Lasers and Prisms Lesson

Plan

Amount of time Demo takes: 3-10 mins.
Don’t try this at home!

Materials
- Laser optics kit
  - Mirror
  - Several prisms
  - Laser box
- Extension cord—Needs electricity
- Velcro mount
- Ray diagram sheets, key diagrams

Set-up Instructions
1. Place the laser block on the table/secure with velcro if applicable.
2. Inventory and make sure all prisms and blocks are accounted for.
3. Press the red button to turn the box on; use the switch to change between 1, 3, and 5 beams.

SAFETY!
- Ensure that the lasers are blocked at the end of the table by a non-reflective surface.
- Do not look directly into the lasers.

Lesson’s Big Idea
- Light can be redirected and controlled using various prisms -- some of them cause light to come together, and others force beams apart.

Background Information
- Convex lenses: These lenses are thicker in the middle than at the ends and they refract parallel light rays so they come together at a single point. This is called convergence.
- Concave lenses: These lenses are...
thinner in the middle than at the ends (bend inwards). A concave lens refracts parallel beams so that they spread out. This is called divergence.

- If the laser hits some prisms at the correct angle, the light is reflected and doesn’t exit the prism from the place we might expect, like it does when it refracts (image from Seiler):

\[\text{reflection}\]

\[\text{refraction}\]

**Instructional Procedure**

1. Demonstrate the operation of the laser block.
2. Show briefly how the lasers interact with the prisms. Point out what conditions make the beam reflect, converge, etc. Explain the differences between convex and concave lenses.
3. Challenge the audience to use the optical components to match the ray diagrams provided.

**Assessment/sample questions you can ask**

1. What’s the difference between convex and concave lenses?
2. Why do some of the lenses reflect the light without the light escaping through the other side?

**Clean Up**

- Wipe prisms/mirror and pack materials carefully into the box.

**References**

- Seiler Precision Microscopes

**Next Generation Science Standards**

- K-5
  - 1-PS4-2/3/4
- 6-8
  - MS-PS4-2