

Ratios and Proportional Relationships - Speed Science

Grade Level: 6

Competency: Speeding – The effects of speeding on crash forces. The effects of speeding on reaction and braking time.

Objective: To teach the importance of wearing seatbelts at all times.

Content Strand: Physical Science – 6.2C Investigate and describe the effects of forces acting on objects.

2018 College and Career Readiness Standards for Science

GRADE SIX: Physical Science

P.6.6 Motions, Forces, and Energy Conceptual Understanding: Newton's Laws describe forces and motion affecting substances in various environments and situations. Motion is determined by the amount of force applied. Focusing on magnetic, frictional, and gravitational forces will provide an understanding of the relationship between distance and contact forces.

P.6.6.5 Conduct investigations to predict and explain the motion of an object according to its position, direction, speed, and acceleration.

P.6.6.6 Investigate forces (gravity, friction, drag, lift, thrust) acting on objects (e.g., airplane, bicycle helmets). Use data to explain the differences between the forces in various environments

Common Core:

Math.6.RP - Understand ratio concepts and use ratio reasoning to solve problems. Solve unit rate problems including those involving unit pricing and constant speed.

Duration: 60-90 minutes

Material: Paper (or science log), pencil, whiteboard, access to YouTube

Description:

- 1) The teacher will have the following worksheet for students to solve (speed/distance/time) found at <http://sciencespot.net/Media/speedmach.pdf> - Speed Machines (Nascar - finding the speed, distance traveled, or time for various word problems)

***Put the following formula on the board:** (or students can use formula sheet)

$$\text{Formula: speed} = \frac{\text{distance}}{\text{time}}$$

****Optional or additional worksheet: Gearing Up for Math** (additional math/science word problems finding speed, distance and time) also incorporates finding median and average.

Google: **IMAX Nascar** (A comprehensive Educator's Resource packet) or click on:

<http://www.si.edu/Content/SE/Educator%20Guides/NASCAR%20-%20The%20IMAX%20Experience.pdf>

After completing worksheet and reviewing answers, teacher will show video of Richard Petty driving his car. (YouTube – Richard Petty Driving Experience – Charlotte Motor Speedway -video - <http://www.youtube.com/watch?v=hROPX5TPAIM>)

Have students make observations about the safety risks that a Nascar driver takes when traveling at high speeds. How has the racing industry influenced safety technologies in passenger cars? (Example: helmets; drives with both hands on the wheels; seat belts and harnesses; safety glasses; flame resistant clothing and gloves; proper footwear).

- 2) The teacher will ask: Do we use any of these safety requirements while driving or riding in our vehicles today? Are there any other safety features that car manufacturers build into cars that they may know of? (air bags, etc.)
- 3) Talk about the importance of wearing seatbelts no matter what speed you are traveling and emphasize that it is a law. Click it or Ticket!! Nascar racers know that seatbelts save lives.
- 4) Watch YouTube video Crash Test With and Without Seatbelts by *Texas Click It*
<http://www.youtube.com/watch?v=d7iYZPp2zYY>.
- 5) Optional: If you have time..... Watch the YouTube video on *The Crashes that Have Changed Nascar* – even Nascar knows that safety is first!
http://www.youtube.com/watch?v=-eHrV_x0_lo
- 6) Students will then be given the worksheet *Safety Behind the Wheel* (within resource listed above– IMAX Nascar) that discusses all the safety features that have been incorporated in Nascar because of the fatal crashes that were happening early in the history of car racing.

Resources:

Student worksheet: <http://sciencespot.net/Media/speedmach.pdf>

[NASCAR: The IMAX Experience Educator's Guide - Smithsonian](http://www.si.edu/Content/SE/Educator%20Guides/NASCAR%20-%20The%20IMAX%20Experience.pdf)
<http://www.si.edu/Content/SE/Educator%20Guides/NASCAR%20-%20The%20IMAX%20Experience.pdf>

<http://www.youtube.com/watch?v=hROPX5TPAIM>

<http://www.youtube.com/watch?v=d7iYZPp2zYY>

http://www.youtube.com/watch?v=-eHrV_x0_lo