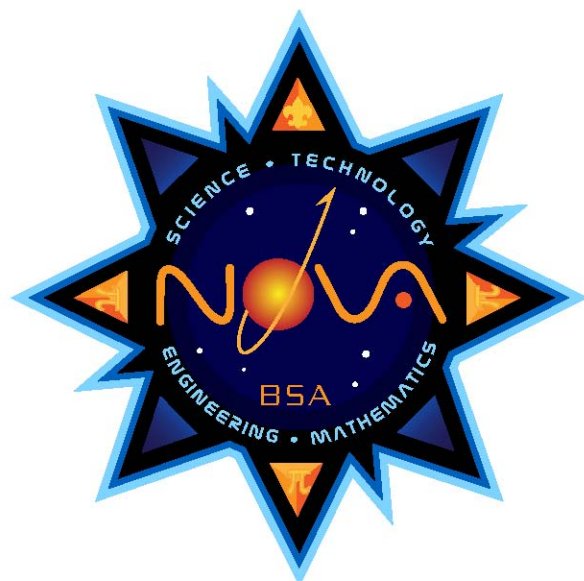




Golden Gate Area Council
Summer of STEM 2020
Activity Guide



About this Guide

This guide is a resource for Scouts working on select Nova Awards in the Summer of 2020 with the Golden Gate Area Council. The registration page has links to download Nova Award Worksheets. These worksheets are not required to complete these awards, but the Scouts may find them very helpful as they answer the questions and challenges posed by these Nova Awards. Under each Nova Award are suggested search terms for possible watching and reading topics, as well as some specific suggestions for videos and books. For every Nova Award, you, the Scout, will be responsible for completing the watching/reading requirement. Each Nova Award will have at least two meeting sessions. In between those sessions, you will need to complete the hands-on tasks associated with award. Since we are not meeting in person, this will be entirely up to you. After successfully completing a Nova Award, we will send you an advancement card that you can give to your Unit Leader attesting that you have successfully completed that particular Nova Award. The contact information for the lead Nova Counselor will also be provided.

If at any point, you or your parent should have any questions or concerns, I can be contacted via email at mcdowell.scouter@gmail.com.

Sincerely,

A handwritten signature in black ink, appearing to read "Dr. Michael McDowell", is centered on a light yellow rectangular background.

Dr. Michael McDowell

GGAC STEM Committee Chair

TABLE OF CONTENTS

<i>Cub Scout Nova Awards</i>	4
Schedule, Platform, and Advancement	4
Uncovering the Past Nova Award	4
Fearful Symmetry Nova Award.....	7
Cub Scouts Can Code Nova Award	9
Down & Dirty Nova Award	10
Out of This World Nova Award	12
<i>Scouts BSA Nova Awards</i>	14
Schedule, Platform, and Advancement	14
Splash! Nova Award	14
Whoosh! Nova Award	18
Start Your Engines! Nova Award	20
Hello World Nova Award.....	22
Mendel’s Minions Nova Award.....	25
Let It Grow! Nova Award.....	27

CUB SCOUT NOVA AWARDS

SCHEDULE, PLATFORM, AND ADVANCEMENT

The Cub Scouts Nova Awards will have a first meeting on a Saturday at 10:30 AM (PDT). The group will meet again the following Saturday (one week later) to complete the requirements. The second meeting will be at an agreed upon time.

All sessions will be via Zoom. The links for each meeting will be sent prior to the scheduled meeting. We will also set up a Google Classroom for each Nova Award, so the Scouts can share pictures and artwork. In the event we want to share your artwork or pictures, we will check back with you to verify that this is agreeable.

To obtain credit for earning the award, Cub Scouts and Webelos will need to do one of the following—have their Cubmaster establish a connection to the GGAC STEM Committee Chair or supply a snail mail address where we can send the hardcopy record at the completion of the award.

UNCOVERING THE PAST NOVA AWARD

MEETING SCHEDULE

The first meeting via Zoom will be on Saturday, June 20th at 10:30AM (PDT). The follow-up meeting will be on Saturday, June 27th at an agreed upon time (that will not conflict with Fearful Symmetry).

REQUIREMENTS NOT COVERED:

Each Scout will do the viewing/reading requirements (#1, ONE hour) on their own. Scouts will need to have completed an Adventure for their rank (Wolf Scouts: Collections and Hobbies; Bear Scouts: Beat of the Drum; Webelos Scouts: Looking Back, Looking Forward or Project Family) or one of the other Options available (Please consult the current requirements for [Uncovering the Past](#) for the Options.)

REQUIREMENTS TO BE COVERED:

#1—Discussion about Viewing and/or Reading done for Requirement #1

#2—Discuss how your Adventure used Science, Technology, Engineering, or Math.

#3—We will learn about archaeology and what archaeologists do. We will also learn what artifacts are. During the week, you will look for artifacts that give clues to the way you live.

#4—We will learn more about what archaeologists do. During the week, you will do your own archaeology dig or recreate an archaeology dig.

#5—We will share a link so you can take a virtual tour of museum then we will discuss it.

#6—We will share what we learned about archaeology.

SAMPLE SEARCH TERMS FOR VIEWING OR READING:

Archaeology, Anthropology, Dinosaurs, Neanderthals, natural history museum, Jamestown, Burial mounds, pyramids, Egyptology, King Tut, Ancient Rome, Ancient Greece, cave paintings

VIDEO SUGGESTIONS:

Want to be an Archaeologist? (6 mins)

<https://www.youtube.com/watch?v=ao4vVcfvyuE>

About Archeology and archeologists (5 mins)

https://www.youtube.com/watch?v=0XJLh5XFvxg&list=PLILW8M17u_i0qBq4yEaUCg7EbneS8vT-m&index=19&t=0s

Archaeology: Is it a Real Job? (12 mins)

<https://www.youtube.com/watch?v=MBnK8LHUkq8>

Know Your Scientists! Archaeology or Paleontology (5 mins)

<https://www.youtube.com/watch?v=q6OjU8UvY54>

Solving Mysteries with Archaeologists! (4 mins)

<https://www.youtube.com/watch?v=zOJICdMvWAI>

Mystery skeleton mystifies archaeologist (An archeological dig) (10 min)

https://www.youtube.com/watch?v=7DP_WjswBWw

SciGirls 104: Digging Archaeology (28 mins)

<https://www.youtube.com/watch?v=CSwCYm9qC6c>

A Day in the Life of the Archaeology Dig at James Fort (4 mins)

<https://www.youtube.com/watch?v=Mhla7OJ8sN4>

Unearthing Native American Artifacts with TROY Archaeology and NRCS (5 mins)

<https://www.youtube.com/watch?v=wp6fRNiLBiE>

Visit Grand Canyon Archaeology Sites Hidden For Centuries (16 mins)

<https://www.youtube.com/watch?v=F-oGKHpDvSw>

Rock art of Djulirri, in Australia

<https://www.archaeology.org/exclusives?slg=australia-rock-art-of-djulirri>

READING SUGGESTIONS:

Midden – an archeological garbage dump

<https://www.thoughtco.com/midden-an-archaeological-garbage-dump-171806>

Shell midden

<https://www.aboriginalheritage.tas.gov.au/cultural-heritage/aboriginal-shell-middens>

Emeryville Shellmound

https://en.wikipedia.org/wiki/Emeryville_Shellmound

FEARFUL SYMMETRY NOVA AWARD

MEETING SCHEDULE

The first meeting via Zoom will be on Saturday, June 27th at 10:30AM (PDT). The follow-up meeting will be on Saturday, July 11th at an agreed upon time (that will not conflict with Cub Scouts Can Code).

REQUIREMENTS NOT COVERED:

Each Scout will do the viewing/reading requirements (#1, ONE hour) on their own. Scouts will need to have completed an Adventure for their rank (Wolf Scouts: Air of the Wolf, Code of the Wolf, or Motor Away; Bear Scouts: Forensics or Marble Madness; Webelos Scouts: Art Explosion, Build It, or Maestro!) or one of the other Options available (Please consult the current requirements for [Fearful Symmetry](#) for the Options.)

REQUIREMENTS TO BE COVERED:

#1—Discussion about Viewing and/or Reading done for Requirement #1

#2—Discuss how your Adventure used Science, Technology, Engineering, or Math.

#3—We will learn about different types of art and designs that rely on symmetry then during the week you will create your own artwork based on these different sources.

#4—We will share a link for visiting a place where symmetry is important then we will share what we learned.

#5—We will share what we learned about symmetry.

SAMPLE SEARCH TERMS FOR VIEWING OR READING:

Navajo rugs or art, litema, kolam, paper lanterns, reflections, rotational symmetry, point symmetry, Fibonacci sequence, Nautilus, snowflakes, symmetry in nature, MC Escher, Stained glass windows, Amish Quilts, Contemporary Quilts

VIDEO SUGGESTIONS:

INTRODUCTION TO SYMMETRY & MATHEMATICAL SYMMETRY

Lines of symmetry (2 mins)

<https://www.youtube.com/watch?v=Kah5w06eyCo>

Line Symmetry and Mirror Symmetry (8 mins)

<https://www.youtube.com/watch?v=-fRGFhbzxDw>

Reflection Symmetry and Rotational Symmetry (6 mins)

<https://www.youtube.com/watch?v=s4tS-ZmpJfw>

Translations, Reflections, and Rotations (9 mins)

<https://www.youtube.com/watch?v=VJT xv-tRKj0>

SYMMETRY IN ART

Symmetry & Balance (3 mins)

<https://www.youtube.com/watch?v=F42eJ60Y0UE>

Mastering Composition with the Law of Symmetry (3 mins)

<https://www.youtube.com/watch?v=fmycAyQK2Zg>

Litema Mural Art (8 mins)

<https://www.youtube.com/watch?v=HFj9PO4pWZU>

How It's Made-Navajo Rugs (5 mins)

https://www.youtube.com/watch?v=Vyw93hJt__g

SYMMETRY IN SCIENCE

Animal Symmetry (13 mins)

<https://www.youtube.com/watch?v=uZbKhWHxhiQ>

What is Symmetry in Physics? (4 mins)

<https://www.youtube.com/watch?v=eb19XaOE1Po>

Demo of Fibonacci Sequence Spirals in Nature (2 mins)

<https://www.youtube.com/watch?v=iEnR8zupK0A>

SYMMETRY IN ARCHITECTURE

Symmetry in Architecture (2 mins)

<https://www.youtube.com/watch?v=kuwQ1KF7p6M>

CUB SCOUTS CAN CODE NOVA AWARD

MEETING SCHEDULE

The first meeting via Zoom will be on Saturday, July 11th at 10:30AM (PDT). The follow-up meeting will be on Saturday, July 18th at an agreed upon time.

REQUIREMENTS NOT COVERED:

Each Scout will do the viewing/reading requirements (#1, ONE hour) on their own. Scouts will need to have completed an Adventure for their rank (Wolf Scouts: Code of the Wolf; Bear Scouts: Robotics; Webelos Scouts: Game Design) or one of the other Options available (Please consult the current requirements for [Cub Scouts Can Code](#) for the Options.)

REQUIREMENTS TO BE COVERED:

#1—Discussion about Viewing and/or Reading done for Requirement #1

#2—Discuss how your Adventure used Science, Technology, Engineering, or Math.

#3—We will play some games with conditionals and learn about algorithms. During the week you will create your own algorithm or conditional game.

#4—We will learn a bit about programming. We will point you to some free programs, so you can do your own programming during the week.

#5—We will talk about how computers affect our everyday life.

SAMPLE SEARCH TERMS FOR VIEWING OR READING:

Computers, programming, code, binary language, computer languages, algorithms,

VIDEO SUGGESTIONS:

Introduction to Computers - For Beginners (26 mins) https://www.youtube.com/watch?v=fdSPUKSe_Xk

Computer course from A - Z for beginners (39 mins)

<https://www.youtube.com/watch?v=KsLztu1ow28>

How Does the Internet Work? - Glad You Asked S1 (19 mins)

<https://www.youtube.com/watch?v=TNQsmPf24go>

DOWN & DIRTY NOVA AWARD

MEETING SCHEDULE

The first meeting via Zoom will be on Saturday, July 25th at 10:30AM (PDT). The follow-up meeting will be on Saturday, August 1st at an agreed upon time (that will not conflict with the GGAC Virtual Day Camp Closing.)

REQUIREMENTS NOT COVERED:

Each Scout will do the viewing/reading requirements (#1, ONE hour) on their own. Scouts will need to have completed an Adventure for their rank (Wolf Scouts: Collections & Hobbies, Digging in the Past, or Grow Something; Bear Scouts: Super Science; Webelos Scouts: Adventures in Science or Earth Rocks!) or one of the other Options available (Please consult the current requirements for [Down & Dirty](#) for the Options.)

REQUIREMENTS TO BE COVERED:

#1—Discussion about Viewing and/or Reading done for Requirement #1

#2—Discuss how your Adventure used Science, Technology, Engineering, or Math.

#3—We will learn about volcanoes and rocks. During the week, you can choose to do an activity with volcanoes or rocks and minerals then share it with your group.

#4—We'll share an online tour relevant to rocks, minerals, or volcanoes. During the week you can also learn what it takes to become an Earth Scientist.

#5—We'll share what we learned about Earth Science.

SAMPLE SEARCH TERMS FOR VIEWING OR READING:

Volcanoes, Mt. St. Helens, pyroclastic flow, Kilauea, lava, Ring of Fire, geology, earth science, oceanography, weather, hurricanes, tornadoes, igneous, metamorphic, sedimentary, California rocks and minerals

VIDEO SUGGESTIONS:

VOLCANOES

Clarendon Learning Volcanoes for Kids (7 mins)

<https://www.youtube.com/watch?v=3Jxeh-yAXek&list=PLeeXmdwhh9O7q8L8NGiHoTm2C99nUmJsR>

National Geographic Lava Driven Earth (44 mins)

<https://www.youtube.com/watch?v=ZdB4cxFp8is>

Bill Nye Oceanography (18 mins)

<https://youtu.be/uVusqN-dNd0>

WEATHER & CLIMATE

Scikids Weather and Climate (23 mins)

<https://youtu.be/l9E0ZZC2gJ4>

National Geographic Tornadoes 101 (3 mins)

<https://youtu.be/iMWoYPaQx0Q>

National Geographic Hurricanes 101 (3 mins)

<https://youtu.be/LIXVikDkyTg>

GEOLOGY, ROCKS, & MINERALS

Geology: What Forces Shape Your World? | Science Trek (4 mins)

https://youtu.be/x_gORuU_eso

Rocks and Minerals - Mike Sammartano (17 mins)

https://youtu.be/ZkHp_nnU9DY

A Brief Introduction to Minerals - Mike Sammartano (10 mins)

<https://youtu.be/8a7p1NFn64s>

Identifying Minerals - Mike Sammartano (8 mins)

https://youtu.be/32NG9aeZ7_c

OUT OF THIS WORLD NOVA AWARD

MEETING SCHEDULE

The first meeting via Zoom will be on Saturday, August 8th at 10:30AM (PDT). The follow-up meeting will be on Saturday, August 15th at an agreed upon time.

REQUIREMENTS NOT COVERED:

Each Scout will do the viewing/reading requirements (#1, ONE hour) on their own. Scouts will need to have completed an Adventure for their rank (Wolf Scouts: Collections & Hobbies, Germs Alive, or Motor Away; Bear Scouts: Robotics or Super Science; Webelos Scouts: Adventures in Science, Engineering, or Game Design) or one of the other Options available (Please consult the current requirements for [Out of This World](#) for the Options.)

REQUIREMENTS TO BE COVERED:

#1—Discussion about Viewing and/or Reading done for Requirement #1

#2—Discuss how your Adventure used Science, Technology, Engineering, or Math.

#3—We will learn about the planets of our solar system. We will think about what it would be like to live on the moon or Mars. During the week, you will learn more about the planets then plan out your Moon base or Mars base.

#4—We will share an online tour of a Space & Air Museum and learn what it takes to be an astronaut or space scientist.

#5—We'll talk about what we've learned about Space and Space Exploration.

SAMPLE SEARCH TERMS FOR VIEWING OR READING:

NASA, Mercury, Venus, Mars, Jupiter (and its moons), Saturn (and its moons), Uranus, Neptune, Kuiper Belt, Mariner, Voyager 1 and 2, Viking 1 and 2, Mars Rovers, Smithsonian Air & Space, Apollo, Gemini, Satellites

VIDEO SUGGESTIONS:

NASA's Path to Mars (5 mins)

<https://youtu.be/noEod29Tr6c>

To Scale: The Solar System (7 mins)

<https://youtu.be/zR3lgc3Rhfg>

Mars 2020: The Next Mission to Mars (9 mins)

<https://youtu.be/iZCRFRgSgas>

Solar System 101 | National Geographic (Start of Playlist) (16 videos, 3-5 mins each)

<https://youtu.be/libKVRa01L8?list=PLivjPDIt6ApTHMisqbFv2SmJ7x0333mFz>

What Did Voyager 1 See During its Journey out of the Solar System (9 mins)

<https://youtu.be/Du5hekU95mY>

What Did Voyager 2 See During its Journey out of the Solar System (9 mins)

https://youtu.be/39Xo_iOlujY

NASA History: Viking, Mariner, Pioneer-Exploration of the Planets (24 mins)

<https://youtu.be/nK7mdQkag4I>

SCOUTS BSA NOVA AWARDS

SCHEDULE, PLATFORM, AND ADVANCEMENT

The Splash!, Whoosh!, Start Your Engines, and Hello World Nova Awards will have a first meeting on a Monday at 1PM (PDT) , then by mutual agreement, the group will meet again on Wednesday and Friday to complete the requirements. The combined Mendel’s Minions/Let It Grow Nova Award will meet on Tuesdays initially at 1 PM (PDT), but the later meetings will be by agreement.

All sessions will be via Zoom. The links for each meeting will be sent prior to the scheduled meeting. We will also set up a Google Classroom for each Nova Award, so the Scouts can share pictures or videos. In the event we want to share your pictures with the outside world, we will check back with you to verify that this is agreeable.

To obtain credit for earning the award, Scouts will need to do one of the following—have their Scoutmaster establish a connection to the GGAC STEM Committee Chair or supply a snail mail address where we can send the hardcopy record at the completion of the award.

SPLASH! NOVA AWARD

MEETING SCHEDULE

The first meeting via Zoom will be on Monday, June 22nd at 1PM (PDT). The two follow-up meetings will be one Wednesday, June 24th and Friday, June 26th at an agreed upon time.

REQUIREMENTS NOT COVERED:

Each Scout will do the viewing/reading requirements (#1, THREE hours) on their own. Scouts will need to have earned ONE of the merit badges listed for Requirement #2 (Chemistry, Energy, Engineering, Environmental Science, Fish & Wildlife Management, Fishing, Fly-Fishing, Forestry, Geology, Nature, Oceanography, Public Health, Soil & Water Conservation, Sustainability, or Weather) and not used that merit badge for a previous Nova Award.

REQUIREMENTS TO BE COVERED:

Your Nova Counselor will be leading/facilitating your discussions, but you will need to do additional research outside of the meeting sessions. (For additional details and specifics for Splash!, please consult the [Splash!](#) Requirements.)

#1—Discussion about Viewing and/or Reading done for Requirement #1

#2—Discuss how the merit badge earned for Requirement #2 pertains to water.

#3C—Use the Internet (with your parent’s or guardian’s permission) to determine the annual water use for your state in gallons and acre-feet.

#3D--Household water use. Create a list all of the ways that water is used around your home in a 24-hour period, including the bathroom, kitchen, and any appliances. Don’t forget outdoor water uses such as pools, hot tubs, sprinkler systems, landscape and gardens, pets and/or livestock, and cleaning efforts such as washing cars, boats, pets, etc.

#4--Visit a place where water is being processed either by humans or by nature (wastewater treatment plant, naturalist center, conservation department, etc.), take a tour, and speak with a professional about the processing of the water. Discuss with your counselor the STEM being used. (We will be taking a virtual tour and we have a hydrologist that will be leading the discussions.)

#5--Discuss with your counselor what you have learned about how water affects your everyday life.

SAMPLE SEARCH TERMS FOR VIEWING OR READING:

hydrologic cycle, water treatment, wastewater treatment, surface tension, capillary action, hydrogen bonding, electronegativity, water conservation

VIDEO SUGGESTIONS:

HYDROLOGIC CYCLE:

National Science Foundation – The Water Cycle: 7 minutes

<https://www.youtube.com/watch?v=al-do-HGulk>

USGS – Water Cycle and Global Water Distribution: 15 minutes

<https://water.usgs.gov/edu/watercycle.html>

Examine the Water Cycle diagram and click on at least 8 of the 17 links below it and read the description on the page. Make sure you include the Freshwater Storage, Groundwater Storage, Ice and Snow, Precipitation, Runoff, and Streamflow links. Read the Where is Earth's Water page below the diagram.

Bill Nye – Evaporation and Condensation: 3 minutes

https://www.youtube.com/watch?v=hehXEYkDq_Y

WATER USED BY HUMANS:

American Water Corporation – Water Treatment Process, 5 minutes

<https://www.youtube.com/watch?v=KMP9-49I1U4>

National Science Foundation – Drinking Water: 5 minutes

<https://www.youtube.com/watch?v=nk-y6wcxEQc>

National Science Foundation - Wastewater: 5 minutes

<https://www.youtube.com/watch?v=328bJkcemHo>

National Science Foundation – Water, Food, and Energy: 6 minutes

<https://www.youtube.com/watch?v=5b-zbSWG8e8>

CA Department of Water Resources – CA Water History, Development, Ag, & Problems – 17 min.

<https://www.youtube.com/watch?v=Ozle7tS1SgQ>

WATER CHEMISTRY:

CrashCourse – Polarity, Solvents, Electrolytes, Dilutions - 13 minutes

<https://www.youtube.com/watch?v=AN4KifV12DA>

Bill Nye – Steam, Surface Tension: 6 minutes

<https://www.youtube.com/watch?v=Hm52rkh68JA>

Science Mom – Cohesion, Capillary Action, Density: 13 minutes

<https://www.youtube.com/watch?v=IsvHQon2IqQ>

Science Mom – Surface Tension: 13 minutes

<https://www.youtube.com/watch?v=OeYYiSsPf4I>

BBC Earth Lab – Surface Tension, Water Striders, and Droplets: 4 minutes

<https://www.youtube.com/watch?v=5NCONr3VSAY>

WATER DENSITY:

TED-Ed – Water Density Changes with Temperature – 4 minutes

<https://www.youtube.com/watch?v=UukRgqzk-KE>

Dr. C Demonstrations – Melting Ice Does Not Decrease Water Level: 3 minutes

<https://www.youtube.com/watch?v=Vers5VT4m8E>

WATER PHYSICS:

PBS – Science of Snowflakes: 6 minutes

<https://www.youtube.com/watch?v=fUot7XSX8uA>

FuseSchool – Changes of State – 5 minutes

<https://www.youtube.com/watch?v=xYU7RSOZ0U>

CLIMATE CHANGE AND EFFECT OF MELTING ICE ON EARTH:

Bill Nye and Asap Science – Sea Ice Melting and Effect: 6 min

https://www.youtube.com/watch?v=b6CPsGanO_U

YOSEMITE NATURE NOTES:

Water, the Lifeblood: 7 minutes

<https://www.youtube.com/watch?v=IWrUh3phnBc>

Frazil Ice in Yosemite: 8 minutes

<https://www.youtube.com/watch?v=9V9p4mFEYXc>

Glaciers: 9 minutes

<https://www.youtube.com/watch?v=mgnzSTY5zRg>

Yosemite flooding: 6 minutes

<https://www.nps.gov/media/video/view.htm?id=EA81A54A-CB4D-410C-6BCB1393E86F108A>

WHOOSH! NOVA AWARD

MEETING SCHEDULE

The first meeting via Zoom will be on Monday, July 6th at 1PM (PDT). The two follow-up meetings will be one Wednesday, July 10th and Friday, July 12th at an agreed upon time.

REQUIREMENTS NOT COVERED:

Each Scout will do the viewing/reading requirements (#1, THREE hours) on their own. Scouts will need to have earned ONE of the merit badges listed for Requirement #2 (Archery, Aviation, Composite Materials, Drafting, Electronics, Engineering, Inventing, Mining in Society, Model Design & Building, Railroading, Rifle Shooting, Robotics, or Shotgun Shooting) and not used that merit badge for a previous Nova Award.

REQUIREMENTS TO BE COVERED:

Your Nova Counselor will be leading/facilitating your discussions, but you will need to do additional research outside of the meeting sessions. (For additional details and specifics for Whoosh!, please consult the [Whoosh!](#) Requirements.)

#1—Discussion about Viewing and/or Reading done for Requirement #1

#2—Discussion on how the merit badge earned involves engineering.

#3—List or Draw the six simple machines, name them, describe how they work, how the machines were involved in your merit badge, the energy source, and what you learned.

#4—Visit an amusement park (virtually) or a playground and identify the machines and forces involved.

#5-- On your own, design one of the following and include a drawing or sketch: an amusement park ride OR a playground fixture OR a method of transportation. Discuss the machines present in your design and the energy sources powering your creation.

#6—Discuss how engineering affects your everyday life.

SAMPLE SEARCH TERMS FOR VIEWING OR READING:

Roller coasters, simple machines, complex machines, railroads, railroading, mining machines, engineering, Archimedes

VIDEO SUGGESTIONS:

ROLLER COASTERS:

Roller Coaster Physics (23 mins)

<https://www.youtube.com/watch?v=H3UQiuDej38>

Physics of Roller Coasters - Gravity, Energy, Momentum, Circular Motion, and Centripetal Force (18 mins)

https://www.youtube.com/watch?v=PsgCR4_hyYo

MegaStructures - The Ultimate Roller Coaster (National Geographic Documentary)(42 mins)

<https://www.youtube.com/watch?v=QPwSrAHSV4o>

Building a Thrill Ride: Expedition Everest (44 mins)

<https://www.youtube.com/watch?v=2HOiVnUDcOc>

SIMPLE MACHINES:

Science Trek: Simple Machines (29 mins)

https://www.youtube.com/watch?v=Kg_vZ2pgQEs

Mechanical Advantage, Simple Machines- Lever & Ramp - Work, Force, Power, & Energy Physics Problems (20 mins)

<https://www.youtube.com/watch?v=SPTNKnCqIW4>

Real World Science Simple Machines (15 mins)

<https://www.youtube.com/watch?v=ry6uUy7KnQY>

MISSIONMakers Shoebox Rover Playlist (14 videos total, each about 3 mins)

https://www.youtube.com/watch?v=zZEp_3f6K4k&list=PLmdoikyGMI-ZeVTSfWwUedIWjYehgAPRt

RAILROAD ENGINEERING:

The fastest trains in the future-The Magnetic Train (Maglev Train) (National Geographic) (42 mins)

https://www.youtube.com/watch?v=YjN3x_9hpK8

Discovery Channel-MegaStructures UK Super Train-National Geographic (1 hr, 14 mins)

<https://www.youtube.com/watch?v=1JkQ7eU4n28>

START YOUR ENGINES! NOVA AWARD

MEETING SCHEDULE

The first meeting via Zoom will be on Monday, July 20th at 1PM (PDT). The two follow-up meetings will be one Wednesday, July 22nd and Friday, July 24th at an agreed upon time. The component items either will be mailed so they arrive prior to the class start or an arrangement made for pickup at the Golden Gate Area Council Service Center in Pleasant Hill, CA

REQUIREMENTS NOT COVERED:

Each Scout will do the viewing/reading requirements (#1, THREE hours) on their own. Scouts will need to have earned ONE of the merit badges listed for Requirement #2 (Automotive Maintenance, Aviation, Canoeing, Cycling, Drafting, Electricity, Energy, Farm Mechanics, Kayaking, Motorboating, Nuclear Science, Programming, Railroading, Small-Boat Sailing, Space Exploration, or Truck Transportation) and not used that merit badge for a previous Nova Award.

REQUIREMENTS TO BE COVERED:

Your Nova Counselor will be leading/facilitating your discussions, but you will need to do additional research outside of the meeting sessions. (For additional details and specifics for Start Your Engines!, please consult the [Start Your Engines!](#) Requirements).

#1—Discussion about Viewing and/or Reading done for Requirement #1

#2—Discussion on how the merit badge earned involves technology.

#3—Using the requirements from the merit badge completed for Requirement #2, discuss the energy sources used along with their pros and cons. List the energy sources that may be used in transportation. Discuss alternative sources of energy along with their pros and cons.

#4—Design and build a working model vehicle. This must include a drawing with specifications prior to building the model. The model must use wind, battery, or solar power. You will need to test the model. Afterwards, you will discuss various aspects of the model. (You will be provided with some components (toy wheels, gears, a toy motor, a bit of wire, some wire nuts, and a small solar panel), but you are neither limited nor required to use these components.)

#5—Discuss with your counselor how technology impacts your everyday life.

SAMPLE SEARCH TERMS FOR VIEWING OR READING:

Solar plane, solar car, battery car, electric car, maglev trains, space travel, space flight, sailing technology, airplane technology, Daedalus project

VIDEO SUGGESTIONS:

Stanford Solar Car Project (47 mins)

https://www.youtube.com/watch?v=Vg_F_A_DpAw

Solar One-Solar powered plane, part 1 (30 mins)

<https://www.youtube.com/watch?v=LDZRVILH6QI>

Solar One, part 2 (19 mins)

<https://www.youtube.com/watch?v=nsxIRoiWSrA>

Solar Impulse-How to fly around the world with no fuel (26 mins)

<https://www.youtube.com/watch?v=ADVvRAL3j1M>

Electric Car Batteries (58 mins)

<https://www.youtube.com/watch?v=OtfKux9BUeE>

Amazing Future Trains (43 mins)

<https://www.youtube.com/watch?v=tZJuqYk3YYE>

Making Humans a Multiplanetary Species-Elon Musk and SpaceX (1 hr, 5 mins)

https://www.youtube.com/watch?v=H7Uyfqi_TE8

Near Light Speed Interstellar Travel Development at NASA (24 mins)

https://www.youtube.com/watch?v=dH_WDStou0Y

Space Planes-The Ultimate Journey (52 mins)

<https://www.youtube.com/watch?v=l7s8c4aQQSg>

Battle of the Boats-America's Cup Sailing Technology (1 hr, 23 mins)

<https://www.youtube.com/watch?v=XQoNYe2jFP8>

Future Aircraft-Nasa Documentary (24 mins)

<https://www.youtube.com/watch?v=Y1gAusOW-RU>

Nova Documentary on Daedalus-part 2 (17 mins)

<https://www.youtube.com/watch?v=Dhlt1fsnhVE>

Nova Documentary on Daedalus-part 3 (25 mins)

<https://www.youtube.com/watch?v=kdwLB0yoGmE>

HELLO WORLD NOVA AWARD

MEETING SCHEDULE

The first meeting via Zoom will be on Monday, August 3rd at 1PM (PDT). The two follow-up meetings will be one Wednesday, August 5th and Friday, August 7th at an agreed upon time.

REQUIREMENTS NOT COVERED:

Each Scout will do the viewing/reading requirements (#1, THREE hours) on their own. Scouts will need to have earned ONE of the merit badges listed for Requirement #2 (Programming, Robotics, or Digital Technology) and not used that merit badge for a previous Nova Award.

REQUIREMENTS TO BE COVERED:

Your Nova Counselor will be leading/facilitating your discussions, but you will need to do additional research outside of the meeting sessions. (For additional details and specifics for Hello World, please consult the [Hello World](#) Requirements.)

#1—Discussion about Viewing and/or Reading done for Requirement #1

#2—Discussion on how the merit badge earned uses coding.

#3—Discuss and Explore Programming Concepts

#4—Using a Programming Language, write two simple programs

#5—Using a non-GUI Programming Language, write a more advanced program

#6—Compare/Contrast the three program you wrote

#7—Visit a place where programming is done and speak to someone that works there.

#8—Discuss the role of coding in your life.

SAMPLE SEARCH TERMS FOR VIEWING OR READING:

Computers, coding, robotics, Boolean, Python Programming, Java Programming, Internet, world wide web, Computer Programming languages, Turing Machine, Atanasoff Berry ABC, Ramac, Fortran, Cobol, microprocessors, computer science

VIDEO SUGGESTIONS:

Android App Development for Beginners. (Start of a YouTube Playlist) (7 mins)

<https://www.youtube.com/watch?v=QAbQgLGKd3Y>

C Programming Tutorial - 1 – Introduction (Start of a YouTube Playlist) (5 mins)

<https://www.youtube.com/watch?v=2NWeucMKrLI>

Python Programming Tutorial - 1 - Installing Python (Start of a YouTube Playlist) (5 min)

<https://www.youtube.com/watch?v=HBxCHonP6Ro>

How To Learn Programming for BEGINNERS! (This one leads you to a website for learning to program) (4.5 mins)

<https://www.youtube.com/watch?v=bJzb-RuUcMU>

Introduction to Programming (32 mins)

https://www.youtube.com/watch?v=lJnvq0A_7WQ

Python Tutorial for Absolute Beginners #1 - What Are Variables? (24 mins)

<https://www.youtube.com/watch?v=Z1Yd7upQsXY>

Introduction to Programming – Basics (23 mins)

<https://www.youtube.com/watch?v=R6nApgQLFeg>

Lecture 0 - Introduction to Computer Science I (50 min)

<https://www.youtube.com/watch?v=z-OxZIC6pic>

Introduction to Programming and Computer Science - Full Course (1 hr, 50 mins)

<https://www.youtube.com/watch?v=zOjov-2OZ0E>

Learn Python - Full Course for Beginners (4.5 hrs)

<https://www.youtube.com/watch?v=rfscVS0vtbw>

Logic Gates, Truth Tables, Boolean Algebra - AND, OR, NOT, NAND & NOR (2 hrs)

<https://www.youtube.com/watch?v=RhS-AL2ZcyE>

Basic Computing Skills – Orientation (40 mins)

<https://www.youtube.com/watch?v=DwsKeoXOa9I>

Java Tutorial for Beginners (2.5 hrs)

<https://www.youtube.com/watch?v=eIrMbAQSU34>

MENDEL'S MINIONS NOVA AWARD

MEETING SCHEDULE

The Mendel's Minions Nova Award will run concurrently with the Let It Grow Nova Award. Each meeting will cover a different topic related to one of the two awards. The first meeting via Zoom will be on Tuesday, June 23rd at 1PM (PDT). All subsequent meetings will be on Tuesday at an agreed upon time.

REQUIREMENTS NOT COVERED:

Each Scout will do the viewing/reading requirements (#1, THREE hours) on their own. Scouts will need to have earned ONE of the merit badges listed for Requirement #2 (Animal Science, Bird Study, Forestry, Gardening, Insect Study, Mammal Study, Medicine, Nature, Public Health, Reptile & Amphibian Study, or Veterinary Medicine) and not used that merit badge for a previous Nova Award.

REQUIREMENTS TO BE COVERED:

Your Nova Counselor will be leading/facilitating your discussions, but you will need to do additional research outside of the meeting sessions. (For additional details and specifics for Mendel's Minions, please consult the [Mendel's Minions](#) Requirements.)

#1—Discussion about Viewing and/or Reading done for Requirement #1

#2—Discussion on how the merit badge earned involves genetics.

#3—We will walk through the extraction of DNA from strawberries and bananas, then you will do it on your own. Together we will replicate a few generations of Gregor Mendel's Pea experiment then do the data analysis.

#4—You will put together either a report or 10 minute presentation on any number of topics (review the options in the [Mendel's Minions](#) Requirements). Our goal is for everyone to present a different topic.

#5—We will share a virtual visit to a place where genetics is used (and it might have something to do with plants...)

#6—We wrap up with a discuss about how genetics and genomics affects our everyday lives.

SAMPLE SEARCH TERMS FOR VIEWING OR READING:

Genetics, genomics, DNA, chromosomes, traits, alleles, phenotype, genotype, double helix, Nucleic Acids, inheritance, Gregor Mendel, Sanger, Watson & Crick, Molecular biology, epigenetics, Central Dogma of Molecular Biology, Crispr, Dominant, Recessive,

VIDEO SUGGESTIONS:

Introduction to Genetics and Heredity for Kids (15 mins)

<https://youtu.be/J1wuttlSjTY>

Introduction to Heredity (Khan Academy) (18 mins)

<https://youtu.be/eEUvRrhmcxM>

Bill Nye the Science Guy Genes (25 min)

www.khswaveriders.org/apps/video/watch.jsp?v=74650

The Eyes of Nye Cloning (25 min)

www.khswaveriders.org/apps/video/watch.jsp?v=79431

The First Human Clone (cloning documentary) (48 mins)

<https://youtu.be/-zTDUZKFb6k>

The Case for Engineering our Food (18 mins)

<https://youtu.be/wZ2TF8-PGQ4>

Neil deGrasse Tyson gets to the bottom of GMOs (20 mins)

<https://youtu.be/aMDhUsxom0U>

Bill Nye the Science Guy Genes (30 mins)

<https://youtu.be/H2Vw6HgMmTs>

Genetics: Greatest Discoveries with Bill Nye (45 mins)

<https://youtu.be/kuFODX4VuAw>

The Evolution of Lactose Intolerance HHMI (15 mins)

<https://youtu.be/MA9boI1qTuk>

The Biology of Skin Color HHMI (20 mins)

<https://youtu.be/hFw8mMzH5YA>

LET IT GROW! NOVA AWARD

MEETING SCHEDULE

The Let It Grow Nova Award will run concurrently with the Mendel's Minions Nova Award. Each meeting will cover a different topic related to one of the two awards. The first meeting via Zoom will be on Tuesday, June 23rd at 1PM (PDT). All subsequent meetings will be on Tuesday at an agreed upon time.

REQUIREMENTS NOT COVERED:

Each Scout will do the viewing/reading requirements (#1, THREE hours) on their own. Scouts will need to have earned ONE of the merit badges listed for Requirement #2 (Animal Science, Cooking, Farm Mechanics, Fish & Wildlife Management, Fishing, Forestry, Gardening, Insect Study, Mammal Study, Nature, Plant Science, or Soil & Water Conservation) and not used that merit badge for a previous Nova Award.

REQUIREMENTS TO BE COVERED:

Your Nova Counselor will be leading/facilitating your discussions, but you will need to do additional research outside of the meeting sessions. (For additional details and specifics for Let It Grow!, please consult the [Let It Grow!](#) Requirements).

#1—Discussion about Viewing and/or Reading done for Requirement #1

#2—Discussion on how the merit badge earned involves agriculture.

#3—We will learn about farming techniques and how technology impacts farming. We will develop our own set of Agri-science experiments looking at things like light, soil, nutrients, and temperature. We will also get small and see how microorganisms impact our lives.

#4—We will take a virtual tour of a place where food is grown.

#5—We'll loop back and talk about how farming impacts our lives.

SAMPLE SEARCH TERMS FOR VIEWING OR READING:

Agriculture, farming, agronomy, horticulture, pomology, genetics, hybrid, cultivar, grafting, hydroponics, nitrogen cycle, integrated pest management, animal science, aquaculture, heirloom varieties, plant diseases, crop rotation, erosion, phytochrome, photosynthesis

VIDEO SUGGESTIONS:

VERTICAL AND ROOFTOP FARMING

Growing Up: How Vertical Farming Works (6 mins)

<https://www.youtube.com/watch?v=QT4TWbPLrN8>

Are indoor vertical farms the future of agriculture? | Stuart Oda (Ted talk) (10 mins)

<https://www.youtube.com/watch?v=z9jXW9r1xr8>

The Rise of Vertical Farming-VPRO Documentary (Don't worry, it's in English) (47 mins)

<https://www.youtube.com/watch?v=ryCkqWI4xtQ>

Does Vertical Farming Work? (17 mins)

<https://www.youtube.com/watch?v=dnCQuwCtqJg>

Growing Roots (Discovery Documentary) (24 mins)

<https://www.youtube.com/watch?v=vPRySy3Qts>

AGRONOMY, HORTICULTURE, & POMOLOGY

What's the difference between Horticulture and Agronomy? (32 mins)

https://www.youtube.com/watch?v=gvHAouhC_EQ

Pomology (13 mins)

<https://www.youtube.com/watch?v=xW831Bm5ntk>

LIGHT

White LED vs Red Blue White LED (4 mins)

<https://www.youtube.com/watch?v=2J3wuwsUiCM>

Photoperiodism || Role of Phytochromes in Flowering (6 mins)

<https://www.youtube.com/watch?v=vcH0vouVDmc>

Red Light: Plants & Light (#106) (7 mins)

<https://www.youtube.com/watch?v=px2EcZPAspE>

Far Red Light: Plants & Light (#107) (10 mins)

<https://www.youtube.com/watch?v=pAtp5TVujXM>

Photoperiodic Flowering -Part 1 (8 mins)

<https://www.youtube.com/watch?v=EWroqqlZ3go>

PLANT NUTRITION

Garden Soil Playlist (5 videos, 21 mins total)

<https://www.youtube.com/playlist?list=PL5mfR-r4BXH3tnGzpzWhDk9dMqW5wb0Z0>

Nitrogen Cycle Part 1 (16 mins)

<https://www.youtube.com/watch?v=dm1qHIXbnMA>

Nitrogen Cycle Part 2 (28 mins)

https://www.youtube.com/watch?v=RRy50_vJOQw

Introduction to Soils (35 mins)

<https://www.youtube.com/watch?v=dqKl-22zIBo>

Plant Nutrition: Mineral absorption (4 mins)

<https://www.youtube.com/watch?v=6aC-WTAWgOg>

Plant Nutrition 101: All Plant Nutrients and Deficiencies (17 mins)

<https://www.youtube.com/watch?v=QALxEt6OFpc>

FARMING AND FARMERS

Iowa Farm Bureau – Welcome to our Family Farms (4 mins)

<https://www.youtube.com/watch?v=o8veOvnS4Tg>

“Is this heaven? No, it’s Iowa.” (13 mins)

<https://www.youtube.com/watch?v=P7Sxm9MD-KU>

Day in the life of an Iowa farm kid | Harvest 2019 (22 mins)

<https://www.youtube.com/watch?v=9DjHanN2xWU>

Tour an Aquaponics Farm in Texas (21 mins)

<https://www.youtube.com/watch?v=HHDgsK09-1k>