

Motion and Design: Goals and Assessment Strategies

Concepts	
Goals	Assessment Strategies
<p>A force is any push or pull on an object. An unbalanced force is needed to make a resting object move, to bring a moving object to rest, or to change the direction of a moving object. Lessons 1, 3–8, 10–12, 14–17</p>	<p>Lessons 1, 5, 9, 12, 14, 16–17, and Additional Assessments 1–2</p> <ul style="list-style-type: none"> ▪ Pre- and post-unit assessments ▪ Class discussions ▪ Student investigations ▪ Record sheets ▪ Oral presentations ▪ Student self-assessments
<p>A force can change the speed of an object. Greater forces can change the speed of an object faster than smaller forces. Lessons 1, 3, 5, 7, 12, 14–17</p>	<p>Lessons 1, 5, 9, 12, 14, 16–17, and Additional Assessments 1–2</p> <ul style="list-style-type: none"> ▪ Pre- and post-unit assessments ▪ Class discussions and lists ▪ Student investigations ▪ Record sheets ▪ Oral presentations ▪ Teacher observations ▪ Student self-assessments
<p>Friction is a force that occurs when two surfaces rub together. Friction opposes motion. Lessons 3, 7–10, 12, 14–16</p>	<p>Lessons 1, 9, 12, 14, 16–17, and Additional Assessments 1–3</p> <ul style="list-style-type: none"> ▪ Pre- and post-unit assessments ▪ Class discussions and lists ▪ Student investigations ▪ Record sheets ▪ Oral presentations ▪ Teacher observations ▪ Building vehicles ▪ Student self-assessments
<p>If the same force is applied to a lighter vehicle and a heavier vehicle, the speed of the lighter vehicle will change more than the speed of the heavier vehicle. Lessons 4–5, 10, 12, 14–16</p>	<p>Lessons 5, 9, 14, 16, and Additional Assessments 1–2</p> <ul style="list-style-type: none"> ▪ Class discussions and lists ▪ Student investigations ▪ Record sheets ▪ Oral presentations ▪ Teacher observations ▪ Student self-assessments
<p>Energy can be stored in a rubber band and released to turn an axle or spin a propeller to make a vehicle move. Lessons 6–16</p>	<p>Lessons 9, 12, 14, 16, and Additional Assessments 1–2</p> <ul style="list-style-type: none"> ▪ Post-unit assessments ▪ Class discussions and lists ▪ Student investigations ▪ Record sheets ▪ Oral presentations ▪ Teacher observations ▪ Building vehicles ▪ Student self-assessments
<p>A spinning propeller exerts a force that pushes air back and moves a vehicle forward. Lessons 11–16</p>	<p>Lessons 12, 14, 16, and Additional Assessments 1–3</p> <ul style="list-style-type: none"> ▪ Post-unit assessments ▪ Class discussions and lists ▪ Student investigations ▪ Record sheets ▪ Oral presentations ▪ Teacher observations ▪ Building vehicles ▪ Student self-assessments

Goals	Assessment Strategies
<p>Friction must be considered when a vehicle is being designed. Lessons 1, 5, 8–12, 14–17</p>	<p>Lessons 1, 9, 12, 14, 16–17, and Additional Assessments 1–4</p> <ul style="list-style-type: none"> ▪ Pre- and post-unit assessments ▪ Class discussions and lists ▪ Student investigations ▪ Record sheets ▪ Student drawings ▪ Oral presentations ▪ Teacher observations ▪ Building vehicles ▪ Student self-assessments
<p>Air resistance is a force that can slow the speed of a moving vehicle. Lessons 9–10, 14–16</p>	<p>Lessons 9, 12, 14, 16, and Additional Assessments 1–4</p> <ul style="list-style-type: none"> ▪ Pre- and post-unit assessments ▪ Class discussions and lists ▪ Student investigations ▪ Record sheets ▪ Student drawings ▪ Oral presentations ▪ Teacher observations ▪ Building vehicles ▪ Student self-assessments
<p>Design requirements specify how a vehicle or other product must perform. Lessons 5–6, 9, 14–16</p>	<p>Lessons 1, 5, 14, 16–17, and Additional Assessments 2–3</p> <ul style="list-style-type: none"> ▪ Pre- and post-unit assessments ▪ Class discussions and lists ▪ Student investigations ▪ Record sheets ▪ Oral presentations ▪ Teacher observations ▪ Building vehicles
<p>Cost is often an important consideration in designing a product. Lessons 13–16</p>	<p>Lessons 14, 16, and Additional Assessment 3</p> <ul style="list-style-type: none"> ▪ Class discussions and lists ▪ Record sheets ▪ Oral presentations ▪ Building vehicles
<p>Engineers develop, modify, and improve designs to meet specific requirements. Lessons 1–2, 5, 8–9, 11–17</p>	<p>Lessons 1–2, 5, 9, 12, 14, 16–17, and Additional Assessments 1–3</p> <ul style="list-style-type: none"> ▪ Pre- and post-unit assessments ▪ Class discussions and lists ▪ Student investigations ▪ Record sheets ▪ Student drawings ▪ Oral presentations ▪ Teacher observations ▪ Building vehicles ▪ Student self-assessments

Skills	
Goals	Assessment Strategies
<p>Designing, building, testing, and modifying vehicles to meet design requirements. Lessons 1–2, 5, 8–9, 11–17</p>	<p>Lessons 1–2, 5, 9, 12, 14, 16–17, and Additional Assessments 1–3</p> <ul style="list-style-type: none"> ▪ Pre- and post-unit assessments ▪ Class discussions and lists ▪ Student investigations ▪ Record sheets ▪ Student drawings ▪ Oral presentations ▪ Teacher observations ▪ Building vehicles ▪ Student self-assessments
<p>Building vehicles from technical two- and three-view drawings. Lessons 2, 11, 14–16</p>	<p>Lessons 2, 12, 14, 16</p> <ul style="list-style-type: none"> ▪ Student drawings ▪ Teacher observations ▪ Building vehicles
<p>Recording vehicle designs through drawing. Lessons 2, 5, 9, 14–16</p>	<p>Lessons 2, 5, 9, 12, 14, 16, and Additional Assessment 4</p> <ul style="list-style-type: none"> ▪ Record sheets ▪ Student drawings ▪ Teacher observations
<p>Observing how an object moves and describing its motion and changes in motion. Lessons 1, 3–8, 10, 12–17</p>	<p>Lessons 1, 5, 12, 14, 16–17, and Additional Assessments 2–3</p> <ul style="list-style-type: none"> ▪ Pre- and post-unit assessments ▪ Class discussions and lists ▪ Student investigations ▪ Record sheets ▪ Oral presentations ▪ Teacher observations
<p>Measuring the time it takes a vehicle to move a given distance. Lessons 1, 4–5, 14–17</p>	<p>Lessons 1, 5, 14, 16–17, and Additional Assessment 2</p> <ul style="list-style-type: none"> ▪ Pre- and post-unit assessments ▪ Student investigations ▪ Record sheets ▪ Oral presentations ▪ Teacher observations
<p>Collecting and recording data and analyzing it to determine representative values. Lessons 4–5, 7, 10, 14–16</p>	<p>Lessons 1, 5, 14, 16–17, and Additional Assessment 2</p> <ul style="list-style-type: none"> ▪ Pre- and post-unit assessments ▪ Student investigations ▪ Record sheets ▪ Oral presentations ▪ Teacher observations
<p>Predicting the effect of an applied force on how a vehicle moves. Lessons 1, 3–5, 7–10, 12, 14–17</p>	<p>Lessons 1, 5, 12, 14, 16–17, and Additional Assessments 1–2</p> <ul style="list-style-type: none"> ▪ Pre- and post-unit assessments ▪ Class discussions and lists ▪ Student investigations ▪ Record sheets ▪ Oral presentations
<p>Recording and comparing distances a vehicle travels under various conditions. Lessons 1, 7, 12, 14–17</p>	<p>Lessons 1, 12, 14, 16–17, and Additional Assessment 2</p> <ul style="list-style-type: none"> ▪ Pre- and post-unit assessments ▪ Class discussions and lists ▪ Student investigations ▪ Record sheets ▪ Oral presentations

Goals	Assessment Strategies
Designing a vehicle that is propelled by stored energy. Lessons 6–16	Lessons 9, 12, 14, 16, and Additional Assessments 2, 4 <ul style="list-style-type: none"> ▪ Post-unit assessments ▪ Student investigations ▪ Record sheets ▪ Student drawings ▪ Oral presentations ▪ Teacher observations ▪ Building vehicles
Solving design problems using previously collected data. Lessons 5, 10, 14–16	Lessons 5, 9, 14, 16, and Additional Assessment 2 <ul style="list-style-type: none"> ▪ Student investigations ▪ Record sheets ▪ Teacher observations ▪ Building vehicles
Communicating results of an investigation through record sheets, written observations, drawings, and class discussions. Lessons 1–10, 12–17	Lessons 1–2, 5, 9, 12, 14, 16–17, and Additional Assessments 2–4 <ul style="list-style-type: none"> ▪ Pre- and post-unit assessments ▪ Class discussions and lists ▪ Student investigations ▪ Record sheets ▪ Student drawings ▪ Oral presentations ▪ Teacher observations ▪ Student self-assessment

Attitudes	
Goals	Assessment Strategies
Recognizing the role that technological design plays in daily problem solving. Lessons 1–2, 5–6, 8–17	Lessons 1–2, 5, 9, 12, 14, 16–17, and Additional Assessments 1–4 <ul style="list-style-type: none"> ▪ Pre- and post-unit assessments ▪ Class discussions and lists ▪ Student investigations ▪ Record sheets ▪ Student drawings ▪ Oral presentations ▪ Teacher observations ▪ Building vehicles ▪ Student self-assessment
Appreciating how science can be used to solve practical problems. Lessons 1–2, 5–6, 8–17	Lessons 1–2, 5, 9, 12, 14, 16–17, and Additional Assessments 1–4 <ul style="list-style-type: none"> ▪ Pre- and post-unit assessments ▪ Class discussions and lists ▪ Student investigations ▪ Record sheets ▪ Student drawings ▪ Oral presentations ▪ Teacher observations ▪ Building vehicles ▪ Student self-assessment

Motion and Design: Goals and Assessment Strategies, Skills (continued)

Goals	Assessment Strategies
<p>Recognizing the importance of repeating trials to gain valid test results. Lessons 3–5, 7, 10, 14–16</p>	<p>Lessons 1, 5, 14, 16–17, and Additional Assessments 2, 4</p> <ul style="list-style-type: none"> ▪ Pre- and post-unit assessments ▪ Class discussions and lists ▪ Student investigations ▪ Record sheets ▪ Teacher observations
<p>Valuing the application of test results to future investigations. Lessons 1, 3–5, 7, 9–10, 14–15, 17</p>	<p>Lessons 1, 5, 9, 14, 16–17, and Additional Assessments 2, 4</p> <ul style="list-style-type: none"> ▪ Pre- and post-unit assessments ▪ Student investigations ▪ Record sheets ▪ Teacher observations ▪ Building vehicles ▪ Student self-assessment