



SCIENCE FICTION SCIENCE FUTURE

On Display May 14th - September 24th, 2023

FIELD TRIP GUIDE

COX
SCIENCE CENTER
AND AQUARIUM



Fellow Educators,

Thank you for your interest in the Cox Science Center and Aquarium (CSCA). We look forward to meeting with you and your classes while you explore our exciting new exhibition, Science Fiction/Science Future!

This Field Trip Guide is designed to enhance your Science Center experience by helping you and your students prepare for your visit. This guide will answer questions such as: how long you can expect to spend at the science center and where you can eat your lunch. As you know, by preparing students in advance for their trip, they will better focus on the science content. Additionally, this guide includes some quick and fun activities to further enhance the educational experiences offered by the exhibit.

Have additional questions? Please call our Group Sales Coordinator at (561) 832-2026. It is our sincere hope that your experience embodies our mission to "Open Every Mind to Science." We'll see you at the Science Center!

Sincerely,

The Education Team

Cox Science Center and Aquarium



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Pricing and Policies

Pricing

Pricing for groups scheduled in advance

Self-guided visit admission per student.....\$10

Visit plus an additional demo/planetarium show per student.....\$14

Visit plus a laboratory program per student.....\$16-\$20

*One chaperone is required per 10 students at \$8 per chaperone up to a maximum of one chaperone per 5 students. Chaperone admissions must be paid as part of the group booking; they will not be allowed to pay separately.

Policies

- Reservations must be made at least 14 days in advance.
- A 20% deposit is required 14 days before your visit.
- Final payment must be made by the day of your scheduled visit.
- If final payment has not been received by the day of your visit, reservations are subject to cancellation.
NO REFUNDS WILL BE GRANTED.
- On the day of your scheduled visit, check in your group at the Front Desk under your group/contact name. Additional tickets may be purchased at the group rate on the day of your scheduled visit, if space is available.
- Increase in headcount should be called in as soon as possible to ensure availability.
- Acceptable forms of payment are check, money order, or credit card (Visa and Master Card).
- Please make checks payable to the *Cox Science Center and Aquarium* and mail to:

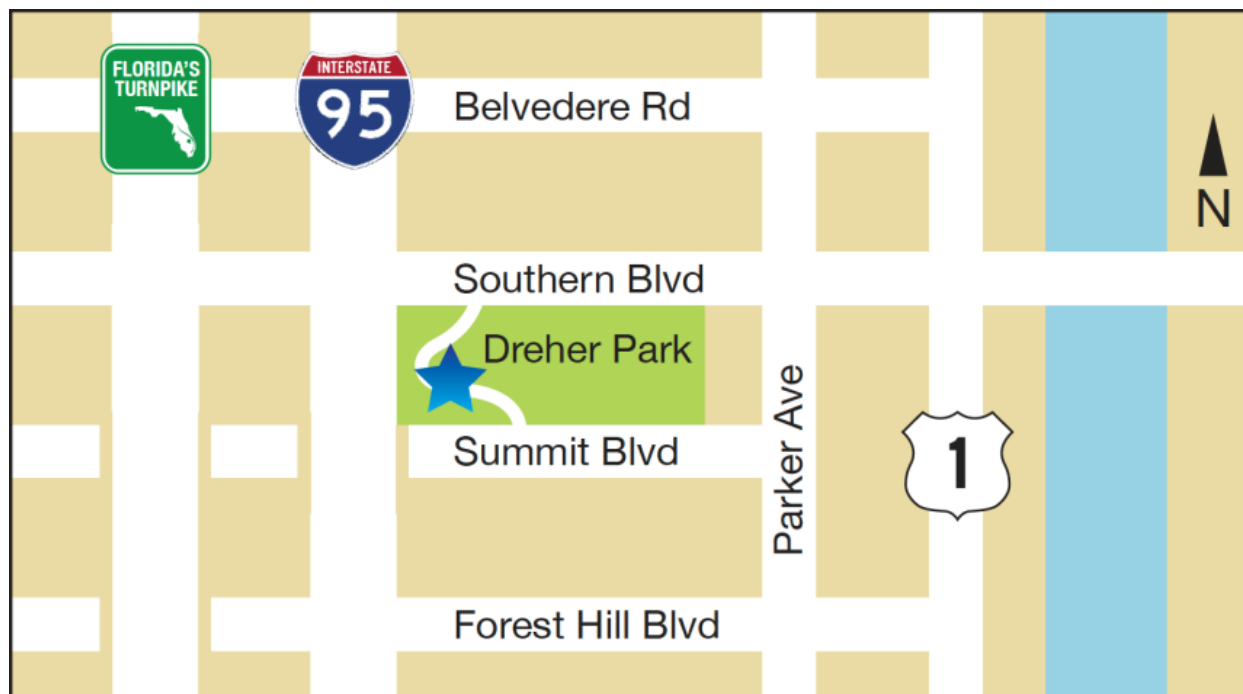
Cox Science Center and Aquarium, Attention: Group Sales
4801 Dreher Trail North
West Palm Beach, FL 33405

- Surcharges may apply for special event days and holidays.
- Science center memberships, coupons and other discounts are not applicable with school group rates.
- Teacher Members receive \$25.00 off first program booked only

Directions and Map

The Cox Science Center and Aquarium is located at:

4801 Dreher Trail North,
West Palm Beach, FL 33405.
Phone: (561) 832-1988



From the Florida Turnpike:

Take the Southern Boulevard exit 97 east, and continue just past I-95. Make a right into Dreher Park. Follow Dreher Trail to the Cox Science Center.

From I-95, heading south:

Take exit 68, Southern Boulevard and head east. Immediately over the I-95 bridge, make a right into Dreher Park. Follow Dreher Trail to the Cox Science Center.

From I-95, heading north:

Take exit 68, Forest Hill Boulevard east to Parker Avenue. Turn left on Parker Avenue (north) to Summit Boulevard. Turn right on Summit (west). At the first light (Dreher Trail North), turn right and continue around to the Cox Science Center.

Science Center Manners

PLEASE REVIEW THESE GUIDELINES WITH YOUR STUDENTS BEFORE YOU ARRIVE AT THE SCIENCE CENTER.

- Please walk, do not run, while in the science center. This is for your safety, as well as the safety of others.
- Please do not touch the glass on any exhibits, including the aquarium.
- Please enjoy yourselves and the hands-on exhibits, but leave them the way you found them.
- Please keep eating and drinking to the patio and picnic areas outdoors.
- Please have students remain with their chaperone at all times.
- Chaperones, please refrain from using your phones while supervising students at the Science Center.
- Violation of the rules could result in your group being asked to leave the Science Center.
- No refunds will be given.

Science Center Store Rules

- Students must be accompanied by a chaperone while in the gift shop. Please do not allow more than 5 children per chaperone in the store at one time.
- All sales are final, so please choose carefully.

What to Do at the Science Center

Arrival

Welcome! Once you arrive at the Science Center, have students either remain on the bus or line up on the patio space leading up to the front doors. Have your group leader check in at the front desk and get directions on where to go first. One of our CSCA staff members will welcome and orient your group as a whole.

Programs

Favorite programs such as planetarium shows, labs, and demonstrations can be scheduled for a small fee to be added in with your field trip. **Call (561) 832-2026 in advance to schedule.**

Lunch

Picnic tables are available on the Science Trail or you can eat within Dreher Park, surrounding the Science Center. Snacks are available for purchase at the snack bar located in the main exhibit hall.

Exhibits

There are many exciting exhibits to explore at the CSCA:

Aquariums of the Atlantic

See marine life from around the world in over 10,000 gallons of salt and fresh water aquariums. A living coral reef, sharks, eels, the invasive lion fish and a "touch tank" create this wonderful undersea exhibit hall.

Travel through Florida's diverse ecosystems of Everglades, Coral Reefs, Gulf Stream, and Open Ocean, home to the most beautiful native fish such as queen angels, lookdowns, moray eels, stingrays, seahorses and many more.

The Hidden World of the Everglades

Experience the Florida Everglades ecosystem and listen to sounds of Florida's wildlife in their natural habitat in this interactive exhibit about America's only sub-tropical wilderness.

River of Grass

Find out where our water comes from as you follow a drop of water from the Everglades to your faucet in this interactive display.

Florida Conservation Station

This learning station brings to life the immense variety of life in Florida and the complex relationships among living things. Visitors become real world biologists at these learning stations that include hands-on experiments and research activities.

Frozen Shadows

Lights, Action! 'Freeze' your shadow on the wall while you experience the effects of phosphorescence.

Marvin Dekelboun Planetarium

Palm Beach County's only public planetarium features a full-dome, newly renovated digital projection system. Sit back and be transported through the Universe with daily star shows, interactive astronomy presentations and other immersive science adventures. It's only \$4 more per adult/child visitor to book as a group.

Discovery Center Powered by PNC Grow Up Great

Children 6 years and younger can play and discover in their very own space! The Center's features include a giant 16 x 5-foot water table, a wall-sized Lite Brite play area, lounge area for parents, story time area with bookshelves, a dress-up area and more.

Nano Exhibit

Nano is an interactive exhibition that engages family audiences in nanoscale science, engineering, and technology. Visitors will be able to build a giant model of a carbon nanotube, explore progressively smaller magnetic materials, and explore the relative effects of static electricity and gravity using the Static vs. Gravity discs.

Hands and Minds on Science

Explore the basic principles of science with hands-on displays representing the states of matter, including solid, liquid, gas, and plasma displays. Continue through the gallery for more basic principles of electricity revealed through conversion machines and Jacob's Ladder.

Out of This World

Part of the Ambassadors of Space Exploration, the Science Center was honored by Apollo 14 Astronaut Dr. Edgar Mitchell with a long-term loan of an authentic Moon rock collected during the Fra Mauro expedition. This exhibit also features a Mars rock found in Nigeria in 1962, a 232 pound meteorite.

Mitchell was the Lunar Module Pilot on NASA's 3rd Moon expedition where Mitchell became the 6th man to walk on the Moon. Authentic mission footage accompanies this rare display.

Brain Teasers

Exercise your mind with puzzling challenges for all ages!

Conservation Golf Course

Enjoy our 18-hole miniature golf course focused on Florida native plant and animal conservation and designed by Jim Fazio and Gary Nicklaus. Set within a giant butterfly garden and a series of babbling brooks, this educational mini golf experience is sure to be unlike any other. **Price is \$1 per students for groups only.**

Hurricane Simulator

Have you ever experienced hurricane force winds? In our Discovery Hall, dial up the winds of a Category 1 Hurricane and see the 78 mph wind make your skin crawl! Visitors can also learn how to better protect their lives and property, and what to do once the storm has passed. The booth uses video, audio and high wind speed to make you feel like you are right in the storm!

Science On A Sphere

Science on a Sphere (SOS) is a room sized, global display system that uses computers and video projectors to display planetary data onto a six foot diameter sphere, analogous to a giant animated globe. Researchers at NOAA developed Science on a Sphere as an educational tool to help illustrate Earth system science to people of all ages.

Journey Through the Human Brain

The Cox Science Center in collaboration with the FAU Brain Institute presents the world's most advanced neuroscience exhibit which will inspire a new generation of scientists, technologists, and medical professionals. Journey Through the Human Brain features the latest research and innovations, with high-tech displays, immersive experiences, and state-of-the-art equipment. It takes a bottom-up approach to telling the story of the human brain, from the molecular level to the integrated circuitry that reveals how the brain informs our senses, creates our thoughts and emotions, and how it has evolved into the most complex structure in the universe. There is something for all ages in this permanent exhibit.

Fisher Family Science Trail

Enjoy the outdoors while continuing your science exploration! The upgraded quarter-mile trail connects 15 new exhibits, including a Physics Forest, FPL *SolarScape*, splash pad, gem panning station, shark tooth dig pit, a dinosaur walk, picnic areas and much more!



SCIENCE FICTION SCIENCE FUTURE

SCHOOL AND
VISITORS GUIDE

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exhibitions



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EXHIBITION OVERVIEW

Science Fiction, Science Future allows visitors to move objects with their minds, turn invisible, be mimicked by a robot and see augmented reality in action.

Are you ready for science fiction to become a reality...?

This visually compelling exhibition provides opportunities for creativity and innovation on a large scale. Engaging exhibits enable visitors to develop a deeper understanding of how science fiction ideas and concepts might become the science reality of tomorrow.

Science Fiction, Science Future engages visitors with exciting hands-on and full-body experiences incorporating robots, invisibility, mind control, holograms and augmented reality.

High impact graphic panels have been designed to explore science principles in everyday terms. They convey information on medical technology, communication and transport and include links to science fiction films and pop-culture references.

With interactive, engaging exhibits that challenge the mind and body, and a stunning visual environment, this exhibition sets the stage for a unique journey of science exploration, curiosity and discovery.



Key messages

Just like science fiction stories, curiosity, innovation and imagination underpin many scientific principles. This exhibition incorporates these notions to bring to life many innovations and inventions that were once considered possible only in film and literature.

The exhibition gives visitors the opportunity to practice science literacy skills, including:

- predicting, imagining, thinking critically, being curious and assessing fictions versus fact; and,
- developing positive attitudes toward science and scientists, being aware of the positive role of science in society, and being able to engage in social or political debates related to science

EXHIBITS

Hey, that robot's copying me

Robots are no longer just industrial machines but can now have social applications. Interact with this robot and see it analyze your emotions and mimic them.

Science Links: Robotics, Biology



Beam me up

Imagine if teleportation could really be the transport of the future. Enter this exhibit and give your family and friends the illusion of being beamed out and back again.

Science Links: Science in Society, Technology and Innovation, Special Effects



Mind control

Sensors can measure a huge range of things about our bodies, including our state of relaxation. Using this engaging exhibit, visitors compete against one another to see who can move a ball using only their brain waves.

Science Links: Neurobiology and Neuroscience



Invisible me

Cloaking features heavily in science fiction movies, either as personal invisibility cloaks or a method for making entire spaceships undetectable. Visitors interacting with this exhibit can see how all or part of them can become 'cloaked' as they watch themselves disappear on screen.

Science Links: Science in Society, Technology and Innovation, Special Effects





Augmented reality wristbands

Using advanced augmented reality technology, visitors can scan a special wristband and see a virtual 3D avatar appear on screen that reveals information about their DNA, medical condition and possible future career.

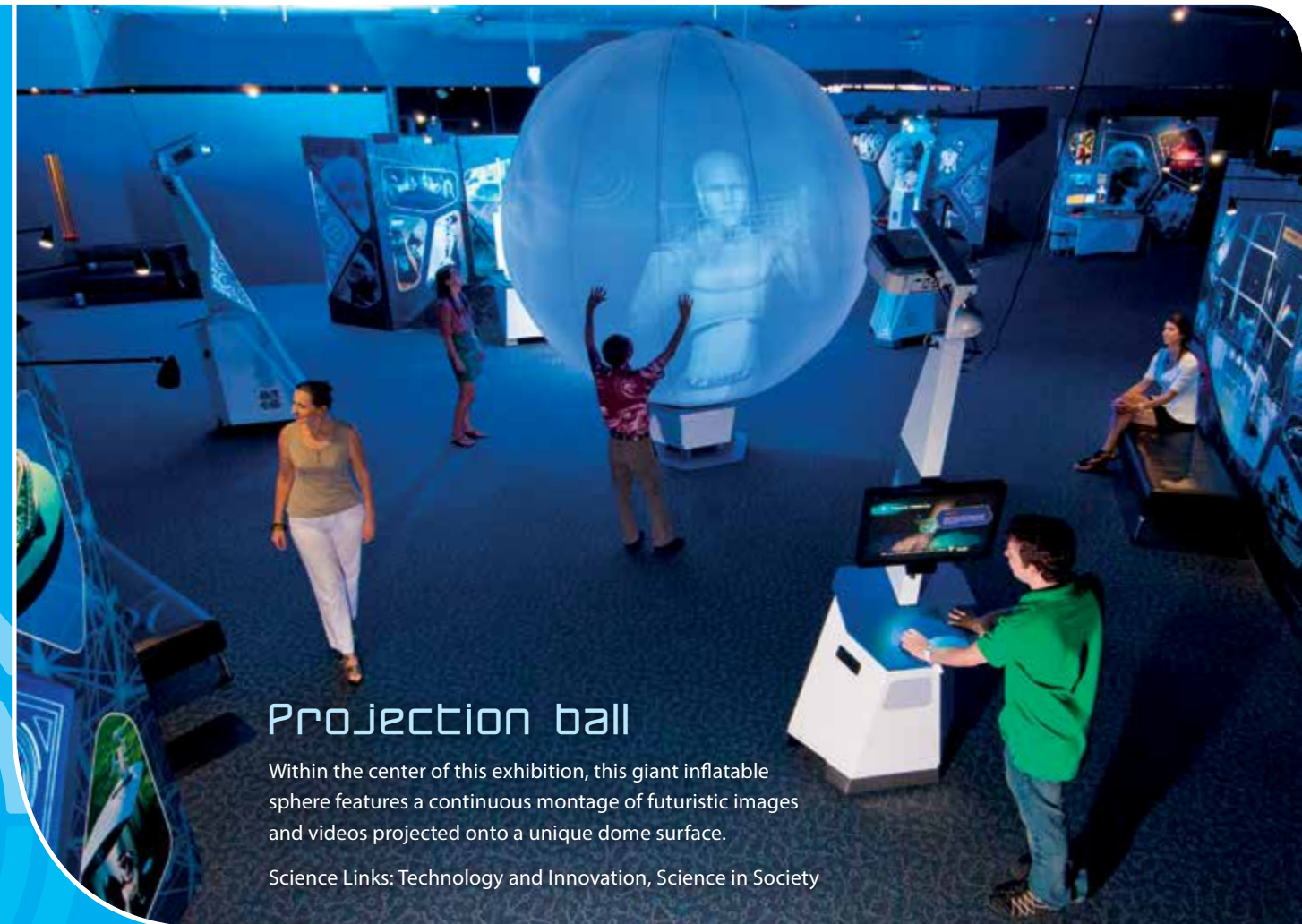
Science Links: Biology, Technology and Innovation, Ethics of Science



Eye control

Initially developed for people with limited body movement, eye-gazing systems and interfaces continue to evolve for a range of future applications. This exhibit asks the visitor to control various components on a computer screen using only their eyes.

Science Links: Biology, Technology and Innovation, Science in Society



Projection ball

Within the center of this exhibition, this giant inflatable sphere features a continuous montage of futuristic images and videos projected onto a unique dome surface.

Science Links: Technology and Innovation, Science in Society



Design a cyborg

This entertaining exhibit allows visitors to create a customized cyborg of the future. A range of organic and synthetic parts are available to create this augmented reality robotic friend.

Science Links: Technology and Innovation

EXHIBITS

Future past

This exhibit takes a look at the visions people had of the future from the 1890s to the present day. Did they get it right?

Science Links: Science in Society, Technology and Innovation



Choose your future

This quiz-like kiosk puts the visitor in the hot seat and challenges them with ethical dilemmas they may be faced with in the future, such as eating in-vitro meat and wearing an identity chip. A running tally shows each visitor how their answers compare with previous visitor data.

Science Links: Ethics of Science, Science in Society



Medibioscan 3000

Medical scans are integral in revealing information about our body systems. As this technology evolves we predict it will provide more information and even be able to treat diseases non-invasively. Visitors can enter the Medibioscan 3000 and see what it reveals about their internal body.

Science Links: Biology, Technology and Innovation

Draw your future

This exhibit encourages visitors to draw what they think the future might be like and then add their drawing to a wall featuring a collage of other visitor predictions.

Science Links: Technology and Innovation

EXHIBITS

A holographic future

Imagine having a 3D hologram appear out of a mobile phone. This exhibit explores how we might communicate through holograms in the future.

Science Links: Science in Society, Technology and Innovation, Physics



Our quantum future

A classic demonstration of light that underpins quantum physics and explores its links to the possibilities of transporter technology.

Science Links: Physics, Technology and Innovation

Wormholes through space

Some scientists believe it could be possible to journey through space and time by travelling through a wormhole. This exhibit reveals what a wormhole is and how we could travel through one.

Science Links: Physics, Technology and Innovation



Research questions, ages 4 – 8

Technology is anything that humans make which helps us to do things. Phones and computers are examples of technology, but so are paper and the wheel. What new technologies might there be in the future?

There are lots of ideas in the *Science Fiction Science Future* exhibition - maybe you might help invent one of them! To answer the questions on this worksheet, find each pictured exhibit and have a go. You might need to read the graphics panels for clues too.

Plasma Propulsion:

Question 1. What is propelling the rotor? _____

Hey, that robot's copying me:

Question 2. Name two ways robots are already being used.

- 1. _____
- 2. _____

Choose Your Future:

Question 3. Which question did you find easy to answer? _____

Question 4. Which question was hard to answer? _____

Future Past:

Question 5. Which year features a:

- Piano playing robot?_____
- A robot which vacuums the floor with its feet?_____
- Personal wings? _____

Mind Control:

Question 6. Which type of brain wave do you have when you are most relaxed?

Beam Me Up:

Question 7. Have scientists ever managed to teleport something? _____

What was it? _____

Question 8. Can this technology be used on humans? _____

Did you know?

Jules Verne was one of the first science fiction writers – around the end of the 19th century. He wrote about several pieces of technology that were later invented, including the submarine and the solar sail.

Research questions, ages 8 - 12

Technology is anything that humans make which helps us to do things. Phones and computers are examples of technology, but so are paper and the wheel. What new technologies might there be in the future?

There are lots of ideas in the *Science Fiction Science Future* exhibition - maybe you might help invent one of them! To answer the questions on this worksheet, explore the exhibition and have a go on each of the exhibits. You might need to read the graphic panels for clues too.

Our Quantum Future:

Question 1. What does this experiment show about how light travels? _____

Plasma Propulsion:

Question 2. What is propelling the rotor? _____

Question 3. Name two other places we could find plasma.

- 1. _____
- 2. _____

Choose Your Future:

Question 4. Which question did you find easy to answer? _____

Question 5. Which question was hard to answer? _____

Eye Control:

Question 6. How does the computer know where you are looking? _____

Question 7. Name one type of person who would find this technology useful. _____

Mind Control:

Question 8. Which type of brain wave do you have when you are at your most relaxed? _____

Hey, that robot's copying me:

Question 9. Name two ways robots are already being used in society.

1. _____

2. _____

Beam Me Up:

Question 10. Have scientists ever managed to use instantaneous transportation technology on something?
If so, what? _____

Question 11. Why can't this technology be used on humans? _____

Future Past:

Look at the video from 1910.

Question 12. Name three things they got right.

1. _____

2. _____

3. _____

Question 13. Name three things that didn't happen like they thought it would.

1. _____

2. _____

3. _____

Did you know?

In 2013, scientists in Japan created an artificial womb – which had previously been imagined in such science fiction works as The Matrix, Brave New World and Daedalus. It is hoped that this technology could help save prematurely born babies.

Research answers, ages 4 – 8

Plasma Propulsion:

Question 1. What is propelling the rotor?
Plasma, lightning or electricity are all acceptable answers.

Hey, that robot's copying me:

Question 2. Name two ways robots are already being used in society.
Robot pets for the elderly, assisting surgeons.

Choose Your Future:

Question 3. Which question did you find easy to answer?
Student's choice.

Question 4. Which question was hard to answer?
Student's choice.

Future Past:

Question 5. Which year features a:

- Piano playing robot? *1980*
- A robot which vacuums the floor with its feet? *1940*
- Personal wings? *1890*

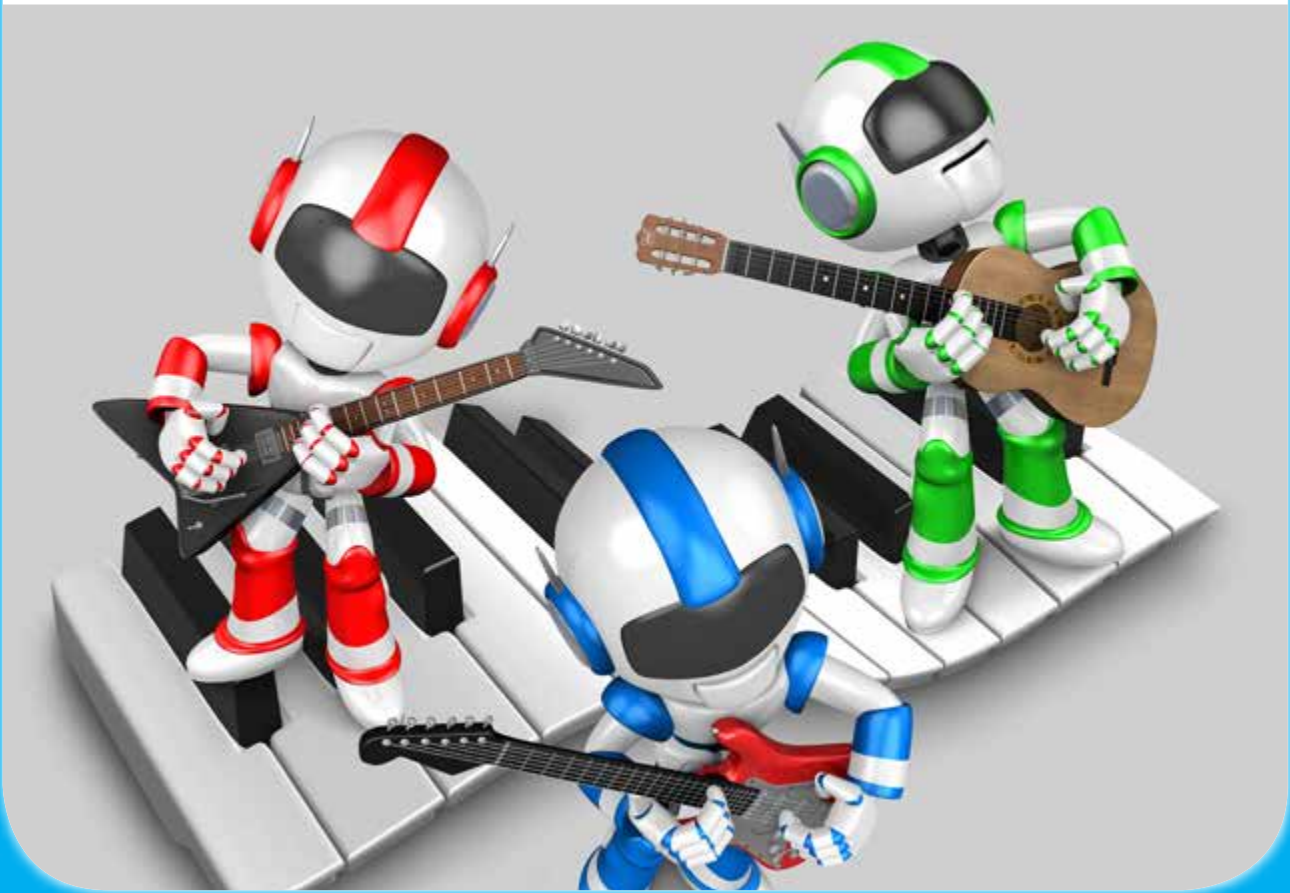
Mind Control:

Question 6. Which type of brain wave do you have when you are most relaxed?
Delta waves during deep sleep

Beam Me Up:

Question 7. Have scientists ever managed to teleport something? *Yes – light*

Question 8. Can this technology be used on humans? *No*



Research answers, ages 8 - 12

Our Quantum Future:

Question 1. What does this experiment show about how light travels? *It travels in waves*

Plasma Propulsion:

Question 2. What is propelling the rotor? *Plasma, electricity, or lightning are all acceptable answers.*

Question 3. Name two other places we could find plasma *Correct answers include (but are not limited to): lightning, stars, fire, plasma TV, fluorescent/neon lamps.*

Choose Your Future:

Question 4. Which question did you find easy to answer? *Student's choice*

Question 5. Which question was hard to answer? *Student's choice*

Eye Control:

Question 6. How does the computer know where you are looking? *There is a special camera tracking where your eye is looking.*

Question 7. Name one type of person who would find this technology useful
Correct answers include: People who cannot use their limbs to control the mouse; scientists researching how people find and track information on a screen.

Mind Control:

Question 8. Which type of brain wave do you have when you are at your most relaxed? *Delta waves while sleeping*



Hey, that robot's copying me:

Question 9. Name two ways robots are already being used in society. *Robot pets for the elderly, assisting surgeons*

Beam Me Up:

Question 10. Have scientists ever managed to use instantaneous transportation technology on something? If so, what? *Yes, on light*

Question 11. Why can't this technology be used on humans? *The human body and brain represents too much information to store and transfer. Our computers are not that large or fast.*

Future Past:

Question 12. Look at the video from 1910. Name three things they got right *Possible answers include: Firefighting/policing from the air; voice typing; video telephone; planes and airships.*

Question 13. Name three things that haven't happened like they thought it would. *Possible answers include: police and firefighters flying using strap-on wings rather than in helicopters; barber machine; video telephone is much more compact than their idea; voice typing does not use a typewriter and megaphone; airplanes used for most air travel.*

Post-visit Classroom Activities

The Ethics of Innovation

Encourage your children to write essays or conduct debates on the ethics of a new or proposed innovation. For younger children you could hold a class discussion and then have them write down one or two thoughts or draw a picture.

Here are some example discussion points:

Would you eat in-vitro meat?

- Would it gross you out to know your food was grown in a jar?
- What if it meant no more animals had to be killed?
- Would it be better or worse for the environment?

Would you replace your legs with prosthetics to run faster?

- Would you still be able to compete in games/sports with 'regular' people?
- What if people changed their bodies for cosmetic rather than therapeutic reasons?
- When do you stop being 'you'?

Would you want to live to be 150 years old?

- What if your loved ones made the opposite choice to you?
- Would you still expect to retire at 65? What would you do for the next 65 years?
- How would it affect the world's population if people lived longer? How would that affect the environment?

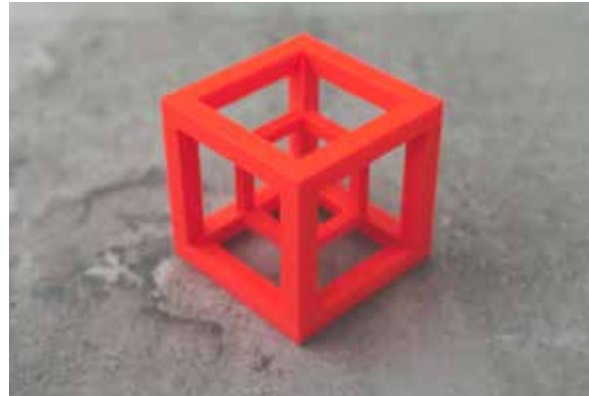


Fourth Dimension Battleship

Introduce students to the idea of a fourth dimension using the game Battleship and explore how it is used in science fiction.

You will need:

- Grid paper for each student
- If possible, an animation of a hypercube (this can be found easily on the internet); otherwise an image of a hypercube will do.



What to do:

Children measure a four inch (10 centimeter) line and mark coordinates using the grid (e.g. each segment of the line could be assigned a number from 1-10). The students draw marks on their line to represent two ships and then take turns trying to guess where each other's ships are.

After a few minutes get them to stop and discuss whether it was easy or hard. They only had one set of coordinates to deal with because it was a line. This is called the first dimension.

Now have students draw a square and play the game again, but with more battleships allowed. Allow the students to realise that to play the game successfully they will need a second set of coordinates. Discuss whether they should use numbers again or something else (maybe letters). This is the second dimension. Allow them to play for a little while as this is a fun game and it will improve their graphing skills.

Now ask the students how they could add a third dimension onto their grid – perhaps by extending it upwards. What's that called? Height. If you have open ended cubes they can try this, otherwise make it a thought experiment or use the classroom to help them visualize it.

Say we wanted to describe where something was inside this cube. First we could give a number, then a letter. That would show where it was relative to the base of the cube. But what if the object was

floating somewhere in the middle of the cube? Like an airplane flying above the ocean instead of a battleship floating on its surface. Again allow children to realize we would need yet another set of coordinates and choose what it could be (colors? Types of car?) How many coordinates do we have now? Three – the third dimension.

Now what if we added a fourth dimension to the cube? Now we have a hypercube and we need four coordinates to find our way around in it. This is very hard for us to imagine, because we live in three dimensions and we have not experienced a fourth (unless you include time, but we still experience time very differently to the three spatial dimensions).

We can imagine what this hypercube might look like if we viewed it here in our three dimensions. Show conceptualization. This hypercube (or tesseract) idea is in *The Avengers* movies as well as lots of other science fiction.

Extend and Discuss

Read *A Wrinkle in Time* by Madeleine L'Engle and discuss how the fourth dimension is envisaged in this book.

You might also want to watch *The Avengers* depending on the age of your students. What are the differences in the use and portrayal of the fourth dimension in these two texts? If we really had access to this kind of technology/power, what would be the benefits of it? What would be the drawbacks? When would it be OK to use it?

English/Science Crossover Lesson

Children explore the links between science fiction novels and/or TV and film, and actual technology – e.g. trans-dimensional travel in *Doctor Who*, DNA technology in *Gattaca*.

Some interesting questions for discussion might be:

- What roles does the technology play in the text? Is it good or bad?
- Is this technology feasible? What sort of similar inventions or scientific advancements have already been made?
- Should we invent this technology?
- What sort of rules would be needed to govern its use?



Robotics

For a classroom-based course on robotics good options include; Edison, Lego Mindstorm, or Beebots (for the early years). These all introduce children to programming in a very simple and accessible way.

For an extended or whole school project: Undertake explorations underwater using OpenROV and OpenExplorer. OpenROV is an open source underwater exploration unit that many schools use to explore their local rivers, lakes and beaches. The results of your explorations can be shared on OpenExplorer. You can also connect this with past technologies and ideas about underwater exploration such as in *20,000 Leagues Under the Sea* by Jules Verne.



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