

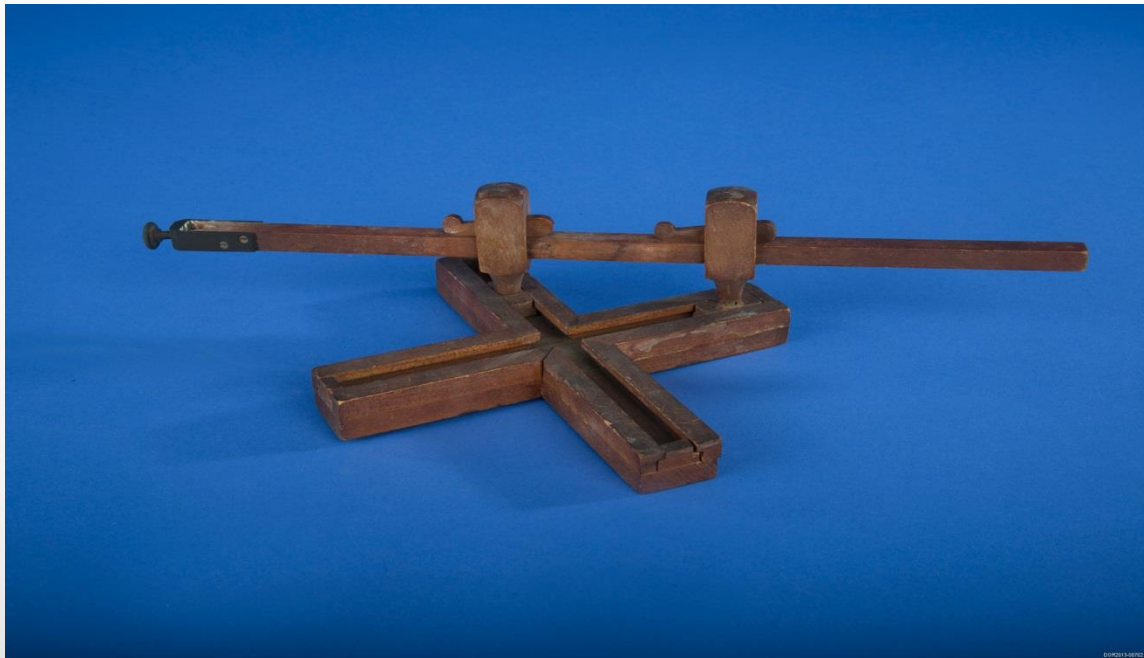
Object Based Learning: Using the Smithsonian Collections to Enhance Mathematics Education

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Smithsonian National Museum of American History (NMAH)



NMAH Online Collections

- Many computing and mathematical items owned by the Smithsonian are housed at NMAH.
- Current museum trend—to create online collections of museum objects available to the public.
- Object groups are collections of related items.

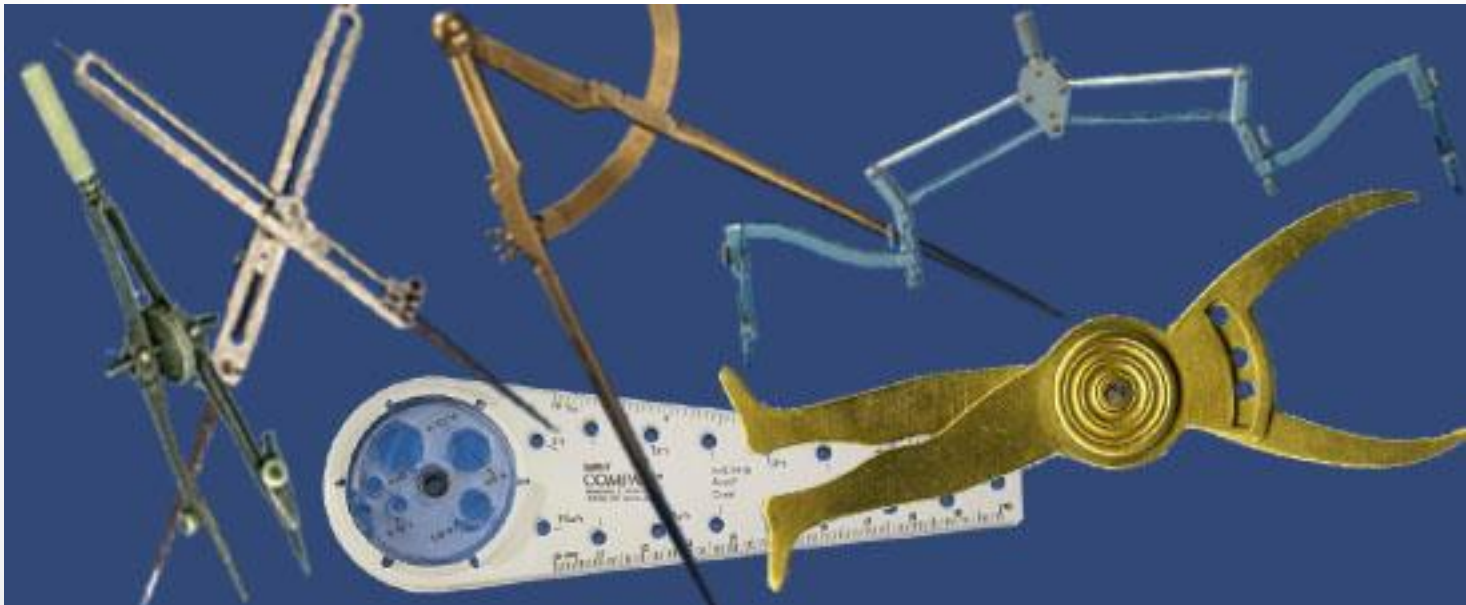


Elliptic Trammel
(for drawing ellipses)
19th century
NMAH cat. no.
1985.0112.227
Neg. no. DOR2013-
00702

NMAH Object Groups

Each group contains:

- An introduction with background and historical overview.
- Records for individual objects, which can be viewed separately.
- Resources page.



Header for Dividers & Compasses Object Group

Uses in the classroom

- Sources for student research
- Historical images for use in teaching
- Historical examples to illustrate a concept
- In class demonstrations
- Build physical models
- Connections to the history of mathematics and the history of education
- Cultural diversity
- Interdisciplinary projects and topics

Spherometers

- Measure the radius of curvature of lens
- In class math examples: right triangles, trigonometry and measurement

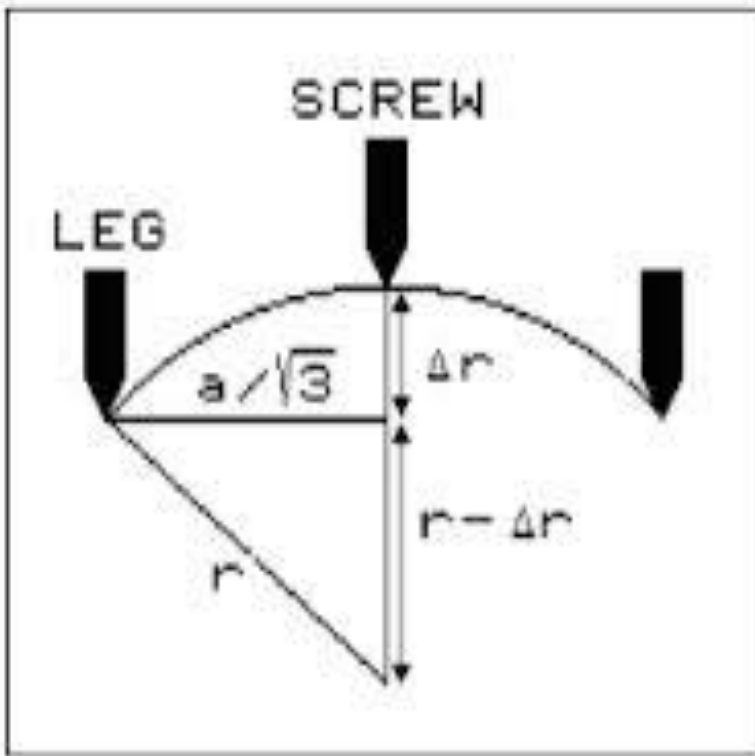


Figure 1



Grunow Spherometer
ca 1860

Cat. no. 315739, Neg. no. 75-2953

Spherometers

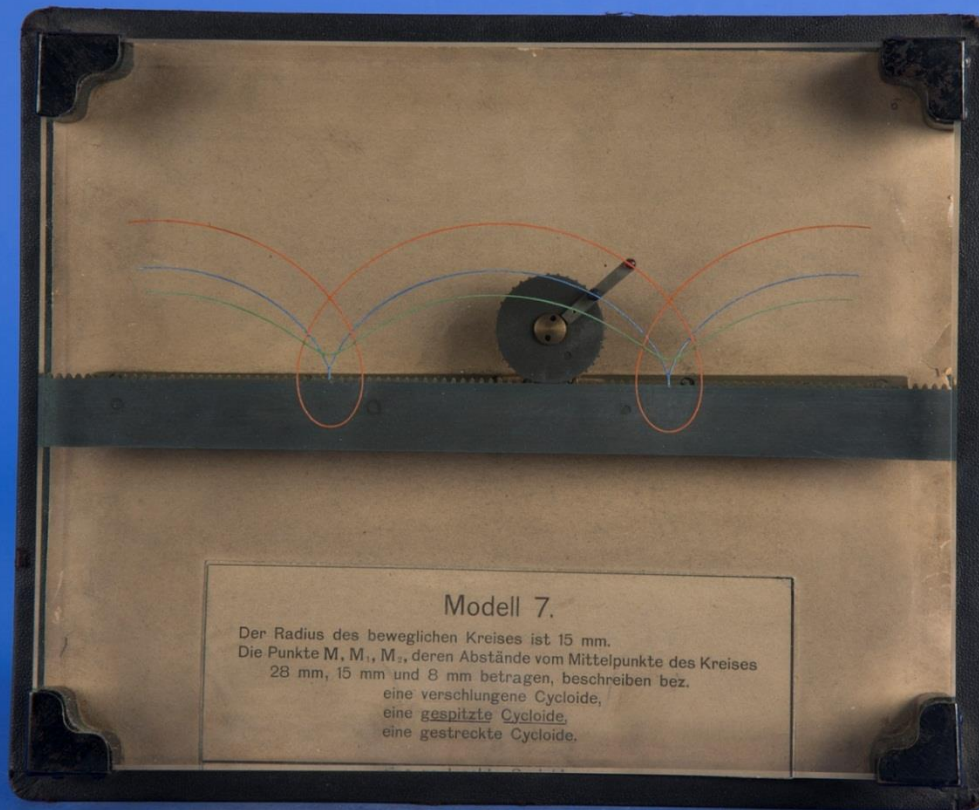
- Student models

Homemade spherometer
made by ASG for a talk
on spherometers



Kinematic Models

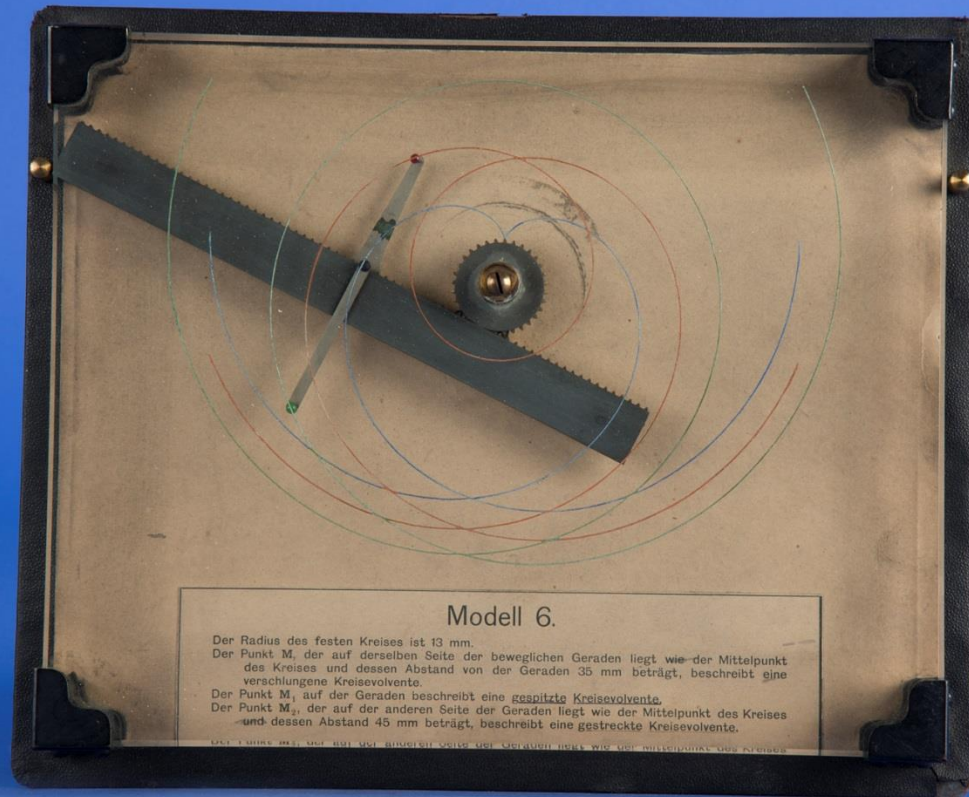
- Calculus class projects—cycloids



Schilling model #7
ca 1900
Cat no. 1982.0795.05
Neg no. DOR2013-
50218

Kinematic Models

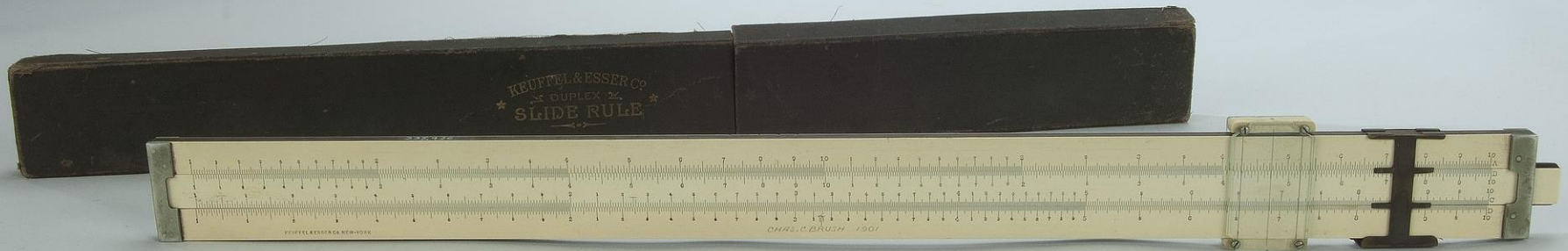
- Calculus class projects—involutes



Schilling model #6
ca 1900
Cat no. 1982.0795.06
Neg no. DOR2013-50219

Slide Rules

- In-class project on visual calculation with logarithms, etc.
- Loaner program from International Slide Rule Museum
- Online scales for making your own slide rules



Keuffel & Esser Duplex Slide Rule, Model 4078, with two cursors
Rule and chisel cursor date to 1901–1903; frameless glass cursor made after 1915
NMAH cat. no. 335926, neg. no. DOR2012-1502

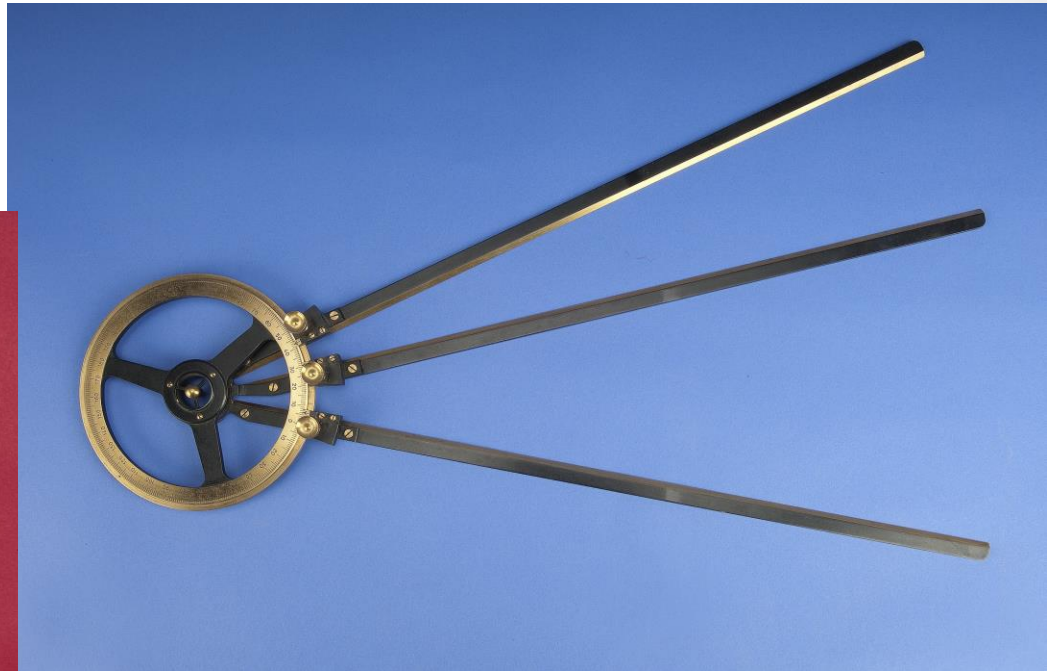
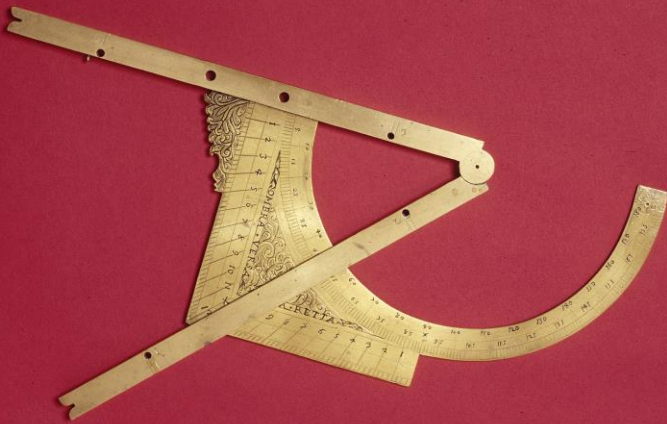
Protractors

- Dividing the circle in geometry or with pre-service teachers
- Applications/mathematical careers

Protractor & Shadow Square, 18th century

NMAH cat. no. 326978

Neg. no. 2002-2878

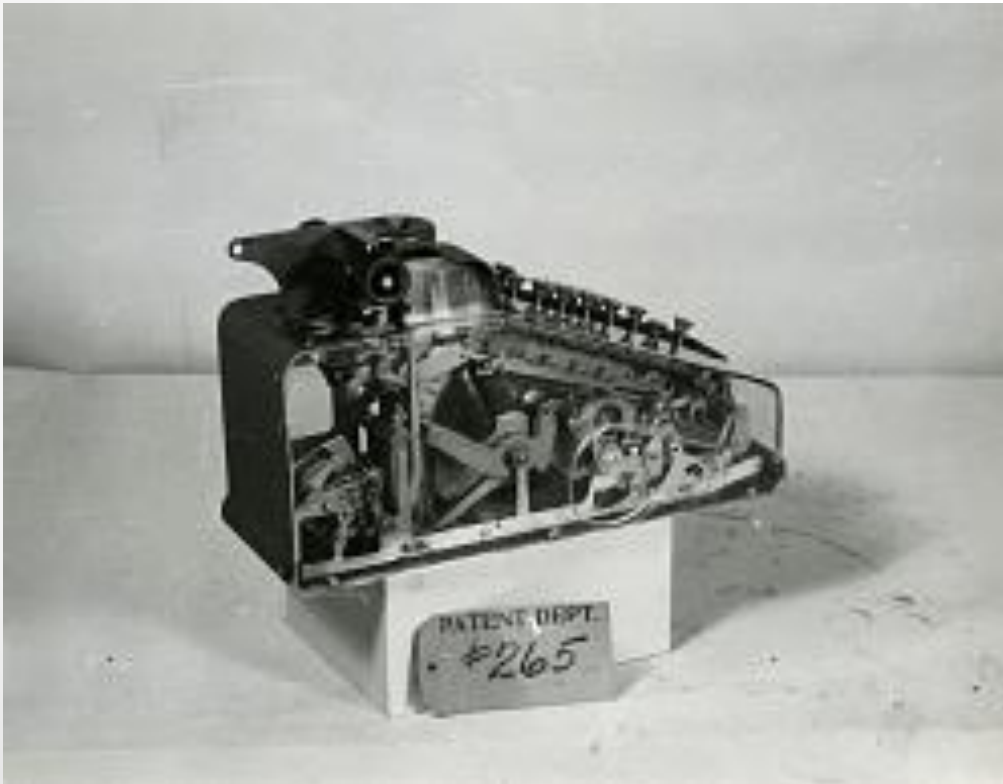


Station Pointer, 20th century
NMAH cat. no. 1986.0316.07

Neg. no. DOR2011-8523

Calculating Devices

- Burrows Adding Machine



Burroughs

Durability


Material that cannot be excelled, processes that cannot be bettered, workmanship that cannot be surpassed —all these have built into every Burroughs machine that quality which insures accuracy and durability.

BURROUGHS ADDING MACHINE COMPANY
6282 SECOND BOULEVARD
DETROIT, MICHIGAN

ADDING • BOOKKEEPING • CALCULATING AND BILLING MACHINES

Blogs!

- Many SI museums have blogs that are fun to read.
- <http://americanhistory.si.edu/blog>

 Smithsonian

AMERICAN HISTORY HOME


EXPLORE HISTORY

VISIT


ABOUT

O Say Can You See?


Stories from the National Museum of American History



Help reunite Dorothy and Scarecrow



There was more than one pair of Ruby Slippers in Dorothy's closet?



The conservator who is saving the Ruby Slippers' sparkle

Blog

Film & Television

Food History

Invention & Innovation

Latino History & Culture

Object Project

All Categories

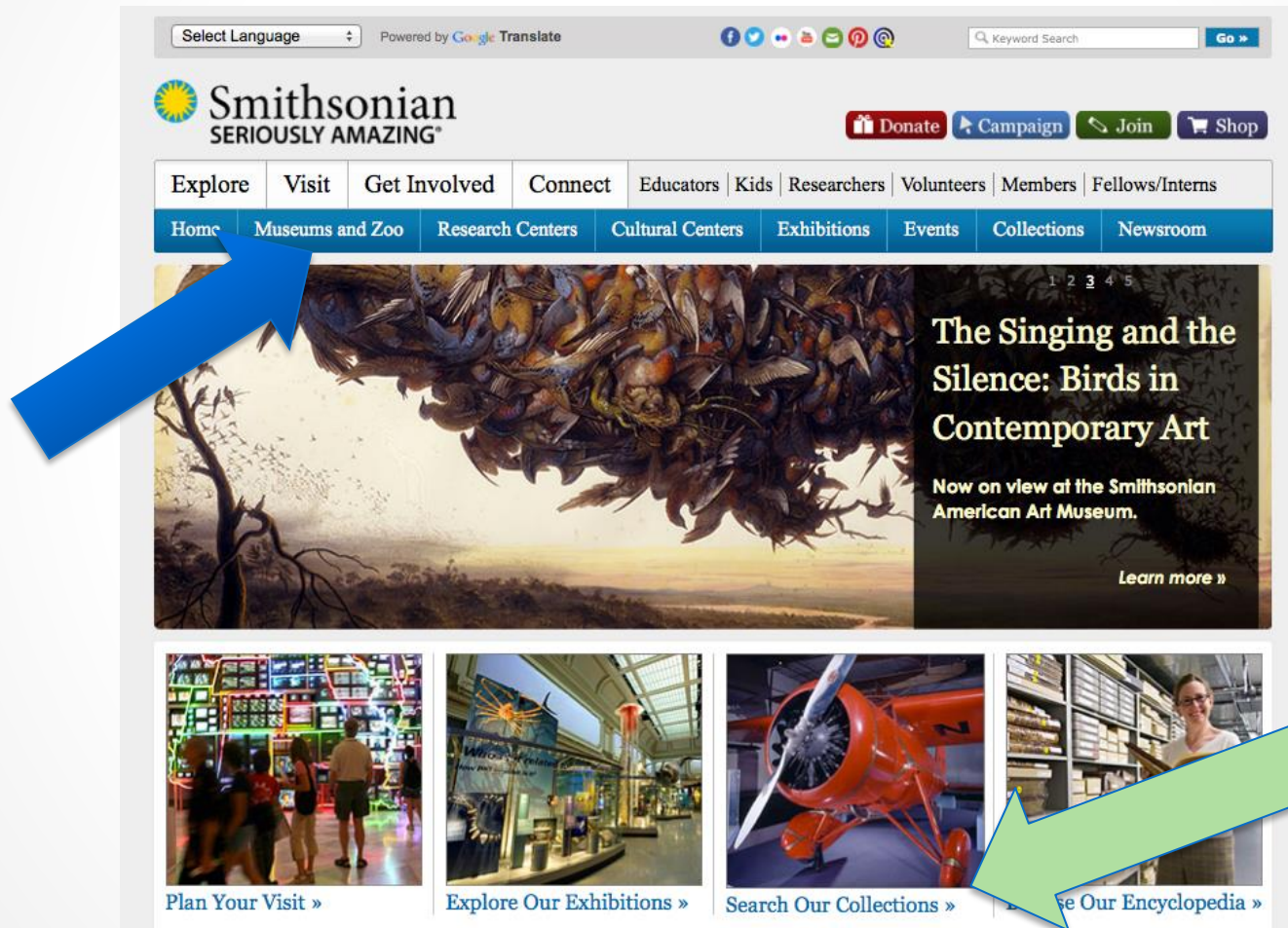
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TRAVEL BACK TO THE '60S
The Museum celebrates its fiftieth anniversary with a look back to 1964

Star-Spangled Banner

Holiday Festival

Ofrenda Installation

Fiftieth Anniversary


National Campaign

News

Smithsonian Holiday Festival
On December 6 and 7, celebrate the season at the Smithsonian with musical performances, films, book signings, trunk shows, crafts for kids, and more.

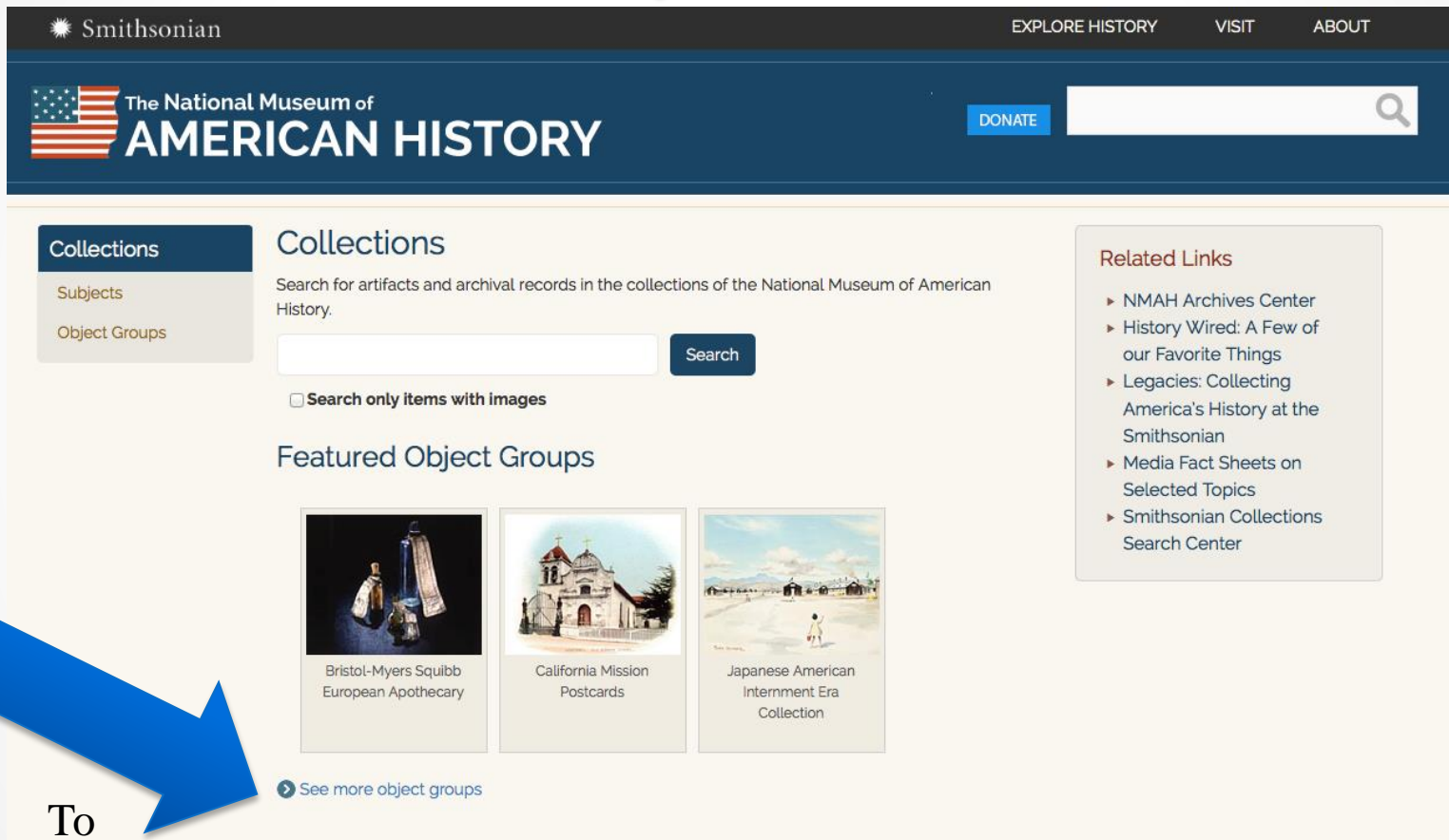
New Video: Tetris

From Our Blog

**The hoof of fire horse number 12**
In the early morning hours of March 30, 1890, in Washington, D.C., the collision of two horse-drawn fire wagons racing to answer an alarm seemed a minor matter. The vehicles—a hose cart and a heavy steam engine—continued on their way to the fire.

Getting there

americanhistory.si.edu/collections



Smithsonian

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The National Museum of
AMERICAN HISTORY

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Collections

Subjects

Object Groups


Collections

Search for artifacts and archival records in the collections of the National Museum of American History.


Search

☐ Search only items with images


Featured Object Groups



Bristol-Myers Squibb
European Apothecary



California Mission
Postcards



Japanese American
Internment Era
Collection

[See more object groups](#)

Related Links


- NMAH Archives Center
- History Wired: A Few of our Favorite Things
- Legacies: Collecting America's History at the Smithsonian
- Media Fact Sheets on Selected Topics
- Smithsonian Collections Search Center

To


<http://americanhistory.si.edu/collections/object-groups>

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Object Groups

Object Groups


The National Museum of American History preserves a wide variety of historical artifacts, archival documents, and library materials. In these Object Groups, curators have gathered items that relate to each other and provided background and contextual information to supplement basic object identifications.

Collections Search


Search

☐ Search only items with images


Featured Object Groups



Bristol-Myers Squibb European Apothecary




California Mission Postcards



Japanese American Internment Era Collection

All Object Groups




19th Century Survey Prints

Nearly 40 examples of prints from three government survey expeditions to the American West: the U.S. and Mexico Boundary Survey, the U.S. Naval Astronomical Expedition to the Southern Hemisphere, and the U.S.

Sample Object Group

americanhistory.si.edu/collections/object-groups/protractors

The National Museum of
AMERICAN HISTORY

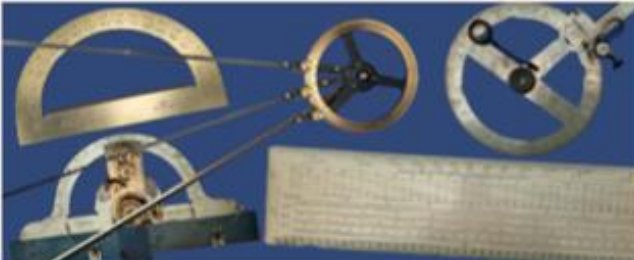
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Collections


Subjects

Object Groups

Protractors



Protractors are mathematical drawing instruments used to draw and to measure angles. Americans typically encounter them in elementary or middle school when they are learning to produce reasonably accurate geometrical figures in order to explore mathematical relationships between those figures. Perhaps many people then never have reason to consider these objects again. However, protractors are not merely tools for enhancing learning but rather have a lengthy history of application in a variety of fields. The protractors in the mathematics collections of the National Museum of American History (NMAH) illustrate stories of technical work and innovation in navigation, surveying, engineering, and war.



Safe-T Protractor, ca. 1998

Collections Search

Search

☐ Search only items with in

Contents

Introduction

Navigation

Surveying

Engineering & Drafting

War

School

Innovation

Oddities

Resources

What you can choose from

- Abaci & Numeral Frames
- Adders
- Adding Machines
- Arithmetic Teaching Apparatus
- Bookkeeping Machines
- Calculating Machines
- Cash & Credit Registers
- Counters
- Desktop Electronic Calculators
- Dividers & Compasses
- Ellipsographs
- Kinematic Models
- Mathematical Charts & Tables
- Mathematical Paintings
- Metric System Demonstration Apparatus
- Parallel Rules
- Pens & Pencils
- Planimeters
- Protractors
- Scales & Rulers
- Sectors
- Sets of Drawing Instruments
- Slide Rules
- Spheromoeters
- Tabulating Equipment
- Triangles & Squares
- Women in Mathematics
- ...and more

Questions?

