Homeschool Self-Guided Education Packet

TEACHER GUIDE

GRADES 4 - 5

STUDENT SHEETS INCLUDED

LEGOLAND® DISCOVERY CENTRE

VISIT GUIDE: GRADE 4-5

Welcome to LEGOLAND® Discovery Centre

LEGOLAND® Discovery Centre
connects learning and fun together like LEGO® bricks!

Our self-guided homeschool visits allow students to **explore, discover**, **and create** in an engaging environment filled with hands-on activities. The guide is designed to add fun, focused, and interactive learning during your visit.

This guide includes **curriculum-based challenges and activities** covering Mathematics, English, History, and Science for 3 attractions! Including:

MINILAND
Marvel at LEGO landmarks while telling your own story.

LEGO® Kingdom Quest
Think like a scientist on a data investigation!

LEGO® Racers Build & Test
Design and test your way to the finish line!

The attractions can be visited in any order.

TEACHER GUIDE: GRADES 4-5

LEGO® MINILAND

MINILAND is a miniature replica featuring the city's most loved buildings and landmarks.
Fun Facts: All of the MINILAND models took a total of 5000 hours to design and build.
MINILAND is made up of over 1.5 Million LEGO® Bricks. There are over 500 Minifigures!

Challenge

Use MINILAND as inspiration to build and retell a story about an experience you've had in your own city using LEGO Bricks as you tool.

Setting the Scene: As you explore MINILAND, ask your student some of the following questions:

- What buildings do you see in MINILAND?
- How many places have you visited?
- What did you do there?
- Who were you with?
- Did you enjoy it?
- Do you have any stories to share?

Post Challenge

Building the Story: Students are asked to write down observations, collect data, and identify connections to community. Afterwards they are tasked to solve a design challenge and sketch it. Then students are tasked with retelling a personal story, sequencing events and drawing them. Before lastly, writing a paragraph communicating ideas, iterations and evaluation about an experience they had in their own city.

TEACHER GUIDE: GRADES 4-5

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Ontario Curriculum Alignment (Grades 4-5)

Activity Component	What Students Do	Ontario Curriculum Expectation (Grades 4–5)	Alignment Details
Exploration & Observation	Students explore MINILAND, identify buildings, and record observations.	**Grade 4/5 Science & Technology – Understanding Structures and Mechanisms A1.1, A1.2** – Ask questions, plan investigations, and collect data.	Students act like scientists, observing built environments and identifying key features.
Connect to Community	Students reflect on places they've visited, their uses, and their importance to the community.	**Social Studies: People and Environments (Grade 4–5) B2.2, B3.2** – Explain how communities meet needs through structures and systems.	Students link landmarks to culture, history, and how communities function.
Build LEGO Models of Landmarks/Experiences	Students design LEGO models to represent real-world places and personal experiences.	**Science & Technology A2.2** – Use models to test, explore, and explain ideas. **The Arts (Visual Arts D1.1)** – Create art to communicate experiences.	LEGO builds become models that represent real-world and community connections.
Define & Solve Problems (Design Challenge)	Students analyze how landmarks serve communities, sketch ideas, and propose improvements.	**Science & Technology A2.1, A2.4** – Define design problems with criteria/constraints; build/test solutions.	Students apply the **engineering design process** to city planning challenges.
Storytelling & Sequencing	Students retell a personal story about their city, sequencing events with drawings.	**Language – Writing (W1.1, W2.1)** – Generate ideas, plan, and organize writing in logical order.	Writing/storytelling integrates literacy with science and design.
Communicate Information	Students write a paragraph explaining their design, story, and evaluation.	**Language – Writing (W2.3, W4.1)** – Use evidence to support ideas; revise and communicate clearly.	Students use evidence and explanation to share ideas clearly in writing.
Science, Engineering, & Society	Students consider how infrastructure and landmarks support people and protect resources.	**Grade 5 Science – Earth & Space Systems (E2.2, E2.3)** – Identify human uses of resources and evaluate impacts on sustainability.	Students connect science, society, and environment by reflecting on community systems.

Student Name: _____

MINILAND: My Favorite Memory

Part 1 – Observations

As you explore MINILAND, record your observations below.

Landmark/Building	What is it used for?	Have you visited a place like this in your city? (Yes/No)	Notes

Reflection Question: Which building is your favorite and why?

_____

_____

Student Name: _____

MINILAND: My Favorite Memory

Part 2 – Design Challenge

Every building or landmark solves a problem. Pick one and think about how you might improve it.

Landmark	**Problem it Solves:** (e.g., crossing river, government building)	1 Idea to Improve It

Sketch of My Idea

Bonus Question: How would you change or help the community or environment?

_____

_____

Student Name: _____

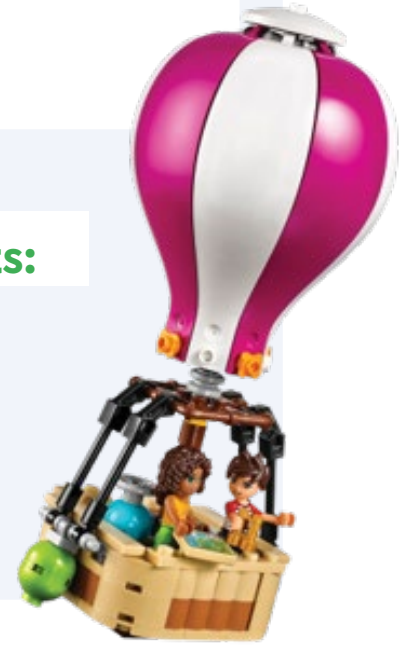
MINILAND: My Favorite Memory

Part 3 – My City Storyboard

Think of a story about an experience you've had in your own city. Use the boxes to sketch and label each part. (Beginning, Middle, Middle, Ending) Then head over to any build zone and recreate your scene using LEGO® bricks.

Writing Prompts:

- Who was there?
- What happened?
- Why was it special?



Student Name: _____

MINILAND: My Favorite Memory

Part 4 – Reflection & Sharing

Write about your LEGO® model and your experience.

Questions to Address: What did you build? What details did you include and why? How does your LEGO model connect to your city? If you rebuilt it, what would you do differently? Share your model with someone and write one nice thing they noticed about your work.

TEACHER GUIDE: GRADES 4-5

LEGO® Kingdom Quest

Kingdom Quest is a ride in which riders board carriages and are transported through a series of interactive screens. Each person in the carriage is provided with a "blunderbuss" and compete to save the princess and get the highest score!

Challenge

Students are instructed via voiceovers to zap the bad guys with the blunderbuss – this is done by pointing and shooting. A score appears on a screen in front of each students which tallies their success in zapping the bad guys. To gather the appropriate amount of data, enjoy the ride up to 4 times! Adults are encouraged to ride also; this way students have more data to utilize.

Ride 1: Choose any seat and sit on the right side.
Ride 2: Choose the same seat but sit on the left side.
Ride 3: Choose a seat in a different row, sit on the right side.
Rode 4: Choose the same row but sit on the left side.

- At the conclusion of each ride, students must remember their score.
- Students can also ask other riders what their scores were.
- After exiting the ride each time, students must write down their score and those of others.

Post Challenge

Students are encouraged to think about the different ways they can represent this data and are to explore how the same data can be represented in different ways. They are challenged to represent the data in a grid form. They can also reflect on whether Kingdom Quest was fair.

Ontario Aligned Learning Objectives

The Kingdom Quest Ride Fairness Activity directly supports Ontario's Science & Technology, Mathematics, and Language expectations for Grades 4–5. Students engage in the engineering design process by conducting fair tests, changing one variable at a time, and recording results. They apply data management skills from mathematics by tallying, graphing, and analyzing patterns, while also developing scientific reasoning by evaluating whether the ride is fair. This activity integrates science concepts (energy transfer and systems), math applications (data representation and pattern recognition), and communication skills (argument from evidence, discussion, and reflection). It provides a rich STEM + literacy experience where students act as scientists and engineers while also practicing critical thinking and collaboration.

TEACHER GUIDE: GRADES 4-5

LEGO® Kingdom Quest

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Ontario Curriculum Alignment (Grades 4-5)

Activity Component	What Students Do	Ontario Curriculum Expectations (Grades 4–5)	Alignment Details
Engineering Design / Fair Tests	Students ride multiple times, changing one variable (seat, side, row) at a time to compare results.	**Science & Technology – A2.1, A2.4** – Define problems with criteria/constraints; test designs and control variables in investigations.	Students practice the **engineering design cycle** by isolating and testing variables.
Observation & Data Collection	Students record their own and peers' scores after each ride.	**Science & Technology – A1.1, A1.2** – Ask questions, plan investigations, collect/record data systematically.	Builds habits of accurate observation and data gathering.
Data Representation	Students organize scores into grids/tables and compare across rides.	**Mathematics – Data (Grade 4–5 D1.1, D1.2, D1.3)** – Collect, organize, represent data in charts, tables, graphs.	Links math and science through **data organization and representation**.
Pattern Recognition	Students analyze whether seat/row/side affects score patterns or outliers.	**Mathematics – Data (Grade 5 D1.4, D1.5)** – Analyze data sets, describe trends, outliers, and draw conclusions.	Students apply **critical analysis** to find correlations in experimental results.
Applying Scientific Ideas to Devices	Students connect ride mechanics (energy transfer, light sensors) to scoring outcomes.	**Grade 4 Science – Understanding Matter & Energy (E2.1, E2.2)** – Apply scientific ideas about energy transfer in devices and systems.	Students recognize how **energy and mechanics** drive the ride's scoring system.
Argument from Evidence	Students debate whether the game is "fair," using their data as evidence.	**Science & Technology – A1.5** – Use evidence and scientific reasoning to support conclusions.	Encourages **reasoned argument and evidence-based communication**.
Multiple Representations of Data	Students explore tally charts, grids, graphs to represent ride results in different ways.	**Mathematics – D1.2, D1.3** – Represent data in multiple ways; interpret and compare data sets.	Builds **numeracy and visualization skills**.
Collaboration & Communication	Students share and compare scores with peers to broaden the dataset.	**Language – Oral Communication (Grade 4–5 O1.2, O1.3)** – Ask questions and communicate findings clearly in discussions.	Strengthens **peer collaboration** and scientific discourse.

Student Name: _____

Data Investigation: Is the Game/Ride Fair?

Part 1 – Planning Our Investigation

Our Question: Is the game/ride fair for all players, no matter where they sit or how many times they play?

Prediction (Hypothesis):

_____

_____

Variables:

- What we will change (Independent Variable):

_____

- What we will measure (Dependent Variable):

_____

- What we will keep the same (Controlled Variable):

_____

Part 2 – Collecting Our Data

Player Name	Seat/Row	Try #	Score	Notes (anything unusual?)

Student Name: _____

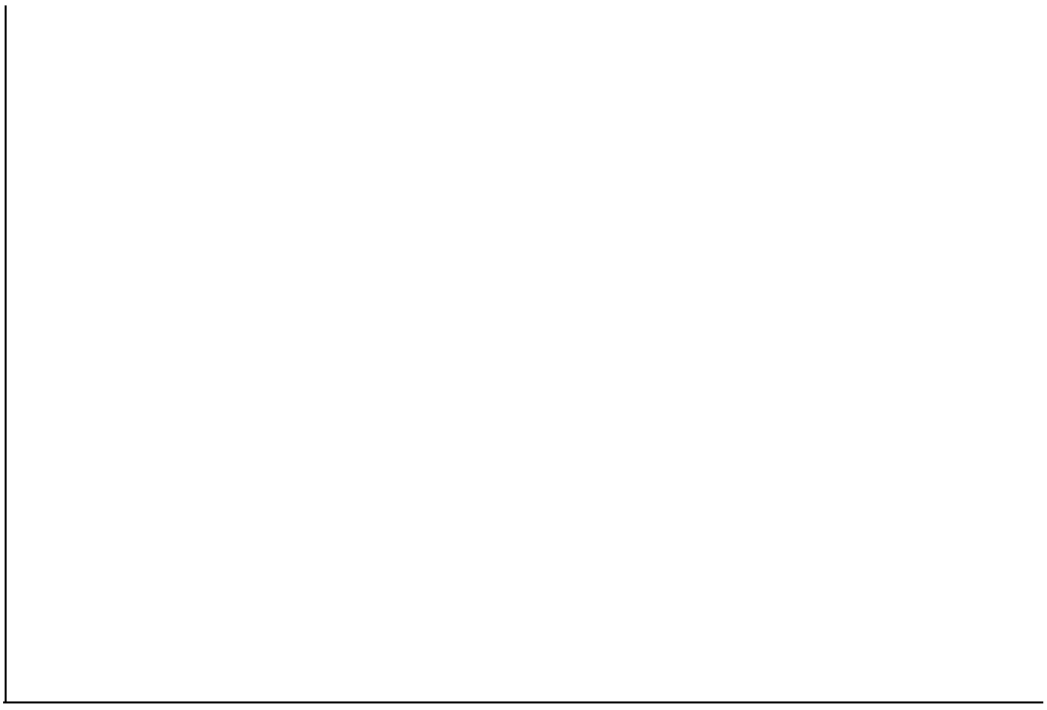
Data Investigation: Is the Game/Ride Fair?

Part 3 – Analyzing the Data

Step1- Organize your data: Make a graph (bar, line, or dot plot) to show scores for different seats/rows. Color code if you want to show first rides vs repeat rides.

Step 2- Look for patterns:

- Do some seats have higher scores?
- Do scores improve with more tries?
- Any unusual results (outliers)?



Student Name: _____

Data Investigation: Is the Game/Ride Fair?

Part 4 – Drawing Conclusions

1. Was the game/ride fair? Why or why not?

_____

_____

2. What could make it more fair?

_____

_____

3. If you did the investigation again, what would you change?

_____

_____

Part 5 – Reflection & NGSS Connections

- Analyzing Data: How did our graph help us see patterns?
- Planning Investigations: How did we keep the test fair?
- Arguing from Evidence: What evidence supports your conclusion?

Final Statement: I think the game/ride IS or IS NOT fair because…

_____

_____

TEACHER GUIDE: GRADES 4-5

LEGO® Build & Test

In the Build and Test area, students will find brick pits featuring car pieces including wheels, body pieces, and axels. They can then use two different ramps to test the durability and speed of their cars.

Challenge

Students must build cars and race them against other students' builds. Students need to observe which cars win the race and critically consider what design features are more prominent in the winning cars. They are then asked to tick which features listed on their worksheet help the cars go faster.

Post Challenge

Students are challenged to review the data from build and test and determine the design features needed for a fast car. They are asked to list the top 5 features. They are then tasked with creating a visual design of the car featuring the five most important design elements.

Ontario Aligned Learning Objectives

In this LEGO Race Car Engineering Design Activity, students act as engineers and scientists, designing, testing, and refining vehicles to maximize performance. The activity emphasizes controlled experimentation, where students isolate variables, collect and represent data, and identify patterns that influence speed and efficiency. Students evaluate materials and design choices, reflect on fairness, and use evidence to select the top design features. The activity integrates Science & Technology expectations (forces, materials, and engineering design), Mathematics (data collection, representation, and analysis), and Critical Thinking (evaluation, reflection, and communication of findings). By completing this project, students develop problem-solving skills, apply the engineering design cycle, and connect scientific concepts to real-world applications.

TEACHER GUIDE: GRADES 4-5

LEGO® Build & Test

In the Build and Test area, students will find brick pits featuring car pieces including wheels, body pieces, and axels. They can then use two different ramps to test the durability and speed of their cars.

Ontario Curriculum Alignment (Grades 4-5)

Activity Component	What Students Do	Ontario Curriculum Expectations (Grades 4–5)	Alignment Details
Science & Engineering Practices (SEPs)	Students collect and interpret data from multiple race trials, communicate solutions, and argue evidence-based conclusions.	**A1.1, A1.2, A1.5 (Science & Technology)** – Plan investigations, record observations, interpret data, and use reasoning.	Students apply the SEPs by analyzing race performance, drawing conclusions, and defending claims.
Forces & Materials	Observe which car features affect speed, measure and compare performance, and evaluate materials used.	**Grade 4–5 Science – Properties of Materials & Energy Concepts** – Investigate how forces and materials affect performance.	Students connect **speed, motion, and material properties** to real-world engineering outcomes.
Engineering Design Cycle	Define design problems, identify criteria and constraints, test materials and techniques, and refine solutions.	**A2.1, A2.2, A2.4 (Science & Technology)** – Use the engineering design process to plan, create, test, and improve solutions.	Students engage in **iterative design thinking**, experimenting with features to optimize car performance.
Fair Testing Practices	Build cars, race against peers, change one design variable at a time, and analyze fairness of results.	**A2.4 (Science & Technology)** – Conduct fair tests, controlling variables and evaluating outcomes.	Students apply **controlled experiments** to determine the impact of design choices.
Data Collection & Representation	Record race results, tally wins, and represent data in charts, tables, or grids.	**Mathematics – Data (D1.1, D1.2, D1.3)** – Collect, organize, represent, and interpret data.	Students integrate **math skills** to analyze and visualize performance patterns.
Critical Analysis & Reflection	Identify top 5 features contributing to speed and create a visual design including these features.	**A1.5 & A2.2 (Science & Technology)** – Use evidence to support decisions and communicate solutions.	Students apply **reasoning and evidence-based reflection** to improve design solutions.

STUDENT WORKSHEET

LEGO® Build & Test

Student Name: _____

Car Building & Racing Investigation

You will build and race cars to find out which design features make a car go faster. After each race, record your results and look for patterns. Use your data to design a new car with the best features!

Part 1 – Challenge

Build LEGO® cars and then race them on the ramp. Try and make sure everyone is building different types of cars so you can test which cars are the fastest. Take note of the fastest times: **READY, SET GO!**

Times

1. _____ 3. _____

2. _____ 4. _____

Part 2 – Race Results

Record results below. Tick the features each car had and write the race outcome.

Car #	Wheels (Big/Small)	Weight (Light/Heavy)	Body (Wide/Narrow)	Other Features	Race Result (Win/Lose)
Car 1					
Car 2					
Car 3					
Car 4					

Car Building & Racing Investigation

Part 3 – Evaluation

Tick which design features make a car go faster.

- ☐ Big wheels
- ☐ Small wheels
- ☐ Long body
- ☐ Short body
- ☐ Low body
- ☐ Tall body
- ☐ Wide body
- ☐ Thin body
- ☐ Dark colored bricks
- ☐ Light colored bricks
- ☐ Windshield
- ☐ No windshield
- ☐ Heavy car
- ☐ Light car

Review the data from your test and write down the top 5 things needed for a fast car.

1. _____
2. _____
3. _____
4. _____
5. _____

Car Building & Racing Investigation

Part 6 – Design Your Car

Draw and label your car design below, showing the 5 features you chose.