

Washtenaw County Elementary Science Olympiad

Photon Phun Workshop 1

Introduction to light

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Presented at Scarlett Middle School

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What will we learn today...?

- ✧ Introduction to light
- ✧ How light travels
- ✧ How light reflects
- ✧ How to use protractor
- ✧ Light relay

See materials section at the end for the supplies for activities



Why is light important?

Why is light important?

- ★ **To see things**
 - Stars used for navigation before technology
- ★ **To provide energy**
 - The Sun provides heat and light
 - Can be used to generate electricity (solar power)

More about light

- ★ Light can pass through some materials, but not others
 - Opaque materials: metal sheet, wood, etc.
 - Transparent: glass, water, some plastic, etc.
 - Translucent: waxed paper, frosted glass, etc.
- ★ Light travels very fast!
 - Takes only 8 min from the Earth to the Sun
 - A car traveling at 60mph: 177 years!

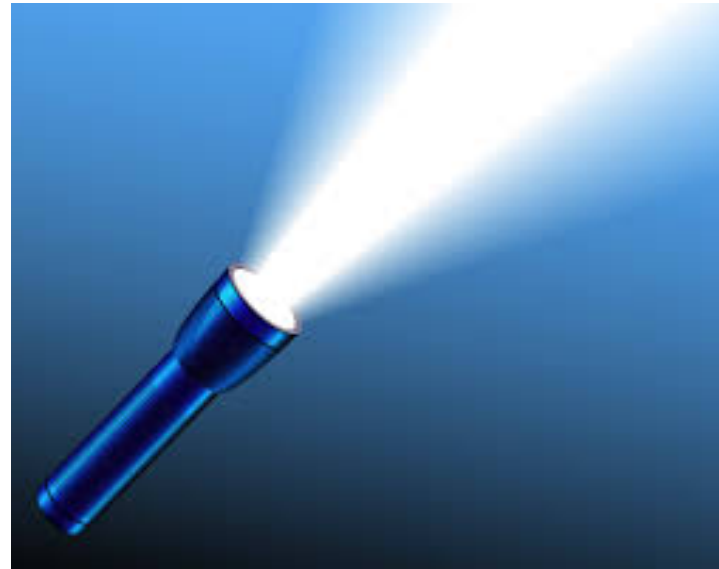
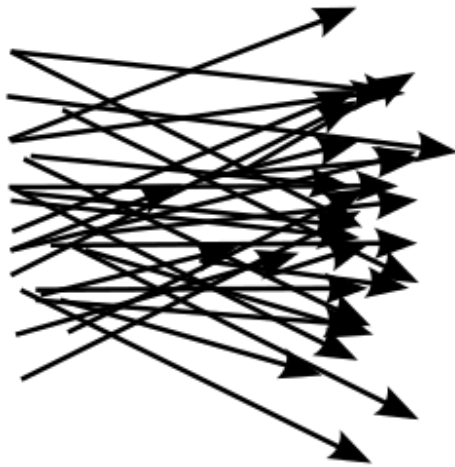
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How does light travel?

- * Light travels in a straight line until it hits another material
 - At that point, it can reflect or refract (change direction) – discussed later
- * How do we know?
- * Design an experiment!

Most light is made up of light traveling in different directions

- * It might look like light is not traveling straight!



Left image source: https://en.wikipedia.org/wiki/Collimated_light
Right image source: shutterstock.com; used with license



**How do we select only the
ones going in one direction?**

Activity 1: Does light travel in a straight line?

- * Take one of the tubes (one per team)
- * Take a piece of tape
- * Tape the tube to the flashlight
- * How can you get the light to come out to the other side?
- * Hint: pulling the tube tautly can help!

Reflections

- * An image can bounce back off an object, such as, a mirror, pond or lake, or shiny metal.
- * Where does the light go when it reflects?

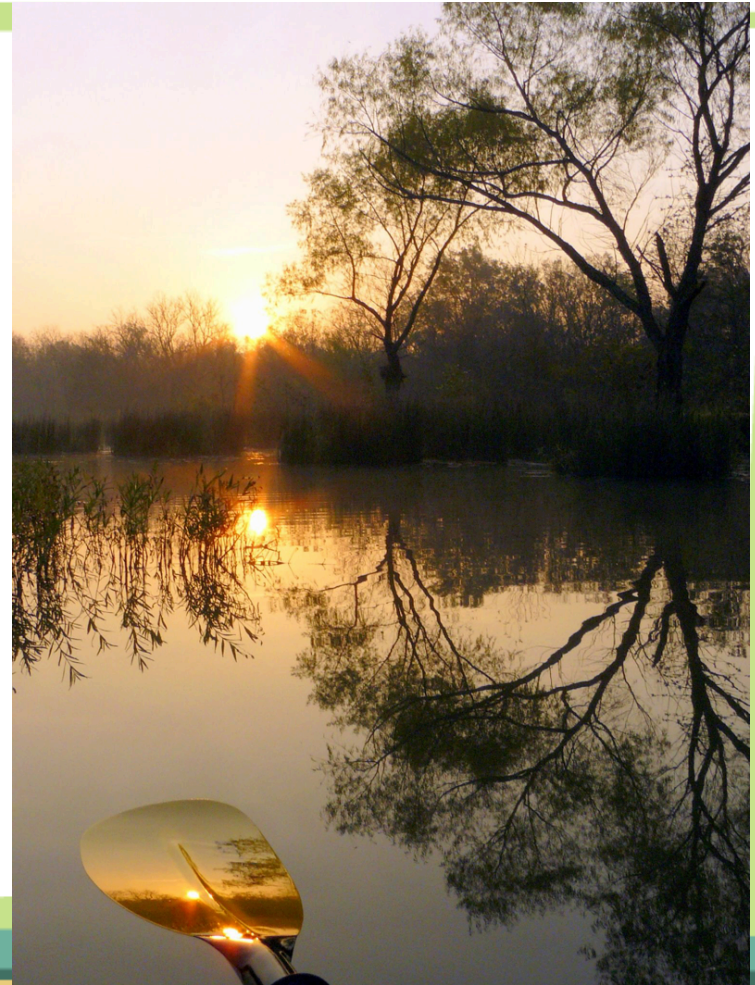


Image source: [https://en.wikipedia.org/wiki/Reflection_\(physics\)](https://en.wikipedia.org/wiki/Reflection_(physics))

Reflections

* **Reflection:** light or an image bounces back off an object's surface

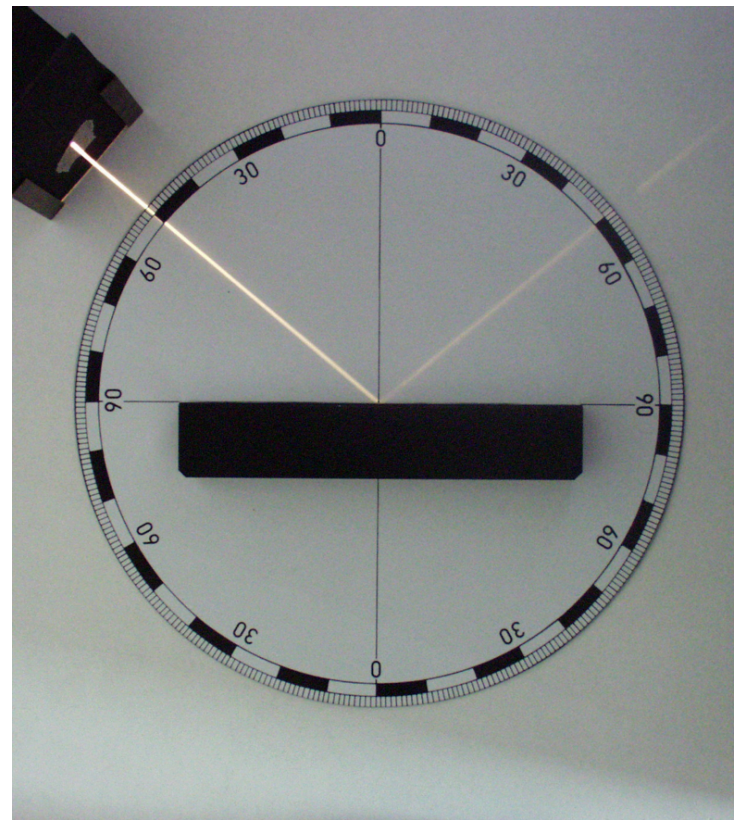
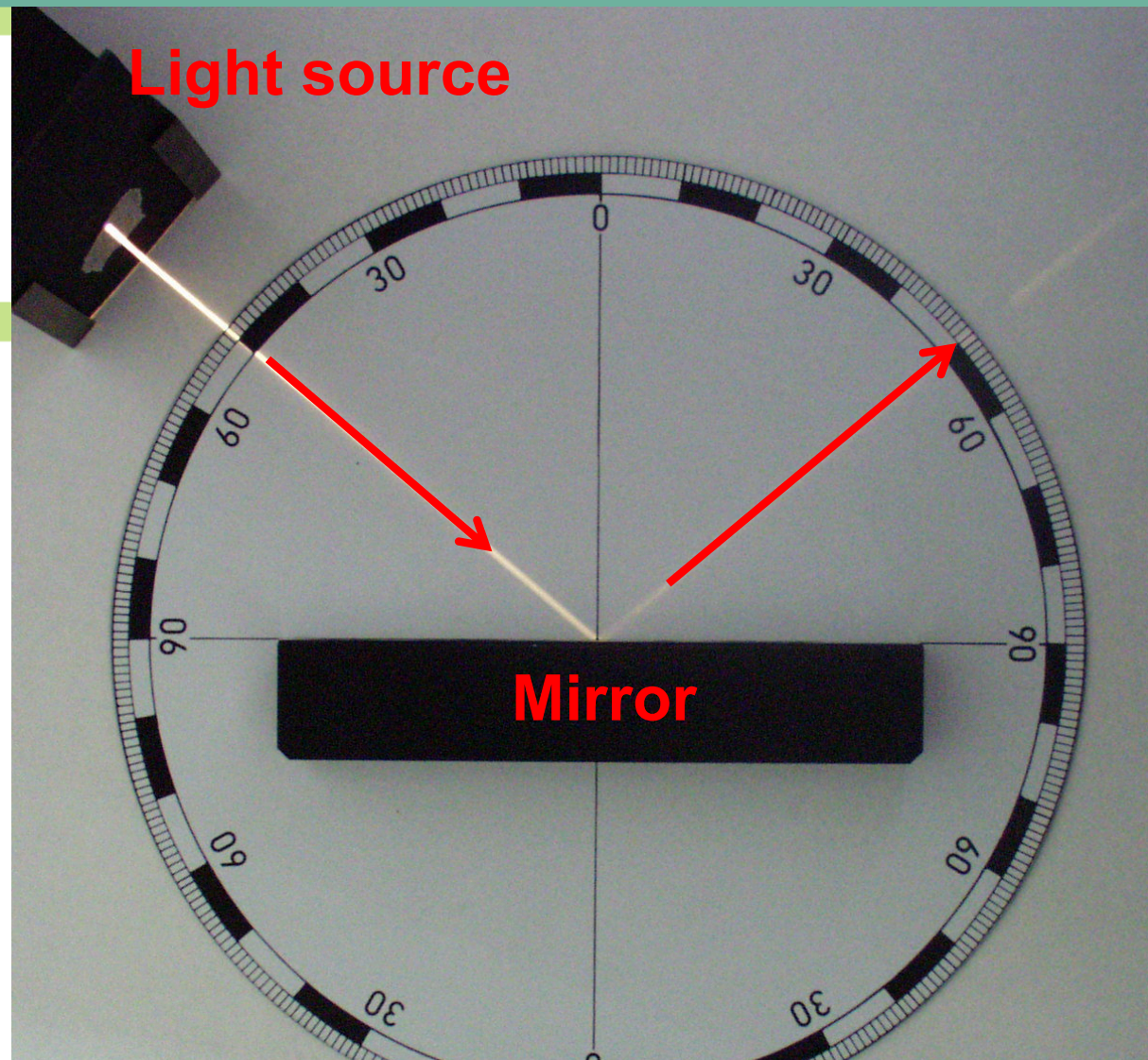
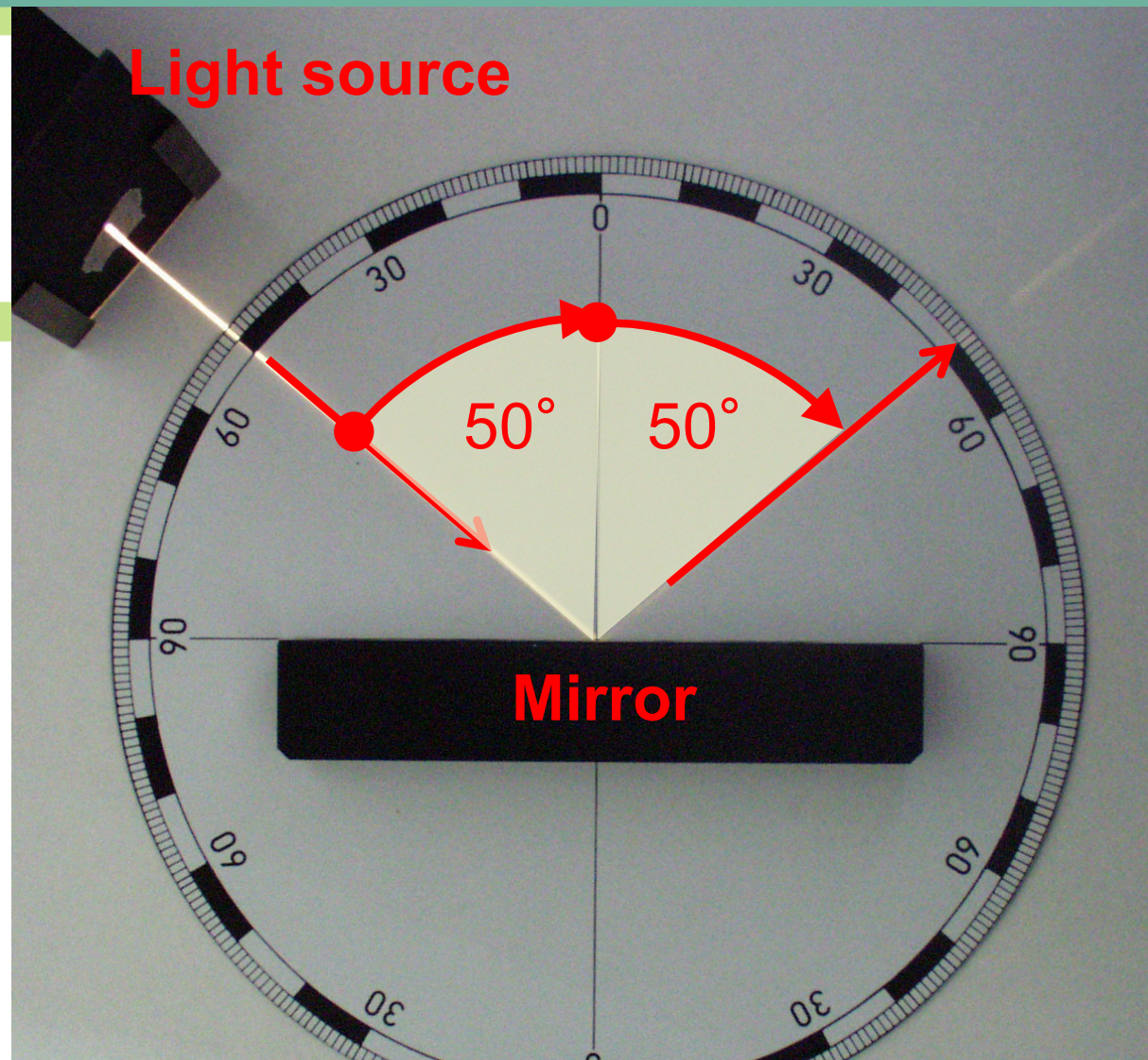


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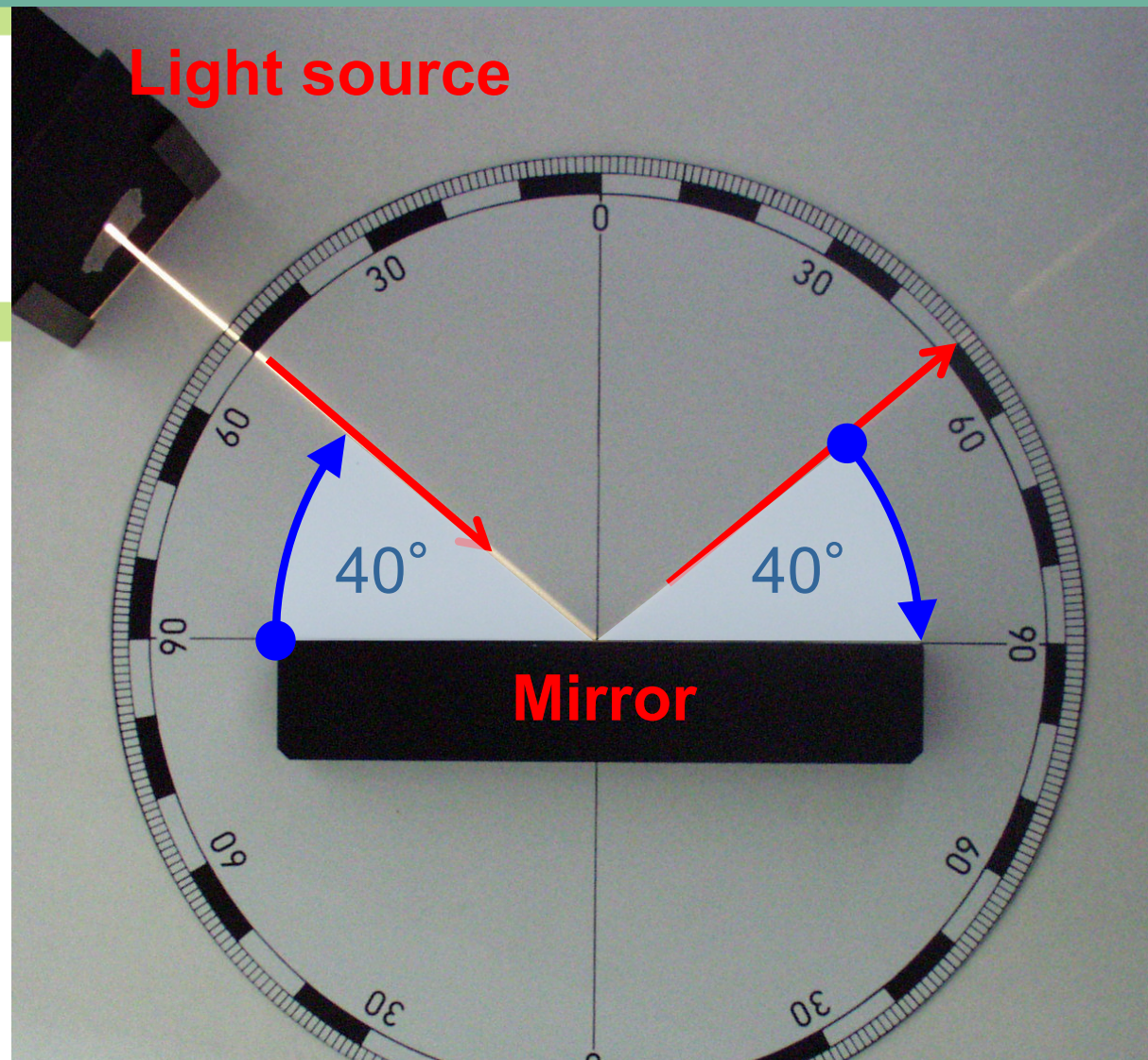
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Reading a protractor

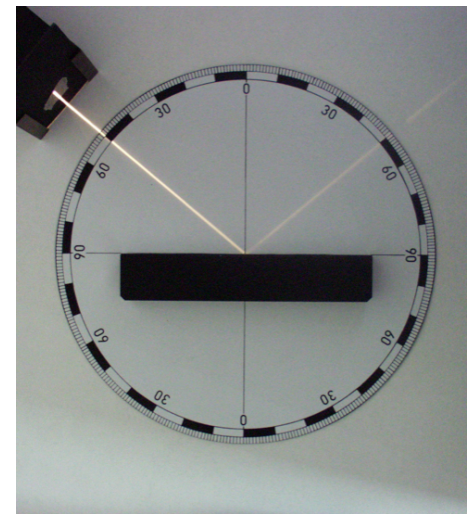
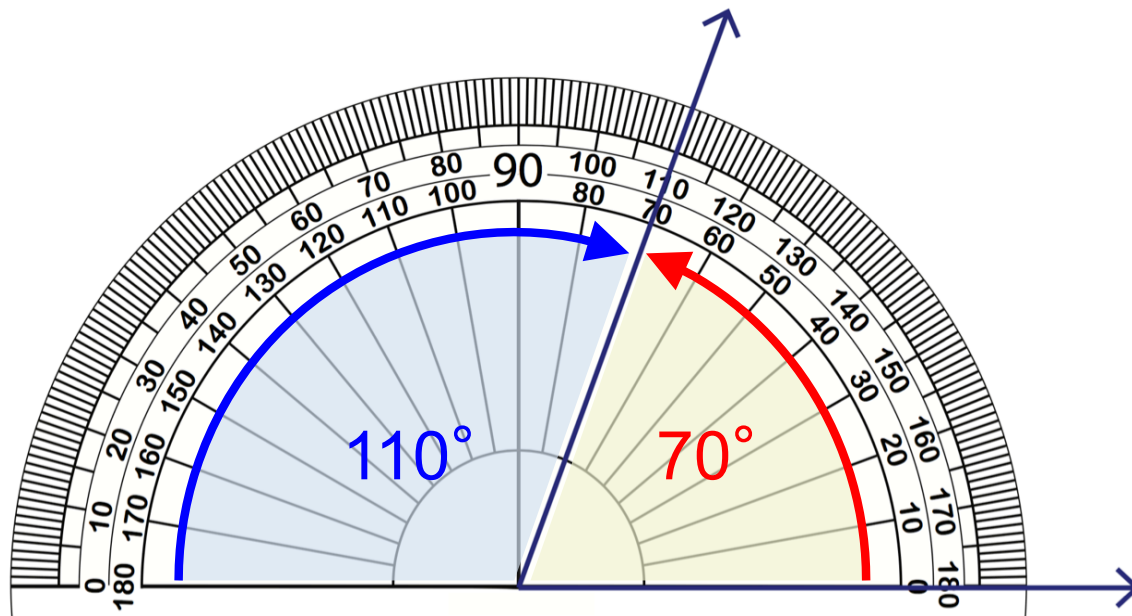


Image sources:

(left) www.mathworksheets4kids.com

(right) [https://en.wikipedia.org/wiki/Reflection_\(physics\)](https://en.wikipedia.org/wiki/Reflection_(physics))

Reading a protractor

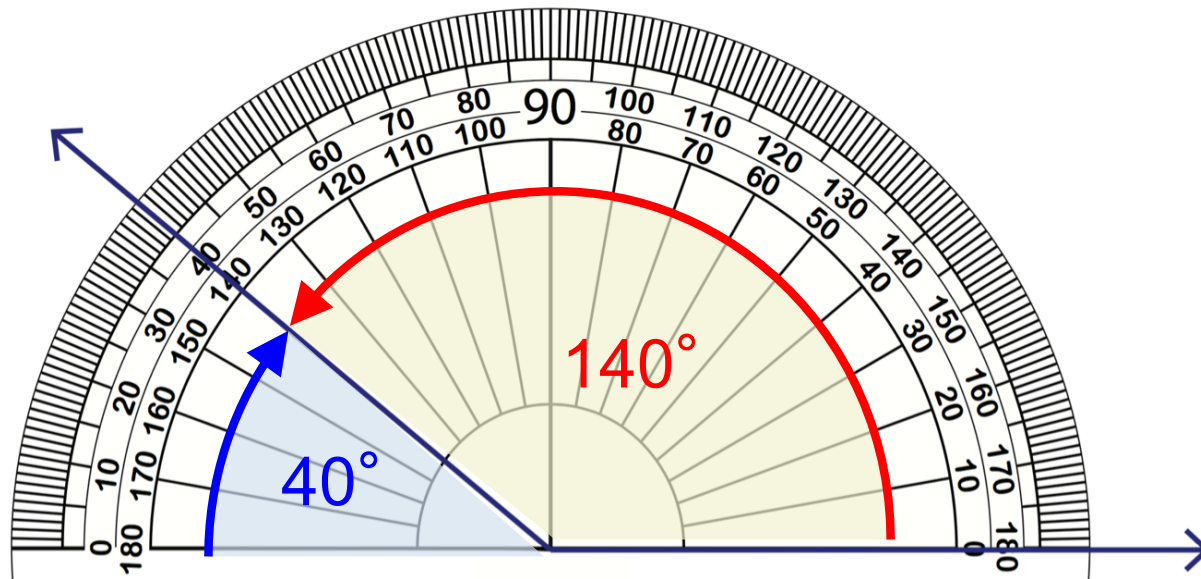


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Reading a protractor

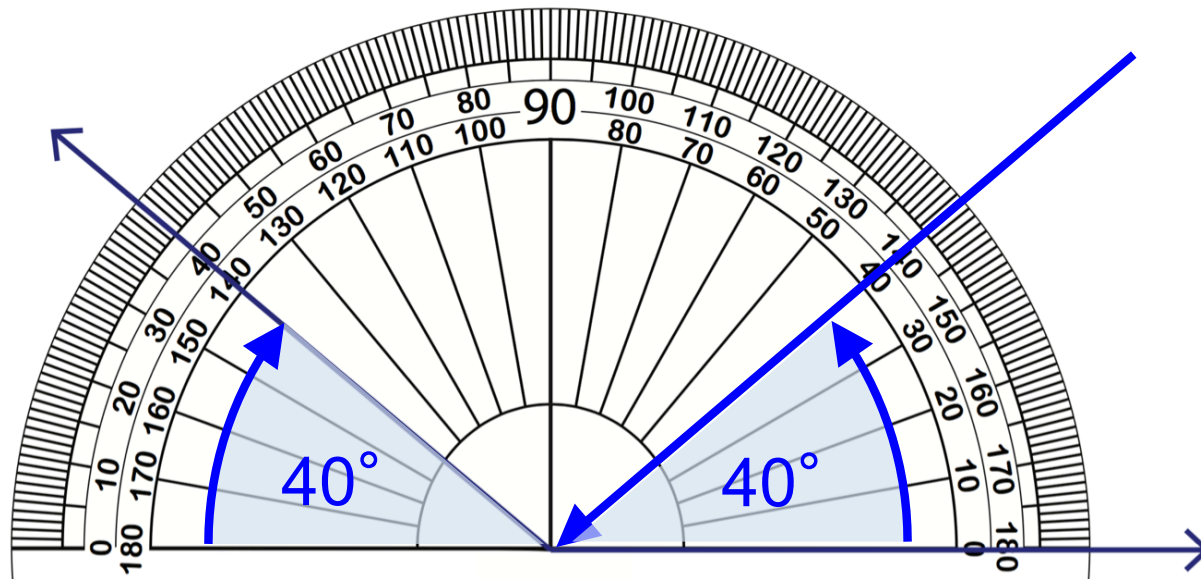


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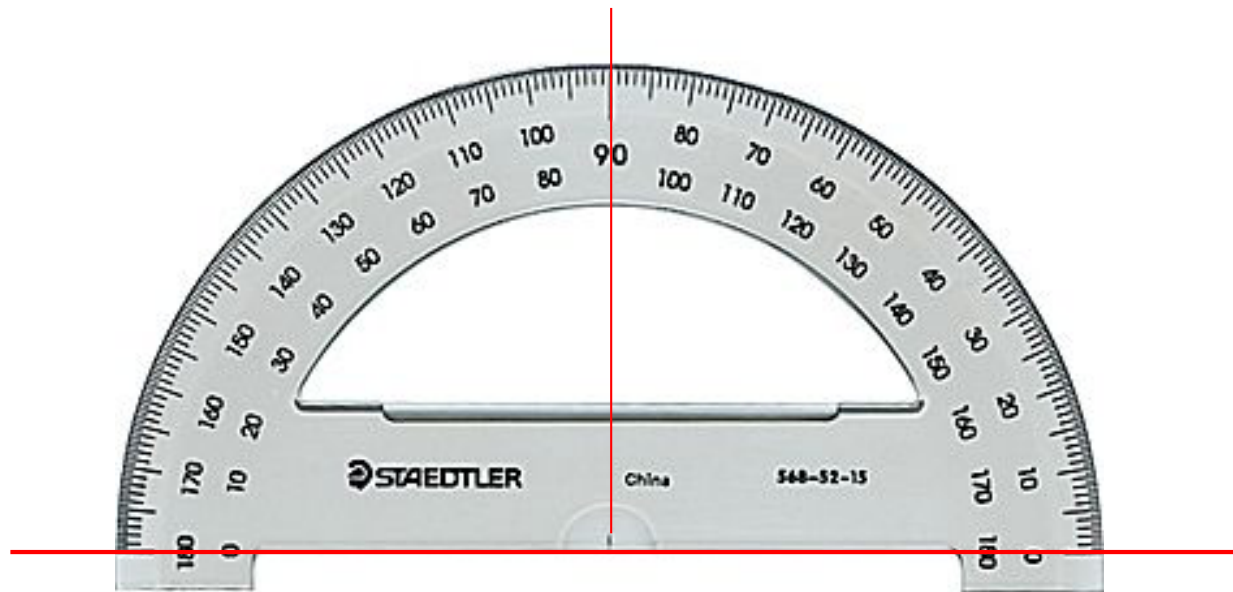
Activity 2: Protractor

- * Worksheet on how to use protractor (page 1 and 2)



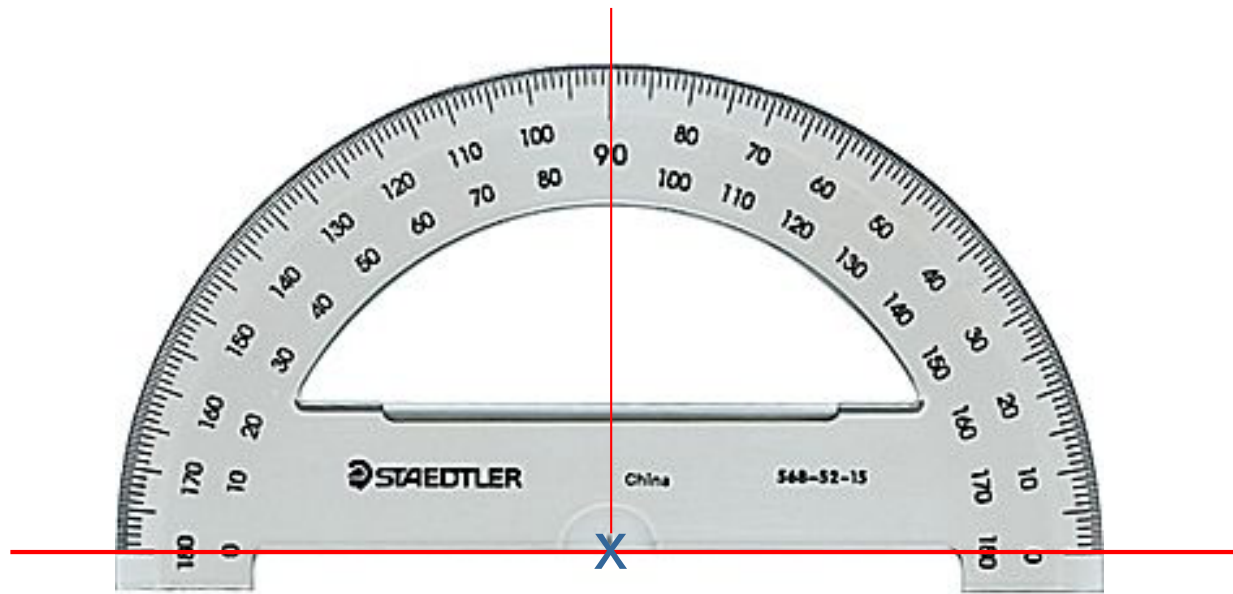
Line connects $0^\circ/180^\circ$ points
X is at the center of the line

Image source: http://www.staples.ca/en/Staedtler-Protractor-6-inch-180-degree-Tinted/product_13230_2-CA_1_20001



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Activity 3: Law of Reflection

- A member put a piece of paper with a straight line on the floor, and hold a mirror aligned on the line
- Place a flashlight on the floor such that it shines on the mirror at an angle
- Another member takes one string and pull it taut to the flashlight
- Another member takes the other string and pull it taut along the reflected light
- Use a ruler to draw the lines along the string
- Measure the angles of the incoming light and reflected light, measured from the surface



What results did you get?

Activity 4: Reflection

* See worksheets page 3-5

Take-away...

- * Light travels straight
- * The angle between the incoming light and surface is the same as angle between the reflected light and the surface
- * Use of protractor

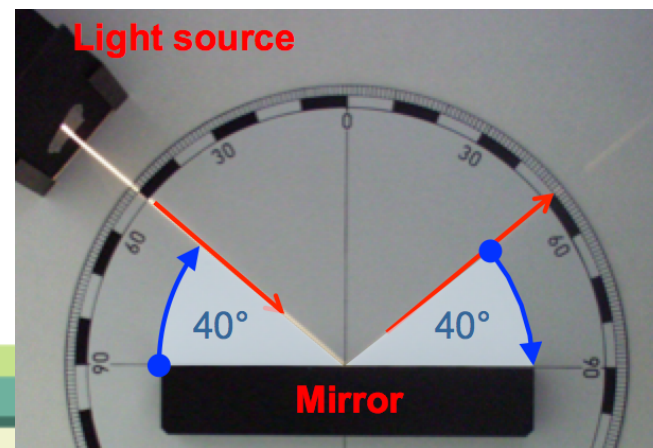
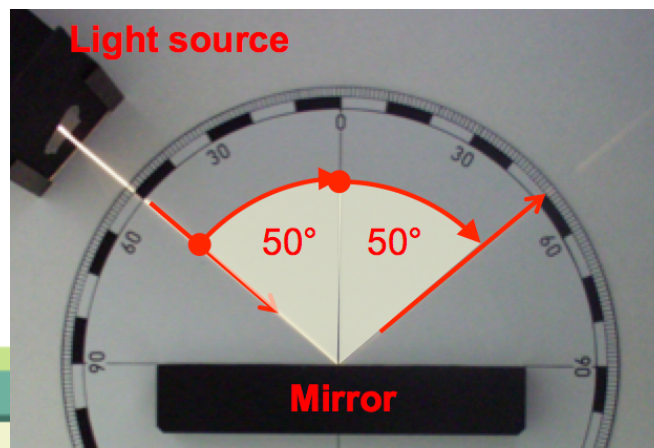


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Thanks!

Questions?
Light relay demo next



Supplementary Materials for Coaches and Parents

Activity 1 Materials

- ✦ A small flashlight (provided by WESO)
- ✦ Split flexible tubing such as Gardner Bender FLX-5007T sold at Home Depot
- ✦ Masking tape (wider the better)
- ✦ See picture for the final product



Can see light only if pulled straight

Activity 3 Materials

- * Put a hole near the bottom of a mirror (distributed by WESO) and thread a yarn or string a few feet long
- * No actual picture is available since all of them were given away; a schematic is given below

