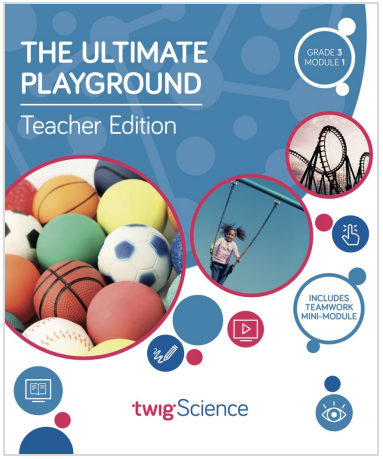
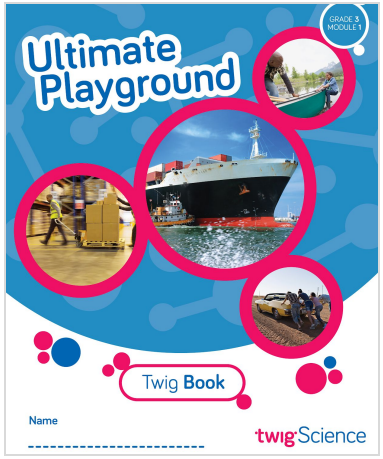
twig Science

3.1 The Ultimate Playground

Assessment Overview





In this module, students design their Ultimate Playground to investigate the Module Phenomenon: How are objects affected by the forces of push and pull?

Students begin by studying forces and changes in motion as cause and effect. They focus on roller coaster (gravity-based) rides and kicking a ball as the first elements of their Ultimate Playground.

Students are then introduced to balanced and unbalanced forces, demonstrated by tug-of-war. They use this concept to further design and test their Ultimate Playground. Students study swings and create models to understand their importance in the design process. Teams build models of both one-rope and two-rope swings, look for patterns, and decide which type of swing to include in their Ultimate Playground.

Students are introduced to an industrial application of magnets—maglev trains—and go on to design a tabletop game that uses magnets. They also design a model for a Dragon Ride, the centerpiece of the Ultimate Playground.

Students are assessed on their ability to answer questions about cause-and-effect relationships between magnets and other objects. They develop their own questions about how the cleanup method might work outside a laboratory environment.

Pre-Explorations (Diagnostic Pre-Assessment)

Key: Driving Question (DQ) Lesson (L) Teacher Edition (TE) Twig Book (TB)

Reference	Assessment Tool	Description	Type	Misconceptions identified
DQ1L1 TE Reflect p. 60	Motion Progress Tracker	Students read four statements about forces and state if they think they are true or false.	Constructed response *Written (TB p. 16)*	• An object is either moving or not moving; a moving object does not change its motion (change its speed or direction of movement). • An object sits still or comes to a stop because of a lack of forces to make it move or keep it moving. • Moving objects, or parts of them (e.g., wheels), have the ability to move by themselves (e.g., wheels "have" force). • Things fall because there is nothing holding them up or there are no forces involved.
DQ2L1 TE Reflect p. 119	Forces Progress Tracker	Students observe two images and identify the forces acting on objects, then state whether they are balanced or unbalanced.	Constructed response *Written (TB p. 39)*	• If an object is at rest, no forces are acting upon it. • The force of gravity acts on an object only when it is falling. • Only animate objects can exert a force. • Sustaining motion requires a continued force.
DQ3L1 TE Reflect p. 163	Swings Progress Tracker	Students observe an image of a swing, draw an arrow to predict its motion, and provide reasoning.	Constructed response *Drawn and written answer to one question (TB p. 51)*	• We cannot predict the motions of an object. • The patterns of motion of an object are always the same; they do not rely on outside forces.
DQ4L1 TE Reflect p. 207	Magnets Progress Tracker	Students read four statements about magnetic forces and state if they think they are true or false.	Constructed response *Written (TB p. 69)*	• Static electricity is not a force that can make things move. • Magnetism is not a force that can make things move. • All silver-colored items are attracted to magnets. • Magnets only pull (attraction). They never push (repulsion).

Formative Assessment (Informal Assessment)

Key: Driving Question (DQ) Lesson (L) Teacher Edition (TE) Twig Book (TB)

Page	Assessment Tool	Description	Type	What's being assessed?
DQ1L4 TE Reflect p. 85	Motion Progress Tracker	Students watch videos about forces, and make two models with arrows that show the forces causing motion.	Constructed response *Drawn (TB pp. 22–23) and written answer to one prompt (TB p. 24)*	Student ability to use a variety of methods to observe the causes of objects' motions (SEP-2, PS2.A, PS2.B, CCC-2).
DQ1L6 TE Report p. 97	Motion Progress Tracker	Students plan and conduct an investigation to observe how strong a push or pull is, and determine the effects of the strength of the force.	Constructed response *Filling in a chart (TB p. 28)*	Student ability to investigate the effects of varying the strength and direction of force applied to a playground ball (SEP-2, SEP-3, PS2.A, CCC-2).
DQ1L7 TE Reflect p. 108	Motion Progress Tracker	Students add arrows to a diagram and answer questions about the forces acting on a football.	Constructed response *Drawn and written (TB p. 34)*	Student ability to apply the concept of forces as pushes and pulls, with strength and direction of motion, and recognize the presence of gravity as a downward pull (PS2.B, CCC-2).
DQ2L2 TE Reflect p. 129	Twig Book	Students look at a picture of a tug-of-war and predict what will happen if each player pulls at the same time with the same amount of force.	Constructed response *Written and drawn (TB p. 41)*	Student understanding that, if there are unbalanced forces, the rope will go in the same direction as the largest force, and that if there are balanced forces, the rope will not move.
DQ2L4 TE Reflect p. 145	Forces Progress Tracker	Students use an interactive to explore balanced and unbalanced forces, and then make a sketch (with labels and arrows) of a ride and explain the effect that	Constructed response *Drawn and written (TB p. 46)*	Student ability to use a variety of models to investigate the effects of balanced and unbalanced forces on the motion of objects (SEP-2, PS2.2, PS2.B, CCC-2). Student ability to identify the force of gravity acting on an object at rest and in motion

		balanced and unbalanced forces had on the ride's motion.		(PS2.A, PS2.B, CCC-2).
DQ3L2 TE Reflect p. 174	Twig Book	Students complete the 3-2-1 chart.	Constructed response *Written (TB p. 54)*	Student ability to build on others' ideas and express their own clearly.
DQ3L3 TE Investigate p. 174	Swings Progress Tracker	Students make a model of a swing and investigate the patterns of its movement.	Constructed response *Written (TB pp. 56–57)*	Student ability to recognize patterns in the motion of swings (PS2.A, CCC-1).
DQ3L5 TE Reflect p. 188	Swings Progress Tracker	Students make a model and investigate the swing patterns of a one-rope swing, then look at a picture of a swing and write what they need to know to predict its motion.	Constructed response *Written (TB pp. 61–64)*	Student ability to investigate and make observations to use in predicting the future motion of a swing (SEP-3, PS2.A, CCC-1).
DQ4L2 TE Reflect p. 215	Magnets Progress Tracker	Students write an exit slip with either a question they want to investigate about magnets, or a prediction of what they will observe in the magnetism investigation.	Constructed response	Student ability to ask questions about static and magnetic interactions observed between objects not in contact with each other (3-PS2-3, SEP-1, PS2.B).
DQ4L3 TE Reflect p. 221	Magnets Progress Tracker	Students test materials to answer their questions about magnetism	Constructed response *(TB pp. 70, 72)*	Student ability to investigate cause-and-effect relationships between magnets held at different distances from and in different relative orientations to each other (SEP-3, PS2.B, CCC-2).
DQ4L4 TE Reflect	Magnets Progress Tracker	Students write about how a magnet can push or pull another	Constructed response	Student ability to investigate cause-and-effect relationships between

p. 229		magnet without touching it, and then design a game that uses magnets.	*Written and drawn (TB p. 76)*	magnets held at different distances from and in different relative orientations to each other (SEP-3, PS2.B, CCC-2).
DQ5L3 TE Reflect p. 254	Twig Book	Students reflect on whether their games meet the criteria, and write and draw improvements.	Self-assessment *Written and drawn (TB p. 83)*	Student ability to identify any failure points in their designs and prototypes.
DQ5L5 TE Reflect p. 267	Twig Book	Students reflect on what they've learned and use it in their designs.	Self-reflect *Written (TB p. 88)*	Student ability to describe how they will choose ideas from their research to help them design their Dragon Rides.

English Language Proficiency Assessment

Key: Driving Question (DQ) Lesson (L) Teacher Edition (TE) Twig Book (TB)

Page	Description	Type	Standards
DQ1L7 Investigate TE p. 107	Students look at photos in a text and write a brief description of what it shows.	Written constructed response	Writing Domain
DQ1L7 Investigate TE p. 107	Students read aloud the first three paragraphs of a text, and then answer three questions.	Oral response	Reading Domain
DQ1L7 Investigate TE p. 107	Teacher records students' use of academic vocabulary and connecting words when answering the two questions in the Listening Domain task.	Oral response	Speaking Domain
DQ1L7 Investigate TE p. 107	Students answer two questions about a text.	Oral response	Listening Domain
Leveled Reader Lesson, Chapter 3, Second Read TE p. 313	Students look at an illustration and write a brief description of what is happening.	Written constructed response	Writing Domain
Leveled Reader Lesson, Chapter 3, Second Read TE p. 313	Students read aloud three sentences, and then match each to the correct photo or part of a photo.	Oral response	Reading Domain
Leveled Reader Lesson, Chapter 3, Second Read TE p. 313	Students listen to some text and then answer four questions.	Oral response	Listening Domain
Leveled Reader Lesson, Chapter 3, Second Read TE p. 313	Teacher records students' use of academic vocabulary and ability to summarize the key details when answering the four questions in the Listening Domain task.	Oral response	Speaking Domain

Summative Assessment

Performance Tasks

Key: Driving Question (DQ) Lesson (L) Teacher Edition (TE) Twig Book (TB)

Page	Assessment Tool	Description	Type	What's being assessed?
DQ2L5 TE pp. 146–150	Balanced and Unbalanced Forces Writing Rubric	Students write about and draw one of the Ultimate Playground rides or games, focusing on the balanced and unbalanced forces that make the ride or game work.	Constructed response *Written and drawn (TB pp. 47–48)*	3-PS2-1, PS2.A, SEP-8, CCC-2
DQ3L6 TE pp. 190–194	Swings Opinion Writing Rubric	Students write their opinions about the kind of swing that would be more exciting for their Ultimate Playground.	Constructed response *Written (TB p.66)*	3-PS2-2, PS2.A, SEP-7, SEP-8, CCC-2
DQ5L5 TE pp. 262–267	Dragon Ride Project Rubric	Students research and generate ideas for possible solutions to the design problem: How can we use magnets to make a surprising and exciting main attraction for the Ultimate Playground?	Performance Task and constructed response *Written (TB pp. 87–88)*	3–5-ETS1-2, ETS1.B, SEP-6
DQ5L6 TE pp. 268–275	Dragon Ride Project Rubric	Students use the Criteria for All Rides to help them write three specific criteria for their Dragon Ride, and then draw and design their final rides.	Performance Task and constructed response *Written (TB pp. 89–90)*	3-PS2-4, PS2.B, SEP-1
DQ5L7 TE pp. 276–281	Dragon Ride Project Rubric	Students build their final Dragon Rides.	Performance Task	3-PS2-4, 3–5-ETS1-2, SEP-1, SEP 6, PS2.B, ETS1.B

Summative Assessment

Benchmark Assessment and 3-D Multiple Choice

Key: Driving Question (DQ) Lesson (L) Teacher Edition (TE) Twig Book (TB)

Page	Assessment Tool	Description	Type	Standards
DQ5, Benchmark Assessment TE pp. 288–292	What Are Magnetic Forces? Rubric	Students watch a video about cleaning up oil spills and answer questions about cause-and-effect relationships between magnets and other objects. They develop their own questions about how the cleanup method might work outside a laboratory environment.	Written constructed response	3-PS2-3, 3-PS2-4, PS2.B, SEP-1, CCC-2
Multiple Choice Assessment, Part A (online only)	Assessment Answer Key	Students read through a series of statements about forces, and decide which statements are true and which are false.	Multiple choice	PS2.A, PS2.B
Multiple Choice Assessment, Part B (online only)	Assessment Answer Key	Students answer a series of questions about different types of forces and their effects.	Multiple choice	SEP-2, SEP-3, SEP-6, SEP-7, SEP-8
Multiple Choice Assessment, Part C (online only)	Assessment Answer Key	Advanced students answer a series of open-ended questions about magnetic force.	Written constructed response	ETS1.C, SEP-2