

Cosmic Calendar Events Handout

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The Big Bang

The formation of first neutral atoms

Formation of first stars & galaxies

Formation of the thin disk of the Milky Way Galaxy

Formation of the Solar System

Formation of the Moon

Birth of life on Earth

First cells develop on Earth

First vertebrates (creatures with backbones)

First dinosaurs

First mammals

Death of the dinosaurs from giant impact

First bipedal hominids
(human-like creatures walking on two legs)

First humans (homo sapiens)

Development of agriculture (farming)

Development of the wheel for transportation

Invention of the telescope

Right now

Cosmic Time Line Events Worksheet

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Note: The symbol ~ in front of a number means “roughly” or “about”

Event	Number of Years Ago	Number of Days Ago on Calendar	Date/Time on Calendar
The Big Bang	13.7 billion	365	Jan. 1, 12 am
The formation of first neutral atoms	13.7 billion (400,000 years after the BB)	365	Jan. 1, 12:15 am
Formation of first stars & galaxies	~13 billion		
Formation of the thin disk of the Milky Way Galaxy	~9 billion		
Formation of the Solar System	4.56 billion		
Formation of the Moon	~4.5 billion		
Birth of life on Earth	~3.8 billion		
First cells develop on Earth	~2 billion		
First vertebrates (creatures with backbones)	~520 million		
First dinosaurs	230 million		
First mammals	~200 million		
Death of the dinosaurs from giant impact	65 million		
First bipedal hominids (human-like creatures walking on two legs)	~4 million		
First humans (homo sapiens)	200,000		
Development of agriculture (farming)	~10,000		
Development of the wheel for transportation	~6500		
Invention of the telescope	400		
Right now	0	0	Dec. 31, midnight

KEY: Cosmic Time Line Events Worksheet with Answers

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Note: The symbol ~ in front of a number means “roughly” or “about”

Event	Number of Years Ago	Number of Days Ago on Calendar	Date/Time on Calendar
The Big Bang	13.7 billion	365 days	Jan. 1, 12 am
The formation of first neutral atoms	13.7 billion (400,000 years after the BB)	365 days plus 15 min.	Jan. 1, 12:15 am
Formation of first stars & galaxies	~13 billion	~347 days	~Jan. 19
Formation of the thin disk of the Milky Way Galaxy	~9 billion	~240 days	~May 6
Formation of the Solar System	4.56 billion	122 days	Sep. 1
Formation of the Moon	~4.5 billion	~120 days	~Sep. 3
Birth of life on Earth	~3.8 billion	~101 days	~Sep. 22
First cells develop on Earth	~2 billion	~53 days	~Nov. 9
First vertebrates (creatures with backbones)	~520 million	~14 days	~Dec. 18
First dinosaurs	230 million	6 days	Dec. 26
First mammals	~200 million	~5 days	~Dec. 27
Death of the dinosaurs from giant impact	65 million	1.7 days	Dec. 30
First bipedal hominids (human-like creatures walking on two legs)	~4 million	~2.5 hrs	Dec. 31, ~9:30 pm
First humans (homo sapiens)	200,000	8 min	Dec. 31, 11:52 pm
Development of agriculture (farming)	~10,000	23 sec	Dec. 31, 11:59:37
Development of the wheel for transportation	~6500	~15 sec	Dec. 31, ~11:59:45
Invention of the telescope	400	1 sec	Dec 31, 1 second before midnight
Right now	0	0	Dec. 31, midnight

Cosmic Time Line Events Calculations

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In this exercise, we want to set the age of the universe equal to one calendar year. Then we want to set up ratios to figure out where in that calendar year significant events in the history of the universe would fall. (In this analogy, the Big Bang happens in the first moment of Jan. 1 and NOW is the very last moment of Dec. 31.)

So our basic idea is that 13.7 billion years equal one calendar year (365 days). We'll ignore leap years for this exercise.

We set up a ratio in the form:

$$\frac{\text{Number of years ago an event happened}}{\text{Number of years ago Big Bang happened}} = \frac{x \text{ days}}{365 \text{ days}}$$

The number of years ago the Big Bang happened is 13.7 billion years = 13,700 million years.

When you've solved for x, the number of days ago (from Dec. 31) that an event should be placed on our calendar, you then have to count the days backwards. To make that easier, we have provided a table that tells you on what date any number of days counted backwards from Dec. 31 would fall. (You're welcome.)

So, for example, the dinosaurs developed 230 million years ago. Setting up our equation,

$$\frac{230 \text{ million years}}{13,700 \text{ million years}} = \frac{x \text{ days}}{365 \text{ days}}$$

$$x = 6.13 \text{ days (which we round off to 6 days ago)}$$

Looking at the table of dates counted backwards, 6 days before the end of Dec. 31 puts the start of the dinosaurs on Dec. 26.

Use the table "Cosmic Time Line Events Worksheet" which lists some of the key events in the history of the universe and do the same kind of calculation for each event. At first, you can round off, but as you get to events closer to the end, fractions matter.

So we want to figure out how many years of real time would make an hour on our cosmic calendar. If 13.7 billion years = 1 calendar year, then one day on our calendar would be:

$$\frac{13,700 \text{ million yrs in a calendar year}}{365 \text{ days in a calendar year}} = 37.5 \text{ million years/calendar day}$$

In the same way, divide by 24 hours in a day to figure out the number of years in a calendar hour and divide by 60 again to get the number of years in a calendar minute.

Days of the Year*

Number of days before December 31st

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
JAN	365	364	363	362	361	360	359	358	357	356	355	354	353	352	351	350	349	348	347	346	345	344	343	342	341	340	339	338	337	336	335
FEB	334	333	332	331	330	329	328	327	326	325	324	323	322	321	320	319	318	317	316	315	314	313	312	311	310	309	308	307			
MAR	306	305	304	303	302	301	300	299	298	297	296	295	294	293	292	291	290	289	288	287	286	285	284	283	282	281	280	279	278	277	276
APR	275	274	273	272	271	270	269	268	267	266	265	264	263	262	261	260	259	258	257	256	255	254	253	252	251	250	249	248	247	246	
MAY	245	244	243	242	241	240	239	238	237	236	235	234	233	232	231	230	229	228	227	226	225	224	223	222	221	220	219	218	217	216	215
JUN	214	213	212	211	210	209	208	207	206	205	204	203	202	201	200	199	198	197	196	195	194	193	192	191	190	189	188	187	186	185	
JUL	184	183	182	181	180	179	178	177	176	175	174	173	172	171	170	169	168	167	166	165	164	163	162	161	160	159	158	157	156	155	154
AUG	153	152	151	150	149	148	147	146	145	144	143	142	141	140	139	138	137	136	135	134	133	132	131	130	129	128	127	126	125	124	123
SEP	122	121	120	119	118	117	116	115	114	113	112	111	110	109	108	107	106	105	104	103	102	101	100	99	98	97	96	95	94	93	
OCT	92	91	90	89	88	87	86	85	84	83	82	81	80	79	78	77	76	75	74	73	72	71	70	69	68	67	66	65	64	63	62
NOV	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	
DEC	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

*Does not take leap years into account.