



Australian Government
Great Barrier Reef
Marine Park Authority



Reef Guardian
School

2024 Reef Guardian School Global Eco-challenge Teaching Resource Guide

*‘Time to **level up** your conservation efforts.’*

First Nations Acknowledgement

The Reef Authority acknowledges the expertise, wisdom, and enduring connections that have informed the guardianship of the Reef for millennia. We pay our respects to the Traditional Owners as the first managers of this land and sea Country, and value their traditional knowledge which continues to inform the current management and stewardship of the Reef for future generations.



Welcome Teachers

We are excited to welcome you to our 2024 Eco-challenge. Before getting started, please ensure you have [registered for the 2024 Eco-challenge](#) and received the **participant guide** for all the challenge details.

This teaching resource guide has been designed around an inquiry-based model to assist with incorporating the Eco-challenge within the classroom. Students learn key STEAM and life skills through [inquiry-based learning](#), and we hope this resource compliments your teaching. Within this guide you will find subject specific Australian curriculum codes (ACARA 9.0) and ways to adapt this to international curriculum outcomes. The Eco-challenge also aligns with nine of the [UN global sustainable development](#) goals.

The Eco-challenge can be incorporated in the classroom or as an independent project within collaborative groups outside class time.

“The meaning of ‘knowing’ has shifted from being able to remember and repeat information to being able to find and use it.” – National Research Council, 2007. – Inquiry Based Model

The aim of this year’s Eco-challenge is to:

- **Use gamification to design a product that will encourage your audience to adopt pro-environmental behaviours that will aid the survival of earth’s aquatic species.**

The 2024 Reef Guardian School Eco-challenge is linked to this year's Australian [National Science Week](#) theme of 'Species Survival - More than just sustainability' and is reflected throughout the teaching resource guide. The challenge is suited to students in grades 4 –12 but can be modified to suit any age range. We have allowed a 6-month period to ensure enough time to develop quality and impactful outcomes. We hope you enjoy...



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Stage 1: Exploration

Students can explore gamification:

- What is gamification?
- What are the elements of gamification?
- What are the benefits of gamification?
- Are there different forms of gamification?
- How is gamification used to benefit the environment?

Game testing:

Students can research and test out environmental games (physical or digital). This will ignite curiosity and get the ideas flowing.

Game Name	Star Rating: / 5	What did you like and what didn't you like?	What gamification design elements were used?	Do you think it would be effective in encouraging behaviour change? Why?
1.	☆☆☆☆☆			

Pressures facing aquatic species:

Watch 'Our Planet: Coastal Seas' episode by David Attenborough: [Our Planet | Coastal Seas | Episode.](#)

Students can investigate the below questions after watching the video to gain an understanding of Earth's species and the pressures they face.

- What were the environmental pressures identified in the video? Can you think of any others?
- Which part of the episode do you feel most passionate about? A specific animal, or environmental impact?



Additionally, students can visit the [IUCN Red List website](#) and pick five aquatic animals to investigate and develop a table like the one below:

Animal	ICUN red list category	Population Trend	Top 3 Threats	Conservation Actions
<i>Example: Dugong</i>	<i>Vulnerable</i>	<i>Decreasing</i>	<i>Residential and commercial development</i> <i>Biological resource use</i> <i>Pollution</i>	<i>Education</i> <i>In-place land / water protection</i>

- Can you think of any other innovative conservation actions to help vulnerable species?

Experimental Design Within Real World Settings (The Fun Theory)

Students can explore the concept of 'fun theory':

- Watch this video: <https://youtu.be/zSiHjMU-MUo>. This 'fun theory' design aids in encouraging people to recycle, by collecting points and ultimately helping combat pollution.
- Research the [fun theory](#) and think about how you could use a design method such as this to contribute to the survival of species.

'In every job that must be done, there is an element of fun. You find the fun and SNAP. The job's a game.' – Mary Poppins



Stage 2: Investigating

Eye on the Reef App:

The Reef Authority's Eye on the Reef App enables anyone who visits the Great Barrier Reef to contribute to its long-term protection by reporting valuable sightings of reef health, marine animals and incidents that is used to understand the bigger picture and inform how we protect the Reef.



Students can download the Eye on the Reef App on a school device or visit the [Eye on the Reef website](#) and have a look at how the app works and its intended purpose.

- How could you add gamification design elements such as incentives, leaderboards, points & badges to gamify this application?

Gamification methods:

Within the participant guide we provide different examples of gamification. Students are to investigate and choose what they would like to develop. This could include:

- Video games
- Phone applications
- Board games
- Eco-avatars
- Community based projects – “Fun Theory”

This table of prompts can be used by students to assist the brain-storming process:

Do I need to learn any skills to develop this?
Or What software will I need to use?
How long will I need to develop it?
What other resources do I need?
Does my school have resources that could help me to develop this product?



Threats

The key threats to the Great Barrier Reef are:

- Climate change
- Poor water quality from land-based run-off
- Coastal development impacts
- Remaining impacts from fishing

Ask students to choose a threat that they would like to develop an infographic or PowerPoint on that includes the following information:

- What is the threat?
- How does the threat impact aquatic species? (Can be how the threat impacts a collective of aquatic species or it can be focused on how the threat impacts one species).
- What is being done to reduce the threat?
- Statistics and factual evidence.
- Pictures / graphs / symbols / icons.

Students can use this information to educate the class about their chosen threat. They can present an infographic or PowerPoint to the class. See **Appendix 1** for an example of an infographic.

Senior Grades Activity: Can gamification encourage pro-environmental actions?

One of the aims of the 2024 Reef Guardian School Eco-challenge is to design a product that will encourage pro-environmental behaviours regarding the survival of aquatic species. Recent research has indicated that the use of gamification is an effective tool in influencing real word behaviour, and social change ([Ro et al., 2017](#)). We have provided an example below.

Encourage the students to find other examples. Do some research and develop a table like the one below.

Game	Behavioural Change	Why was it effective?
<u>"Cool Choices"</u> An online card game	<ul style="list-style-type: none">- 86% of players and 20% of non-players indicated that they were now more aware of opportunities to <u>save energy</u>.- In the post-game survey, players reported higher levels of activity to save energy in the home, water in the home, and gasoline two months after the game ended than before it began.	<ul style="list-style-type: none">- Low-cost- Easy to scale.- Used multiple gamification elements.- Social and can be seen by other users, prompting transparency and progress tracking.



Stage 3: Planning

Students can start planning their design or product using these prompting questions:

- Who is my intended audience?
- What problem am I trying to solve?
- Does my idea align with the Eco-challenge criteria?
- Do I need to develop a story board / sketch or prototype?
- If I'm producing an application should I create a [wireframe](#)? (See Appendix 3 for a wireframe template).
- Do I need to create avatars or characters?

After answering these prompts, plan a design concept of the game.

Planning tools for a digital project:

- [Gamification Model Canvas Demo](#) is a great gamification planning tool: To use this as an interactive online planning tool visit: [Gamification Model Canvas Demo | Canvanizer](#) or **Appendix 2** provides an outline.
- Research the role of wireframe in the planning process [here](#):
- Sketch out a wireframe using **Appendix 3**.

Planning tools for a physical project:

- Use **Appendix 4** to start drawing some cards for your board game.
- Use **Appendix 5** for some 'fun theory' inspiration.

When creating a board game or physical game, try creating instructions or a 'how to guide' – this will assist in the vision and planning process.

Students can present a detailed plan to their classmates and gain feedback.



Stage 4: Developing

Students are encouraged to start developing their product or design with guidance from teachers and peers. Remember the challenge can be completed in groups.

- Primary grades: Genially is a very basic free platform where students can make simple games from structure templates with the ability to customise information: [Genially, the platform for interactive animated content](#).
- Unity is a development platform for the development of video games, apps and experiences: [Unity Real-Time Development Platform | 3D, 2D, VR & AR Engine](#).

Students could develop a timeline to ensure they have enough time to design, create and submit their product.

Entries need to be submitted by the **8th of November 2024**.

Stage 5: Demonstrating & Submitting

Students will need to develop a video demonstrating and explaining their product. This will be used to judge submissions.

Ensure you have a clear video of how to use the product. Students can review the judging criteria in the participant guide to help guide what they might want to include in their video. The video should not exceed 5 minutes.

Entries need to be submitted by the **8th of November 2024** to be eligible for prizes.

Stage 6: Reflecting

Students can think about:

- What worked well?
- What could be improved?
- How could I improve my planning stage?
- Will my design and product influence the survival of aquatic species? Or, do I need to re-assess my objective?

They can create a method to evaluate the effectiveness of the design.



Curriculum Alignment

The open nature of the Eco-challenge supports a variety of Australian Curriculum (ACARA 9.0) links. It can also be easily adapted to support various international curriculum standards. With multiple links to the [United Nations Sustainable Development Goals](#), it can be incorporated across multiple year levels. The following descriptions are included to guide the learning outcomes of the Eco-challenge.

- 🌍 You can easily adapt the themes from the Australian Curriculum to align with your own country's curriculum.

For example:

The Australian standard, *“Investigate the physical conditions of a habitat and analyse how the growth and survival of living things is affected by changing physical conditions (AC9S6U01).”*

Is similar to:

The US science standard (NGSS), *“Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all (3-LS4-3 - Biological Evolution: Unity and Diversity).”*



Australian Curriculum (ACARA 9.0) curriculum codes

Science

Science Understanding

- Investigate the physical conditions of a habitat and analyse how the growth and survival of living things is affected by changing physical conditions ([AC9S6U01](#)).
- Particular structural features and behaviours of living things enable their survival in specific habitats ([AC9S5U01](#)).
- Use models, including food webs, to represent matter and energy flow in ecosystems and predict the impact of changing abiotic and biotic factors on populations ([AC9S7U02](#)).

Science Inquiry

- Write and create texts to communicate ideas and findings for specific purposes and audiences, including selection of language features, using digital tools as appropriate ([AC9S5I06](#)).

Science as a Human Endeavour

- Analyse the key factors that contribute to science knowledge and practices being adopted more broadly by society ([AC9S9H03](#)).

Digital Technologies

Processes and Production Skills

- Define and decompose real-world problems with design criteria and by creating user stories ([AC9TDI8P04](#)).
- Select and use a range of digital tools efficiently, including unfamiliar features, to create, locate and communicate content, consistently applying common conventions ([AC9TDI8P11](#)).
- Evaluate existing and student solutions against the design criteria and user stories and their broader community impact ([AC9TDI8P10](#)).
- Design and prototype the user experience of a digital system ([AC9TDI10P07](#)).
- Select and use emerging digital tools and advanced features to create and communicate interactive content for a diverse audience ([AC9TDI10P11](#)).
- Generate, communicate and compare designs ([AC9TDI4P03](#)).
- Generate, modify, communicate and evaluate designs ([AC9TDI6P04](#)).
- Implement, modify and debug programs involving control structures and functions in a general-purpose programming language ([AC9TDI8P09](#)).

Knowledge and Understanding

- Explain how hardware specifications affect performance and select appropriate hardware for particular tasks and workloads ([AC9TDI8K01](#)).

Work Sample

- High School Game Development Work Sample ([WSO1](#)).



Design and Technologies

Process and Production Skills

- Generate, test, iterate and communicate design ideas, processes and solutions using technical terms and graphical representation techniques, including using digital tools ([AC9TDE8P02](#)).
- Analyse needs or opportunities for designing, and investigate and select materials, components, tools, equipment and processes to create designed solutions ([AC9TDE8P01](#)).
- Analyse needs or opportunities for designing; develop design briefs; and investigate, analyse and select materials, systems, components, tools and equipment to create designed solutions ([AC9TDE10P01](#)).
- Generate, iterate and communicate design ideas, decisions and processes using technical terms and graphical representation techniques, including using digital tools ([AC9TDE6P02](#)).
- Examine design and technologies occupations and factors including sustainability that impact on the design of products, services and environments to meet community needs ([AC9TDE4K01](#)).

Visual Arts

Creating and Making

- Reflect on the ways that they and other artists respond to influences to inform choices they make in their own visual arts practice ([AC9AVA8D02](#)).
- Experiment with, document and reflect on ways to use a range of visual conventions, visual arts processes, and materials ([AC9AVA6D01](#)) ([AC9AVA8C01](#)).

Media Arts

Creating and Making

- Design and structure media arts works to communicate ideas, perspectives and meaning for an intended audience ([AC9AMA8C01](#)).
- Apply production processes and use media arts concepts to construct representations and produce media arts works that communicate ideas, perspectives and/or meaning for specific audiences using responsible media practice ([AC9AMA8C02](#)).

Project Based Design Solutions

Major projects

In high school, students may opt to undertake this task as their major ICT design project. If digitally focused, you may even want to consider submitting your work in the '[Young ICT explorers' competition](#)'.



UN Global Sustainable Development Goals

The Sustainable Development Goals (SDGs), were adopted by the United Nations in 2015 as a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity.

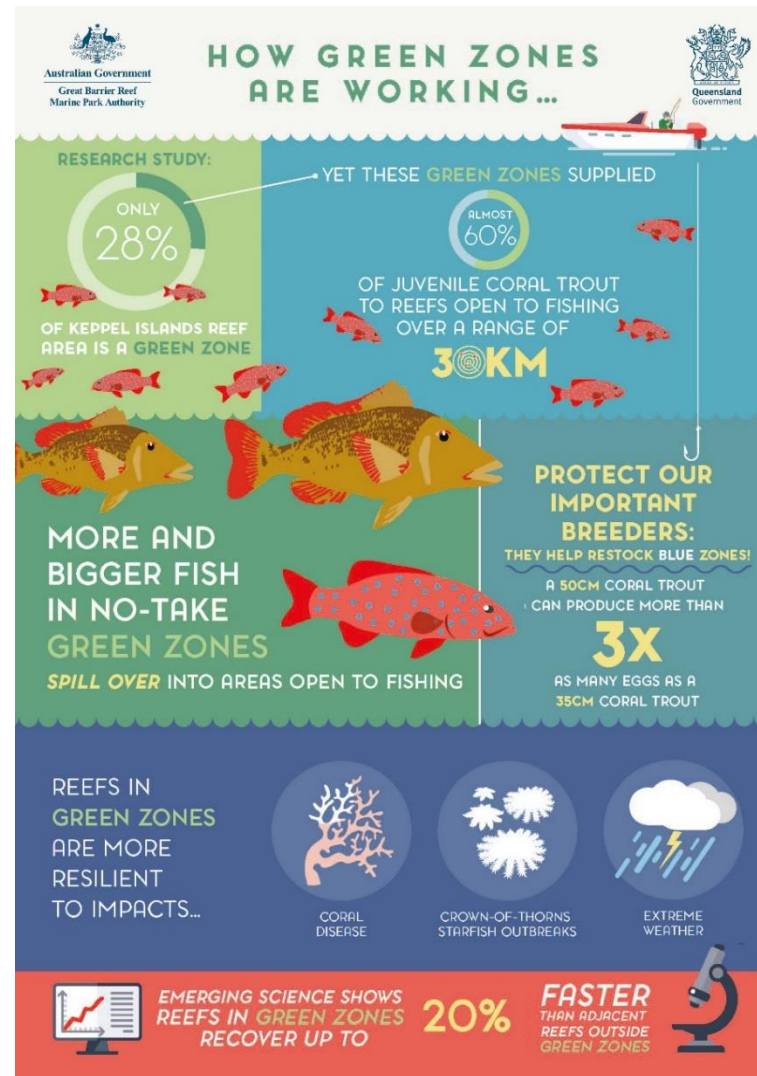
The below nine goals align to the outcomes of the 2024 Reef Guardian School Eco-challenge.

 Students could have a look at how their country is tracking towards these goals.





Appendix 1: Infographic Example





Appendix 2: Gamification Model Planner

PLATFORMS +	MECHANICS +	DYNAMICS +	AESTHETICS +	PLAYERS +
	COMPONENTS +		BEHAVIORS +	
COSTS +		REVENUES +		



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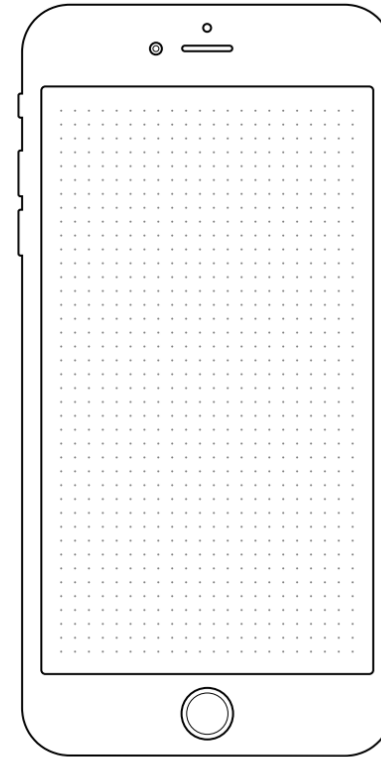
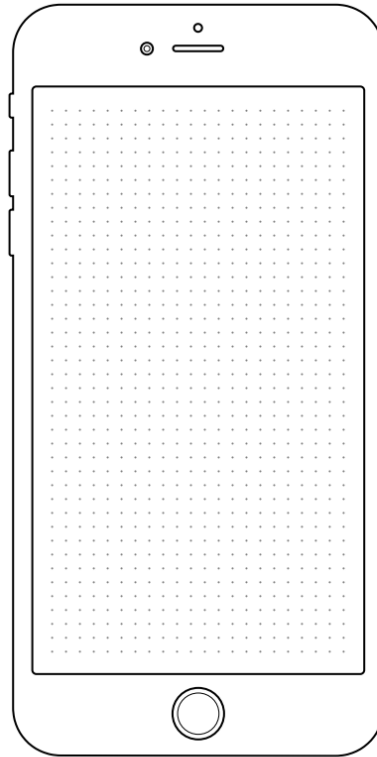
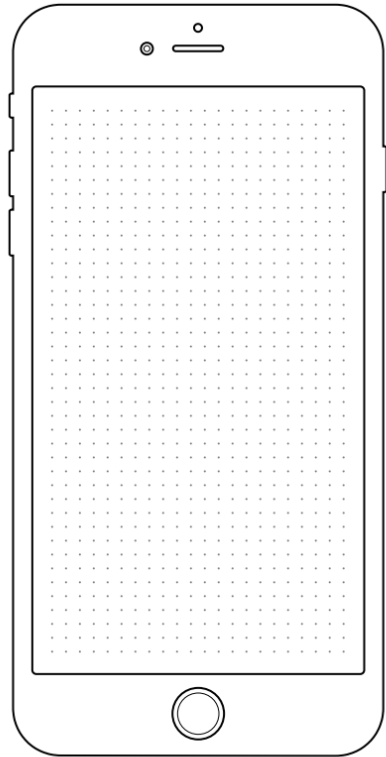
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Appendix 3: Wireframe Application Planner

Visit [Sketchize: Free Wireframing Sheets](#) for more templates:

PROJECT NAME

DATE



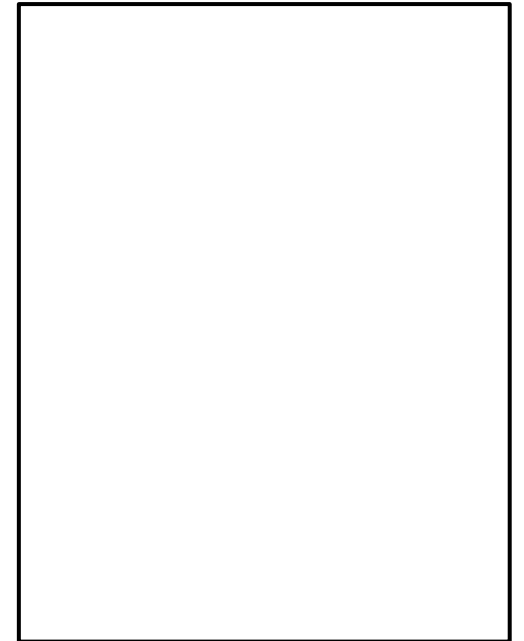
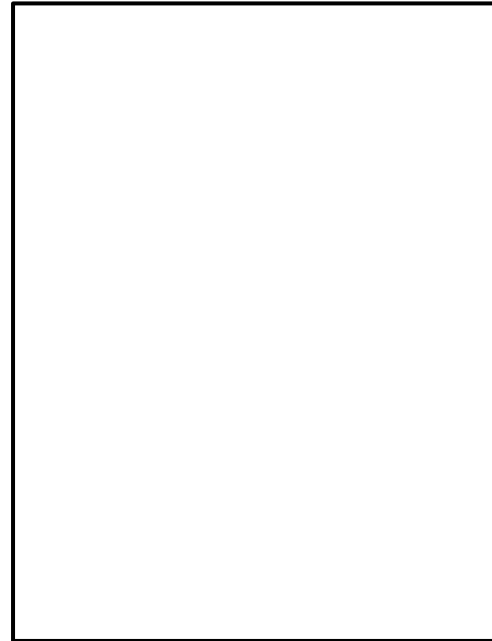
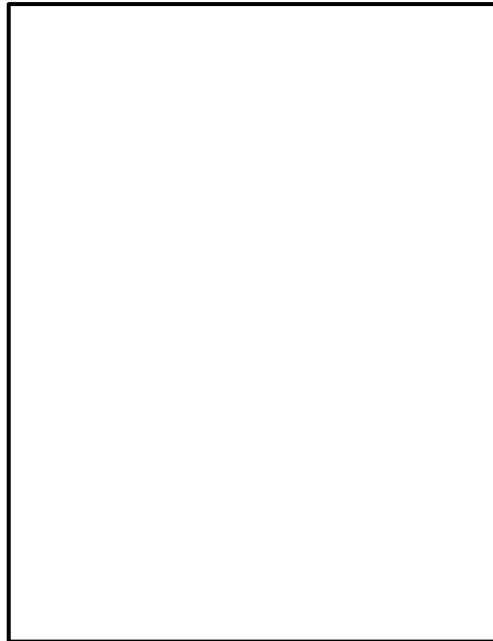
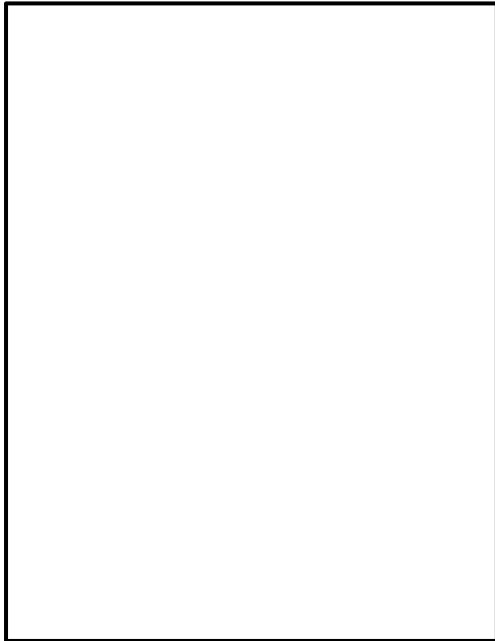
We believe your ideas are worth sketching. Sketchize © 2018

iPhone 6S



Appendix 4: Board-game card sketch area

Gather some inspiration and sketch your ideas in the card templates below.





Appendix 5: Fun Theory Brainstorming



What is the aim of the design: To get better at timetables.

What are the incentives for the participants:

They get to go up a step when they get it right. Maybe a reward at the top after completing?

Picture:

© Block Designs, 2023

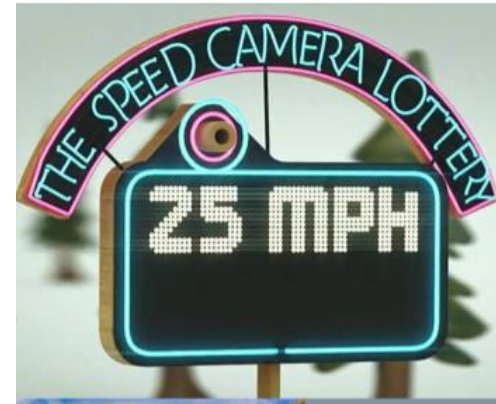


What is the aim of the design: To get people to recycle more often.

What are the incentives for the participants: *Can you think of an incentive or reward for hitting a slam dunk? A completion between classes? whatever class gets he most slam dunks per week receives a prize?*

Picture:

© Glue Crew Recycling Program



Watch Video here: [Speed camera lottery video.](#)

What is the aim of the design: To reduce the amount of people speeding.

What are the incentives for the participants: *If they are under the speed limit, they get entered into a lottery to win money from the fines of people over the speed limit.*

Picture:

© Rewarding Speed Limit Signs
- Submitted by Kevin Richardson

Sketch Idea Here:

Can you think of one to aid the survival of earths species?

What is the aim of the design?

What are the incentives for the participants?

Who is your audience? Will it be used in a school or community setting?

Remember for it to be classified as a gamification technique there needs to be incentives or rewards for the user.