The
“Look Mom, No Adding Machine Tape!”
Geologic Timeline

Kids can make their own geologic timeline with annotated, illustrated tabs marking important dates in Earth’s geological and biological history...all without adding machine tape!

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Questions, Comments, Feedback? Contact Kelly Terry at kellytinpg@gmail.com.
Directions for  
The Adding Machine Tape-Free Annotated and Illustrated Geologic Timeline Model

Here are suggested directions for using this activity. This activity packet contains many materials and presents many options. This activity packet can be differentiated to accommodate the needs of students of all ability and interest levels. May you find this activity fun, flexible, and informative!

Dimensions of Finished Product

The timeline itself in color or black and white is 80 inches long by 5 ½ inches wide (with tabs but without “stacking” the tabs) and 9 ½ inches wide if you “stack” all the tabs. If you add the optional Cenozoic Era piece, the length increases to 82 inches. Please read the small notes on the “Glue Here” portion of the tabs for instructions on stacking tabs.

<table>
<thead>
<tr>
<th>Activity</th>
<th>What needs to be printed and copied</th>
<th>Brief description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assembling a Full-color Geologic Timeline</td>
<td>Pages 3, 4, 5 (Page 11 optional) (print one of each per timeline)</td>
<td>Use a color printer. Print pages, cut and assemble timeline. Best for teacher made demo or for limited number of timelines because of colored ink.</td>
</tr>
<tr>
<td>Assembling a Full-color Geologic Timeline with Main Event or Other Tabs</td>
<td>Pages 3, 4, 5 for timeline (Page 9 optional) Page 12 for directions in color Page 14 for Main Events Tabs in color Page 16 for Biological Events in color Page 18 for Geological Events in color (print one of each per timeline)</td>
<td>Use a color printer. Print pages, cut and assemble timeline. Best for teacher made demo or for limited number of timelines because of colored ink. Be sure to use page 14 as it contains “the basics.” Page 16 and/or page 18 offer additional information.</td>
</tr>
<tr>
<td>Assembling a Black and White Geologic Timeline</td>
<td>Pages 6, 7, 8 (print one of each page per student or small student group)</td>
<td>Students use scissors and glue sticks to assemble simple timeline. They then color it using colored pencils or markers.</td>
</tr>
<tr>
<td>Assembling a Black and White Geologic Timeline with Main Event or Other Tabs</td>
<td>Pages 3, 4, 5 for timeline (Page 10 optional) Page 13 for directions in black and white Page 15 for Main Events Tabs in black and white Page 17 for Biological Events in black and white Page 19 for Geological Events in black and white (print one of each page per student or small student group)</td>
<td>In addition to the timeline pages (3-5), be sure to use page 14 as it contains “the basics.” Page 16 and/or page 18 offer additional information. The teacher might consider asking all students to complete the tabs on page 14 and allowing the faster students to complete the tabs on page 16 and/or page 18 as well. Students use colored pencils and/or markers to color the model.</td>
</tr>
<tr>
<td>Completing the Etymology Worksheet</td>
<td>Pages 20-21 (print one of each page per fast-finishing student)</td>
<td>This is a fairly challenging activity with a crossword puzzle. Recommended for advanced or super speedy students.</td>
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<tr>
<td>Completing the Scientific Notation Worksheet</td>
<td>Pages 22 (print one of each page per fast-finishing student)</td>
<td>This is a fairly challenging activity. Recommended for advanced or super speedy students.</td>
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<tr>
<td>Answers for Worksheets</td>
<td>Found on pages 23, 24, 25</td>
<td>Answer keys</td>
</tr>
<tr>
<td>Blank tabs (for students to add their own information)</td>
<td>Found on page 26</td>
<td>Students can use these tabs to create their own markers for important events</td>
</tr>
</tbody>
</table>
Directions:

1. Cut out each of the 10 strips carefully along the outer solid lines.

2. Use a glue stick to put glue on the “Glue Here” tab of strip #1.

3. Place the end of strip #2 (the end without a tab) over the “Glue Here” tab on strip #1. Press.

4. Repeat steps 2 and 3 for each of the 10 strips (Strip #10 is very short) until all pieces are used. Your finished strip will be nearly 3 meters long!
ZOIC EON

1.6 billion years ago

1.5 billion years ago

1.4 billion years ago

1.3 billion years ago

1.2 billion years ago

1.1 billion years ago

1 billion years ago

900 million years ago

800 million years ago

700 million years ago

PHANEROZOIC EON

PALEozoic ERA

600 million years ago

500 million years ago

400 million years ago

300 million years ago

200 million years ago

100 million years ago

CENOZOIC ERA

700 million years ago

600 million years ago

500 million years ago

400 million years ago

300 million years ago

200 million years ago

100 million years ago

CEOUS PALEOGENE

NEOGENE

Strip # 10
Directions:

1. Cut out each of the 10 strips carefully along the outer solid lines.

2. Use a glue stick to put glue on the “Glue Here” tab of strip #1.

3. Place the end of strip #2 (the end without a tab) over the “Glue Here” tab on strip #1. Press.

4. Repeat steps 2 and 3 for each of the 10 strips (Strip #10 is very short) until all pieces are used. Your finished strip will be nearly 3 meters long!

5. Color each time period carefully!
Optional Enlarged Cenozoic Era - Page to Print for Single Copy

(Can be added to end of timeline to allow students to better see recent time periods)

Strip # 11 (optional)
Directions for Using Main Events Tabs (Color)

1. Did you notice that the outer portion of each tab is green if the event is mostly biological and brown if the event is mostly geological?

2. Carefully color each tab.

3. Carefully cut out each tab.

4. To attach the tabs to your timeline, carefully find the location of the date on the tab on the timeline. Line up the pointer on the tab with that date.

5. Put a little glue on the “Glue Here” portion of the tab and place it beneath the correct portion of the timeline. Press and hold until the tab sticks on its own. Tape can also be used for this.

HINTS:
By looking at whether the text is upside-down or right-side-up, you can tell whether the tab should be glue above or below the timeline.

Some of the tabs “Glue Here” parts of the tabs have special directions on them. Following these directions will help you to make a nice looking finished product.

Some of the tabs have unusual shapes that will guide you in knowing where to place them. You might consider placing these tabs last so that fitting them correctly will be easier.

Finally, if you use optional Strip #11, do not attach tabs to that strip. The scale for that strip is different than the scale used for the other strips.
Directions for Using Main Events Tabs (Black and White)

1. Did you notice that the outer portion of each tab is speckled if the event is mostly biological and has a diagonal pattern if the event is mostly geological?

2. Carefully color each tab.

3. Carefully cut out each tab.

4. To attach the tabs to your timeline, carefully find the location of the date on the tab on the timeline. Line up the pointer on the tab with that date.

5. Put a little glue on the “Glue Here” portion of the tab and place it beneath the correct portion of the timeline. Press and hold until the tab sticks on its own. Tape can also be used for this.

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Main Events in the History of Earth

4.5 billion years ago
Formation of Earth's moon, possibly due to giant impact.

4.4 billion years ago
First free water found on Earth's atmosphere. I'm FREE!

4.2 billion years ago
First oceans emerge. This date is disputed. Some scientists think the oceans emerged around 3.8 billion years ago.

3.5 billion years ago
First bacterial and archean life on Earth. Some scientists think this happened earlier.

3.2 million years ago
Modern humans evolve. 200,000 years ago.

2.7 billion years ago
First oxygen-producing bacteria.

1.8 billion years ago
Appearance of the first eukaryote (a single cell organism with a complex inner structure).

1 billion years ago
Multi-cellular organisms appear.

530 million years ago
Cambrian explosion begins. This was the rapid appearance of most major animal groups.

360 million years ago
Four legged vertebrates emerge on land.

200 million years ago
Supercontinent Pangaea begins to break apart.

65 million years ago
The Cretaceous-Tertiary mass extinction - also known as the K/T extinction - wipes out the dinosaurs.
Main Events in the History of Earth

4.5 billion years ago
Formation of Earth’s moon, possibly due to giant impact

4.4 billion years ago
First free water found on Earth’s atmosphere

4.2 billion years ago
First oceans emerge (This date is disputed...some scientists think the oceans emerged around 3.8 billion years ago)

2 million years ago
Early hominid nicknamed “Lucy” lives.

3.5 billion years ago
First bacterial and archean life on Earth. Some scientists think this happened earlier.

2.7 billion years ago
First oxygen-producing bacteria.

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Appearance of the first eukaryote (a single cell organism with a complex inner structure)

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Four legged vertebrates emerge on land.

530 million years ago
Multi-cellular organisms appear.

65 million years ago
The Cretaceous-Tertiary mass extinction - also known as the K/T extinction - wipes out the dinosaurs.

200 million years ago
Supporting framework begins
Other Important Events in Earth’s Biological History

2.4 billion years ago
Oxygen catastrophe takes place. Earth’s anaerobic inhabitants mostly wiped out.

200 million years ago
The Triassic-Jurassic mass extinction wiped out about half of all species on Earth.

420 million years ago
Land plants evolve.

555 million years ago
Multi-cellular marine life common.

450 million years ago

2.4 billion years ago

443 million years ago

43 million years ago

248 million years ago

200 million years ago

160 million years ago
Dinosaurs were found in great numbers all over Earth.

1.25 billion years ago
Stromatolites, mats of cyanobacteria, reach their peak.

340 million years ago
Vast forests dominated the landscape.

240 million years ago
Earliest dinosaurs. These were only about 2-3 feet tall.

Optional labels:
- MEZOZOIC ERA
  “Age of the Reptiles”
- CARBONIFEROUS & PERMIAN ERAS
  “Age of the Amphibians”
- SILURIAN AND DEVONIAN ERAS
  “Age of the Fish”
- CAMBRIAN AND ORDOVICIAN ERAS
  “Age of the Invertebrates”
Other Important Events in Earth’s Biological History
(Dates are approximate)

2 billion years ago
2
Glue Here!

450 million years ago
43
Glue Here!

2.4 billion years ago
248
Oxygen catastrophe takes place. Earth’s anaerobic inhabitants mostly wiped out.

200 million years ago
2
The Triassic-Jurassic mass extinction wiped out about half of all species on Earth.

420 million years ago
2 Glue Here!

555 million years ago
2
Land plants evolve.

555 million years ago
2
Multi-cellular marine life common.

555 million years ago
2
2
Glue Here!

443 million years ago
2
The Cambrian-Ordovician mass extinction wiped out 55% of all species on Earth.

420 million years ago
2
Glue Here!

420 million years ago
2
Glue Here!

380 million years ago
2
Glue Here!

380 million years ago
2
Dinosaurs were found in great numbers all over Earth.

380 million years ago
2
Glue Here!

340 million years ago
340 million years ago
2
Vast forests dominated the landscape.

340 million years ago
2 Glue Here!

340 million years ago
2
Glue Here!

1.25 billion years ago
1.25 billion years ago
2
Stromatolites, mats of cyanobacteria, reach their peak.

1.25 billion years ago
2 Glue Here!

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  "Age of the Fish"
- CAMBRIAN AND ORDOVICIAN ERAS
  "Age of the Invertebrates"
Other Important Events in Earth’s Geological History
(Dates are approximate)

2.6 billion years ago
First Snowball Earth period begins.

4.1 billion years ago
Late Heavy Bombardment begins.

440 million years ago
Plants and fungus break down rocks, allow clay and soil to form.

1.5 billion years ago
Supercontinent Columbia breaks up.

3.8 billion years ago
Oldest rocks found on Earth today are formed.

3.9 billion years ago
Late Heavy Bombardment ends.

5.5 billion years ago
Supercontinent Rodinia forms.

750 million years ago
250 million years ago
9.8 billion years ago
8.9 billion years ago
4.4 billion years ago

Glue Here!
Glue Here!
Glue Here!
Glue Here!
Glue Here!
Glue Here!
Glue Here!
Glue Here!
Glue Here!
Glue Here!
Glue Here!

Other Important Events in Earth’s Geological History

(Dates are approximate)

2.6 billion years ago
First Snowball Earth period begins.

2.5 billion years ago
Shallow seas cover much of the land.

4.1 billion years ago
Early Earth forms an atmosphere.

4.4 billion years ago
First cells evolve.

50 million years ago
First land plants appear.

1.5 billion years ago
Supercontinent Columbia breaks up.

3.5 billion years ago
Diverse life forms first appear.

3 billion years ago
Supercontinent Ur forms.

3.8 billion years ago
Oldest rocks found on Earth today are formed.

440 million years ago
Plants and fungi break down rocks, allowing clay and soil to form.
Geologic Timeline:
What do those all those crazy words mean?

The geologic timeline is divided up into eons, eras, epochs, periods, and ages. Have you ever wondered where those complicated names given to each of those time periods come from? Check out the tables below.

Here are some word roots used in the geologic timeline that come from Greek and Roman.

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<td>new</td>
</tr>
<tr>
<td>creта-</td>
<td>chalk, limestone</td>
</tr>
<tr>
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<td>relating to the fiery underworld</td>
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</tr>
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</tr>
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<td>new</td>
</tr>
<tr>
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</tr>
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<td>earlier, first</td>
</tr>
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Here are some names of people and places used in names found on the geologic timeline. Most of these are the names of places where fossils were found or of the people who lived in those places.

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</tr>
<tr>
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<td>A place in England in the UK</td>
</tr>
<tr>
<td>Ordovices</td>
<td>A tribe that lived in Wales, in the UK</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>A place in the United States</td>
</tr>
</tbody>
</table>

Now try this! Use the tables above to match the name of the geologic time period with its definition.

_____ 1. Period of new birth  | a. proterozoic
_____ 2. When the earth was like the fiery underworld  | b. archеan
_____ 3. Eon of “earlier life”  | c. cretaсeous
_____ 4. Era of new life  | d. neоgene
_____ 5. Before the time when all the many animals whose fossils were found in Wales were alive  | e. mioсene
_____ 6. Epoch of “less new” animal life  | f. carboniferous
_____ 7. Epoch of entirely new living things  | g. Hadean
_____ 8. Period when great coal beds were formed  | h. precambrian
_____ 9. Period when great chalky layers of limestone were laid down  | i. paleоarchеan
_____ 10. The old eon  | j. holоcene
_____ 11. The ancient old epoch  | k. cenоzoic
Feel like a challenge? Based on what you’ve learned about word roots in the geologic timeline, can you figure which word goes with each definition?

Here’s the word bank:
zoology  concrete  generation  archaeology
preschool  neophyte  protozoan  miocardia
Hades  tricycle  paleontology  mezzanine

Across
3. earliest type of living thing
5. the study of animal life
7. new people born around the same time
8. a three wheeled vehicle
10. the study of old times
11. in a building, a low floor between two others
12. the study of ancient time, a LONG time ago

Down
1. where children go before they go to kindergarten
2. fewer heart beats, a medical condition
4. a beginner, someone new to something
6. the god of the fiery underworld
9. the material found in chalk bound together as a building material
**Geologic Timeline: Scientific Notation Practice**

Scientists use scientific notation to write very large and very small numbers. The geologic timeline involves some very big numbers, so it provides a great opportunity to practice scientific notation.

The geologic timeline is divided up into eons, eras, periods, epochs, and ages. But what do those words mean? Use your scientific notation skills to write about how long those periods are.

<table>
<thead>
<tr>
<th>Unit of Time</th>
<th>How long is that?</th>
<th>Number written in standard form</th>
<th>Number written in scientific notation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eon</td>
<td>Half a billion years or more</td>
<td>500,000,000</td>
<td></td>
</tr>
<tr>
<td>Era</td>
<td>Measured in hundreds of millions of years</td>
<td>100,000,000</td>
<td></td>
</tr>
<tr>
<td>Period</td>
<td>A period varies in length of time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Epoch</td>
<td>Measured in tens of millions of years</td>
<td>10,000,000</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>Measured in millions of years</td>
<td>1,000,000</td>
<td></td>
</tr>
</tbody>
</table>

Can you write the approximate time when these events occurred in scientific notation?

<table>
<thead>
<tr>
<th>Event</th>
<th>When it happened (approximately) written in standard form</th>
<th>When it happened (approximately) written in scientific notation</th>
</tr>
</thead>
<tbody>
<tr>
<td>The moon formed.</td>
<td>4,500,000,000 years ago</td>
<td></td>
</tr>
<tr>
<td>First archean life appears (maybe…it could have been earlier).</td>
<td>3,500,000,000 years ago</td>
<td></td>
</tr>
<tr>
<td>Multicellular organisms appear.</td>
<td>1,000,000,000 years ago</td>
<td></td>
</tr>
<tr>
<td>Earth is covered with ice from pole to pole.</td>
<td>750,000,000 years ago</td>
<td></td>
</tr>
<tr>
<td>Cambrian explosion introduces many new life forms.</td>
<td>530,000,000 years ago</td>
<td></td>
</tr>
<tr>
<td>Four legged vertebrates appear on land.</td>
<td>360,000,000 years ago</td>
<td></td>
</tr>
<tr>
<td>Permian mass extinction kills about 95% of all life on Earth.</td>
<td>248,000,000 years ago</td>
<td></td>
</tr>
<tr>
<td>Dinosaurs could be found all over the earth.</td>
<td>160,000,000 years ago</td>
<td></td>
</tr>
<tr>
<td>Dinosaurs disappear in the K-T mass extinction.</td>
<td>65,000,000 years ago</td>
<td></td>
</tr>
<tr>
<td>Earliest primates evolved.</td>
<td>60,000,000 years ago</td>
<td></td>
</tr>
<tr>
<td>“Lucy,” an early hominid, lived.</td>
<td>3,200,000 years ago</td>
<td></td>
</tr>
<tr>
<td>Modern humans emerge.</td>
<td>200,000 years ago</td>
<td></td>
</tr>
<tr>
<td>Earth’s most current “ice age” began.</td>
<td>110,000 years ago</td>
<td></td>
</tr>
<tr>
<td>Neanderthals died out.</td>
<td>50,000 years ago</td>
<td></td>
</tr>
<tr>
<td>Wooly mammoths became extinct.</td>
<td>3,600 years ago</td>
<td></td>
</tr>
<tr>
<td>Human beings begin the Industrial Revolution.</td>
<td>250 years ago</td>
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1. Period of new birth  
2. When the earth was like the fiery underworld  
3. Eon of “earlier life”  
4. Era of new life  
5. Before the time when all the many animals whose fossils were found in Wales were alive  
6. Epoch of “less new” animal life  
7. Epoch of entirely new living things  
8. Period when great coal beds were formed  
9. Period when great chalky layers of limestone were laid down  
10. The old eon  
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zoology  concrete  generation  archaeology
preschool  neophyte  protozoan  myocardia
Hades  tricycle  paleontology  mezzanine

Across
1.   earliest type of animal life
3.   new people born around the same time
5.   the study of animal life
7.   a three wheeled vehicle
8.   the study of old times
10. the study of old times
11. in a building, a low floor between two others
12. the study of ancient time, a LONG time ago

Down
1. where children go before they go to kindergarten
2. fewer heart beats, a medical condition
4. a beginner, someone new to something
6. the god of the fiery underworld
9. the material found in chalk bound together as a building material
Geologic Timeline: Scientific Notation Practice

Scientists use scientific notation to write very large and very small numbers. The geologic timeline involves some very big numbers, so it provides a great opportunity to practice scientific notation.

The geologic timeline is divided up into eons, eras, periods, epochs, and ages. But what do those words mean? Use your scientific notation skills to write about how long those periods are.

<table>
<thead>
<tr>
<th>Unit of Time</th>
<th>How long is that?</th>
<th>Number written in standard form</th>
<th>Number written in scientific notation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eon</td>
<td>Half a billion years or more</td>
<td>500,000,000</td>
<td>$5 \times 10^8$</td>
</tr>
<tr>
<td>Era</td>
<td>Measured in hundreds of millions of years</td>
<td>100,000,000</td>
<td>$1 \times 10^8$</td>
</tr>
<tr>
<td>Period</td>
<td>A period varies in length of time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Epoch</td>
<td>Measured in tens of millions of years</td>
<td>10,000,000</td>
<td>$1 \times 10^7$</td>
</tr>
<tr>
<td>Age</td>
<td>Measured in millions of years</td>
<td>1,000,000</td>
<td>$1 \times 10^6$</td>
</tr>
</tbody>
</table>

Can you write the approximate time when these events occurred in scientific notation?

<table>
<thead>
<tr>
<th>Event</th>
<th>When it happened (approximately) written in standard form</th>
<th>When it happened (approximately) written in scientific notation</th>
</tr>
</thead>
<tbody>
<tr>
<td>The moon formed.</td>
<td>4,500,000,000,000 years ago</td>
<td>$4.5 \times 10^9$</td>
</tr>
<tr>
<td>First archean life appears (maybe…it could have been earlier).</td>
<td>3,500,000,000,000 years ago</td>
<td>$4.5 \times 10^9$</td>
</tr>
<tr>
<td>Multicellular organisms appear.</td>
<td>1,000,000,000,000 years ago</td>
<td>$1 \times 10^9$</td>
</tr>
<tr>
<td>Earth is covered with ice from pole to pole.</td>
<td>750,000,000,000 years ago</td>
<td>$7.5 \times 10^8$</td>
</tr>
<tr>
<td>Cambrian explosion introduces many new life forms.</td>
<td>530,000,000,000 years ago</td>
<td>$5.3 \times 10^8$</td>
</tr>
<tr>
<td>Four legged vertebrates appear on land.</td>
<td>360,000,000,000 years ago</td>
<td>$3.6 \times 10^8$</td>
</tr>
<tr>
<td>Permian mass extinction kills about 95% of all life on Earth.</td>
<td>248,000,000,000 years ago</td>
<td>$2.48 \times 10^8$</td>
</tr>
<tr>
<td>Dinosaurs could be found all over the earth.</td>
<td>160,000,000,000 years ago</td>
<td>$1.6 \times 10^8$</td>
</tr>
<tr>
<td>Dinosaurs disappear in the K-T mass extinction.</td>
<td>65,000,000,000 years ago</td>
<td>$6.5 \times 10^7$</td>
</tr>
<tr>
<td>Earliest primates evolved.</td>
<td>60,000,000,000 years ago</td>
<td>$6 \times 10^7$</td>
</tr>
<tr>
<td>“Lucy,” an early hominid, lived.</td>
<td>3,200,000,000 years ago</td>
<td>$3.2 \times 10^6$</td>
</tr>
<tr>
<td>Modern humans emerge.</td>
<td>200,000 years ago</td>
<td>$2 \times 10^5$</td>
</tr>
<tr>
<td>Earth’s most current “ice age” began.</td>
<td>110,000 years ago</td>
<td>$2 \times 10^5$</td>
</tr>
<tr>
<td>Neanderthals died out.</td>
<td>50,000 years ago</td>
<td>$5 \times 10^4$</td>
</tr>
<tr>
<td>Wooly mammoths became extinct.</td>
<td>3,600 years ago</td>
<td>$3.6 \times 10^3$</td>
</tr>
<tr>
<td>Human beings begin the Industrial Revolution.</td>
<td>250 years ago</td>
<td>$2.5 \times 10^2$</td>
</tr>
</tbody>
</table>
Thank you!

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