

Pulleys

Pulley Chasm with Gearling

Learning target

Explain how pulleys can change a lifting task.



Before you begin

Use the reference page and discussion prompts on their own, or open the optional browser adventure. No earlier lesson or physical kit is required.

For online play: use an internet-connected current browser with local storage enabled. Read the three-part Gemling briefing, answer the quick check, and apply the evidence at three checkpoints. Retry feedback supports review; results are not a secure test or gradebook.

Use for teacher-led review, science centers or partner practice. Independent readers may need support with the vocabulary below. The design target is grades 3-5; choose support based on the learner.

Vocabulary and concepts to discuss

Rope and wheel; changing direction; pulley systems; longer pull distance

Open Pulley Chasm - direct lesson link

Scan the QR code or use the clickable link. This guide is usable offline; the adventure runs on an external educational website.



Pulleys - key ideas

1. The first clues

A pulley uses a rope around a wheel. A single fixed pulley can change the direction of a pull without necessarily reducing its size.

2. How the clues connect

Pulley systems with more supporting rope segments can reduce the ideal effort force, but require pulling more rope. Real systems also have friction.

3. Our evidence record

Our fixed-pulley model lifts the load when the free rope end is pulled down. A second multi-segment model trades a longer rope pull for reduced effort.

Keep the science accurate

Teach all six traditional simple machines in grouped lessons. Gears connect to wheels/axles, not a new seventh classical type. No efficiency equations.

Apply the evidence

Use a specific observation from this lesson to explain one choice. Point to a clue, then connect that clue to a scientific idea.

Curriculum reference: <https://www.nextgenscience.org/dci-arrangement/3-ps2-motion-and-stability-forces-and-interactions>

Talk through the evidence

1. What can a single fixed pulley change?

Expected answer: Pull direction

Reasoning: A pulley uses a rope around a wheel. A single fixed pulley can change the direction of a pull without necessarily reducing its size.

2. Which way is the free rope pulled in our model?

Expected answer: Down

Reasoning: Our fixed-pulley model lifts the load when the free rope end is pulled down. A second multi-segment model trades a longer rope pull for reduced effort.

3. What can a supporting-segment system trade?

Expected answer: More rope distance for less effort force

Reasoning: Pulley systems with more supporting rope segments can reduce the ideal effort force, but require pulling more rope. Real systems also have friction.

4. Does every pulley automatically reduce required force?

Expected answer: No

Reasoning: Pulley systems with more supporting rope segments can reduce the ideal effort force, but require pulling more rope. Real systems also have friction.

Guide the discussion

Ask learners to name the evidence that supports their answer. If an answer differs, revisit the matching key idea on page 2 and invite a revised explanation.

Online rewards: this lesson grants one fixed digital Expedition Discovery. Five saved digital Gemling friends become available only after all six distinct subject lessons are complete, in any order. Digital rewards do not establish physical ownership.