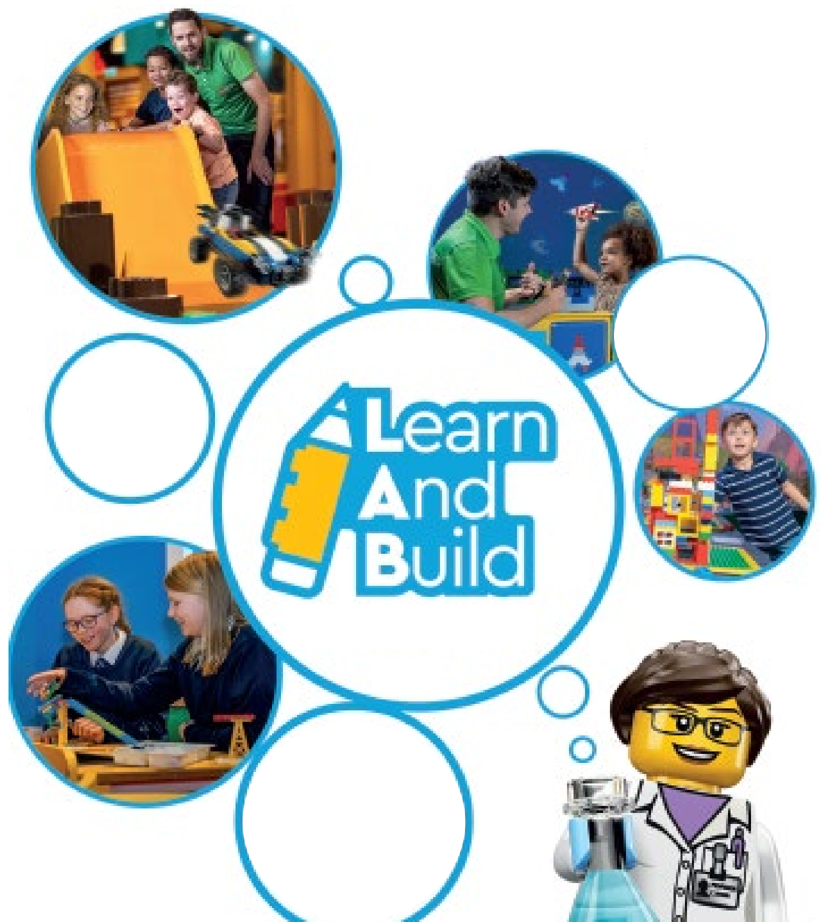
Homeschool Self-Guided Education Packet



TEACHER GUIDE

LEGO DISCOVERY CENTER

GRADES 4 - 5

STUDENT SHEETS INCLUDED

VISIT GUIDE: GRADE 4-5

Welcome to LEGO® Discovery Center

LEGO® Discovery Center
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

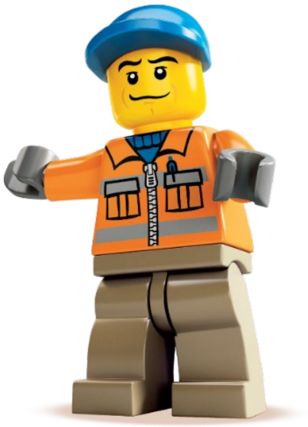
Use MINILAND as inspiration to build and retell a story about an experience you've had in your own city using LEGO Bricks as you tool.

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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MA STE Framework Alignment

Activity Component	What Students Do	MA STE Standards (Grades 4–5)	Alignment Details
Exploration & Observation	Students explore MINILAND, identify buildings, and record observations.	**SEP 1: Asking Questions & Defining Problems SEP 3: Planning & Carrying Out Investigations**	Students act as scientists, observing and documenting landmarks, asking questions, and gathering data.
Connect to Community	Students reflect on visited places, experiences, and community needs.	**5-ESS3-1** – Construct explanations about human use of resources and community planning.	Students relate structures and landmarks to societal functions and infrastructure.
Build LEGO Models of Landmarks/Experience s	Students design LEGO models to represent real-world places and experiences.	**3-5-ETS1-2** – Develop and use models to explain phenomena or design solutions.	LEGO builds act as models communicating personal experiences and community structures.
Define & Solve Problems (Design Challenge)	Students analyze how landmarks serve communities, sketch, and improve ideas.	**3-5-ETS1-1 / 4-ETS1-1** – Define design problems, plan solutions, and evaluate alternatives.	Students engage in engineering design, applying criteria and constraints to solve real-world problems.
Storytelling & Sequencing	Students retell personal stories about their city, sequencing events with drawings.	**MA ELA Integration** – Organize and sequence ideas in written communication.	Writing integrates literacy with science and engineering practices, demonstrating reasoning and reflection.
Communicate Information	Students write a paragraph explaining their design, story, and evaluation.	**SEP 8: Obtaining, Evaluating, and Communicating Information**	Students clearly communicate evidence-based explanations for their design and storytelling choices.
Science, Engineering, and Society	Students consider how infrastructure and landmarks support people and resources.	**5-ESS3-1** – Examine human use of natural resources and the role of engineering in communities.	Students connect human-built systems to sustainability, society, and engineering solutions.

STUDENT WORKSHEET

LEGO® MINILAND

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?

____

____

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
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Sketch of My Idea

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

____

____

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?

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.

Massachusetts STE Learning Objectives

The Kingdom Quest Ride Data Activity allows students to engage in Massachusetts STE standards for grades 4–5 through hands-on, inquiry-based experimentation. Students plan and conduct fair tests, systematically varying seat, row, and side to determine the effect on scores. They collect and organize data, represent it in grids or charts, and analyze trends to identify patterns and outliers. By using math and computational thinking, students calculate averages and compare performance, while engaging in argument from evidence to evaluate whether the game was fair. Finally, students connect energy and motion concepts to real-world actions, linking positioning and aiming to results, integrating scientific reasoning with engineering and problem-solving practices.

TEACHER GUIDE: GRADES 4-5

LEGO® Kingdom Quest

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MA STE Framework Alignment

Activity Component	What Students Do	MA STE Standards (Grades 4–5)	Alignment Details
Fair Testing Practices	Students ride 4 times, changing one variable at a time (seat, row, side) and compare results.	**3-5-ETS1-3** – Plan and carry out fair tests in which variables are controlled and failure points are considered.	Students isolate variables, observe outcomes, and evaluate fairness of results.
Data Collection & Collaboration	Students record their own scores and gather peer scores.	**Science & Engineering Practices (SEP 4: Analyzing & Interpreting Data)**	Students collect, organize, and share data to improve reliability and coverage.
Data Representation	Students organize data in grids, tables, or charts to look for trends or patterns.	**5-ESS1-2** – Represent data in tables, graphs, and charts to identify patterns.	Students visualize results in multiple formats to recognize trends and outliers.
Mathematical & Computational Thinking	Students tally, average, and compare scores across rides and riders.	**Science & Engineering Practices (SEP 5: Using Mathematics & Computational Thinking)**	Students apply calculations and quantitative reasoning to analyze performance differences.
Argument from Evidence	Students reflect on whether the ride/game was fair based on collected data.	**Science & Engineering Practices (SEP 7: Engaging in Argument from Evidence)**	Students make claims and support them using evidence from repeated trials.
Energy & Motion Connection	Students consider how positioning and aiming affects outcomes (score).	**4-PS3-4** – Apply scientific ideas to test and refine a device that converts energy from one form to another.	Students link input actions (aiming, energy) to measurable outcomes (score), demonstrating energy transfer.

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):

____

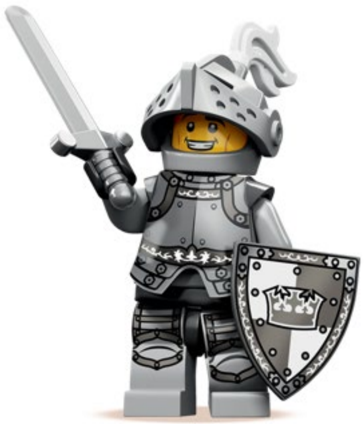
Part 2 – Collecting Our Data

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)?

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

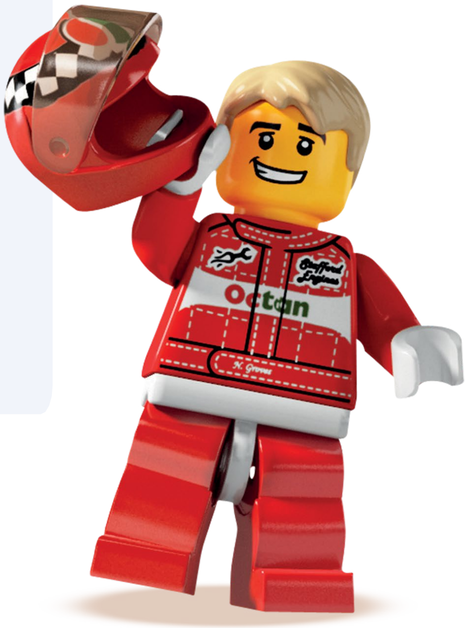
Students must build cars and race them against other students' builds. Students need to observe which cars win the race and critically consider what design features are more prominent in the winning cars. They are then asked to tick which features listed on their worksheet help the cars go faster.

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.

Massachusetts STE Learning Objectives

In this LEGO Race Car Activity, students apply Massachusetts STE standards by designing, building, and testing race cars to explore how design, materials, and forces affect performance. Students plan and conduct fair tests, changing one variable at a time, and collect data to determine which features lead to success. Using evidence from testing, students analyze patterns, identify the top 5 design features, and communicate their findings visually and in writing. The activity integrates engineering design, forces and materials, fair testing, data analysis, and argument from evidence, promoting critical thinking, problem-solving, and effective communication consistent with MA STE standards for grades 4–5.



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.

MA STE Framework Alignment

Activity Component	What Students Do	MA STE Standards (Grades 4–5)	Alignment Details
Engineering Design Cycle	Students define a problem, design race cars, test solutions, and optimize designs.	**3-5-ETS1-1, 3-5-ETS1-2** – Define problems, plan and test solutions, generate multiple solutions.	Students engage in full engineering design practices, applying iterative thinking to improve cars.
Fair Testing Practices	Students race cars while changing one variable at a time (e.g., shape, material, wheel type).	**3-5-ETS1-3** – Plan and carry out fair tests controlling variables and considering failure points.	Students isolate and test individual variables to identify their effect on car performance.
Data Collection & Analysis	Students record race outcomes, compare features of winning cars, and identify patterns.	**Science & Engineering Practices (Analyzing & Interpreting Data)**	Students collect quantitative data, organize it, and recognize trends in performance.
Forces & Materials	Students observe how car materials, weight, and design features affect speed and motion.	**4-PS3-1, 5-PS1-3** – Apply scientific ideas to understand energy transfer, force, and material properties.	Students connect concepts of motion, energy, and material properties to real-world design outcomes.
Argument from Evidence	Students justify why certain design features improve performance and choose top 5 features.	**Science & Engineering Practices (Engaging in Argument from Evidence)**	Students use evidence from testing to make claims and support design decisions.
Communication & Representation	Students create a visual design illustrating the top 5 features and explain their design decisions.	**Science & Engineering Practices (Obtaining, Evaluating, Communicating Information)**	Students communicate findings visually and verbally, supporting ideas with data and reasoning.

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.

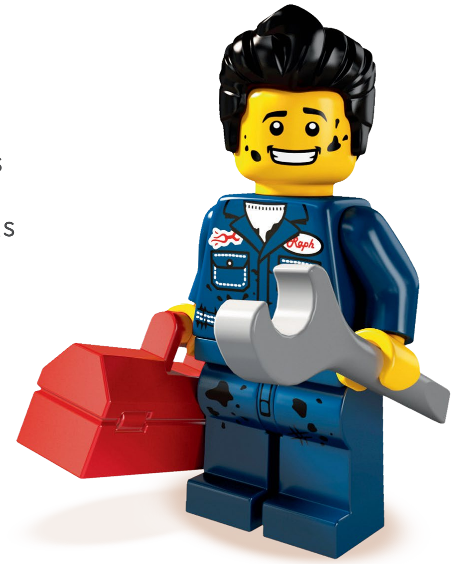
Car #	Wheels (Big/Small)	Weight (Light/Heavy)	Body (Wide/Narrow)	Other Features	Race Result (Win/Lose)
Car 1					
Car 2					
Car 3					
Car 4					

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. ____

Student Name: ______________________

Car Building & Racing Investigation

Part 6 – Design Your Car

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