

# Boy Scouts NOVA Engineering Merit Badge 2017

Homework Due: *April 22nd*

*You will be discussing these three points with a counselor so it is important to remember what you have learned. You should take notes and bring them into class with you. There might be a short open note quiz.*

1. Everyone must watch the links under the **General** section below. Go over the following links (one video, three articles), and come up with a total of five (5) questions surrounding these links that you will discuss with your counselors. From the **Merit Badges** section below, explore two links from any of the sections that interest you. Write two (2) questions about these links. Finally, you must find two other engineering-related videos or articles on your own. Write a summary of these videos or articles, and discuss what you learned with your counselors.

## **General**

- Introduction to Engineering (video)  
<http://science360.gov/obj/video/703d4c1c-5b3c-4d95-bdc8-012b63e73f21/introduction-engineering>
- Explore Different Types of Engineering  
<http://www.discovere.org/discover-engineering/engineering-careers>
- 10 Innovators Who Changed the World  
<http://www.popularmechanics.com/technology/engineering/news/10-innovators-who-changed-the-world-in-2013#slide-1>
- 10 Predictions for the Next 110 Years  
<http://www.popularmechanics.com/technology/engineering/news/110-predictions-for-the-next-110-years>

## **Merit Badges**

### *Archery*

- Olympic archer  
<http://espn.go.com/video/clip?id=8180638>
- Modern day bows  
<http://www.theatlantic.com/technology/archive/2012/03/todays-high-tech-archery-isnt-much-like-the-hunger-games-version/255041/>

### *Aviation*

- Brief history  
<http://www.kidsinflight.org/history.html>
- Forces on Airplane

<https://www.youtube.com/watch?v=aLJzEl5st8s>

- Top new technology/models in planes  
<https://www.aopa.org/news-and-media/all-news/2016/december/06/two-german-gyrocopters-certified-in-primary-category>
- New upcoming technology  
<https://www.aopa.org/news-and-media/all-news/2017/march/29/new-eye-in-the-sky>
- Pedal power flying  
<http://blogs.discovermagazine.com/d-brief/2013/07/12/human-powered-helicopter-wins-prize-for-record-breaking-flight/#.U0OKitxgq04>
- Drones  
<http://www.pbs.org/wgbh/nova/military/rise-of-the-drones.html>

### ***Composite Materials***

- Smart concrete  
<http://science360.gov/obj/video/0c3ce12b-ae04-4fa0-9c93-e07e5270cfdd/science-innovation-smart-concrete>
- Shape Memory materials  
<https://www.youtube.com/watch?v=s62PL5vmfNw>
- Non-Newtonian  
<http://www.youtube.com/watch?v=Yyvq9fHtam8>

### ***Electronics & Robotics***

- Drones  
<http://www.pbs.org/wgbh/nova/military/swarming-drones.html>
- Getting computers to see  
<http://www.pbs.org/wgbh/nova/tech/getting-computers-to-see.html>
- Quadcopters  
<https://www.youtube.com/watch?list=PLzMhsCgGKd1iTywrwdOJFfbpuvKY6rZsm&v=SbbBzV6pcFg>
- Humanoid Robots  
<http://www.pbs.org/wgbh/nova/tech/humanoid-robots.html>

### ***Engineering***

- Smart bridges

<http://www.pbs.org/wgbh/nova/tech/smart-bridges.html>

### ***Inventing, Model Design and Building, & Drafting***

- The next big thing

<http://www.pbs.org/wgbh/nova/tech/counting-toasters.html>

- Robotic Cars

<http://www.pbs.org/wgbh/nova/tech/robo-cars.html>

- Making stuff faster

<http://www.pbs.org/wgbh/nova/tech/making-more-stuff.html#making-stuff-faster>

- Augmented reality

<http://www.pbs.org/wgbh/nova/tech/augmented-reality.html>

- What engineers make

[http://www.youtube.com/watch?v=T2E\\_p\\_T3arY](http://www.youtube.com/watch?v=T2E_p_T3arY)

- Making cars

<http://www.sciencechannel.com/tv-shows/how-its-made/videos/morgan-craftsmanship.htm>

- 3D printing

[https://www.youtube.com/watch?v=TAp93r\\_q1Fc](https://www.youtube.com/watch?v=TAp93r_q1Fc)

### ***Railroading***

- Mag Lev train

<http://science.howstuffworks.com/transport/29341-extreme-engineering-maglev-train-video.htm>

### ***Shooting & Rifle Shooting***

- How shotguns work

<http://science.howstuffworks.com/shotgun.htm>

- New technology

<http://www.safeguntechnology.co/safe-gun-technology-develops-finger-print-kit-for-guns-wtvm-com-columbus-ga/>

2. Now that you have explored two links for the merit badge categories presented above, research how one of the categories that you explored uses engineering today. Think of possible careers or current projects.
3. Follow the link below and learn about the six simple machines. Either list or draw them. You will discuss how these work with your counselor. Also, research the way that different types of energy are involved in these machines, and comment what you learned about motion.

[http://www.constructionknowledge.net/general\\_technical\\_knowledge/general\\_tech\\_basic\\_six\\_simple\\_machines.php](http://www.constructionknowledge.net/general_technical_knowledge/general_tech_basic_six_simple_machines.php)

4. Visit either a playground or an amusement park. Write a summary of the simple machines present at either location. Also, write about the forces involved in the motion of any two rides or playground fixtures that you observed. Be prepared to discuss your findings with your counselors.