

Photo Description



This image shows two long metal rails running straight into the distance, surrounded by trees on both sides. The rails sit on wooden pieces called ties and small rocks called ballast. The straight tracks seem to go on and on, disappearing where the sky meets the trees—this is called perspective!

Scientific Phenomena

Anchoring Phenomenon: Why do railroad tracks look like they come together far away, even though they stay the same distance apart?

This is an example of linear perspective, a visual phenomenon where parallel lines appear to meet at a vanishing point on the horizon. Scientifically, light travels in straight lines from the railroad tracks to our eyes. As objects get farther away, they appear smaller to our brains—including the space between the two rails. The two rails are actually always the same distance apart, but our eyes and brain perceive them as getting closer together the farther away they are. This teaches children about how our eyes help us understand distance and depth in the world.

Core Science Concepts

- * Lines and Shapes in Nature: The railroad tracks form two parallel lines (lines that never meet). Students can observe that even though the rails look like they meet far away, they actually stay the same distance apart. This introduces the concept of parallel lines and perspective.
- * Materials and Properties: The rails are made of metal (a shiny, hard material), the ties are made of wood (hard but can rot over time), and the ballast consists of rocks (small, rough pieces). Each material has different properties that make it useful for its job.
- * Patterns: The railroad tracks follow a clear repeating pattern—tie, rocks, tie, rocks—that repeats over and over into the distance. Recognizing patterns helps us understand how things are organized.

Pedagogical Tip:

Use this image to introduce the concept of "vanishing point" through direct observation rather than technical vocabulary. Ask students to point to where the tracks "disappear" and explain that this happens because things far away look smaller to our eyes. This concrete observation builds foundational understanding for perspective and depth perception that will develop throughout their educational journey.

UDL Suggestions:

Provide multiple means of representation: Show the railroad image alongside a close-up photo of actual railroad ties and ballast so students can see both the distant view AND the detailed materials. For students who benefit from kinesthetic learning, use string or yarn on the floor to create parallel lines that appear to meet, allowing them to physically explore perspective. Offer a tactile model of railroad materials (wood samples, smooth pebbles) for students to examine and compare.

Discussion Questions

- * Why do you think the two railroad tracks look closer together when we look far, far away? (Bloom's: Understand | DOK: 1)
- * What would happen if the railroad ties were not there to hold the metal rails apart? (Bloom's: Analyze | DOK: 2)
- * Can you think of other things you've seen that look like they come together when they are far away, even though they don't really? (Bloom's: Apply | DOK: 2)
- * Why do you think the people who built the railroad used metal rails instead of wood? (Bloom's: Analyze | DOK: 2)

Extension Activities

- * Perspective Art Project: Have students draw or paint their own "railroad tracks" using two parallel lines that appear to meet at a vanishing point. Provide rulers to ensure the lines stay parallel. Display their work and discuss how artists use perspective to make drawings look real.
- * Material Investigation Station: Set up a sensory station with samples of the materials used in railroads: smooth metal objects, wood blocks or railroad tie samples, and gravel or pebbles. Let students touch, observe, and compare the materials. Create a simple chart showing which material is used where and why (metal = strong for rails, wood = flexible for ties, rocks = drainage for ballast).
- * Build a Model Railroad Track: Using craft sticks or popsicle sticks as rails, small wood blocks as ties, and pebbles as ballast, have students construct a mini railroad track on a long piece of paper. They can then roll a toy train along it and explore how the materials work together. Encourage them to observe the parallel lines they've created and note where their "tracks" appear to meet on their paper.

NGSS Connections

Disciplinary Core Ideas:

- K-PS2.A Pushes and Pulls: Understanding that the rails must be positioned and held in place by the ties and ballast shows how objects remain in position due to support forces.
- K-ETS1.A Engineering Design: The railroad system represents how humans design and build structures to solve problems (transporting goods and people).

Crosscutting Concepts:

- Patterns: The repeating pattern of ties and ballast along the track demonstrates how patterns are observable in human-designed systems.
- Structure and Function: The rails, ties, and ballast each have specific structures that allow them to function together as a transportation system.

Performance Expectation:

K-PS2-1: Plan and conduct investigations to provide evidence that pushes and pulls can change the motion of an object. (Connection: The rails must be secured to prevent movement from the weight of trains.)

Science Vocabulary

- * Rails: The two long metal bars that trains roll on.
- * Ties (or Sleepers): The wooden pieces that hold the two rails at the same distance apart.
- * Ballast: The small rocks underneath the ties that keep the railroad track in place and allow water to drain away.

- * Parallel Lines: Two lines that run next to each other and never meet, no matter how far they go.
- * Perspective: The way objects look smaller and closer together when they are far away from us.
- * Metal: A shiny, hard material that conducts heat and electricity, like the material used for railroad rails.

External Resources

Children's Books:

Thomas the Tank Engine and Friends* by Rev. Wilbert Awdrey (introduces trains, tracks, and transportation)

The Little Blue Truck* by Alice Schertle (teaches about vehicles and movement on paths)

Choo Choo* by Virginia Lee Burton (classic story about trains and how they work)

YouTube Videos:

- * "How Do Trains Work?" - TED-Ed Kids (2:45) - A simple, animated explanation of railroad basics. <https://www.youtube.com/watch?v=3B0V8qoHrnI>
- * "Lines and Shapes Around Us" - Khan Academy Kids (3:20) - Explores parallel lines and shapes found in everyday objects, including transportation. <https://www.khanacademy.org/>

Teacher Tip: This lesson works best when paired with direct observation. If possible, take students to a safe location where they can observe railroad tracks in person (with proper supervision and safety precautions). The 3D experience of standing on or near actual tracks will deepen their understanding of perspective far more than a 2D image alone!