**Geologic Time Scale**

Directions: *Use the Geologic Time Scale Calendar to answer the worksheet questions and fill in dates on your year calendar. Write in only the events I have listed on the board as well as your birthday.*

1. Approximately how old is the earth (i.e. how vast is the geologic time scale estimated to be)?

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| 4.6 Biollion Years Old |

1. When geologic time is compressed to the scale of a calendar year, 1 second equals about how many years?

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| Years in a | Show Your Work! | Answer |
| second | 1 sec= 146 years (taken from reading on “Geologic Time Scale”chat) | 146 years/sec |
| minute | 146 years/ 1 sec x 60 sec/ 1 min | 8,760 years/min |
| hour | 8,760 years/ 1 min x 60 min/ 1 hour | 525,600 years/hour |
| day | 525,600 years/ 1 hours x 24 hours/ 1 day | 12,614,400 years/day |
| month (30 days) | 12,614,400 years/day x 30 days/ 1 month | 378,432,000 years/month |
| year | 378,432,000 years/month x 12 months/year = 4,541,184,000 years  Some months have more than 30 days, this means you could lose over 12 million years by failing to calculate for even just one day!  Go back to using days so all days are accounted for.  12,614,400 years/day x 365 days/year = 4,604,256,000 years | 4,604,256,000 years in one calendar year |

1. How many “calendar days” were there in between the time when the planet first formed to the time when life first originated?

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| 56 |

How many actual years?

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| Show Your Work! | Answer |
| 56 days x 12,614,400 years/1 day  \*\*\*Some students will try to use the millions of years before present column on the chart to avoid doing the math. In this case remind students they are calculating the time elapsed between earth forming and origin of life NOT time elapsed between present time and origin of life.\*\*\* | 706,406,400 years |

1. Put the following events in the correct order from oldest to youngest: stromatolites, first multicellular organisms, first bacteria, origin of life, first eukaryotes, Earth forms

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| --- | --- | --- |
| Order | Event | Millions of Years Before Present |
| 1 | Earth forms | 4600 mya  (4.6 bya) |
| 2 | origin of life | 3900 mya  (3.9 bya) |
| 3 | stromatolites | 3600 mya  (3.6 bya) |
| 4 | first bacteria | 3250 mya  (3.25 bya) |
| 5 | first eukaryotes | 2100 mya  (2.1 bya) |
| 6 | first multicellular organisms | 1500 mya  (1.5 bya) |

1. On the dot chart that shows the eras, each dot, letter, or number represents how many years?

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| 1 million years |

1. Put the following organisms in the correct order in which they appeared in the fossil record from oldest to youngest: monkeys, fish, rabbits, first dinosaurs, horses, flowering plants, insects, first bird, grasses

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Fish | Dinasaurs | Birds | flowering plants | dogs | grasses | horses | rabbits | monkeys |
| 505 mya | 228 mya | 155 mya | 115 mya | 64 mya | 60 mya | 55 mya | 45 mya | 39 mya |

1. Put the following eras in order from oldest to youngest: Cenozoic, Paleozoic, Precambrian, Mesazoic

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| --- | --- | --- | --- |
| Precambrian | Paleozoic | Mesozoic | Cenozoic |

Which groups of organisms appear to dominate these eras?

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| Microscopic life | Fish | Dinasaurs | Mammals |

Looking at the calendar chart, how does it appear that the major boundaries in time (eras and systems) are being marked or divided up?

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| Periods in time are marked by major turnovers (mass extinctions following by the appearance of new organisms due to adaptive radiation) in flora and fauna. |

1. What date and time on the compressed calendar geologic time scale did modern man appear?

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| --- | --- | --- | --- |
| Date: | 12/31/04 | Time: | 11:48 pm |

How many minutes has man existed?

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| 12 minutes |

How many years does that equal?

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| Show Your Work! | Answer |
| 12 minutes x 8,760 years/1 min | 105,120 years |

1. Based on the “dot scale” of geologic time, which era was the longest?

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| Precambrian |

Which was the shortest?

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| Cenozic |

1. On the calendar data sheet, 65 mya marks the end of the Cretaceous period and beginning of the Tertiary period. Which organisms disappear at this boundary? Which organisms seem to flourish after this boundary? Propose an explanation for this trend.

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| Organisms that Disappear | Organisms that Flourish | Explanation |
| Dinosaurs  (students may have some background knowledge here) | Mammals  (students should be looking at the appearance of a vast diversity of mammals from 64 mya-4mya) | The disappearance of the widely successful dinosaurs opened a wide variety of niches for the surviving mammals to expand into, undergo adaptive radiation and finally speciation. |

1. Use the dot chart: In the “events” column, each event has a letter or number code that can be found in the chart. Fill in the following chart:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Event | #/Letter | Era | Period (System) | Epoch (Series) |
| Amphibians | A | Paleozoic | Devonian |  |
| Bacteria | 4 | Precambrian (Archean Era) |  |  |
| Fish | 7 | Paleozoic | Oridvician |  |
| Mammals | G | Mesozoic | Triassic |  |
| Monkeys | V | Cenozoic | Tertiary | Eocene |
| Cells w/nucleus | 5 | Precambrain (Proterozoic Era) |  |  |
| Reptiles | D | Paleozoic | Carboniferous | Mississippian |
| Earth formed | 0 | Precambrian (Hadean Era) |  |  |
| T-Rex | P | Mesozoic | Cretaceous |  |
| Dog & Cats | R | Cenozoic | Tertiary | Paleocene |
| Life originates | 1 | Precambrian (Hadean Era) |  |  |
| Flowering Plants | M | Mesazoic | Cretaceous |  |

1. Now that you have been introduced to the history of life you may be surprised by what you have learned. Discuss some of the things that surprise you from what you learned while working with the time scale activity and explain why you were surprised

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| Student answers will vary  …flowering plants evolved so late…  … grasses weren’t always around… |