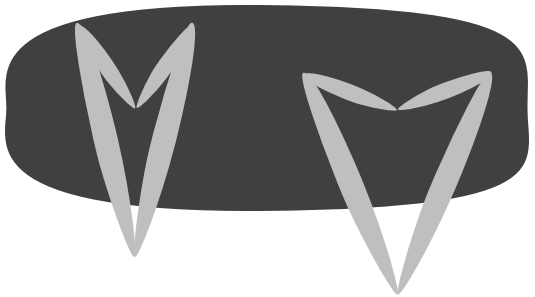

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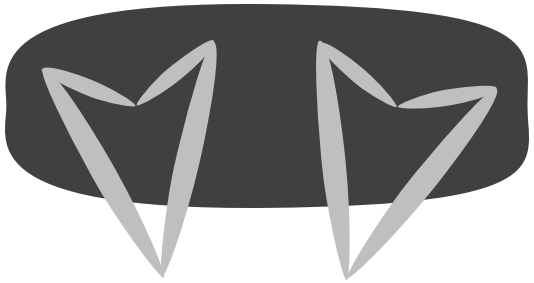

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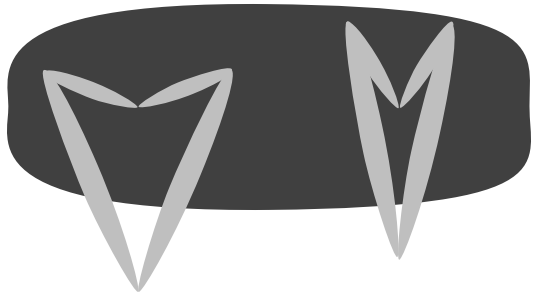

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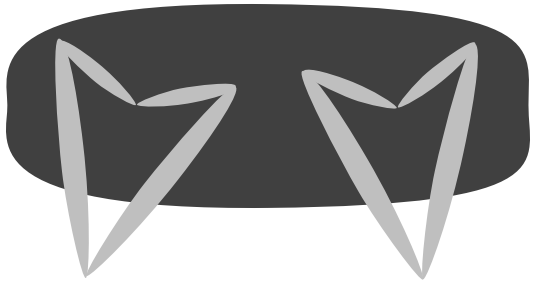

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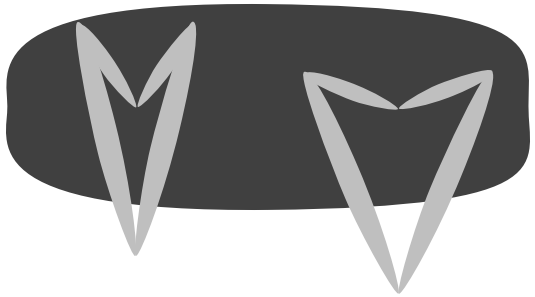

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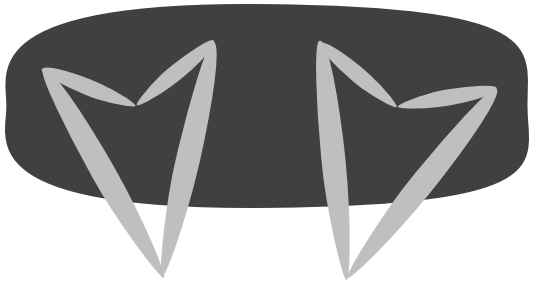

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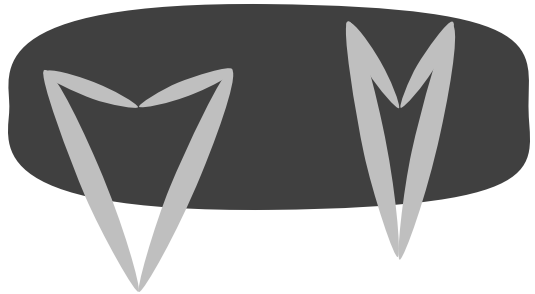

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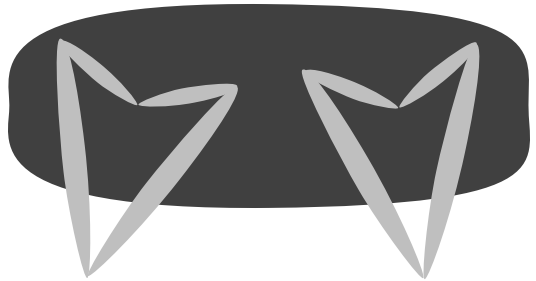

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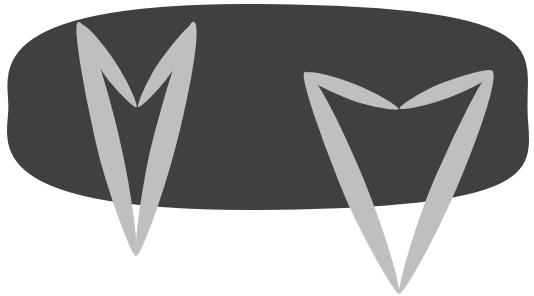

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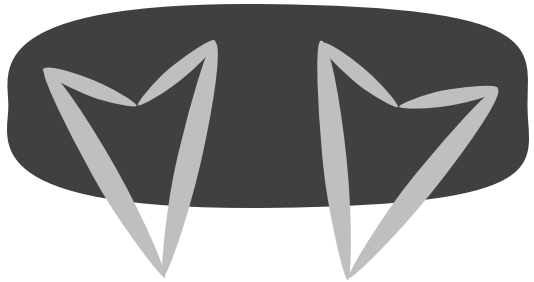

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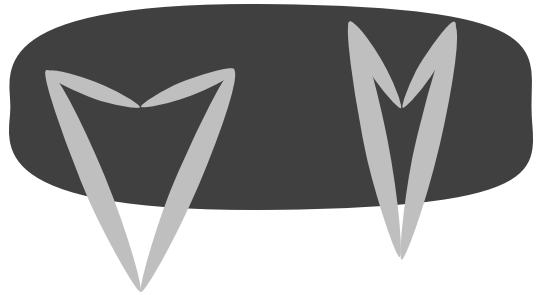

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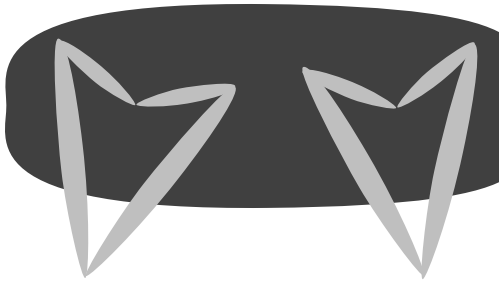

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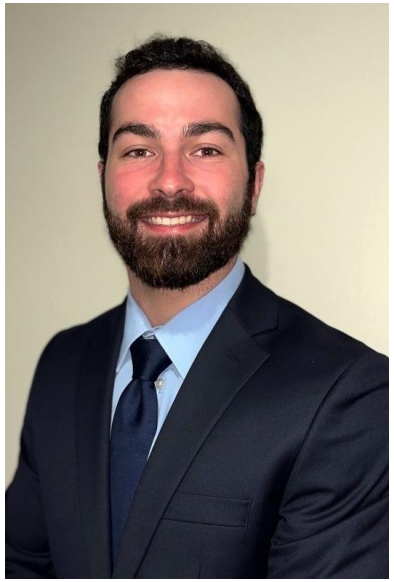
Team Introductions



Milton Bouchard
Fabrication Engineer

Michael Dina
Mechatronics Engineer

Onoriode Onokpise
Systems Engineer

Jackson Raines
Testing Engineer

Zachary Shapiro
Materials Engineer

Sponsors and Advisor

CISCOR

Center for Intelligent Systems, Control, and Robotics

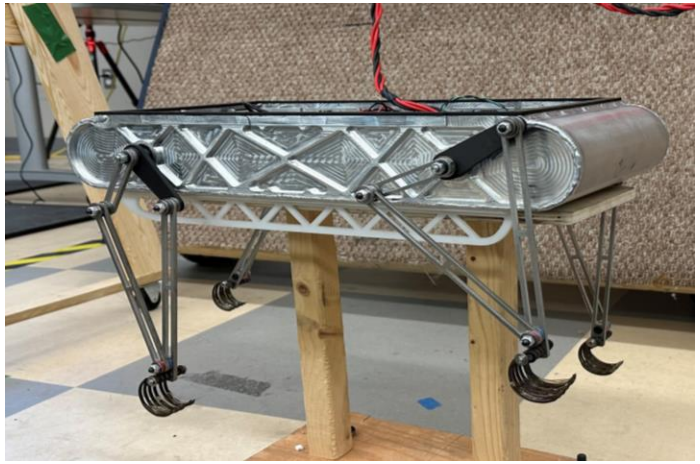
Dr. Jonathon Clark
Sponsor

Dr. Patrick Hollis
Advisor

Dr. Shayne McConomy
Sponsor

Objective

The objective of this project is to develop a tool that informs the design of quadrupedal robots using the knowledge gained from previously built CISCOR robots.



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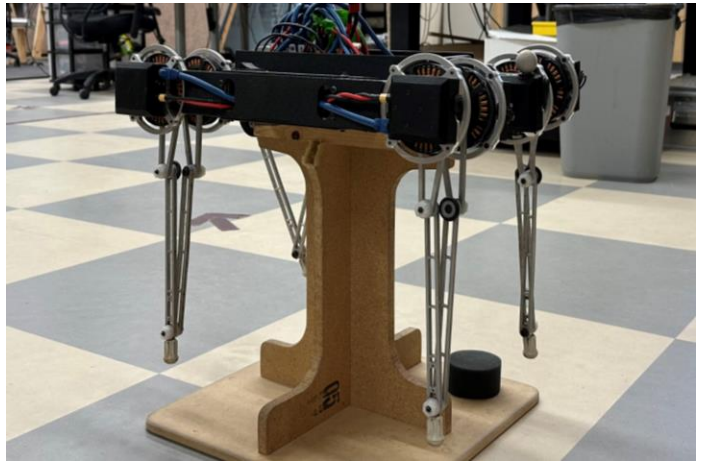


Minitaur

Primary Market

Professors

Graduate Students

Undergraduate assistants

Primary Market

Professors

Graduate Students

Undergraduate assistants

Primary Market

Professors

Graduate Students

Undergraduate assistants

Primary Market

Professors

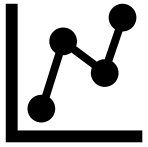
Graduate Students

Undergraduate assistants

Secondary Markets

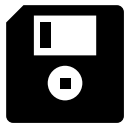
Key Goals

Develop a tool to assist new quadrupedal robot development



Return critical parameter values

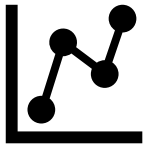
Reduce development time



Act as a database of knowledge for robot development

Key Goals

Develop a tool to assist new quadrupedal robot development



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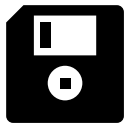

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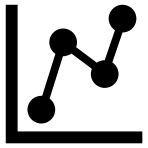

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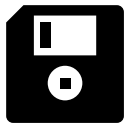

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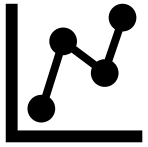

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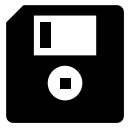

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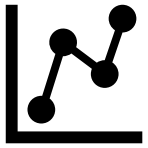

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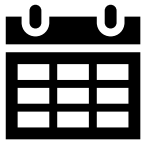
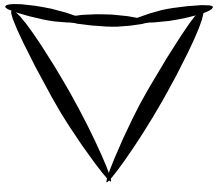


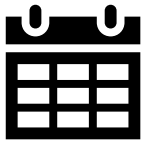
Complete by April 2023

Using MathWorks Software



Focus on 5-bar Quadrupedal Robots

Assumptions



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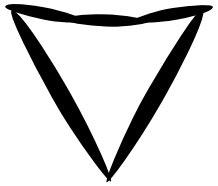

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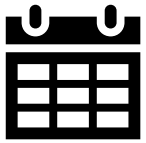

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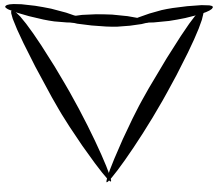

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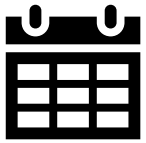

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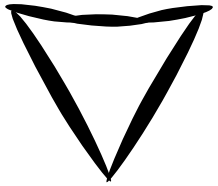

Focus on 5-bar Quadrupedal Robots

Stakeholders

CISCOR

- Dr. Shayne McConomy
- Dr. Jonathon Clark

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FAMU-FSU College of Engineering

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General Stakeholders

- Other educational institutions

Current Work

Relevant Readings in Robotics and Vehicle Design

- *Dynamic Similarity and Scaling for the Design of Dynamical Legged Robots* – Bruce Miller and Jonathan Clark
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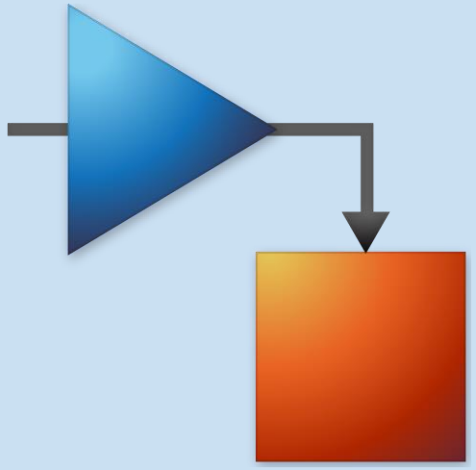
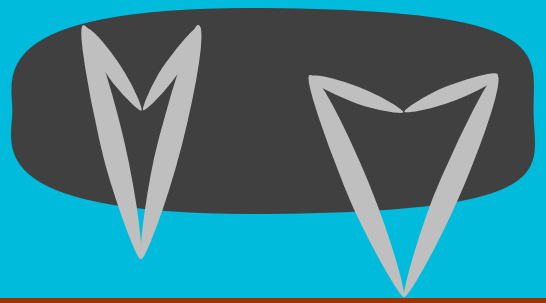
Software On-Ramp

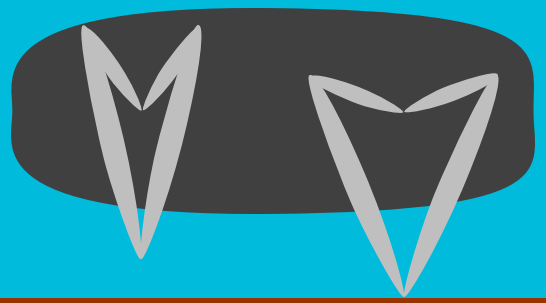
- MATLAB Simulink
- User interface design research



Performance Specifications



Types of Gaits: Walking



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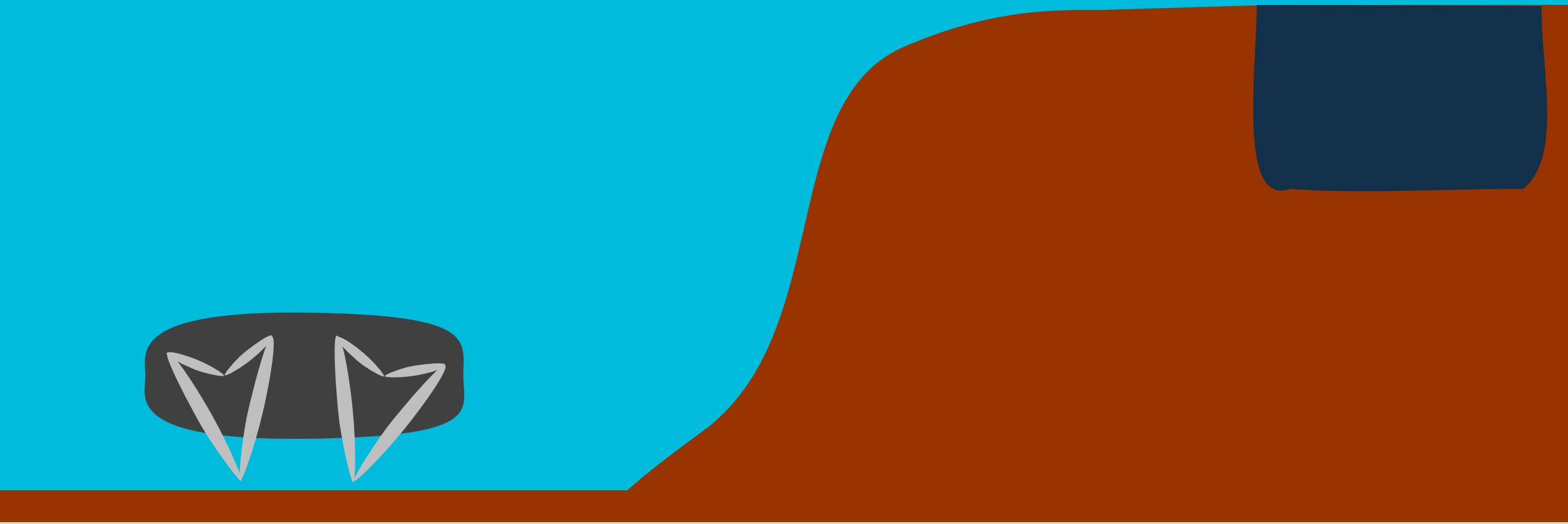

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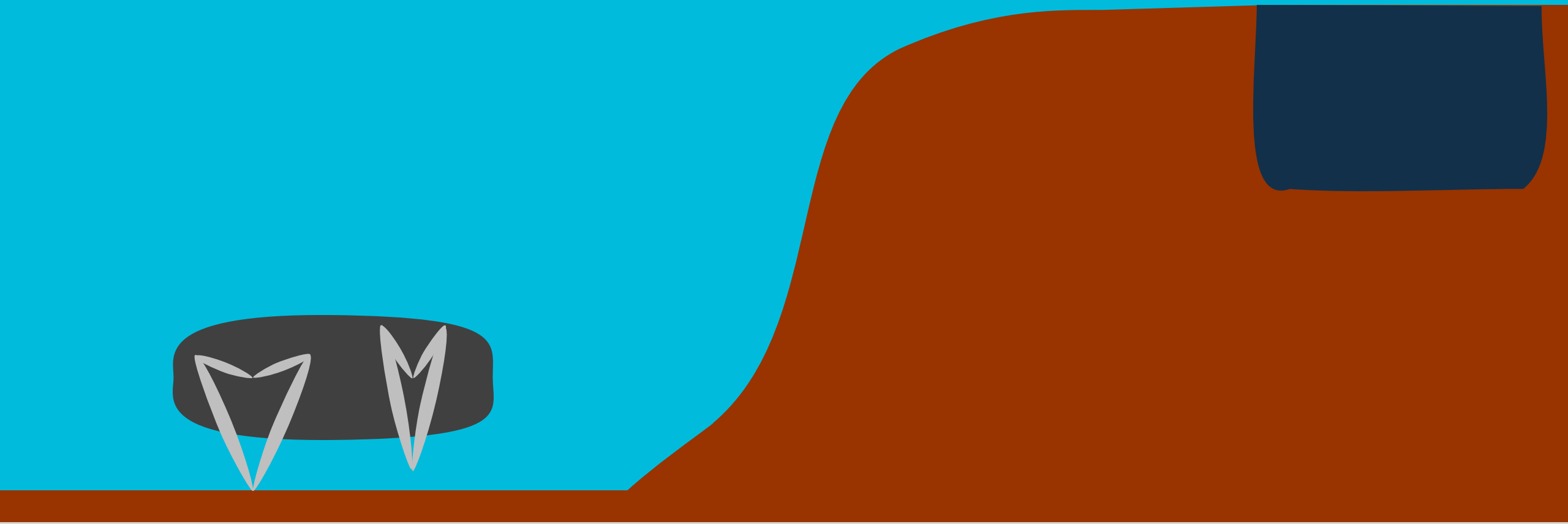

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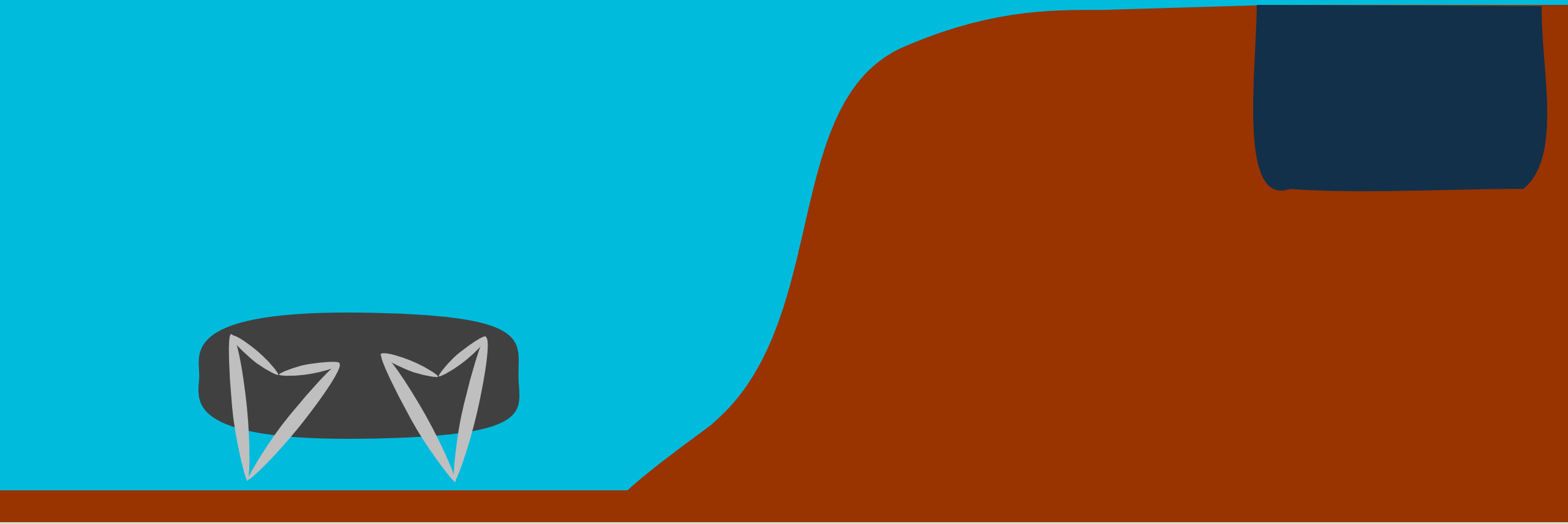

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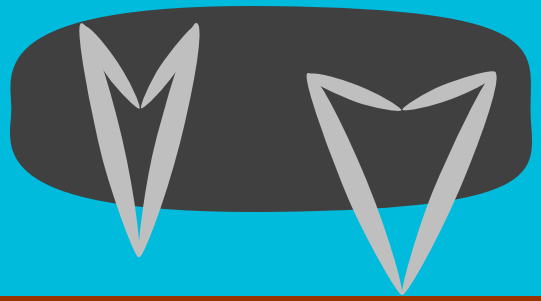

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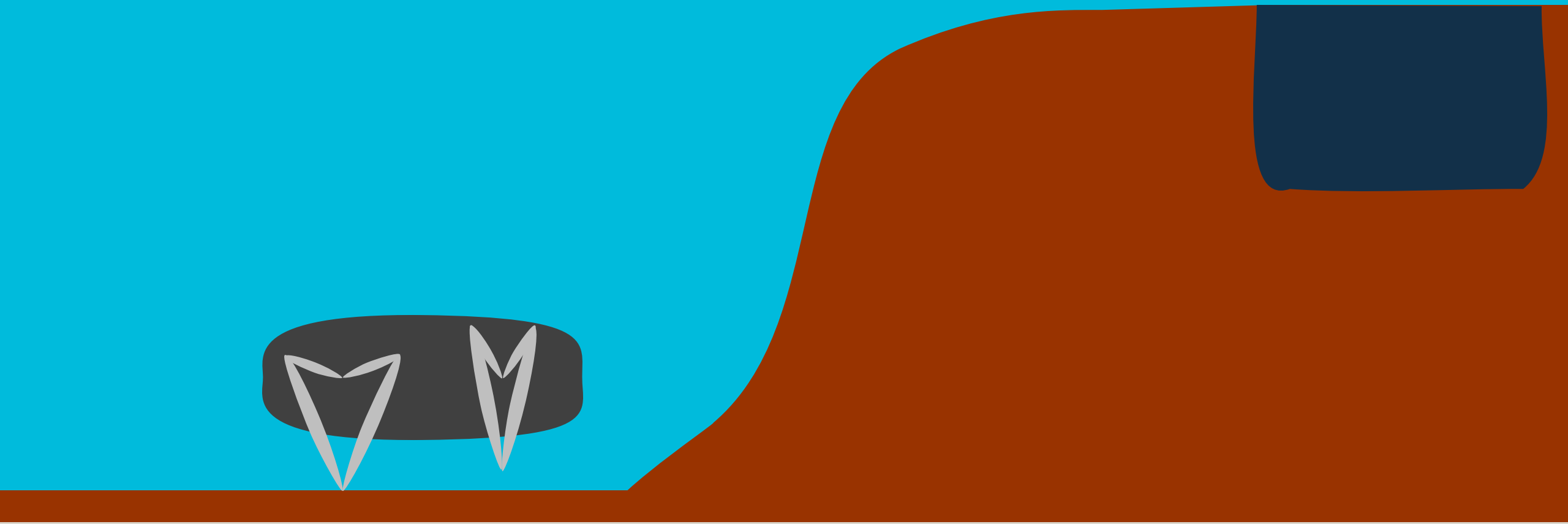

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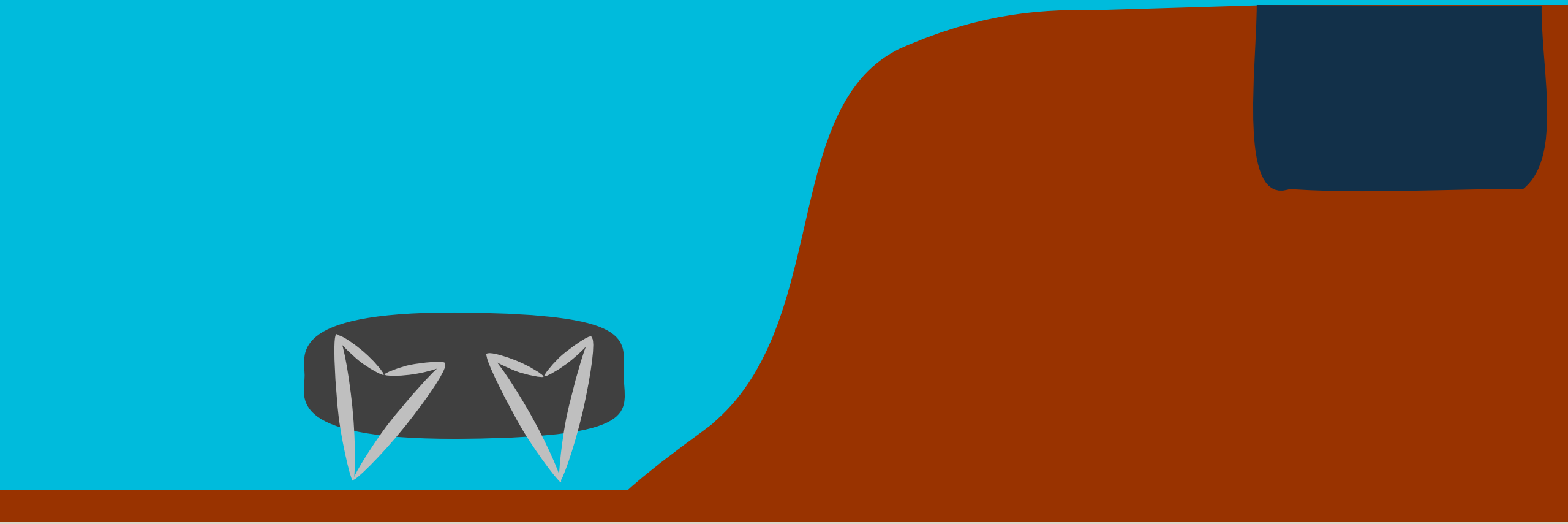

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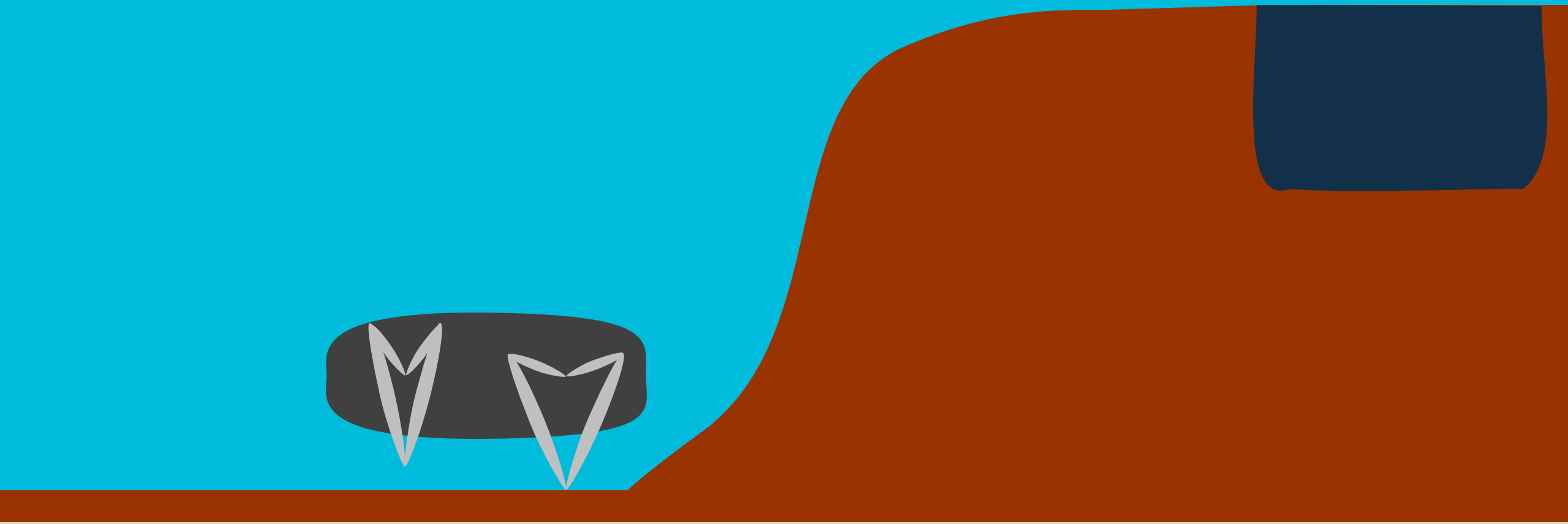

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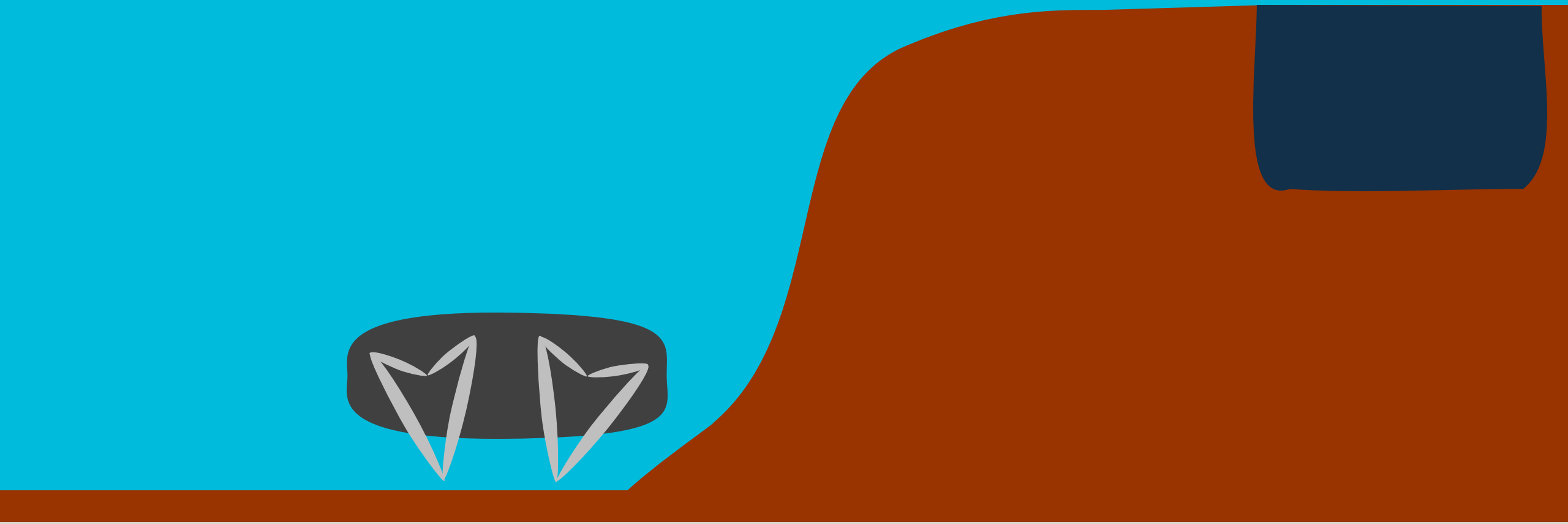
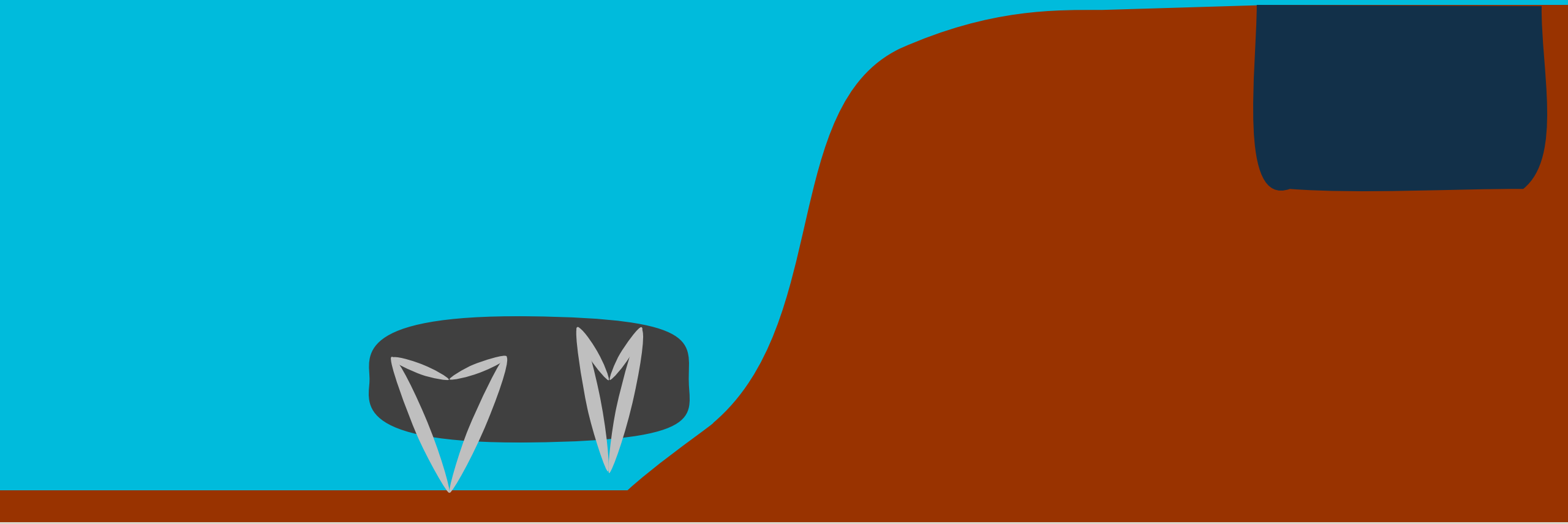


Types of Gaits: Walking



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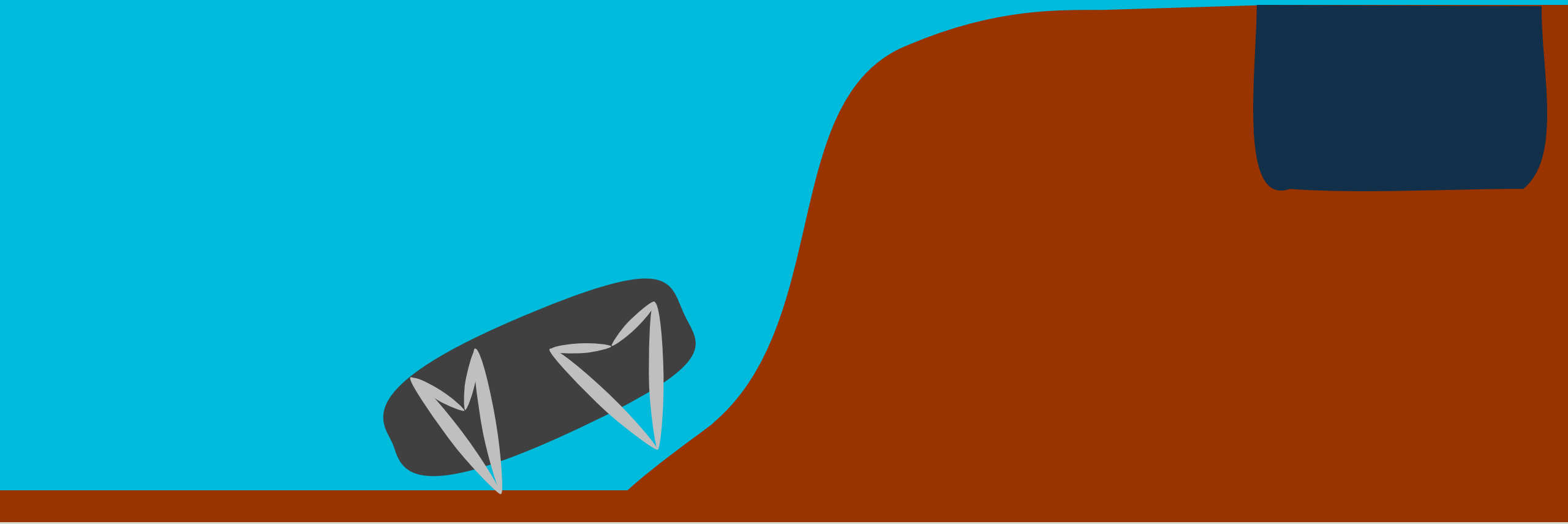

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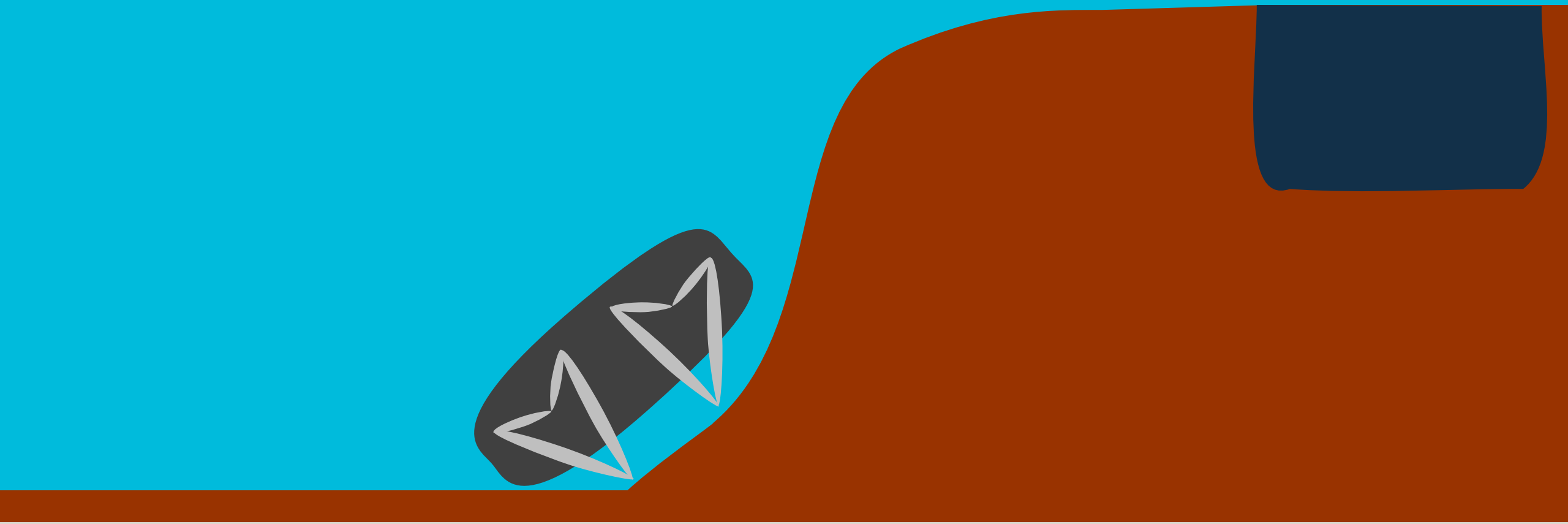
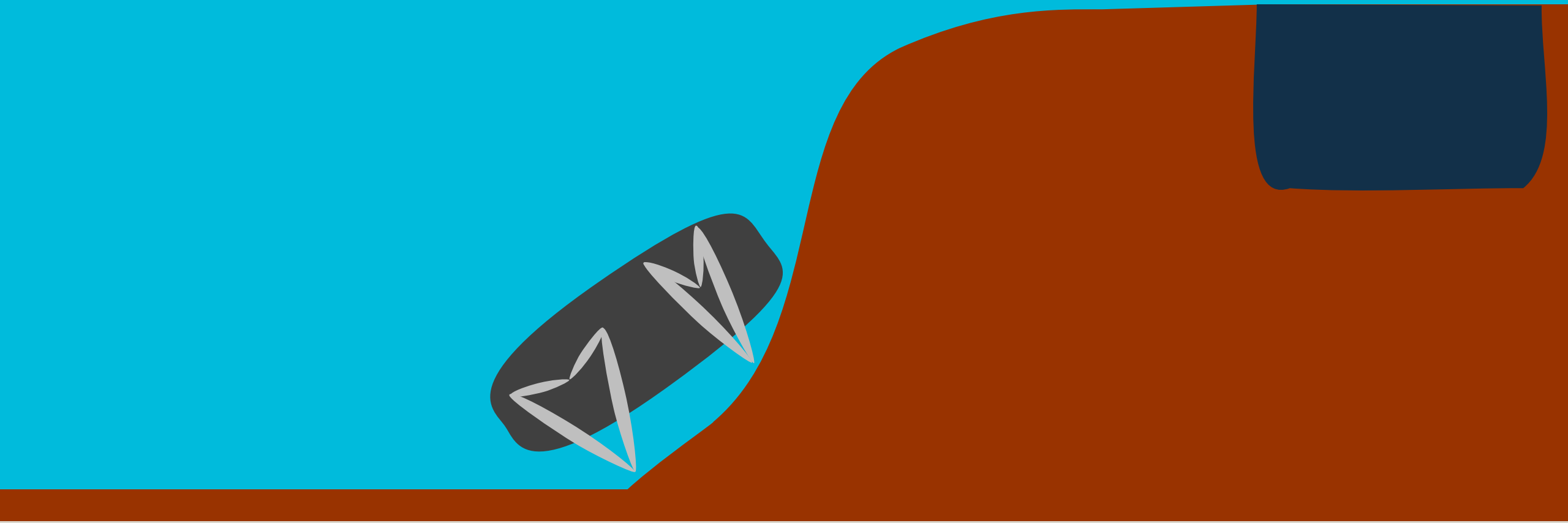


Climbing



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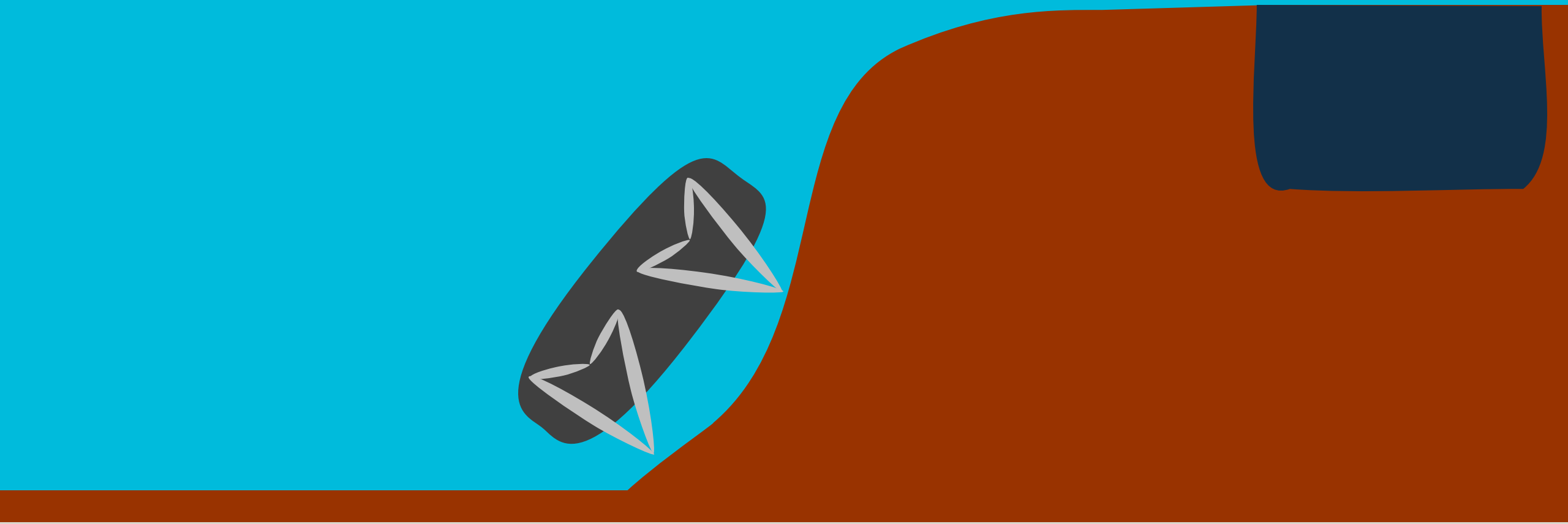

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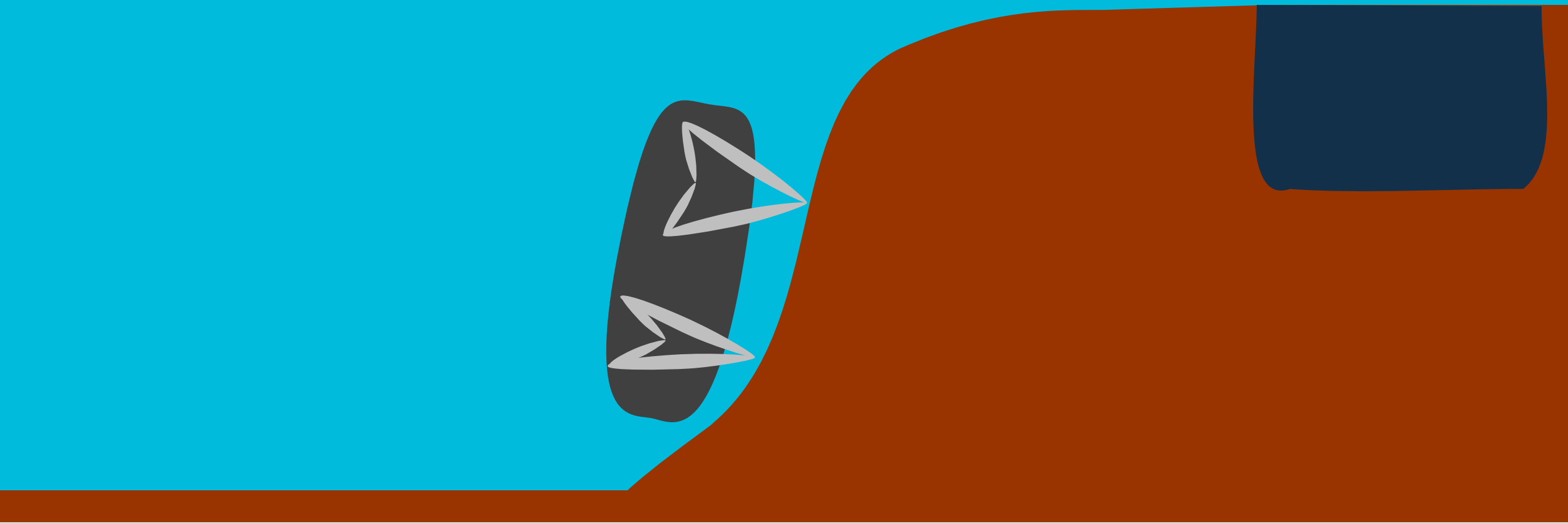

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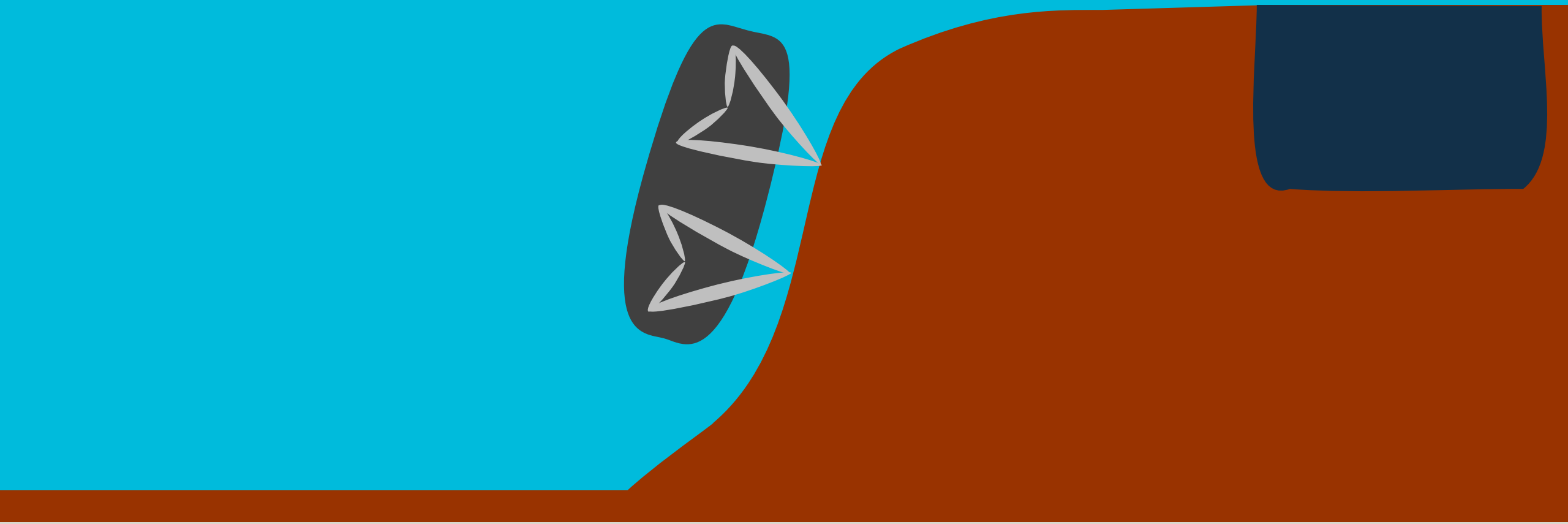

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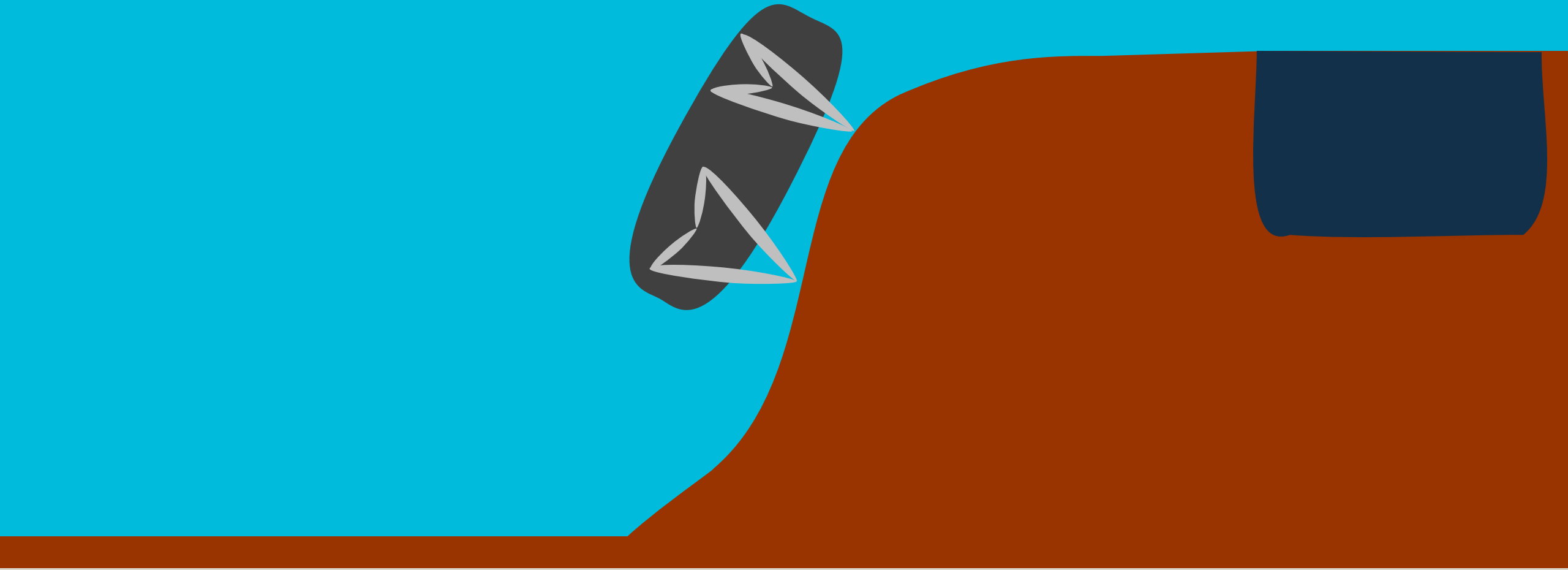

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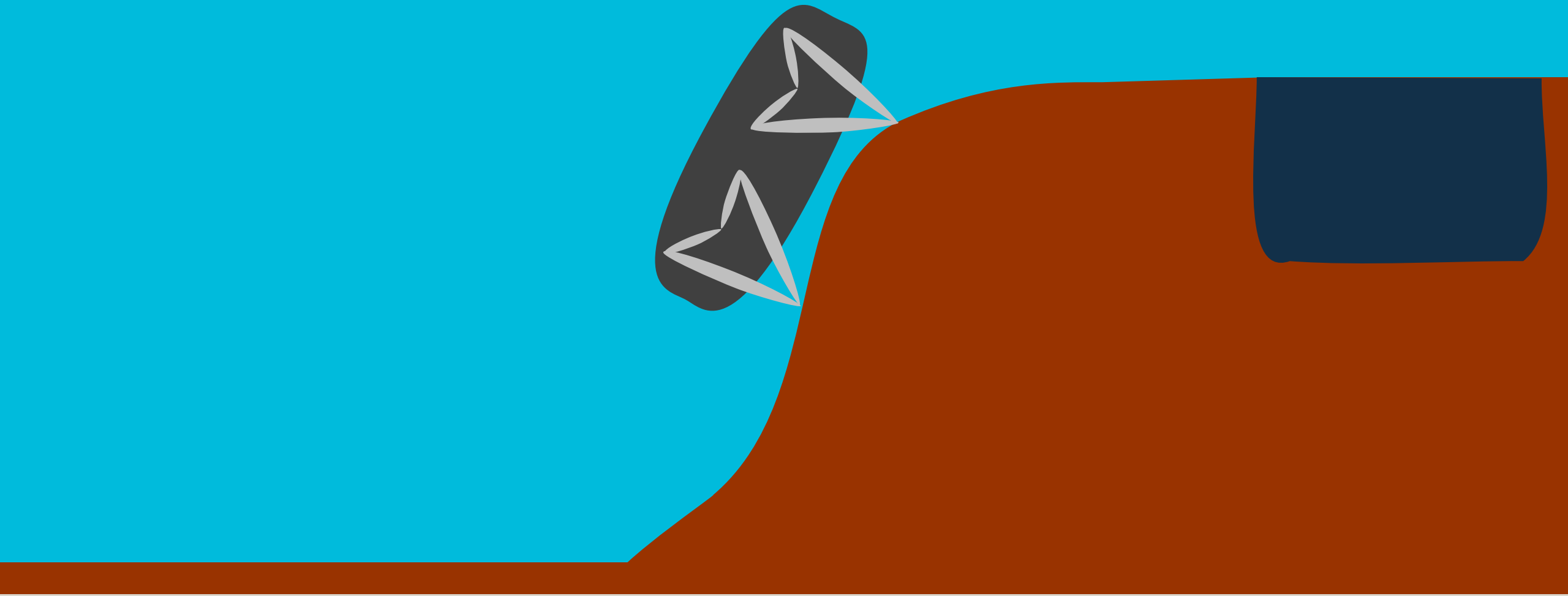

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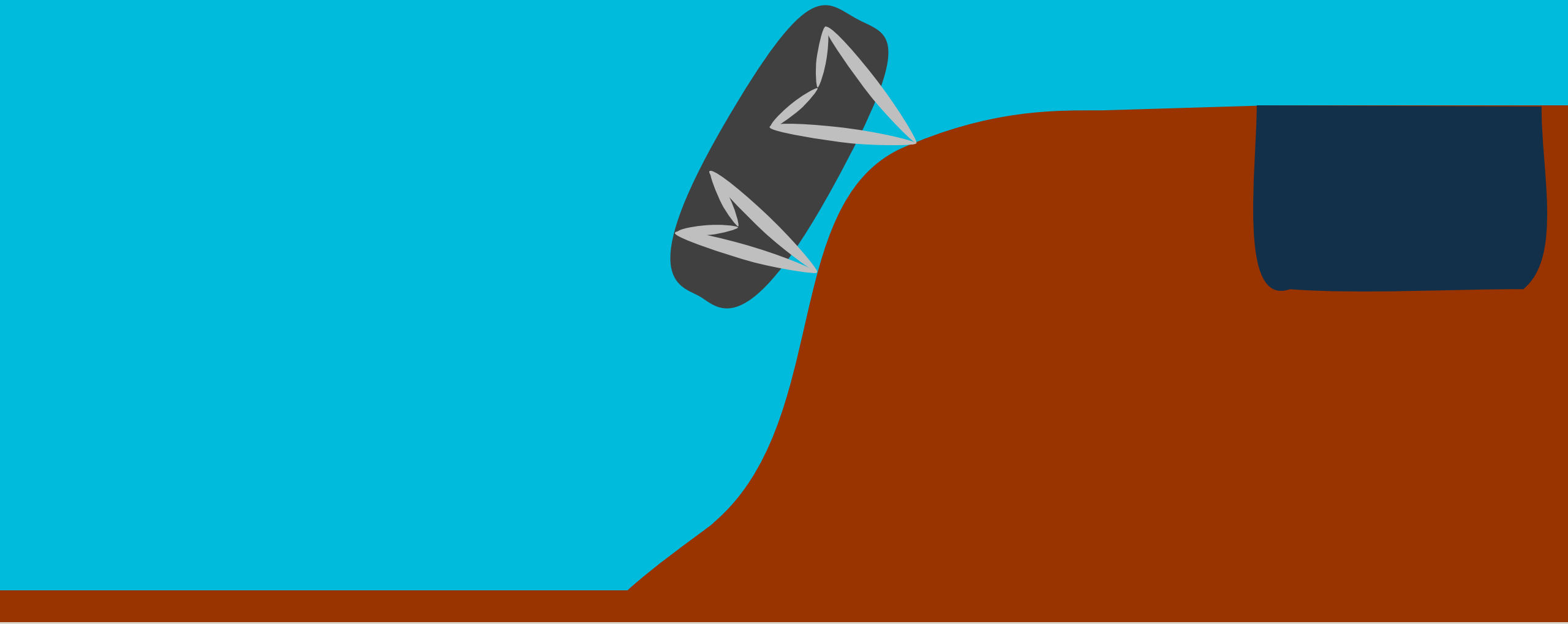

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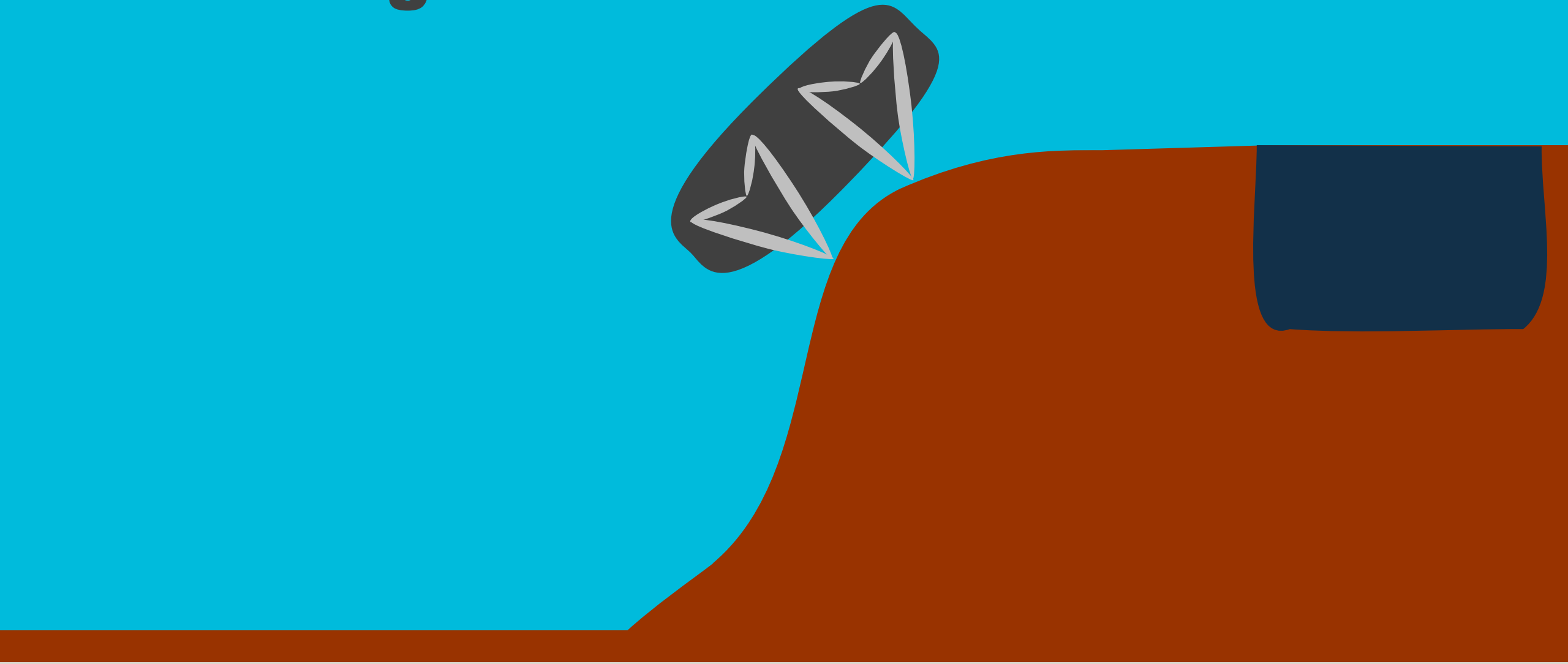

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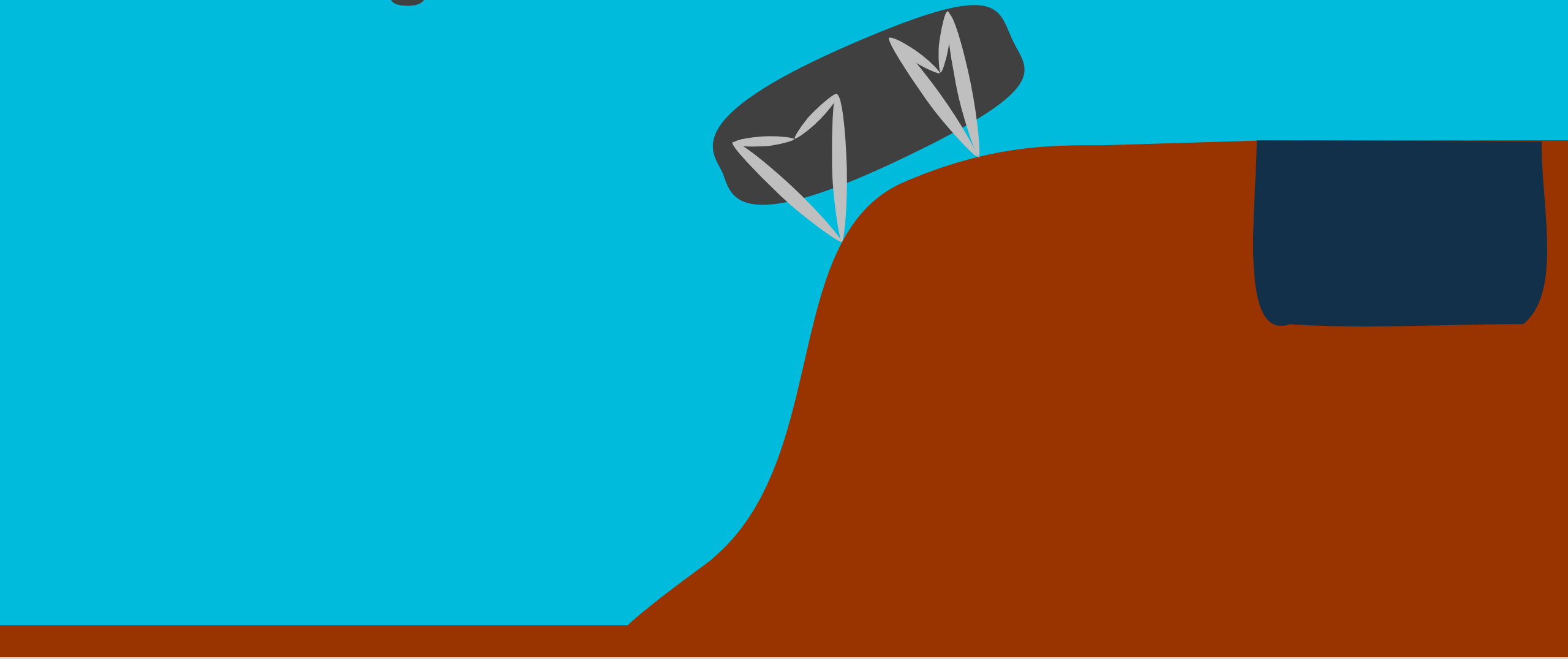

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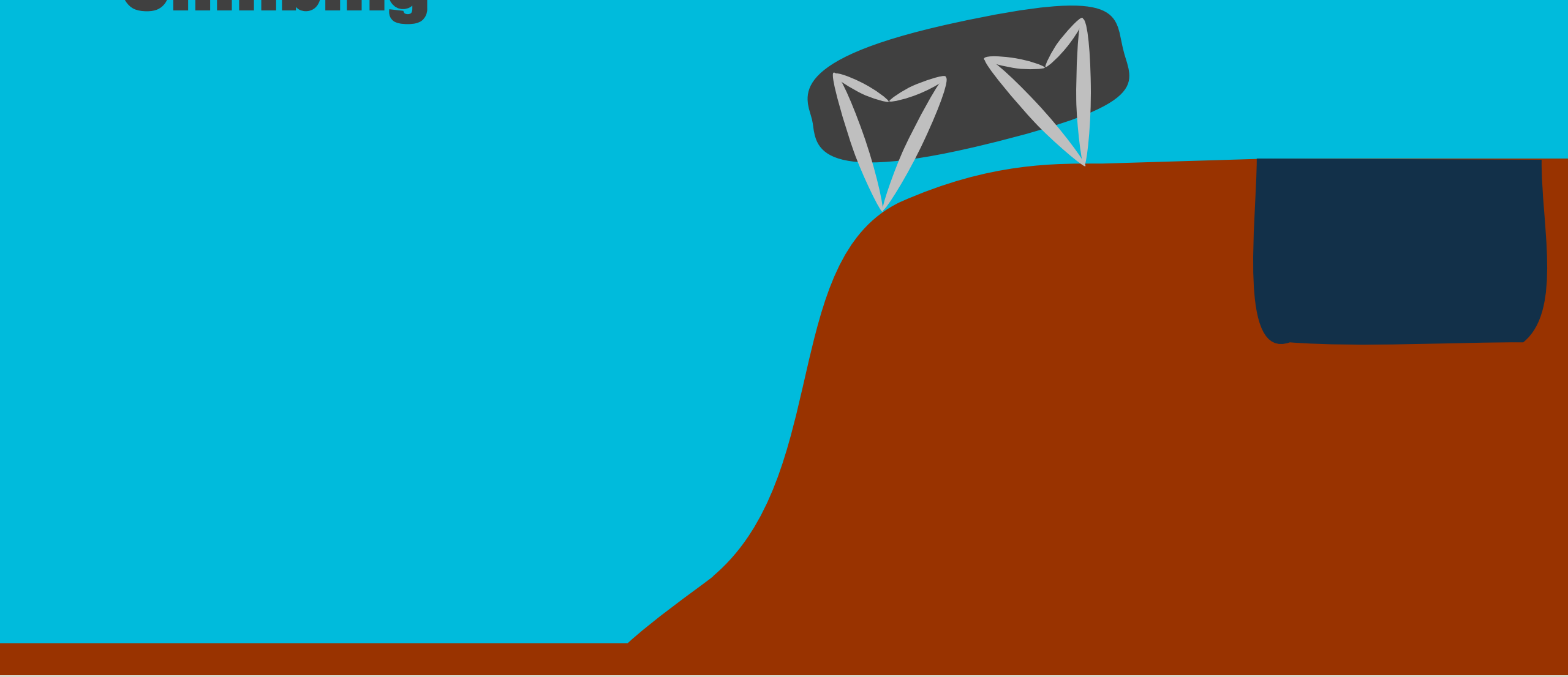

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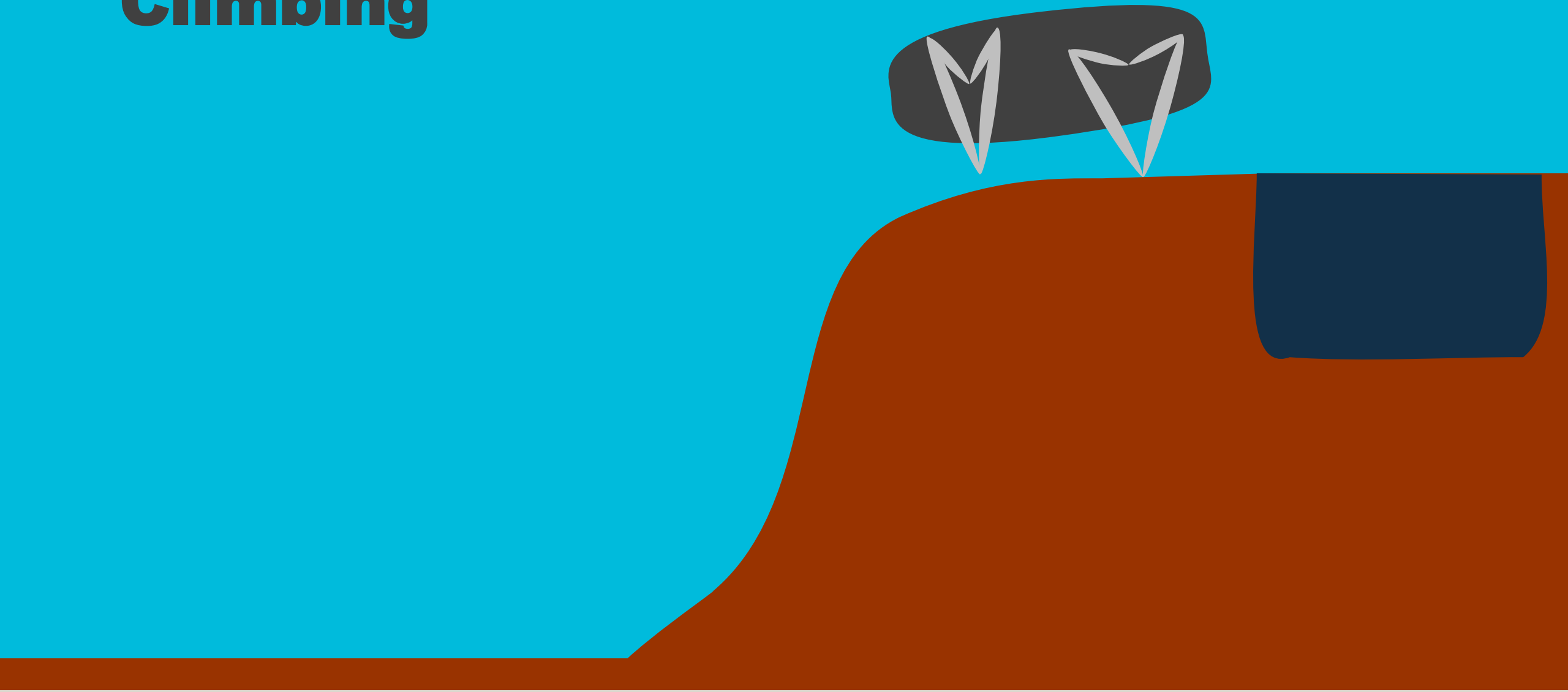

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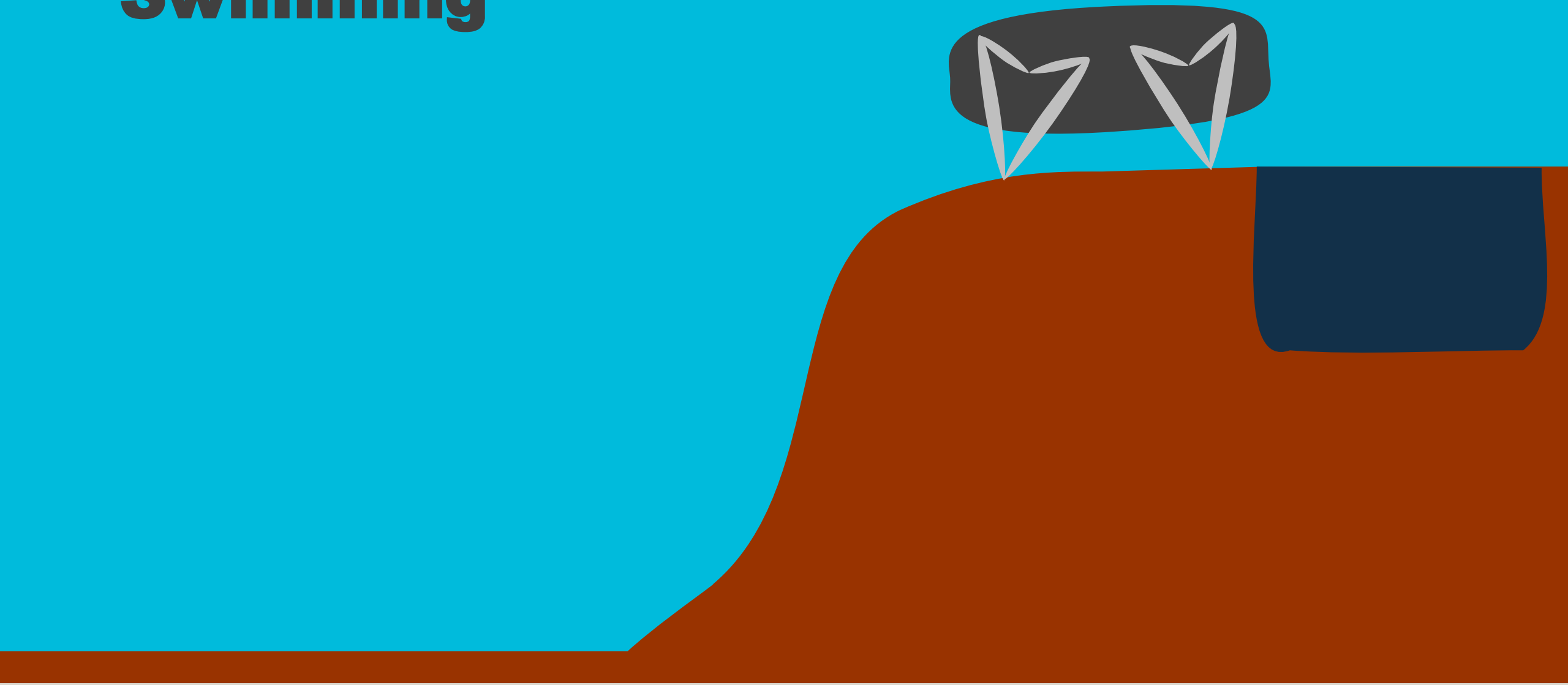

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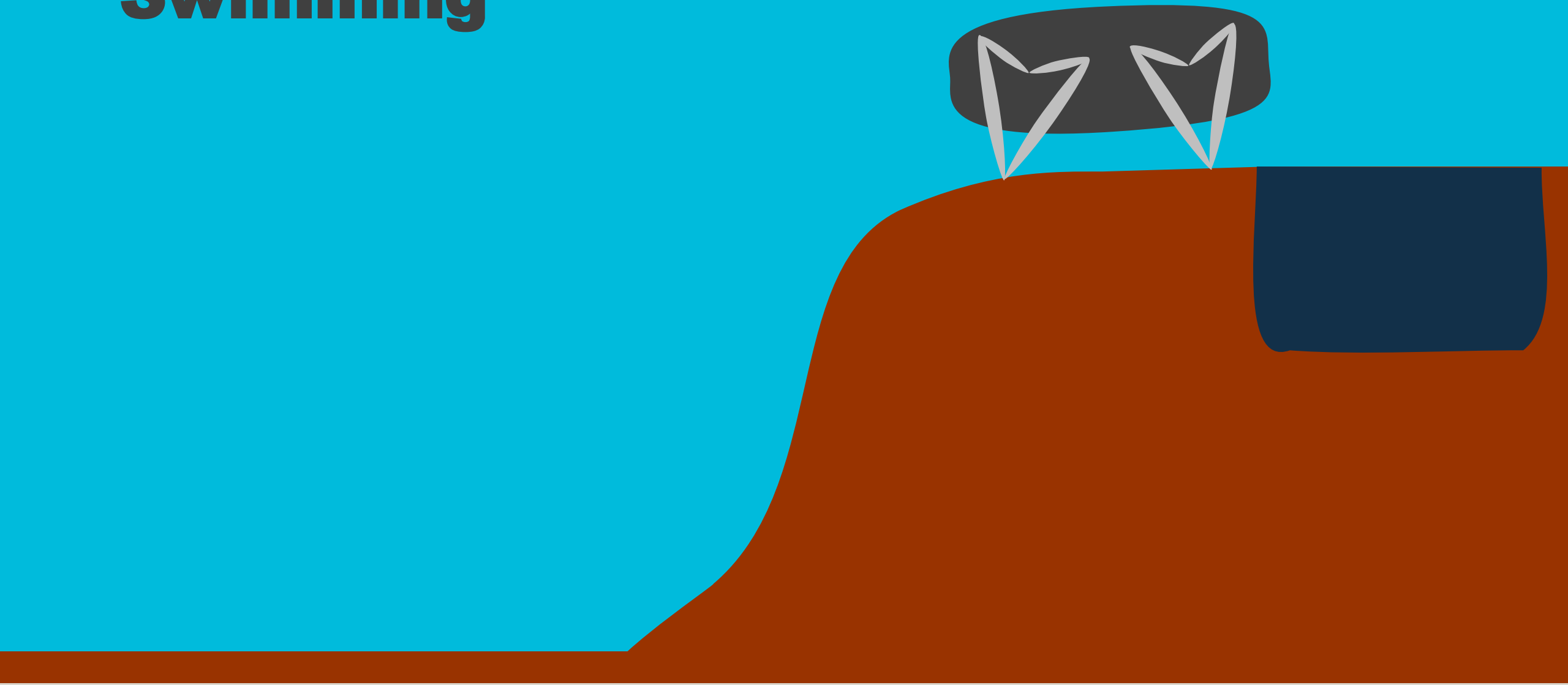
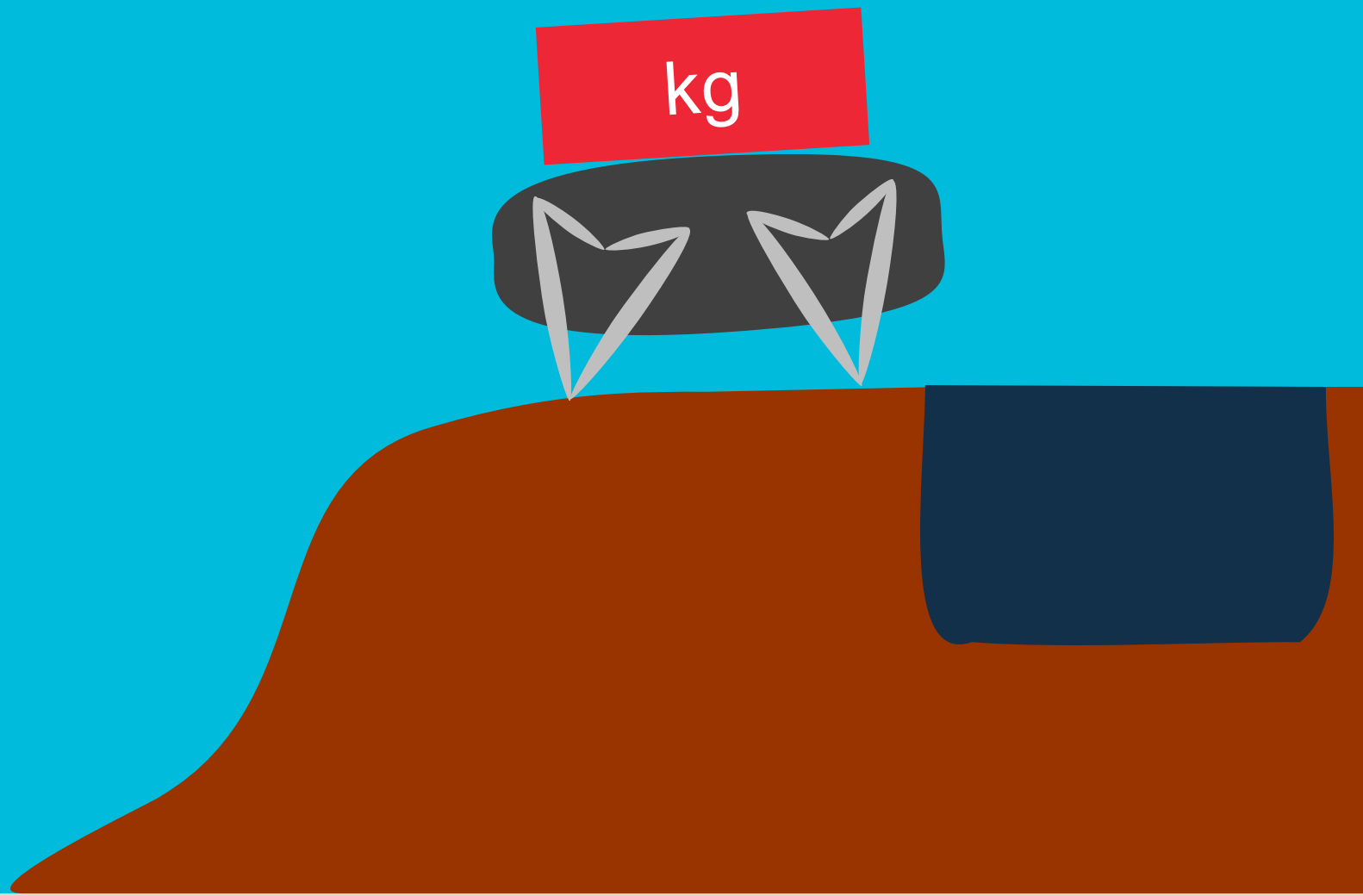
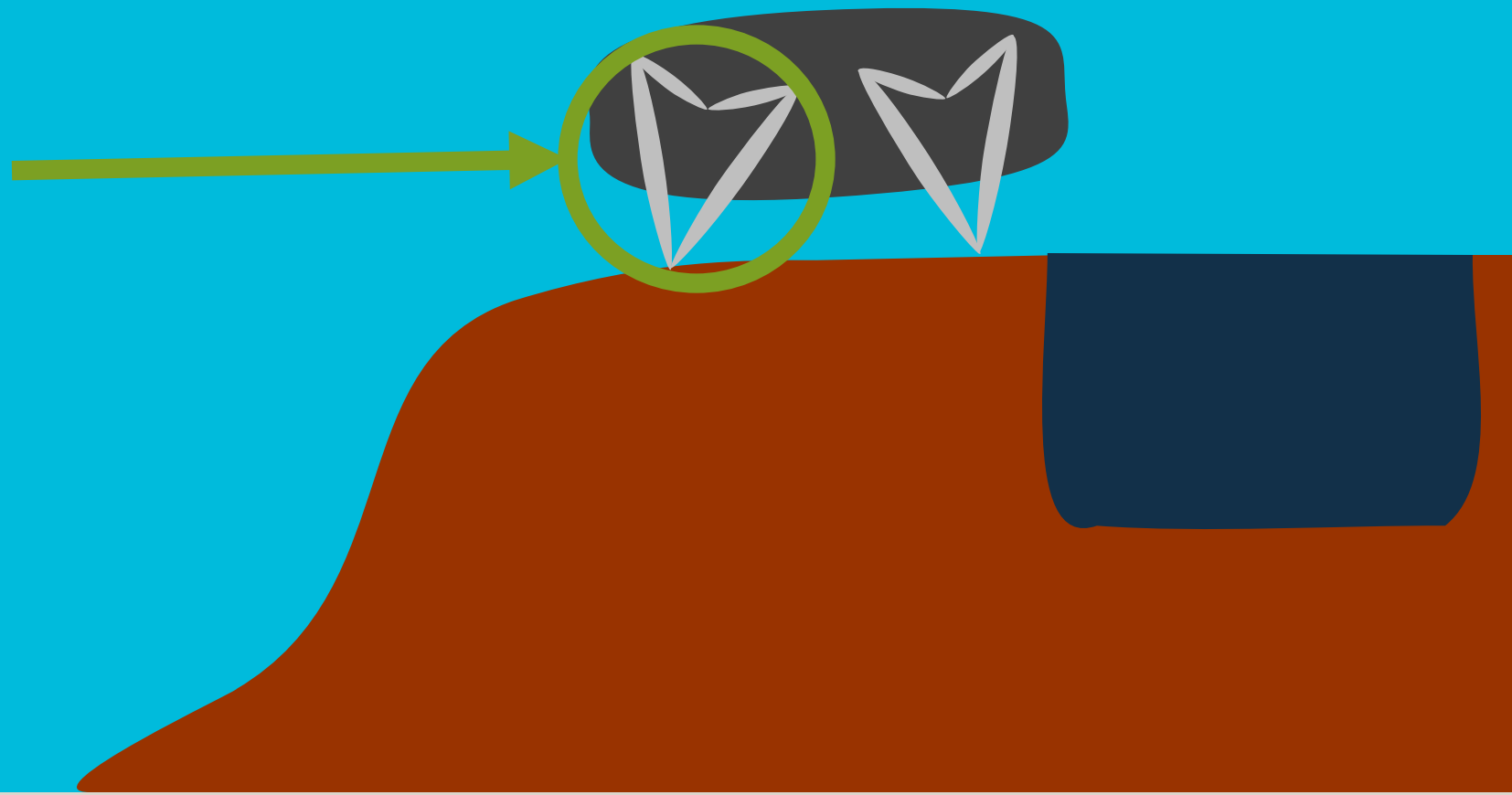


Payload



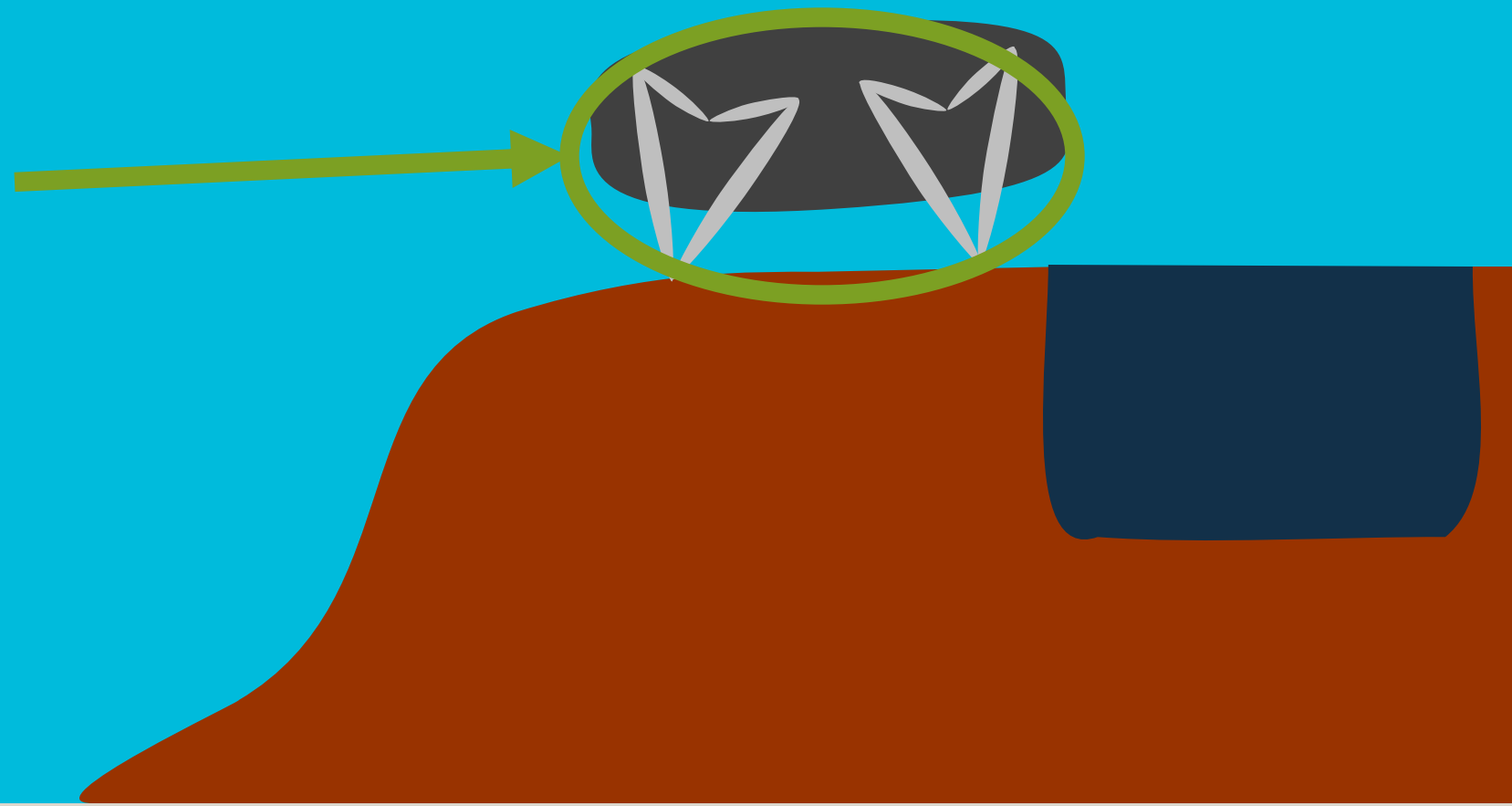
General Classification

Coaxial 5-bar



General Classification

Quadruped



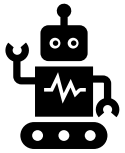
Additional Needs

Use previous robot performance data

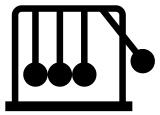
Produce visual comparison graphic for critical targets

Customer Wants

Produce Bill of Materials for developed model



Develop simple parametric models



Utilize physics engine for robot simulation

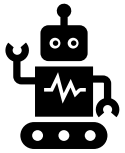
Additional Needs

Use previous robot performance data

Produce visual comparison graphic for critical targets

Customer Wants

Produce Bill of Materials for developed model



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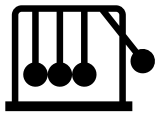

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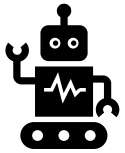

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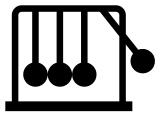

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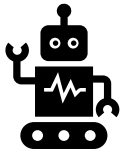

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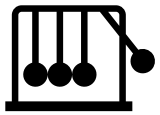

Utilize physics engine for robot simulation

Additional Needs

- Use previous robot performance data
- Produce visual comparison graphic for critical targets

Customer Wants

- Produce Bill of Materials for developed model
- Develop simple parametric models
- Utilize physics engine for robot simulation

Additional Needs

Use previous robot performance data

Produce visual comparison graphic for critical targets

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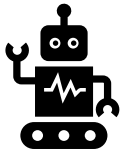

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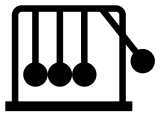
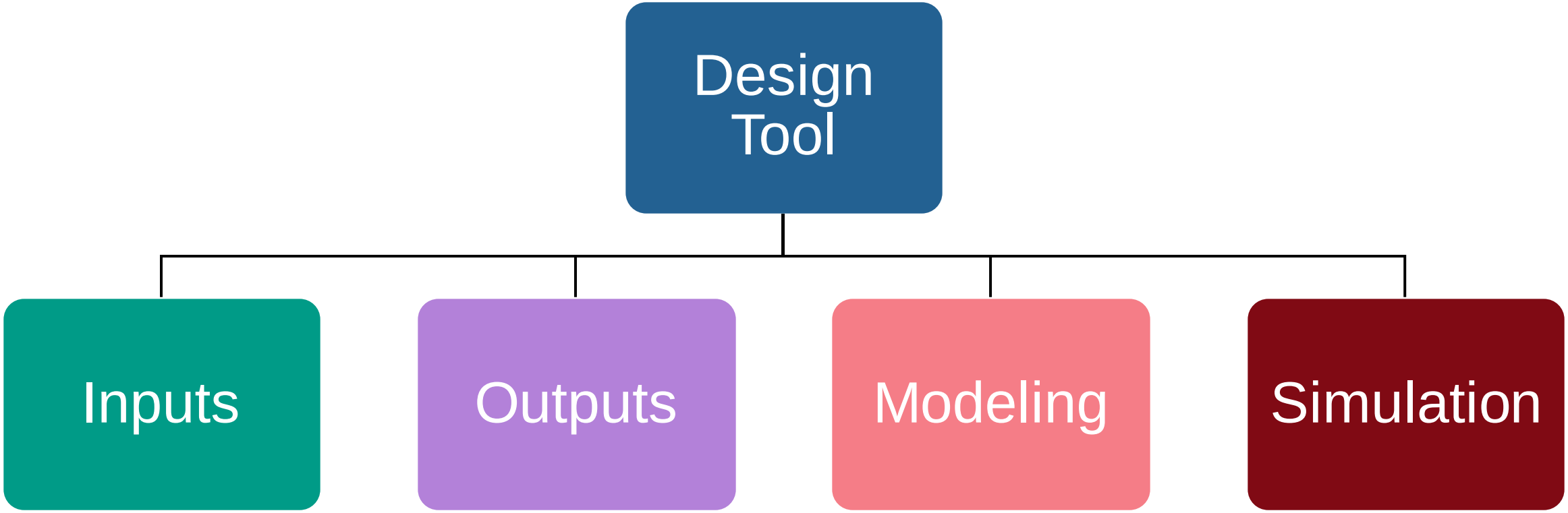


Utilize physics engine for robot simulation

Functions Hierarchy Chart



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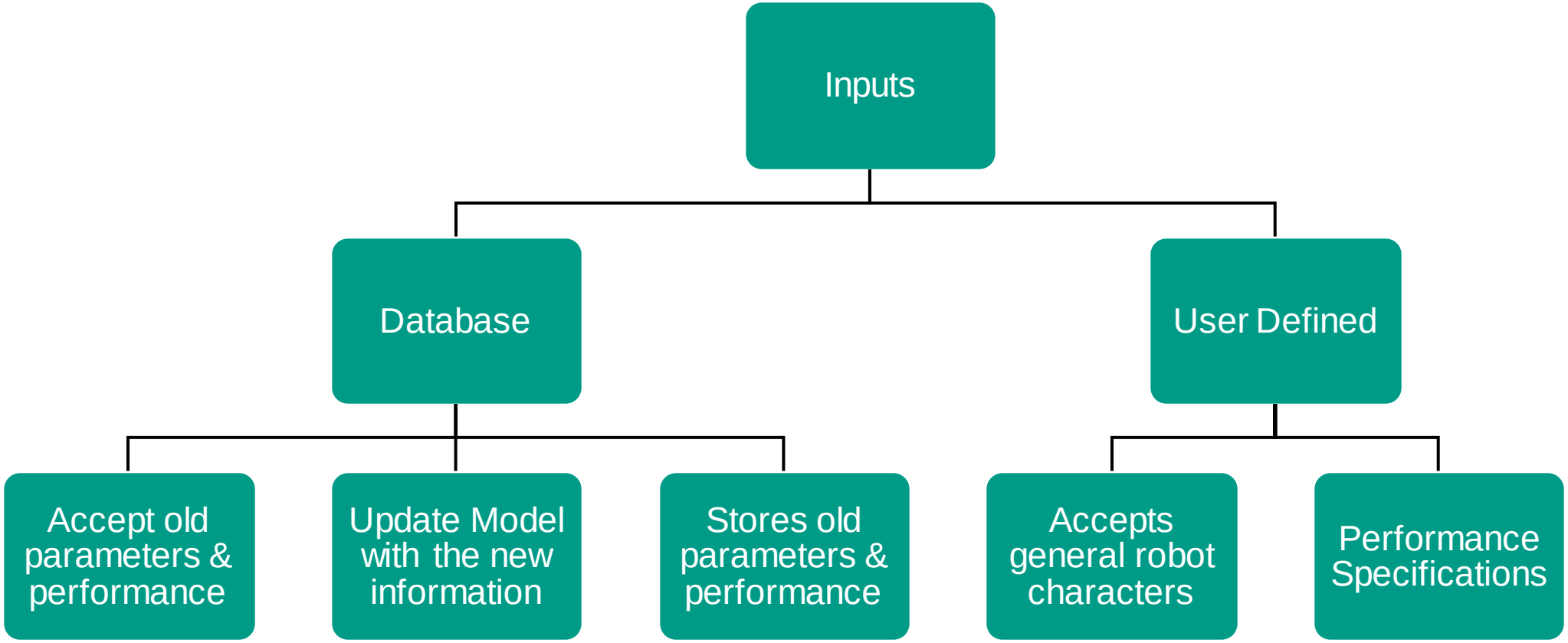

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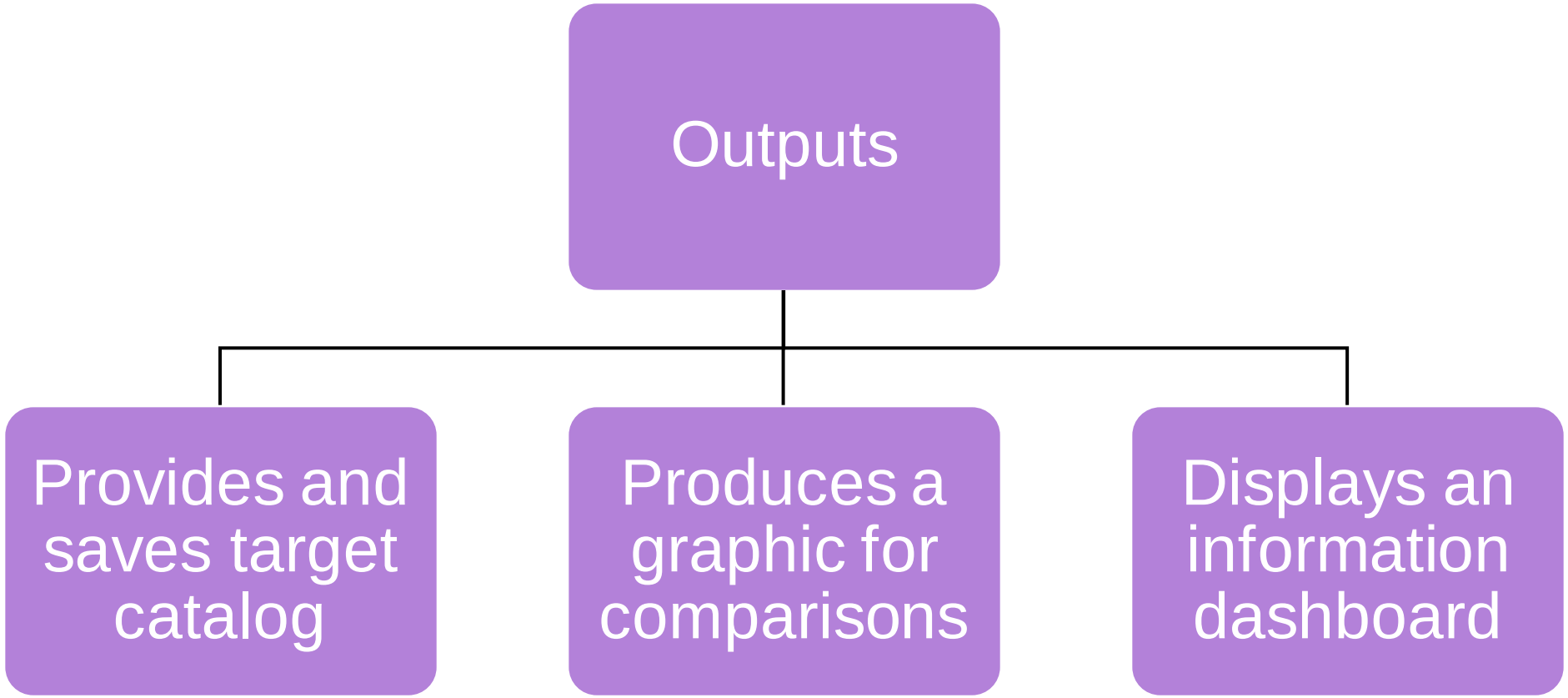

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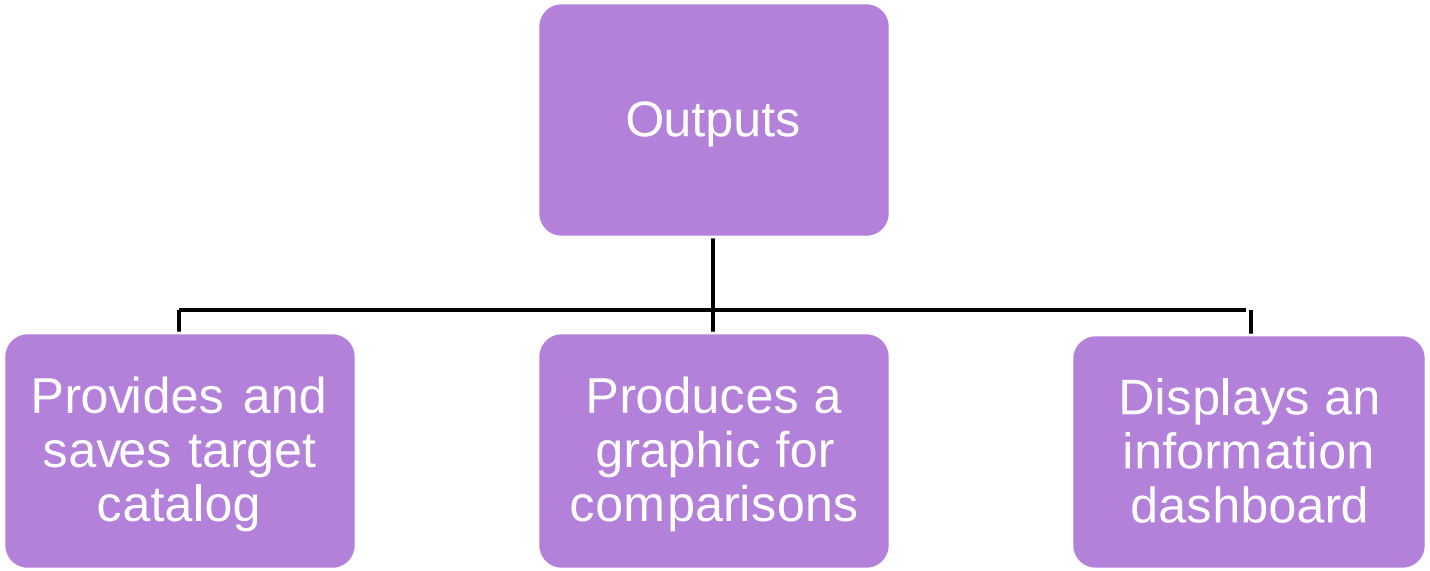

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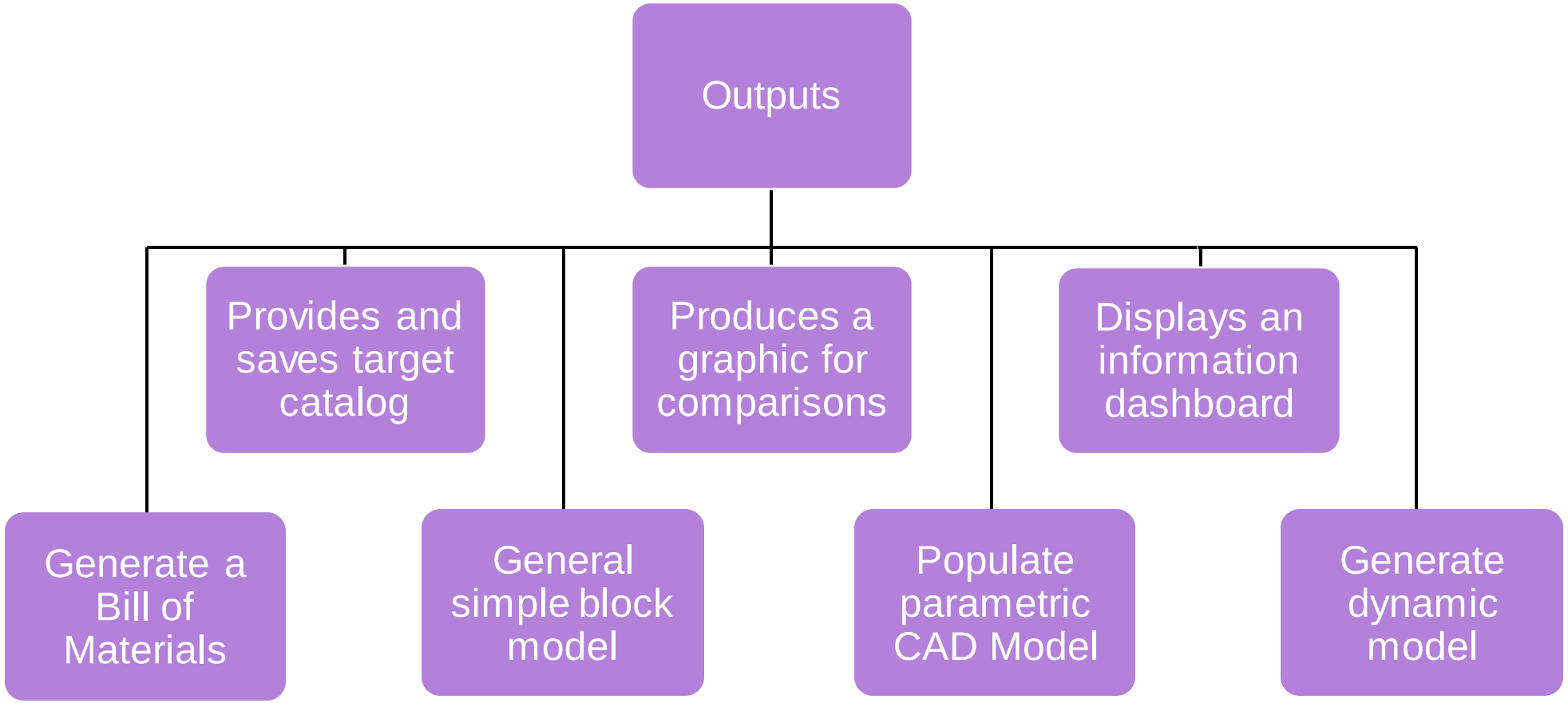

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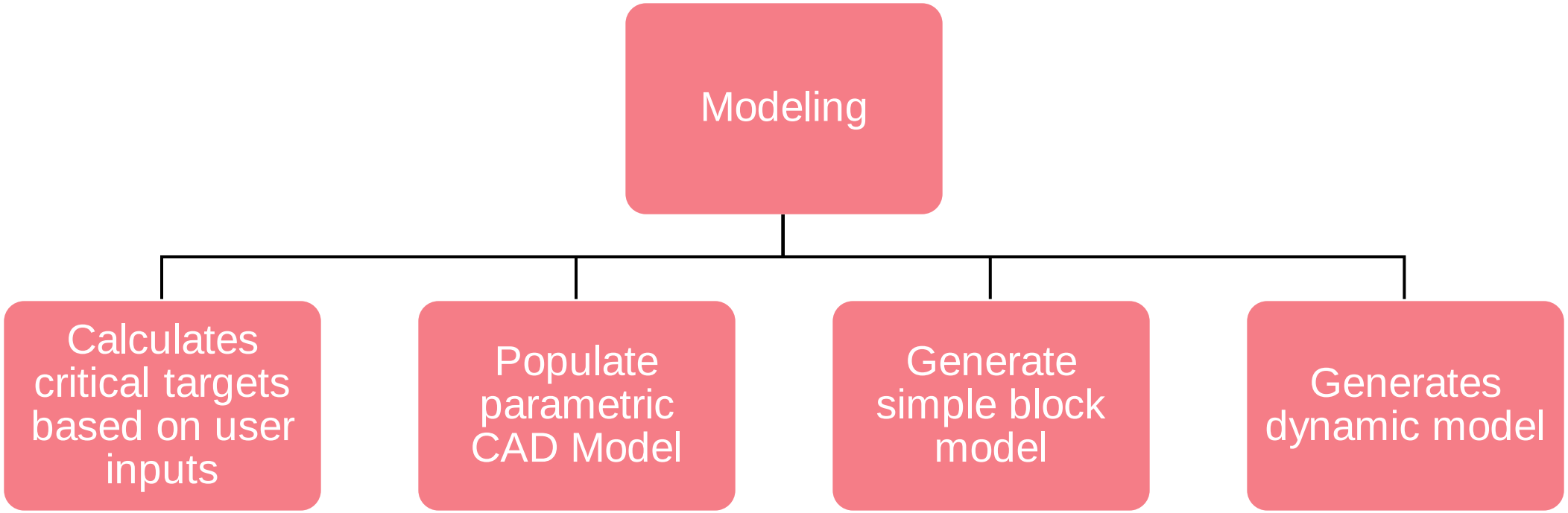

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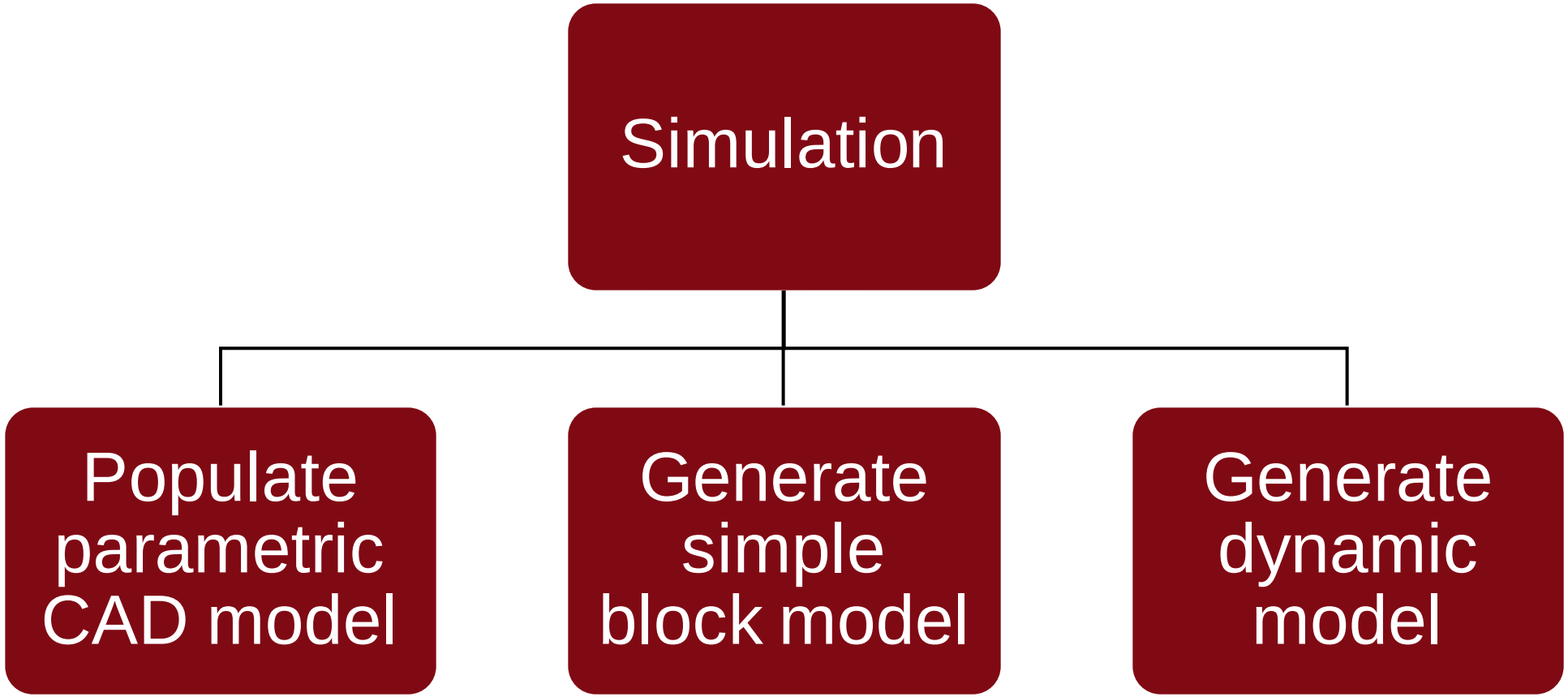
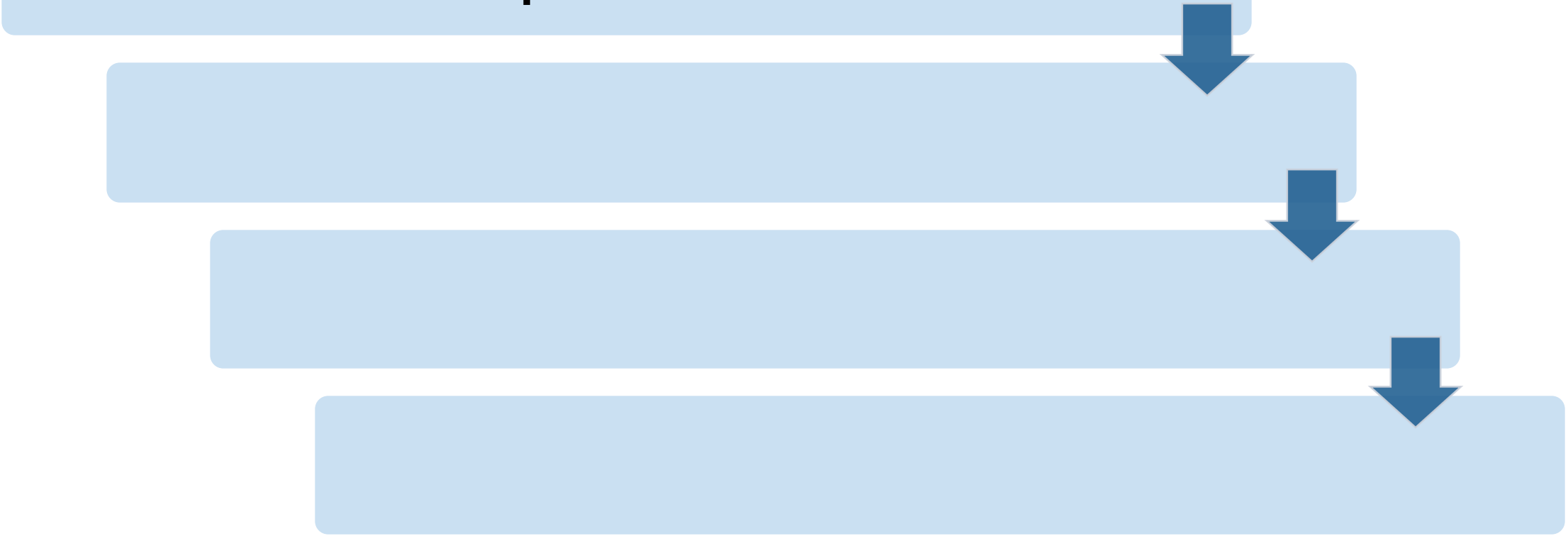


Cross Functional Matrix

	Inputs	Outputs	Modeling	Simulation
Calculates critical targets based on user inputs		X	X	
Populate parametric CAD Model		X	X	X
Generate simple block model		X	X	X
Generate dynamic model		X	X	X

Future Work

Read relevant publications



Future Work

Read relevant publications

Targets and Metrics

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Targets and Metrics

Concept Generation

Future Work

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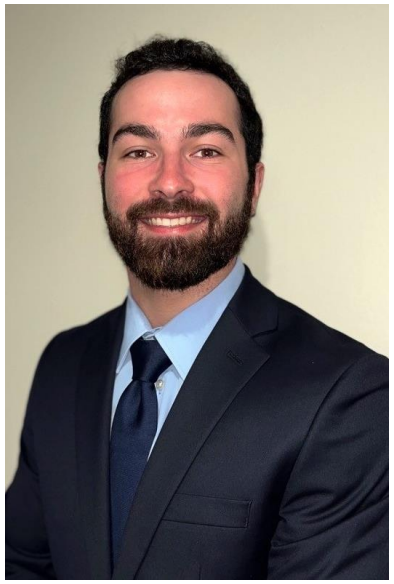
Final Selection

LinkedIn Profiles



Milton Bouchard
Fabrication Engineer

Michael Dina
Mechatronics Engineer

Onoriode Onokpise
Systems Engineer

Jackson Raines
Testing Engineer

Zachary Shapiro
Materials Engineer

Backup Slides