$E=mc^2$ Scavenger Hunt

Answer questions related to $E=mc^2$ by collecting information from library resources.

Ages: 10–14
Time: 1 to $1^1/_2$ hours
Group Size: 10–20 kids
Materials (per pair): Nametags, copy of *$E=mc^2$ Scavenger Hunt* activity sheet (p. 26), pencils, prizes

Big Ideas

Science is a process of inquiry. The legacy of $E=mc^2$ continues.

Get Ready

1 Advertise the scavenger hunt

- **Choose a date and time** for the hunt.
- **Three weeks before, begin advertising** via posters in the children's, young adult, and reference sections; notices on library bulletin boards, Web site, and in library newsletter; and through young adult groups (homework clubs or book clubs). Let kids know they can win prizes.

2 Sign up participants

- **Post a sign-up sheet** at the children's, young adult, and main desk. Participants should include their names, ages, email addresses, and phone numbers.
- **Have a waiting list** in case you have cancellations.
- **Call all participants to confirm attendance** the day before the hunt. Use the waiting list to fill any cancellations.
- **Recruit staff members** to help run the event.

3 Prepare the hunt

- **Survey the questions** on the *Scavenger Hunt* activity sheet. Revise or replace any questions that can't be answered with your library's resources.
- **Photocopy** the *Scavenger Hunt* activity sheet on colorful paper. Make extra copies.
- **Make and post clues for the final question.** Collect four index cards and write one of the letter sets (at left) on each of the cards. Then post each card in a visible place near relevant resource sections (such as the reference section, card/computer catalog, biography section, science experiment section, and journal/periodicals section). Participants will copy the letter sets as they find them, then unscramble the letters to answer the final question.
- **Download video clip** from NOVA program "Einstein's Big Idea" at: www.pbs.org/nova/einstein
- **Obtain prizes** (see ideas at left).

4 Do a test run

- **Check hunt resources and final question clues** to make sure none have been moved or hidden behind other items.
- **Make sure any "off-limits" areas** are clearly indicated.

5 Prepare the start area

- **Set up a sign-in table** staffed by library personnel.
- **Supply blank nametags and markers** for participants to make nametags.
- **Provide snacks and drinks** if permitted.

Final Question Clues

CR	EP
AI	LPP

Prize Ideas

- Einstein- or science-themed bookmark, pencil, or pocket notebook
- Pass to a local science museum
- Book from the resource lists in this guide (pp. 5–7)
- Einstein-themed dolls, mugs, t-shirts, and posters (available at science museum gift shops or such Web sites as www.physlink.com/estore and www.scienceteecher.com)
- Coupon for a video store, movie theater, or ice cream shop

Run the Event

1 Welcome

- **Welcome and sign in participants.** Direct them to the Start Area where they can make nametags and have snacks while waiting for others to arrive.
- **Do a short icebreaker activity** to help people get to know each other. Use your favorite, or try one of these suggestions:
    - Each person in the circle says his or her name and favorite breakfast cereal.
    - Each person receives a slip of paper with half a famous scientist's name on it (e.g., Albert . . . Einstein, Marie . . . Curie, Galileo . . . Galilei, Isaac . . . Newton, Niels . . . Bohr, Antoine . . . Lavoisier, Enrico . . . Fermi), then has to find the other half. Each pair exchanges names and a little information about themselves.
- **Connect the hunt to $E=mc^2$.** Explain that 2005 marks the centennial of Einstein's famous equation $E=mc^2$. Ask participants to share what they know about the equation. Offer some background and/or show a clip of the NOVA program "Einstein's Big Idea" to introduce the young Einstein and other scientists whose work laid the essential groundwork for the equation (available at www.pbs.org/nova/einstein).
- **Form pairs for the hunt.** Let participants form their own pairs or stay in the pairs created during the icebreaker activity.

2 Explain the rules

- **Hunt Rules:** The Hunt is made up of questions related to Einstein and $E=mc^2$. To answer the questions, you need to find an appropriate library resource. One of the goals is to explore the library, so we've placed clues on four index cards near key resources for some of the questions. (This means you can't rely on the computer only to finish the Hunt!) When your sheet is complete, return to the Start Area to have it checked. Pairs with accurately completed sheets receive a prize! Remember, it's not about doing it the fastest, but about using the library to find all the information.
- **Emphasize any "ground rules"** for working in the library, such as respect off-limits areas, keep noise to a minimum, and don't move any clues.
- **Set a time limit,** such as 45 minutes, if necessary.

3 Distribute materials

- **Give each pair a copy of the activity sheet and a pencil.** To avoid a stampede, assign "start clues" by circling different numbers on each copy of the sheet, and instruct pairs to start their search on the circled item.
- **The hunt is on!** Library personnel can circulate to assist or clarify as necessary.

4 Wrap up

- **Check answers and share discoveries.** Ask which clues they found most difficult. If there were any "stumpers," review them with the group. Invite participants to share something new or interesting they learned.
- **Find out what worked.** Ask participants to fill out a brief evaluation (be sure to ask what they would suggest you do differently if repeating the event).
- **Hand out prizes.** Offer the same prize for all participants, or have one prize for participating and another for completing the sheet, as appropriate for your group.

Lise Meitner (Emily Woof) and her nephew, physicist Otto Robert Frisch, were the first to understand that uranium atoms could be split. They calculated how much energy would be released each time a uranium nucleus underwent fission—a dramatic example of $E=mc^2$.

Answers

1 Swiftness or speed; *celeritas*; dictionary

2 Answers will vary

3 Answers will vary

4 Stockholm; almanac, atlas, or encyclopedia

5 Journals might include *Science* (weekly) and *Nature* (weekly); magazines might include *Scientific American* (monthly), *Discover* (monthly), and *Popular Physics* (monthly); periodicals area or in an online database

6 Answers will vary

7 Exit sign; locations will vary

Final Question: Paper clip

$E = mc^2$ Scavenger Hunt

This Scavenger Hunt is made up of questions related to Einstein and *E=mc²*. To answer the questions, you need to find an appropriate library resource. Remember to look for the posted clues so you can answer the final question. Good luck!

1 $E = mc^2$ is a famous equation written by Albert Einstein in 1905. It says that energy and mass are different forms of the same thing. You can convert energy into mass, and vice-versa, using the conversion factor of c^2 (the speed of light, squared). The *c* comes from a word that is also the source of the English word *celerity*.

What does *celerity* mean? _____

***Celerity* comes from what Latin word?**_____

In what library resource did you find this information? _____

2 Before Einstein came up with $E = mc^2$, he thought a lot about different kinds of energy, including how magnets work and how light acts. A lot of other scientists studied the energy of magnets and light by conducting experiments.

Find a book of hands-on science experiments.

Author: _____ **Title:** _____

Call number: _____ **In what area did you find it?**_____

3 In many ways, scientists are like detectives, piecing together clues to discover and explain how the natural world works. Einstein is just one scientist who led a very interesting life.

Find a biography of a scientist other than Einstein.

Author: _____ **Title:** _____

Call number: _____ **In what area did you find it?**_____

4 Working after Einstein proposed his famous equation, Lise Meitner was the first to show that a uranium atom can be split, converting a tiny amount of mass into an enormous amount of energy according to the formula $E = mc^2$. Meitner was living in the capital of Sweden when she came to this discovery.

What is the name of this city? _____

In what library resource did you find this information? _____

5 An important part of scientists' work is communicating their results so that other scientists can learn from the research or ask new questions about it. One major place where scientists share ideas and results is in science journals (specialized magazines).

Find a journal or magazine about science.

What is the name of the journal or magazine? _____

How often is it published? _____

Where in the library did you find it? _____

6 The idea behind $E=mc^2$ led other scientists and engineers to develop many new technologies. One of the most notorious is the atomic bomb. In 1945, the United States dropped two atomic bombs on the cities of Hiroshima and Nagasaki, Japan. The war ended, but the loss of life and destruction were devastating.

Find a nonfiction book about the atomic bombs in World War II.

Author: _____ **Title:** _____

Call number: _____ **Where in the library did you find it?**_____

7 Other applications of $E=mc^2$ are more peaceful. One example can be found in a library or other public spaces. If the power goes out, this object will still glow red, helping you find something important in an emergency. As tiny bits of radioactive matter inside this object are converted into energy, they give off the red glow.

What is this object? _____

Find one and describe its location: _____

Final Question

Einstein's equation says that energy and mass are different forms of the same thing. If you could turn every one of this everyday object's atoms into pure energy, it would yield 18 kilotons of TNT. That's roughly the size of the bomb that destroyed Hiroshima in 1945. **What is this object?**

Collect letters from the four index card clues. Then unscramble the letters to find the answer.

Clue letters: ___ ___ ___ ___ ___ ___ ___ ___ ___

Answer: _____