

Cub Lecture 1 - Earning a Physics Award Patch

A Physics Award Patch

Hi Cub Scout - Lets help get physics the place it deserves in the scouts by teaching you some really cool things. Physics is the foundation of all the sciences. It's how the universe works, from the tiniest atom to the whole huge universe. It took over 2000 years, but mankind has finally figured out just about exactly how everything works. And pretty soon we're going to get the Scouts to turn this patch into an official activity patch. All the other Cub activities involve some form of physics, and physics is always a part of just

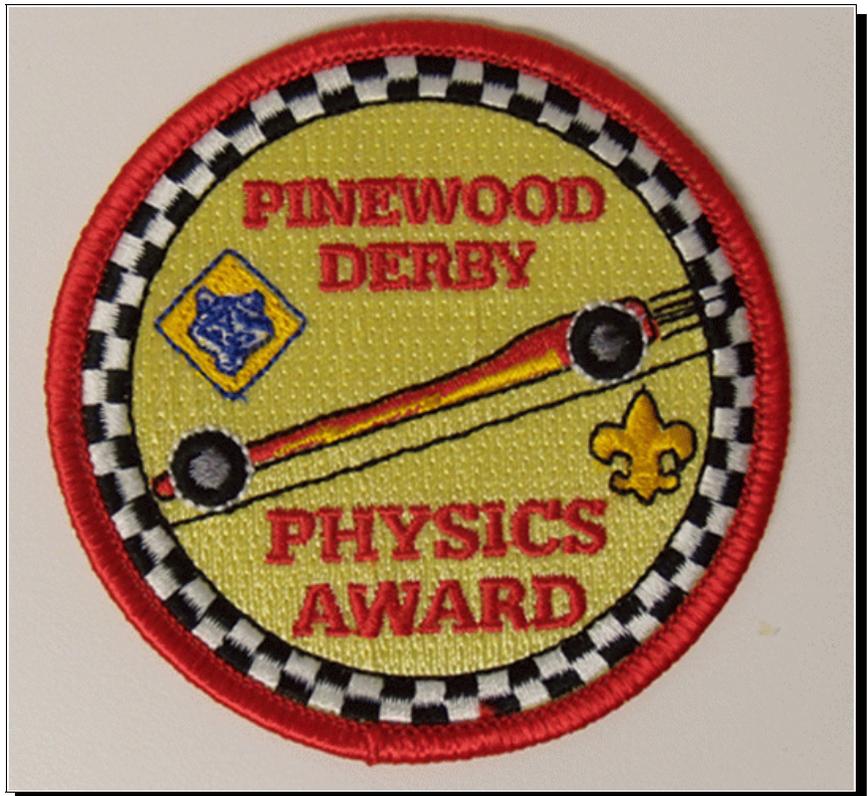


Figure 1 - You'll proudly wear this patch - It will look great on your uniform. And, your friends will be jealous !!

about everything. So learning about physics, as part of the pinewood derby, is going to give you a head start in learning how everything works.

In the following lectures we will do some experiments, really just playing around with things and having fun figuring out just why stuff does what it does. This is called experimental physics. Here we touch things and move things around and take notes on what happens when we change certain things. The other part of physics is called theoretical physics. Theoretical means using math and arithmetic to use the results of our experiments to make a theory, or a law, about how nature works. Then we can use the law to predict the future! Can you imagine the power this will give you, to predict the future? We will study things related to the pinewood derby, because there is a bunch of physics involved in this race. You can use what you learn to build a really fast car and be way out in front at the finish line. Adults will wonder how you made your car go so fast, but in the next two lectures you will learn stuff that many adults don't know. We will be doing Pinewood Derby Physics, and your Mom, Dad or other adult teacher can help you in what follows and maybe learn something as well.

Equipment You Will Need

There is going to be a **Cub Lecture 2** to teach you about friction, the science of rubbing things together. And, there will be a **Cub Lecture 3**, to teach you about how mass and weight work. This is the science of gravity, and how things fall. **Figure 2** shows the things you will need to do the experiments to earn the award patch. Most of this stuff you have around the house.

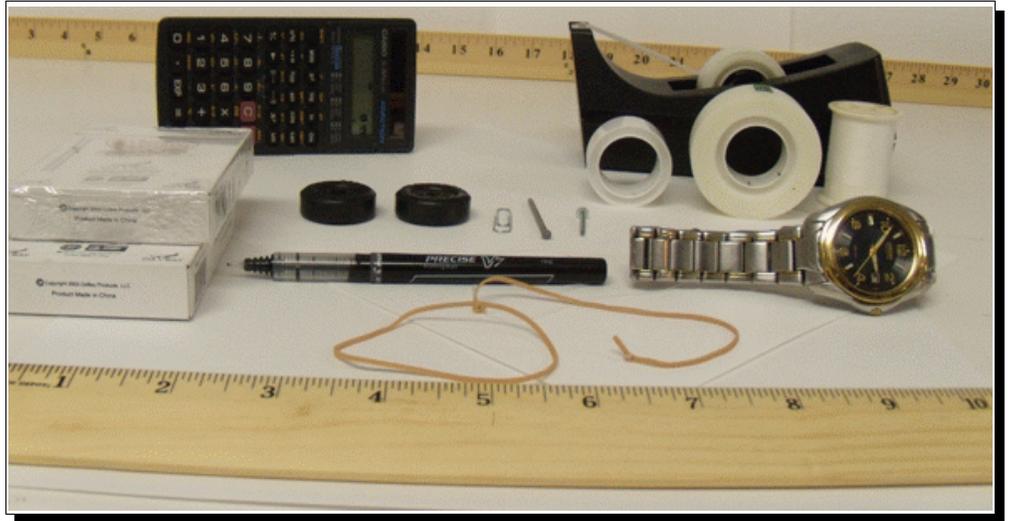


Figure 2 - Equipment you will need for experiments

Cub Lecture 2 Equipment List

- 1- 2 decks of ordinary playing cards
- 2 - 12 inch ruler as shown in the foreground
- 3 - A few No 19 rubber bands - one shown cut and knotted on the ends
- 4 - An ink pen
- 5 - A pocket calculator
- 6 - A 6 penny nail (2 inches long, about same diameter as a pinewood derby axle nail)
- 7- A roll of magic Scotch tape and one of the plastic centers from a used roll of this tape. Also a tape dispenser.
- 8 - A sheet of 20 lb typing paper.

Cub Lecture 3 Equipment List

- 9 - 2 pinewood derby wheels
- 10 - A roll of sewing thread
- 11 - A watch with a second hand
- 12 - A yardstick is shown in the Figure 2 photo, but not absolutely needed
- 13 - A paper clip

Things like a ruler, Scotch tape, No 19 rubber bands, ink pen, etc., can be picked up at places like Office Depot. Playing cards can be found at many stores. A lot of this stuff you probably have around the house. Be sure the rubber bands are size No 19. There will be a Word.doc [answer sheet](#) for you to fill out. Also put your name, rank, and address on it as well. Please save and attach the Word answer sheet to an email to me at pwdauthor@pinewoodderbyphysics.com and I'll mail you the patch if answers are 75% correct.

Happy Racing! & Regards from Doc Jobe