

LANCASTER
SCIENCE FACTORY

Scientific Achievement Badge
Activity Packet
Girl Scout Juniors

To get your special Lancaster Science Factory badge:

Complete all 5 required experiments
at these exhibits:

1. Roller Coaster
2. Dam the Creek
3. Electrical Circuits
4. Puzzles & Brain Teasers
5. MiniRacers

Plus complete 4 out of the 7 experiments
at these exhibits:

1. Crank Power
2. Earthquake
3. Magnetic Sculpture
4. Flight Deck
5. Light & Vision Room
6. Mechanical Advantage
7. Parachute Launch



You must get a signature from your troop leader for each experiment that you do and answer a few questions!

Turn the page and read on to find out what you have to do!

REQUIRED EXPERIMENTS



1. Roller Coaster

Build a roller coaster consisting of at least six pieces of track (including loops). Be sure that the ball reaches the end!

Explain the transfer of energy that occurs while the ball is completing its path.

Why does the ball have to go the perfect speed (not too fast or slow)?

Leader's Initials _____

2. Dam the Creek

Build a dam that keeps back almost all of the water using as few bricks as possible.

What is a drainage channel and what is its purpose?

How many different combinations of dam structures can you come up with?

Leader's Initials _____

3. Electrical Circuits

Wire a circuit that makes at least two lights shine brightly.

What is necessary to have a complete circuit (parts and conditions)?

What is the difference between a series circuit and a parallel circuit?

Leader's Initials _____

REQUIRED EXPERIMENTS



4. Puzzles & Brain Teasers

Complete at least 4 puzzles. List them here:

1. _____
2. _____
3. _____
4. _____

Could you solve each puzzle on your first attempt or did you need to try different methods (you may write notes or draw pictures next to each puzzle listed above)?

Look for patterns (repeated items, images or steps) as you work on the puzzles. Mention at least one of them below or in the spaces above.

Leader's Initials _____

5. MiniRacers

Build a K'nex dragster that races to the finish line.

What propels the car forward when you set it in place on the track?

Identify the forces and types of energy utilized in the movement.

Come up with a way to improve the design and write about it here:

Leader's Initials _____

ELECTIVE EXPERIMENTS



1. Crank Power

Work as a team to light up the headlights, make the radio play music, and spin the fans and mixer all at once.

What do generators do?

Identify the types of energy being used and how they transform in the generator.

Leader's Initials _____

2. Earthquake

Build the biggest building possible that can withstand a very shaky earthquake.

What is the key to building a strong structure?

How many levels of blocks can you stack on top of each other (in a 4-wall structure) without it falling down?

Leader's Initials _____

3. Magnetic Sculpture

See how many nuts you can get to stick together.

The hex nuts are not originally magnetized. How can such long chains of nuts be created?

What's the longest chain you can make (how many nuts)?

Is magnetism an energy or a force?

Leader's Initials _____

4. Flight Deck

Make a paper airplane that flies through at least one hoop.

What are the four forces that must be considered to make something fly?

Are these forces balanced while this plane is flying?

Find the "center" of the plane with the force that is trying to pull it down.

Leader's Initials _____

ELECTIVE EXPERIMENTS



5. Light & Vision Room

Find out what a red image looks like under blue light. Create a purple shadow. Bend some light.

What are the primary colors of light? How is a lens different from a mirror?

How is a convex shape different from a concave shape (you may draw)?

Leader's Initials _____

6. Mechanical Advantage

Try to lift each 100 pound stack of weights.

Which system makes it easiest to lift 100 pounds? With which system is it hardest?

Which pulley set requires you to pull the greatest length of rope?

How much force (in pounds) is needed to lift each set of pulleys?

Leader's Initials _____

7. Parachute Launch

Propel a paratrooper up to the ceiling.

How do parachutes slow the descent of a person or object?

Leader's Initials _____

BONUS QUESTIONS!



1. What was your favorite exhibit or experiment? Why?

2. Which exhibit or experiment was the most difficult? Why?
