

Science, Life Skills and Innovations in American Automobile Racing

Unit Plan Overview

Overarching Questions

How are science concepts demonstrated by auto racing? How do innovations in auto racing make use of science concepts?

Key Concepts

- Passion
- Finding your fit
- Self-confidence
- Learning from mistakes
- Teamwork
- Organization
- Education
- Learn by doing
- Artifact
- Acceleration
- Air resistance
- Force
- Friction
- Inertia
- Mass
- Momentum
- Relative motion
- Speed
- Aerodynamics
- Air resistance
- Velocity
- Centripetal force

Key Concepts Continued

- Downforce
- Gravity
- Trade-offs
- Bernoulli's principle
- Kinetic energy
- Potential energy
- Power
- Thermal energy
- Venturi effect
- Watt
- Weight
- Work
- Airfoil
- Ground effects
- Pressure
- Roll bar
- Safety features

Lessons and Main Ideas

Lesson 1

Life Skills and Automobile Racing

- The skills required to succeed in automobile racing are also helpful general life skills.

Lesson 2

Newton's Three Laws and Racing

- Newton's three laws of motion – the law of inertia, $F=ma$ and action and reaction – can be illustrated with examples from automobile racing.

Lesson 3

Forces Involved in Automobile Racing

- Forces can be illustrated with examples from automobile racing.

Lesson 4

Motion and Energy in Automobile Racing

- Velocity, acceleration, forces, work and energy can be illustrated with examples from automobile racing.

Lesson 5

Ground Effects, Innovations and Safety in Automobile Racing

- Science, physics and engineering principles help explain ground effects and safety innovations in automobile racing.

Continued...

Unit Plan Overview Continued

Duration 5-10 class periods
(45 minutes each)

- Lesson Plans: 5 class periods
- Culminating Project:
1-5 class periods, depending on the project chosen

Digitized Artifacts
from the Collections of **The Henry Ford**

Lesson 2 Newton's Three Laws and Racing

- Willys Gasser, 1958 (side view ID# THF69391)
- Lyn St. James Suited Up in Race Car, Giving a Thumbs-Up, 2008 ID# THF58671
- Start of the Indianapolis 500 Race, 1937 ID# THF68313
- Three Men Pushing a Barber-Warnock Special Race Car Off the Track at Indianapolis Motor Speedway, probably 1924 ID# THF68328
- Official Start of First NHRA Drag Racing Meet, Great Bend, Kansas, 1955 ID# THF34472
- March 84C Race Car, 1984 (cockpit view ID# THF69363)
- Ford Thunderbird NASCAR Winston Cup Race Car Driven by Bill Elliott, 1987 ID# THF69258

- Buck & Thompson Class D Slingshot Dragster, 1960 ID# THF36041
- Race Car “999” Built by Henry Ford, 1902 ID# THF70568
- Damaged Race Car After a Racing Accident, 1905-1915 ID# THF12446

Lesson 3 Forces Involved in Automobile Racing

- Soap Box Derby Car, 1939 ID# THF69252
- Official Start of First NHRA Drag Racing Meet, Great Bend, Kansas, 1955 ID# THF34472
- Three Men Pushing a Barber-Warnock Special Race Car Off the Track at Indianapolis Motor Speedway, probably 1924 ID# THF68328
- Composite Image Depicting Henry Ford and Spider Huff Driving the Sweepstakes Racer at Grosse Pointe Racetrack, 1901 ID# THF24696
- Buck & Thompson Class D Slingshot Dragster, 1960 ID# THF36041
- Damaged Race Car After a Racing Accident, 1905-1915 ID# THF12446

- March 84C Race Car, 1984 (cockpit view ID# 69363)
- Willys Gasser, 1958 (front view ID# THF69394)
- Ford Thunderbird NASCAR Winston Cup Race Car Driven by Bill Elliott, 1987 (aerial view ID# THF69260)
- Start of the Indianapolis 500 Race, 1937 ID# THF68313
- Barber-Warnock Special Race Car in Pit at Indianapolis Motor Speedway, 1924 ID# THF68329
- Henry Ford Driving the 999 Race Car Against Harkness Race Car at Grosse Pointe Racetrack, 1903 ID# THF23024

Lesson 4 Motion and Energy in Automobile Racing

- Willys Gasser, 1958 (engine view ID# THF69399) (side view ID# THF69391)
- March 84C Race Car, 1984 (aerial view ID# THF69371)
- Ford Thunderbird NASCAR Winston Cup Race Car Driven by Bill Elliott, 1987 (side view ID# THF69258) (aerial view ID# THF69260)

Unit Plan Overview Continued

- Summers Brothers “Goldenrod” Land Speed Record Car, 1965 ID# THF37676
- Official Start of First NHRA Drag Racing Meet, Great Bend, Kansas, 1955 ID# THF34472

Lesson 5

Ground Effects, Innovations and Safety in Automobile Racing

- March 84C Race Car, 1984 (aerial view ID# THF69371) (side view ID# THF69368)
- Willys Gasser, 1958 (front view ID# THF69394)
- Ford Thunderbird NASCAR Winston Cup Race Car Driven by Bill Elliott, 1987 (aerial view ID# THF69260)
- Henry Ford Driving the 999 Race Car Against Harkness at Grosse Pointe Racetrack, 1903 ID# THF23024
- Start of the Indianapolis 500 Race, 1937 ID# THF68313
- Lyn St. James Suited Up in Race Car, Giving a Thumbs-Up, 2008 ID# THF58671

Racing Oral History Interviews

- Carroll Shelby: [Passion](#)
- Jim Dilamarter: [Finding Your Fit](#)

- Jim Hall: [Self-Confidence](#)
 - Lyn St. James: [Learning from Mistakes](#)
 - Al Unser, Sr.: [Teamwork](#)
 - Lyn St. James: [Organization](#)
 - Jim Dilamarter: [Education](#)
 - Jim Hall: [Learn by Doing](#)
 - Jim Hall: [Safety Rules](#)
 - Jim Hall: [Engineer to Go Faster](#)
 - Dan Gurney: [Innovations to Get More Force](#)
 - Bobby Unser: [Getting More Force from Better Tire Traction](#)
 - Carroll Shelby: [Kinetic Energy and Brakes](#)
 - Jim Dilamarter: [Getting Downforce and Pushing Air](#)
- Background Information Sheet for Students 3A: Forces Involved in Auto Racing
 - Student Activity Sheet 3B: Forces
 - Answer Key 3B: Forces
 - Background Information Sheet for Students 4A: Motion and Energy in Automobile Racing
 - Student Activity Sheet 4B: Distance, Velocity and Acceleration (Grades 4–5)
 - Student Activity Sheet 4C: Distance, Velocity and Acceleration (Grades 6–8)
 - Answer Key 4B and C: Distance, Velocity and Acceleration (Grades 4–5 and 6–8)
 - Background Information Sheet for Students 5A: Ground Effects, Innovations and Safety in Automobile Racing
 - Student Activity Sheet 5B: Ground Effects and Safety Innovations in Automobile Racing
 - Answer Key 5B: Ground Effects and Safety Innovations in Automobile Racing
 - Culminating Projects
 - Extension Activities
 - Student Activity Sheet 6: Review/Assessment Questions
 - Answer Key 6: Review/Assessment Questions

Materials

- Computer with access to the Internet; digital projector and screen (preferred) OR printed handouts of the digitized artifacts and descriptions
- Bulletin board
- Construction paper and materials for decorating the bulletin board
- Calculators
- Background Information Sheet for Students 2A: Newton’s Three Laws and Racing
- Student Activity Sheet 2B: Newton’s Three Laws
- Answer Key 2B: Newton’s Three Laws