Questacon MAKER PROJECT

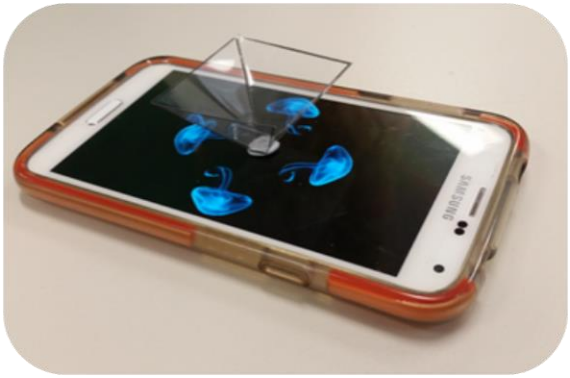
WORKSHOP TEACHER RESOURCE

Short Activity: Hologram Illusion

This practical activity combines math, technology and design to explore light interactions. A simple pyramid shape is used to reflect an image on the screen of a smart phone, demonstrating the importance of combining both old and new technologies.

Activity Objective

Students will create their own 'hologram' illusion.

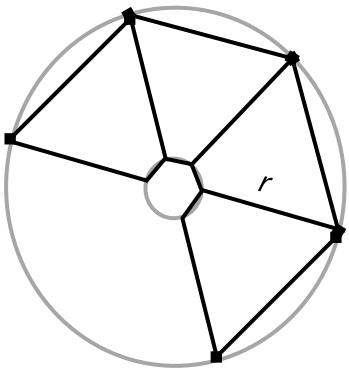


Materials and Tools

- An overhead projector sheet and marker
- A compass
- Scissors
- Clear sticky tape
- A smart phone
- A ruler
- (Optional) downloadable hologram template from the Teacher Resources webpage

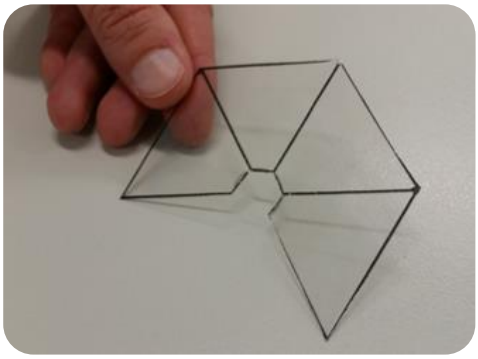
Activity Outline

Please ensure you follow your school WH&S procedures while conducting this lesson.



1. **Measure** the width of your smartphone screen and set your compass so that it is drawing with this radius, *r*.
2. Draw a circle of radius *r* onto the overhead projector sheet.
3. Using the compass, still set at radius *r*, mark consecutive points around the edge of your circle that are r distance apart. Connect these points with straight lines.
4. Close your compass to give the smallest possible radius. Use this to draw a circle at the centre of your larger circle.
5. Rule lines from the points marked on the outer circle directly to the inner circle, using your centre point as a guide. Draw lines to join the marked points on both the large and small circles (see image). Alternatively use the downloadable hologram template from the Teacher Resources webpage.

6. Cut out the four joined trapezoids along the straight lines of the large circle (left).
7. Fold along the long edges and tape the two free long edges together, to create a pyramid like shape.
8. Open YouTube on your device and play the hologram illusion video on the QuestaconNSTC channel.
9. Place the small end of your pyramid in the middle of your smart phone and check out the holograms (you can use Blu-tac to keep it in place).



10. **Investigate** the difference between viewing your hologram in sunlight vs. a darkened room. What happens if you changed the size of the pyramid? What about the size of your screen.

Further Investigation

Euclidian geometry can be used to further mathematical understanding of the illusion. Check out the app Euclidea (available for both Android and Apple) for a hands-on exploration.

Real-world examples of this kind of optical illusion include:

- Pepper's ghost illusion
- Teleprompters
- Periscopes
- Kaleidoscopes
- Mirror mazes

Curriculum Links

Our resources provide a framework for classroom activities and lesson plans that link to the Australian Curriculum in both the Science, and Design and Technology streams. Some of these curriculum links are highlighted below.

Science Inquiry Skills	Science as a Human Endeavour	Science Understanding
Science Inquiry Skills are incorporated across all year levels by encouraging questioning and planning, planning and conducting, processing and analysing data and information, evaluating, and communicating.	If this activity is extended to research and discuss the applications of illusions and geometry, where and how they are used in society (e.g. film production, teleprompters, periscopes), it links to the Science as a Human Endeavour Strand. *ACSHE158, ACSHE161, ACSHE228, ACSHE195*	This activity explores mathematics, especially geometry, and can be extended to include refraction, reflection and the physics of light.

Design and Technology Processes and Production Skills	Design and Technology Knowledge and Understanding
This activity provides hands-on engagement and skills and aligns with project management, design, and production with a strong emphasis on safety. *ACTDEP036*	Facilitating discussion surrounding real life applications of technology, and the impact of cultural, financial, ethical and social factors on design can extend the scope of this activity to incorporate additional curriculum links. *ACTDEK046*

If you have any questions regarding this teacher resource, contact the Smart Skills team at QSSI@questacon.edu.au, and connect with us on Twitter and Facebook.

If you would like to know more about our teacher professional development opportunities, contact the teacher professional development team at teachers@questacon.edu.au.