

Wind Speed (in mph)	Still air temperature (degrees F)														
	Wind Chill Temperature														
	100	90	80	70	60	50	40	30	20	10	0	-10	-20	-30	
100	100	90	80	70	60	50	40	30	20	10	0	-10	-20	-30	
90	100	90	79	69	58	48	37	27	16	6	-5	-15	-26	-36	
80	102	90	77	65	53	41	28	16	4	-9	-21	-33	-46	-58	
70	103	90	76	63	49	36	22	9	-4	-18	-31	-45	-58	-72	
60	104	89	75	61	47	33	18	4	-10	-24	-39	-53	-67	-81	
50	104	89	75	60	45	30	15	1	-14	-29	-44	-59	-73	-88	
40	104	89	74	59	44	28	13	-2	-17	-32	-48	-63	-78	-93	
35	105	89	74	58	43	27	12	-4	-19	-35	-51	-66	-82	-97	
30	105	89	73	58	42	26	10	-5	-21	-37	-53	-68	-84	-100	
25	105	89	73	57	42	26	10	-6	-22	-38	-54	-70	-86	-101	
20	105	89	73	57	41	25	9	-7	-23	-39	-55	-71	-86	-102	
15	105	89	73	57	41	25	9	-7	-23	-39	-55	-71	-87	-103	
10	105	89	73	57	41	25	9	-7	-23	-39	-55	-71	-87	-102	
5	105	89	73	57	41	25	9	-7	-23	-39	-55	-71	-86	-101	
0	105	89	73	57	41	25	9	-7	-23	-39	-55	-71	-85	-101	
-5	105	89	73	57	41	25	9	-7	-23	-39	-55	-71	-83	-99	
-10	105	89	74	58	43	27	12	-4	-19	-35	-50	-66	-81	-97	
-15	105	89	74	59	43	28	13	-3	-18	-33	-49	-64	-79	-95	
		No protection required			Little danger if properly clothed					Increased danger of freezing exposed skin			Great danger of freezing exposed skin		

WIND SPEEDS GREATER THAN 40MPH ADD LITTLE TO THE EFFECT  
Formula used to calculate Wind chill  
Wind chill = 91.4 - (0.474677 - 0.020425 \* W + 0.303107 \* SQRT(W)) \* (91.4 - T)  
(where W = wind speed (mph), T = temperature (° F))

MOON FACT SHEET			
Bulk parameters			
	Moon	Earth	Ratio (Moon/Earth)
Mass (1024 kg)	0.07342	5.9726	0.0123
Volume (1010 km3)	2.1958	108.321	0.0203
Equatorial radius (km)	1738.1	6378.1	0.2725
Polar radius (km)	1736.0	6356.8	0.2731
Volumetric mean radius (km)	1737.1	6371.0	0.2727
Ellipticity (Flattening)	0.0012	0.00335	0.36
Mean density (kg/m3)	3344	5514	0.606
Surface gravity (m/s2)	1.62	9.80	0.165
Surface acceleration (m/s2)	1.62	9.78	0.166
Escape velocity (km/s)	2.38	11.2	0.213
GM (x 106 km3/s2)	0.0049	0.3986	0.0123
Bond albedo	0.11	0.306	0.360
Visual geometric albedo	0.12	0.367	0.330
Visual magnitude (V1.0)	+0.21	-3.86	-
Solar irradiance (W/m2)	1367.6	1367.6	1.000
Black-body temperature (K)	270.7	254.3	1.064
Topographic range (km)	16	20	0.800
Moment of inertia (I/MR2)	0.394	0.3308	1.191
J2 (x 10 <sup>6</sup> )	202.7	1082.63	0.187

Orbital parameters (for orbit about the Earth)		
	Moon	EARTH
Semimajor axis (106 km)	0.3844	149.60
Perigee (106 km)*	0.3633	365.256
Apogee (106 km)*	0.4055	365.242
Revolution period (days)	27.3217	
Synodic period (days)	29.53	
Mean orbital velocity (km/s)	1.022	29.76
Max. orbital velocity (km/s)	1.076	30.79
Min. orbital velocity (km/s)	0.964	29.29
Inclination to ecliptic (deg)	5.145	
Inclination to equator (deg)	18.28 - 28.58	
Orbit eccentricity	0.0549	0.0167
Sidereal rotation period (hrs)	655.728	23.9345
Obliquity to orbit (deg)	6.68	23.44
Recession rate from Earth (cm/yr)	3.8	
Mean values at opposition from Earth		
Distance from Earth (equator, km)		378,000
Apparent diameter (seconds of arc)		1896
Apparent visual magnitude		-12.74

\* These represent mean apogee and perigee for the lunar orbit.  
The orbit changes over the course of the year so the distance from the Moon to Earth roughly ranges from 357,000 km to 407,000 km.  
Lunar Atmosphere

Diurnal temperature range: >100 K to <400 K (roughly -250 F to +250 F)  
Total mass of atmosphere: ~25,000 kg  
Surface pressure (night): 3 x 10<sup>-9</sup> bar (2 x 10<sup>-2</sup> torr)  
Abundance at surface: 2 x 10<sup>5</sup> particles/cm3

MOON ATMOSPHERE	
Estimated Composition (particles per cubic cm):	
Helium 4 (4He) - 40,000 ; Neon 20 (20Ne) - 40,000 ; Hydrogen (H2) - 35,000 Argon 40 (40Ar) - 30,000 ; Neon 22 (22Ne) - 5,000 ; Argon 36 (36Ar) - 2,000 Methane - 1000 ; Ammonia - 1000 ; Carbon Dioxide (CO2) - 1000 Trace Oxygen (O+), Aluminum (Al+), Silicon (Si+) Possible Phosphorus (P+), Sodium (Na+), Magnesium (Mg+)	

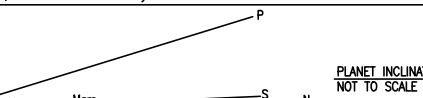
EARTH ATMOSPHERE	
Atmospheric composition (by volume, dry air):	
Major : 78.08% Nitrogen (N2), 20.95% Oxygen (O2)	
Minor (ppm) : Argon (Ar) - 9340; Carbon Dioxide (CO2) - 400 Neon (Ne) - 18.18; Helium (He) - 5.24; CH4 - 1.7 Krypton (Kr) - 1.14; Hydrogen (H2) - 0.55	

NOAA national weather service: heat index														
temperature (°F)														
40	80	82	84	86	88	90	92	94	96	98	100	102	104	106
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137
55	81	84	86	89	93	97	101	106	112	117	124	130	137	
60	82	84	88	91	95	100	105	110	116	123	129	137		
65	82	85	89	93	98	103	108	114	121	128	136			
70	83	86	90	95	100	105	112	119	126	134				
75	84	88	92	97	103	109	116	124	132					
80	84	89	94	100	108	113	121	129						
85	85	90	96	102	110	117	126	135						
90	86	91	98	105	113	122	131							
95	86	93	100	108	117	127								
100	87	95	103	112	121	132								

Rule of thumb for water evaporation from a pool is 1/2" to 1-1/2" of water a day. If it is higher, you may have a leak.  
Water evaporation is higher in fall than in summer.  
About 3 trillion tons (2.7 metric tons) of ocean water evaporate every day.

Evaporation of water depends on a number of parameters: surface area, temperature, wind speed, humidity, etc.

Planets: Physical Characteristics						
Planet (km)	Diameter (g/cm3)	density	rotation (deg)	axis tilt (° Earth's)	mag. field	inclination (deg)
Mercury	4879	5.427	58.785 d	~0	0.0006	7.005
Venus	12,104	5.243	243.686 d	177.36	0.00	3.3947
Earth	12,742	5.515	23.9345 h	23.45	1.000	0.000
Mars	6779	3.933	24.6229 h	25.19	0.00	1.851
Jupiter	139,822	1.326	9.9250 h	3.13	19.519	1.305
Saturn	116,464	0.687	10.656 h	26.73	578	2.484
Uranus	50,724	1.270	17.24 h	97.77	47.9	0.770
Neptune	49,244	1.638	16.11 h	28.32	27.0	1.769
Pluto	2390	1.750	6.405 d	122.53	0.00	17.142



Earth's Moon: Facts and figures	
Orbit Size Around Earth (semi-major axis)	Metric: 384,400 km English: 238,855 miles
Average Distance from Earth	Metric: 384,400 km English: 238,855 miles
Perigee (closest)	Metric: 363,104 km English: 225,623 miles
Apogee (farthest)	Metric: 405,696 km English: 252,088 miles
Sidereal Orbit Period (Length of Year)	0.074803559 Earth years 27.322 Earth days
Orbit Circumference	Metric: 2,413,402.16 km English: 1,499,618.58 miles
Average Orbit Velocity	Metric: 3,680.5 km/h English: 2,287.0 mph
Orbit Eccentricity	0.0554
Orbit Inclination	5.16 degrees
Equatorial Inclination to Orbit	6.68 degrees

Mean Radius	Metric: 1737.5 km English: 1079.6 miles
Equatorial Circumference	Metric: 10,917.0 km English: 6,783.5 miles
Volume	Metric: 21,971,669,064 km3
Mass	Metric: 73,476,730,924,573,500,000,000 kg
Density	Metric: 3.344 g/cm3
Surface Area	Metric: 37,936,694.79 km2 English: 14,647,439.75 square miles
Surface Gravity	Metric: 1.624 m/s2 English: 5.328 ft/s2
Escape Velocity	Metric: 8,552 km/h English: 5,314 mph
Sidereal Rotation Period (Length of Day)	27.322 Earth days 655.73 hours
Minimum/Maximum Surface Temperature	Metric: -233/123 °C English: -387/253 °F

Outer space lacks air, so heat is only transferred via infrared radiation. This means that heat loss occurs very gradually. An object in deep space will eventually get to a few degrees Kelvin, but it's not the instant blood-freeze that's sometimes depicted in the movies. More like hours to freeze.

Many people mistakenly think that gravity does not exist in space. However, typical orbital altitudes for human spaceflight vary between 120 - 360 miles above Earth's surface. The gravitational field is still quite strong in these regions, since this is only about 1.8 percent the distance to the moon. Earth's gravitational field at about 250 miles above the surface is 88.8 percent of its strength at the surface. Therefore, orbiting spacecraft, like the space shuttle or space station, are kept in orbit around Earth by gravity.

FALLING FROM A TALL STRUCTURE  
Neglecting air resistance your weight would not matter and you would fall at a rate of 9.8 m/s².

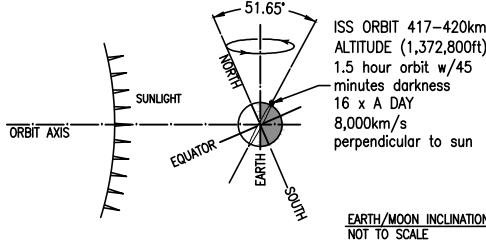
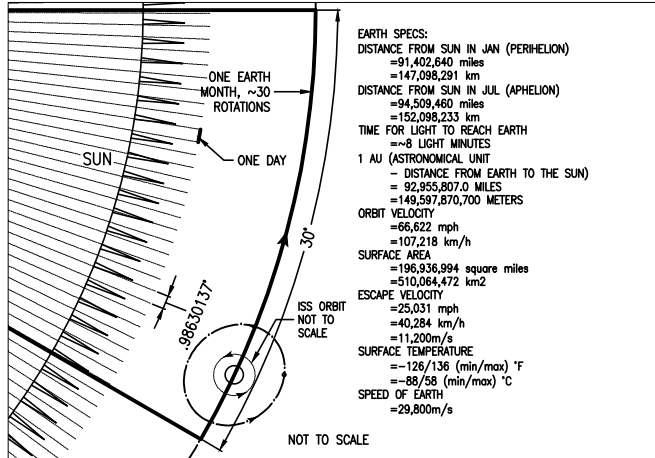
If the building was tall enough and you include air resistance then after a period of time in free fall, the force of air rushing up against you would equal the force of your weight and you would stop speeding up. Terminal velocity.

The International Space travels at 4.791 miles/s (7.71 km/s)	
Muzzle velocity	
Low	>1500 ft/s (762m/s)
High	>1500 >3500 ft/s (914m/s)
Hypervelocity	>3500 ft/s
Speed of sound in water of soft tissue (1.5m/s)	
Speed of sound in standard atmosphere (340.3m/s)	
Escape velocity from earth (11,200m/s)	
Speed of earth around sun (29,800m/s)	
Speed of light (299,792,458m/s)	

SEEING THE STARS ON A BRIGHT DAY  
Seeing the stars during the day is impossible because of the suns rays causing glow in the atmosphere. Only with a dark background will cause the stars to be visible because they are so dim to begin with. The only thing which is visible is the moon. Manmade light pollution will also affect what is visible in a dark sky because of the light contrast which may enter a telescope tube or field of view. Astronomy stations choose to avoid these areas because of this reason. The biggest are in remote areas away from that pollution.

1. Blood does not boil but any exposed water would.
2. Holding your breath would cause lung damage.
3. Very cold but the body doesn't loose heat that fast.
4. The worst effect would be lack of oxygen.
5. Eardrums could rupture if pressure did not equalize.
6. You would not be able to hear anything.
7. A closed bag of potato chips would eventually burst.

Generally, altitudes of 100 km or above are considered outer space.  
Air that is closer to the ground is being squashed since the air supports the weight of the air above it.



ISS ORBIT 417-420km  
ALTITUDE (1,372,800ft)  
1.5 hour orbit w/45 minutes darkness  
16 x A DAY  
8,000km/s perpendicular to sun  
EARTH/MOON INCLINATION NOT TO SCALE

COMPARATIVE GRAVITIES OF THE PLANETS			
Body	Multiple of Earth gravity	m/s2	Time to fall 100 m and maximum speed reached
Sun	27.90	274.1	0.85 s 843 km/h (524 mph)
Mercury	0.3770	3.703	7.4 s 98 km/h (61 mph)
Venus	0.9032	8.872	4.8 s 152 km/h (94 mph)
Earth	1	9.8067	4.5 s 159 km/h (99 mph)
Moon	0.1655	1.625	11.1 s 65 km/h (40 mph)
Mars	0.3895	3.728	7.3 s 98 km/h (61 mph)
Jupiter	2.640	25.93	2.8 s 259 km/h (161 mph)
Io	0.182	1.789	10.6 s 68 km/h (42 mph)
Europa	0.134	1.314	12.3 s 58 km/h (36 mph)
Ganymede	0.145	1.426	11.8 s 61 km/h (38 mph)
Callisto	0.126	1.24	12.7 s 57 km/h (35 mph)
Saturn	1.139	11.19	4.2 s 170 km/h (110 mph)
Titan	0.138	1.3455	12.2 s 59 km/h (37 mph)
Uranus	0.917	9.01	4.7 s 153 km/h (95 mph)
Tritania	0.039	0.379	23.0 s 31 km/h (19 mph)
Oberon	0.035	0.347	24.0 s 30 km/h (19 mph)
Neptune	1.148	11.28	4.2 s 171 km/h (106 mph)
Triton	0.079	0.779	16.0 s 45 km/h (28 mph)
Pluto	0.0621	0.610	18.1 s 40 km/h (25 mph)
Eris	0.0814 (approx.)	0.8 (approx.)	15.8 s 46 km/h (29 mph)

Earth Radius = 6.371x10<sup>6</sup>km  
Earth Mass = 5.9736x10<sup>24</sup>kg

	MERCURY	VENUS	EARTH	MOON	MARS	JUPITER	SATURN	URANUS	NEPTUNE	PLUTO
Mass (1021tons)	0.364	5.37	6.58	0.081	0.708	2093	627	95.7	113	0.0138
Diameter (miles)	3032	7521	7926	2159	4222	86,846	74,897	31,763	30,775	1485
Density (lbs/ft3)	339	327	344	209	246	83	43	79	102	110
Gravity (ft/s2)	12.1	29.1	32.1	5.3	12.1	75.9	29.4	28.5	36.0	1.9
Escape Velocity (miles/s)	2.7	6.4	7.0	1.5	3.1	37.0	22.1	13.2	14.6	0.7
Rotation Period (hours)	1407.6	-5832.5	23.9	655.7	24.6	9.9	10.7	-17.2	16.1	-153.3
Length of Day (hours)	4222.6	2802.0	24.0	708.7	24.7	9.9	10.7	17.2	16.1	153.3
Distance from Sun (106 miles)	36.0	67.2	93.0	0.239*	141.6	483.8	890.8	1784.8	2793.1	3647.2
Orbital Period (106 days)	88.0	66.8	91.4	0.226*	128.6	460.1	840.4	1703.4	2761.6	2755.8
Aphelion (106 miles)	43.4	67.7	94.5	0.252*	145.9	507.4	941.1	1866.4	2824.5	4538.7
Orbital Period (days)	88.0	224.7	365.2	0.73	687.0	4331	10,747	30,569	59,800	90,588
Orbital Velocity (miles/s)	29.7	21.8	18.5	0.64	15.0	8.1	6.0	4.2	3.4	2.9
Orbital Inclination (degrees)	7.0	3.4	0.0	5.1	1.9	1.3	2.5	0.8	1.8	17.2
Orbital Eccentricity	0.205	0.007	0.017	0.055	0.094	0.049	0.057	0.046	0.011	0.244
Axial Tilt (degrees)	0.01	177.4	23.5	6.7	25.2	3.1	26.7	97.8	28.3	122.5
Mean Temperature (F)	333	867	59	-4	-85	-166	-220	-320	-330	-375
Surface Pressure (atmospheres)	0	91	1	0	0.01	Unknown*	Unknown*	Unknown*	Unknown*	0
Number of Moons	0	0	1	0	2	63	60	27	13	1
Ring System?	No	No	No	No	No	Yes	Yes	Yes	Yes	No
Global Magnetic Field?	Yes	No	Yes	No	No	Yes	Yes	Yes	Yes	Unknown