

Institute for Educational Advancement Summer 2021 Academy Program

Online Classes – Ages 6 to 9

Cartooning for Creatives (6-9)

Mondays and Wednesdays from 9:00-10:00am PDT

Do you like drawing? Playing with words? Then this is the class for you! In this class, we will explore drawing and writing using fun and exciting exercises from cartoonist, author and teacher Lynda Barry's book *Making Comics*. We will draw with our eyes closed, draw as many things as we can in one minute, even draw portraits of ourselves as astronauts and pieces of fruit. We will learn about making comic book panels and storyboarding, and create stories and comics based on our own interests and ideas. We will also read and look at different types of cartoons and comics together for inspiration. At the end of this class, students will have amassed enough work to put together a book of comics. This class will focus on encouraging each student's unique drawing and writing styles. Artists and writers of all skill levels are welcome. A supplies list will be provided upon enrollment in the course.

Intro to Brain Anatomy (6-9)

Mondays and Wednesdays from 10:00-11:30am PDT

Do you wonder how the brain works? How your brain is different than another mammal? In this class, students will explore the science of neuroanatomy through an introduction to the basic structures and functions of the brain. Through creative hands-on activities and experiments, students will learn about what neurons are, how they are connected, and delve into more challenging areas of inquiry concerning how the brain computes to enable vision, audition, memory, motor control, and other modalities. Students will also be able to identify what happens when an area of the brain is damaged through research and exploration of previous phenomena. MATERIALS NEEDED: A \$25 materials fee is required.

Kitchen Chemistry (6-9)

Mondays and Wednesdays from 10:15-11:15am PDT

You don't need an expensive laboratory to challenge your chemistry skills - look no further than your kitchen cabinet! By combining everyday ingredients, you can create exciting colors, weird sounds, creepy textures and sometimes - explosions! In this class, students will learn essential scientific equations and elements, conduct safe and fun experiments, and watch different materials react in surprising ways as they explore the

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exciting world of science. Mastery will be demonstrated by a project using the processes of the Scientific Method: hypothesis, observations, experiment, analysis, results conclusions and discussion. A supplies list will be provided upon enrollment in the course.

Action Engineering (6-9)

Mondays and Wednesdays from 11:30am-12:30pm PDT

Pop it up, fling it far, light it up, and make it climb. Use circuits, stored energy, friction, and mechanical motion and make your creations MOVE! Each session will introduce students to a simple mechanism that will allow their creations to come to life. Throughout the course, students will be given challenges with specific criteria and constraints. We will work through the design process (Explore -->Plan -->Create -->Test -->Refine) to solve these challenges. MATERIALS REQUIRED: A \$30 materials fee is required for purchase of a supplies kit. A list of additional household materials such as recyclables and basic craft supplies will be provided upon enrollment in the course.

Bees & Other Builders (6-9)

Mondays and Wednesdays from 1:15-2:15pm PDT

The animal kingdom is buzzing with amazing architects of structures and systems! City-like beehives, earthworm tunnels, termite mounds, weaver bird nests, and beaver dams are examples of spectacular structures designed and built by animals. This class will look not only at animals' impressive structures, but also how some species help keep nature in balance through pollination, decomposition, and more! Students will learn from and about animal builders, demonstrating their mastery by building a product inspired by an animal architect. A supplies list will be provided upon enrollment in the course.

Space Academy (6-9)

Mondays and Wednesdays from 2:30-3:30pm PDT

Planning a trip to space? Your dream launch may be closer than you think! Space X is making it more and more possible that you'll get to travel via space capsule, so wouldn't you like to know what to expect before you go? What daily tasks will you need to perform? What effects will zero gravity have on your body? How is a spacesuit put together? Through research, hands-on projects and group discussion, students will map their mission while learning what it really takes to become an astronaut and how space travel is even possible! Mastery will be demonstrated through creative projects illustrating concepts covered.

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You Matter: An Exploration of Properties of Matter (6-9)

Tuesdays and Thursdays from 9:00-10:00am PDT

If you have mass and take up space, you matter! More accurately, you ARE matter – and so is the air you breathe, the water you drink, and anything else that fits those two criteria. In this class, students will explore the fascinating states and properties of matter. They'll discover the answers to why certain materials are magnetic, can catch on fire, or are more likely to be involved in exciting chemical reactions. If you're interested in finding out more about how mercury can be a liquid metal, what it means to be radioactive, or many other fascinating physical and chemical properties, come join in the discovery!

Fungi Fun (6-9)

Tuesdays and Thursdays from 10:15-11:15am PDT

Calling young mycologists! Come and explore the ancient origins of fungi and amazing ways that fungi could save our planet for future generations. Through experiments and field science, students will explore different ways that fungi can be both helpful and harmful, then come up with their own ideas for fungi-based inventions. A supplies list will be provided upon enrollment in the course.

How to Eat a Poem (6-9)

Tuesdays and Thursdays from 11:30am-12:30pm PDT

In this class that draws on writing exercises developed by legendary poet-teacher Kenneth Koch, students will explore the five senses through the art of poetry. Together we will write Color Poems, Noise Poems, Comparison Poems, Wish Poems, and many more poems combining various strategies for entering into the world of writing. This class will encourage students to write freely and creatively, and develop an appreciation for the infinite possibilities that arise when we begin to play with language. Students will read and listen to poems by children as well as age-appropriate poems by Mary Oliver, Shel Silverstein, Joy Harjo, and more. We will also explore visual modes of art-making that complement our literary adventures. At the end of our class, student work will be compiled into an anthology they can take home for their reading enjoyment.

Mythology of Many Lands (6-9)

Tuesdays and Thursdays from 1:15-2:15pm PDT

Are you enthralled with exciting stories, fantastical creatures, and other cultures? You are not alone! Humans have been telling stories for 3,000 years. Prepare to journey around the world, through time, and in and out of reality as you explore the mythology, folklore and fairytales that have shaped cultures and imparted words of wisdom! Students will

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listen to, read, write and tell stories from near and far while practicing grammar, vocabulary, and presentation skills.

Online Classes – Ages 9 to 12

California's Awesome Nature (9-12)

Mondays and Wednesdays from 9:00-10:00am PDT

Where can you swim at the beach, ski an alpine slope, raft down a river, and camp under a starry desert sky? In this class, students will discover what makes California's geography, climate and weather so diverse and appealing to its 39 million-plus residents. By charting California's four distinct geographical regions and the critical role that water plays in shaping the mountains, deserts, valleys, and coastlines, students will build key vocabulary related to topographical features, geologic processes, and weather patterns unique to places like the Salton Sea, where both human and natural forces impact landscape and livability. Get ready for all that California's beaches, cliffs, lava beds, valleys, waterfalls, and dunes can teach! Mastery will be demonstrated in a comprehensive final project where students present the history, a model of the topography, and the impact of water, weather, and humans on a particular geographical region of California.

Myths and Monsters (9-12)

Mondays and Wednesdays from 10:15-11:15am PDT

Cultures all around the globe feature fantastical creatures, including fire-breathing dragons, bizarre chimerical hybrids, quasi-humans, and multi-headed monstrosities. Behind the myth, however, there lies a kernel of truth based in biological fact. In Myth & Monsters, we will separate fact from fantasy as we uncover the real-world origins and scientific explanations behind some of the world's best-known mythical beasts, including dragons, unicorns, Bigfoot, the Chupacabra, werewolves, Pokemon, and more. Mastery will be demonstrated through hands-on observation of fossils and animal artifacts, in-depth group discussion on cultural beliefs, and tests of acquired knowledge.

Universal Redo: Reimagining the World in Minecraft (9-12)

Mondays and Wednesdays from 11:30am-1:00pm PDT

Imagine that it is 2030 and the world has been remade! It has been said that youth are the leaders of tomorrow, but in this course, students will have an opportunity to lead today. Each week, students will engage with different prompts to explore current global and local systems that govern society and our impact on Earth. Through in-depth research, data

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analysis and engaging discourse, students will be given the opportunity to reimagine and build these systems in more equitable, efficient and sustainable ways. Welcome to Minecraft where Utopia is just a few clicks away!

Mission to Mars (9-12)

Mondays and Wednesdays from 1:15-2:15pm PDT

What is it like to plan a mission to Mars? In this class, students will delve into the world of interplanetary exploration as they investigate the surface of Mars and plan their own missions to the Martian surface. Students will learn to access and analyze data from NASA spacecraft and gain an understanding of the variety of techniques and data available to study planetary surfaces. With an understanding of relevant scientific techniques and current questions about the Martian surface, students will not only outline their own mission, but select a landing site and scientific instruments within engineering constraints. Mastery will be demonstrated through a set of mission planning exercises that will lead to development of a mission plan that is scientifically viable and possible.

CoderZ II (9-12)

Mondays and Wednesdays from 2:30-3:30pm PDT

This course is a continuation of CoderZ I, however, students may join without having taken the course. CoderZ is an engineer's dream, an online platform where students will build and program virtual robots. Through engaging activities, students will explore the world of engineering and coding language (block coding based on MIT's Scratch), as they animate their programmable robots. We will research and test designs and develop our bots to overcome field challenges with obstacles and turns with increasing difficulty. Each class will provide students with the tools to define a problem, create a solution and share their results. Mastery will be demonstrated by the application of the engineering and coding methods in field challenges, and the construction of creative solutions.

MATERIALS NEEDED: A \$40 materials fee for access of a CoderZ license is required.

Nuclear Energy (9-12)

Tuesdays and Thursdays from 9:00-10:00am PDT

Much research has been done to find alternative energy sources that promote sustainability. The understanding that radioactive materials could be used as alternatives to fossil fuels sparked an ongoing societal debate about the safety and efficiency of nuclear energy that continues today. In this class, students will investigate different perspectives, as they review the science, history, and public health implications of nuclear energy. Students learn about nuclear fission and the process of radioactive decay, as well

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as the history and societal implications of using nuclear energy as a power source, and also have the opportunity to explore nuclear fusion and its potential as an energy source.

Jurassic Life (9-14)

Tuesdays and Thursdays from 10:15-11:15am PDT

Welcome to Jurassic Life, the class 65 million years in the making! Get ready to separate the science fiction from the science fact as we take an in-depth look at one of the greatest film franchises in history, Jurassic Park. Students will have the opportunity to learn about dinosaur evolution and biology, all while examining real fossils and paleontological artifacts. We'll discuss what the movies got right, what the movies got wrong, and even have a chance to create some of our own Mesozoic movie monsters! If you haven't seen any Jurassic Park flicks, start watching! Students will need to be familiar with the films to get the most out of this class.

Backyard Astronomy (9-12)

Tuesdays and Thursdays from 11:00am-12:30pm PDT

The movement of the sun, planets and stars has been used for timekeeping and navigation since antiquity. In this course, students will create simple devices (sundial, gnomon, basic astrolabe, cereal-box spectrometer, and a marked-out meridian line) and use them to estimate their location, local time, time relative to the stars, and more. They will also map the analemma, the path the sun makes in the sky, and use it to deduce their track through space and time as the Earth moves along its orbit. Along the way, we'll learn some geometry and trigonometry, and the OpenSCAD programming language. Mastery will be demonstrated through experiments and interpreting the data.

Prerequisites: Basic algebra (for example, what to do with $2x + 3 = 5$) is required. Some programming experience will be helpful, but not essential. Students must have access to an outdoor space which is in full sun around their local noontime (for example, a sunny backyard or a south-facing large window). A supplies list will be provided upon enrollment in the course.

An Exploration of History through Art (9-12)

Tuesdays and Thursdays from 11:30am-12:30pm PDT

Humans have been creating art for at least 30,000 years! Ever since those early cave paintings, art has been an important presence in cultures around the world, from the pyramids of Ancient Egypt and sculptures in Ancient Greece to tapestries in the Middle Ages and ceremonial masks in Africa. In this class, students will explore the great works of

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well-known painters and sculptors and these artists' biographies, explanation of techniques, and what inspired them to make art. Students will then create their own works of art inspired by artistic movements and styles including pointilism, surrealism, abstract expressionism and more! A supplies list will be provided upon enrollment in the course.

Virtual Escape: Mansion Mystery Adventure (9-12)

Tuesdays and Thursdays from 1:15-2:15pm PDT

Your team of investigators has been hired to solve a mystery at the strange and remote Shady Hollow Mansion. Together with your team, you will gather the information and clues necessary to solve puzzles and problems, reveal passwords, and decipher codes. Clues and hints could be anywhere. Solving one puzzle may provide the clue to unlock another! The mystery will be impossible to solve without the help of your investigative team, so collaborating, communicating, and sharing with your teammates will be an important part of successfully advancing through the case; however, you must also keep your discoveries safe from prying eyes! In order to ensure only your team will be able to access important information, you will need to create your own codes and puzzles for your teammates to solve before they can safely unlock the information you want to share. Can your team solve the mystery in time? This escape-room inspired course will encourage students to observe, gather and evaluate evidence, think critically (and laterally!), communicate findings, and problem solve in a collaborative setting. Mastery will be demonstrated through ongoing group problem solving and development of original puzzles. Course requirements: Students must be comfortable working in groups and communicating with peers.

Medieval Battles: Land and Sea (9-12)

Tuesdays and Thursdays from 2:00-3:30pm PDT

Technology is often driven by the need to defend territories or the desire to conquer new ones. In this class, students will learn about offensive and defensive techniques in medieval warfare. They will learn Tinkercad to design and 3D print models of some of these. Students will then take on the role of military advisors and invent "secret weapons" that would have been plausible at the time but were not invented until much later. For the final sessions of the course, we will role play famous land and naval battles of the period, but with a twist! Students will incorporate their own secret weapons to the respective sides. Mastery will be demonstrated by being able to discuss and apply strategy and technology appropriate to the period.

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Math for Future Architects (9-12)

Tuesdays and Thursdays from 2:30-3:30pm PDT

Did you know that the link between math and architecture goes back to ancient times, when the two disciplines were virtually indistinguishable? Pyramids and temples were some of the earliest examples of mathematical principles at work. Today, math continues to feature prominently in building design, from the Kunsthaus Graz in Austria, to Seattle's Central Library, to LA's Disney Concert Hall. Through hands-on projects, students will advance their application of geometry concepts such as dimensions and conversions, area and volume, shapes and angles, 2- and 3- dimensional pictures, rays, lines, segments, and more! Mastery will be demonstrated by students' ability to independently construct and create structures, building on their intuition that Math + Design = Awesome.

Beyond Lord of the Rings (9-12)

Tuesdays and Thursdays from 2:30-4:00pm PDT

What are the secrets to telling a story as good as The Lord of the Rings? In this class, we're not only going to talk about the amazingness of Middle Earth, but capture the secrets of storytelling in LOTR to make our own fantastic worlds. What if Golem used the ring to rule the world? What if Sauron was actually a good guy? What if everyone in the series was replaced with a cat? You'll be able to come up with your own outrageous story idea, whether in Middle Earth, or beyond. Using the same writer's secrets that J.R.R Tolkein did, you'll make any story you touch turn to gold. We will make our own Lord of the Ring quiz, and culminate by putting together all our stories into a new masterpiece folio, our own There and Back Again.

Online Classes – Ages 12-14

Organic Chemistry (12-14)

Mondays and Wednesdays from 9:00-10:00am PDT

Orbitals, isomers, chirality, valence bonds, benzene rings... organic chemistry is a language all its own! Students will increase their O-Chem fluency by delving into the structure, properties, reactions, and mechanisms of organic (or carbon-containing) compounds. This class will expand upon any previous chemistry knowledge of functional groups and Lewis structures to molecular geometry, valence bond theory, and hybridization. By the end of the course, students should be able to predict how various carbon-containing compounds will react or restructure themselves based on the chemicals and conditions present. Mastery will be demonstrated by students' ability to identify,

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differentiate and utilize organic compounds to generate chemical reactions through calculations and laboratory exercises.

Pathology of Viruses (12-14)

Mondays and Wednesdays from 10:15-11:15am PDT

Students in this class will learn all about molecular biology and biochemistry of viruses and virus infection. Topics will include the fundamentals of virus structure, virus multiplication (lytic and lysogenic cycles), disease mechanisms, prevention and intervention of infection, and how viruses pose threats to human and animal health through emergence and evolution. We will discuss selected examples of viruses that impact our world and everyday life, starting with viruses pathogenic to animals and then moving on to learning a "bug per day." At the course's conclusion, students will understand principles and themes in modern day virology, including virus pathogenesis, vaccination, anti-viral drugs, and gene therapy.

Cetology (12-14)

Mondays and Wednesdays from 11:30am-12:30pm PDT

Thar she blows! Few creatures inspire such feelings of awe and wonder as do whales. In Cetology we will take an in-depth look at the natural history of these remarkable animals, from their aquatic adaptations and ecology to their fascinating evolution from landlubber to leviathan. We will discuss the impacts whales have had on human culture as well as the impacts human culture has had on whales. Mastery will be demonstrated by students developing a final project on ecological conservation efforts to support the preservation of these amazing creatures.

Math Circle (12-14)

Mondays and Wednesdays from 1:15-2:15pm PDT

Mathematicians are Pattern Sniffers, Experimenters, Describers, Tinkerers, Inventors, Visualizers, Conjecturers, and Guessers (according to Cuoco, et. al in their iconic paper "Habits of Mind: An Organizing Principle for Mathematics Curricula). Math Circles allow students to establish these habits of mind in a comfortable environment while tackling 'low ceiling, high threshold' problems that are easy to understand but allow exploration at different levels. We revisit ideas again and again from different viewpoints. Math Circles are both a time to get together and discuss mathematics and also a time to circle around deep ideas in mathematics, seeing them from different viewpoints.

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The Manhattan Project (12-14)

Mondays and Wednesdays from 2:30-3:30pm PDT

The nuclear bomb is one of humanity's greatest and most dangerous achievements, and it began as a top secret mission called The Manhattan Project. In this class, students will trace the steps that scientists and military personnel took to harness nuclear energy and eventually use this weapon to end World War II. Students will analyze primary source documents that chronicle this time in U.S. history, study the beginnings of nuclear fission, and debate and discuss the use of nuclear technology in our past as well as now. Student mastery will be demonstrated through a creative final project that covers the course's content.

Digital Civics (12-14)

Tuesdays and Thursdays from 9:00-10:00am PDT

Calling all changemakers! We use technology more than ever, but how can we make sure we're using it for good? This class will explore various approaches to becoming changemakers for our communities through digital civics. Students will be able to identify reliable sources versus misinformation, utilize effective strategies for communicating information, and create impactful media content. Students will be encouraged to apply these skills through projects that raise awareness of causes important to them and their communities.

Jurassic Life (9-14)

Tuesdays and Thursdays from 10:15-11:15am PDT

Welcome to Jurassic Life, the class 65 million years in the making! Get ready to separate the science fiction from the science fact as we take an in-depth look at one of the greatest film franchises in history, Jurassic Park. Students will have the opportunity to learn about dinosaur evolution and biology, all while examining real fossils and paleontological artifacts. We'll discuss what the movies got right, what the movies got wrong, and even have a chance to create some of our own Mesozoic movie monsters! If you haven't seen any Jurassic Park flicks, start watching! Students will need to be familiar with the films to get the most out of this class.

Minecraft Builders II (12-14)

Tuesdays and Thursdays from 10:15-11:45am PDT

Description coming soon!

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Women in Science (12-14)

Tuesdays and Thursdays from 1:15-2:15pm PDT

You've probably heard of Marie Curie, the first woman to receive a Nobel Prize for her discovery of radioactivity. But what about Rosalind Franklin, Ellen Ochoa, Ada Lovelace, Katherine Johnson, Mary Anning, Virginia Apgar, Barbara McClintock, or Jennifer Doudna? Without these women, whose work has spanned centuries, science would be missing invaluable contributions to the fields of genetics, astronomy, medicine, technology, paleontology, and environmental science. Students will explore the scientific contributions of these and other female scientists throughout history and geography, including those who are changing the world today.

Global Awareness (12-14)

Tuesdays and Thursdays from 2:30-3:30pm PDT

In the 21st Century, it is more important than ever to understand that events around the world can affect us here in the United States. Students will learn to think critically about world events using their historical and geographical contexts. Though news headlines can be complicated, this class will help clarify them by examining a nation's shared borders, need for resources, diverse cultures, and more. At the end of the class, students will be able to locate countries that influence global affairs, identify their capitals, and provide a summary of why they are in the news.

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In-Person Classes – Ages 6 to 9

Balloon Force! Newton's Laws of Motion (6-9)

Mondays and Wednesdays from 12:15-1:45pm

Up, up, and away we go! This course will explore how balloons can be used to power a vehicle, absorb chemicals, or propel a hovercraft. Students will experiment with physics, chemistry, aerodynamics, and more using ordinary balloons. MATERIALS NEEDED: A \$25 materials fee is required.

Science in Action (Ages 6-9)

Tuesdays and Thursdays from 10:00-11:30am

In this class students will conduct hands-on experiments to investigate questions that span across divisions of science. Explore the world of chemistry, geology, biology and more through exciting scientific projects. From how to design and cook in a solar oven to investigating the origin of amber to what you'll find hiding inside an owl pellet, this class will inspire the curious young mind to discover through questioning, gathering and evaluating evidence, and communicating to others their scientific findings. Mastery will be demonstrated by the application of the scientific method to lab and field experiments, and the construction of creative projects. MATERIALS NEEDED: A \$25 materials fee is required.

Robotics: Get Rolling! (6-9)

Tuesdays and Thursdays from 12:15-1:45pm

What is a robot, and how does it work? Stretch your imagination by having fun with engineering and coding to explore the world of robotics! In this class, students will become confident learners as they undertake real-world solutions. Skills will be more complex thinking, group cooperation, and problem-solving. Mastery will be demonstrated by the application of the building and coding methods to construct independent and group projects. MATERIALS NEEDED: This course requires the purchase of a Sphero Mini robot. Price varies depending on seller. Information on purchase options and tech requirements will be provided upon enrollment in the course.

In-Person Classes – Ages 10 to 14

Expository Writing: Writing for Impact (10-14)

Mondays and Wednesdays from 10:00-11:30am

Whether you're a budding journalist or astrophysicist, learning the ropes of writing will help you communicate your big ideas with clarity and ease. This course will take the

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mystery out of learning to write well by breaking down the writing process into manageable steps. Using a program called the Hochman Method from The Writing Revolution, students will learn writing strategies that will equip them to face any blank page with confidence. Sessions will focus on specific techniques and targeted feedback that match each student's needs. At the same time, students will have opportunities to pursue content based on their particular interests, with the objective to develop enjoyment and motivation in the writing process, in addition to skill and technique.

Robotics: Makebot Challenge (10-14)

Mondays and Wednesdays from 12:15-1:45pm

Students in this class will be presented with advanced robot challenges through research, testing and building designs using multi-port Hub motors and actuators. Skills will be higher ordered thinking, group cooperation, and problem solving. Mastery will be demonstrated by the application of the engineering and coding methods in field challenges, and the construction of creative projects. MATERIALS NEEDED: This course requires the purchase of a mBot Robot Kit. Price varies depending on seller. Information on purchase options and tech requirements will be provided upon enrollment in the course.

Chemistry Lab (10-14)

Tuesdays and Thursdays from 10:00-11:30am

How do the 118 elements of the periodic table combine and react to create the world around us? This class will cover the properties of matter, atomic structure, acids and bases, electrochemistry, types of reactions, and chemical bonds. Through hands-on experimentation, engaging discussion, and examination of groundbreaking chemists throughout history, students will become comfortable predicting reactions and carrying out the scientific method to explain their outcomes. Mastery will be demonstrated by explaining the work of a past or present chemist of your choice to your classmates. MATERIALS NEEDED: A \$25 materials fee is required.

Your Afternoon Podcast (10-14)

Tuesdays and Thursdays from 12:15-1:45pm

Description coming soon!